BANGALORE UNIVERSITY

NEW SYLLABUS 2020 – 2021

B.B.A DEGREE (REGULAR)
(CBCS -SEMESTER SCHEME)
(Revised Syllabus as on BOS held on 26th June 2020))

Chairperson – BOS
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DEPARTMENT OF COMMERCE
Jnana Bharathi Campus, Bengaluru-560056

BANGALORE UNIVERSITY

DEPARTMENT OF COMMERCE

ACADEMIC REGULATIONS PERTAINING TO B.B.A DEGREE (REGULAR) (CBCS - SEMESTER SCHEME) 2020-2021

I. OBJECTIVES:

1. To prepare students to pursue careers in Finance, Marketing, Human Resource and other functional areas of a company with special reference to MSE sector. and allied dispensation.
2. To prepare students to excel in industry / profession or postgraduate programmes through quality education.
3. To enable students to get an intensive knowledge and management fundamentals to make them industry ready.
4. To develop entrepreneurs and ethical managers with inter disciplinary knowledge'
5. To develop IT enabled global middle level managers for solving business problems.
6. To develop business analysts for companies, capital markets and commodity markets.
7. To prepare students to take up higher education to become business scientists, researchers, consultants and teachers with core competencies.
8. To develop the students for competitive examinations of UPSC, KPSC, BSRB, Staff Selection Commission etc.
9. To provide students a strong foundation in critical and analytical thinking skills required to solve managerial problems.
10. To inculcate in students, professional and ethical attitude, effective communication skills, Team work, interpersonal skills, and an ability to relate managerial issues to broader social context.
11. To sharpen problem solving techniques and decision making skills of students using analytical /logical reasoning and innovative thinking.
12. To inculcate leadership skills both in their chosen professional filed for achieving personal and professional excellence
13. To develop entrepreneurism by equipping them with all the skills and knowledge required to start a business
14. To blend spirituality with materialistic pursuits of business education students

II. ELIGIBILITY FOR ADMISSION:

Candidates who have completed Two years Pre – University course of Karnataka State or its equivalent from any Indian or Foreign approved education board or institution are eligible for admission into this course as notified by the University from time to time.

III. DURATION OF THECOURSE:

The course of study is three (03) years of Six Semesters. A candidate shall complete his/her degree within six (06) academic years from the date of his/her admission to the first semester. A Student successfully completing Three (03) years of the course will be awarded Bachelor's Degree in Business Administration (B.B.A).

IV. MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be in English only

V. CLASS ROOM STRENGTH OF STUDENTS

There shall be Maximum of 60 students in each section and/ or as notified by the University from time to time

VI. ATTENDANCE

a. For the purpose of calculating attendance, each semester shall be taken as a Unit.
b. A student shall be considered to have satisfied the requirement of attendance for the semester, if he/she has attended not less than 75 percent in aggregate of the number of working periods in each of the subjects compulsorily.
c. A student who fails to complete the course in the manner stated above shall not be permitted to take the University examination.

VII. COURSE MATRIX

See Annexure – 1 for B.B.A Degree (Regular) Course Matrix

VIII. TEACHING AND EVALUATION:

M.Com/MBA/MBS graduates with B.Com/B.B.M/BBA/BBS as basic degree from a recognized University are only eligible to teach and to evaluate the subjects (except languages, compulsory additional subjects and core Information Technology related subjects) mentioned in this regulation Languages and additional subjects shall be taught by the graduates as recognized by the respective board of studies.

IX. SKILL DEVELOPMENT / RECORD MAINTENANCE AND SUBMISSION:

a. In every semester, the student should maintain a Record Book in which the exercises / Lab Activities given under each subject are to be recorded. This Record has to be submitted to the Faculty for evaluation at least 15 days before the end of each semester.

b. Every student should also submit the practical record book/report/presentation in which part 3 of the course called "Business Skill Development Course" (BSDC)* of every semester should be incorporated and submitted to the Faculty for evaluation at least 15 days before the end of each semester. The skill development task's , marks and the credits to be awarded are indicated under course matrix of each semester.

c. In every semester, the student should maintain an industrial visit Record Book in which the details of the visit's are to be recorded. This Record has to be submitted to the external examiner for evaluation at least 15 days before the end of each semester or as per the guidelines of BOE BU

X. SCHEME OF EXAMINATION:

a. There shall be a university examination at the end of each semester. The maximum marks forthe university examination in each paper shall be70.

b. 30 marks will be for internal assessment carried out by the college. The internal assessment ofmarks shall be allocated as follows:

- **20 marks from two tests**, which are to be conducted during the semester.
  i. For First test of 20 marks (1-hour duration), questions to be given from thesyllabus component (any of the units).
  ii. For Second test of 20 marks (1-hour duration), questions to be given from theskill development component of the syllabus.
  iii. The average of the two tests must be taken as a score for internal assessments.

- **5 marks for attendance**

The marks based on attendance shall be awarded as given below:76% to 80% = 02marks.

81% to 85% = 03 marks.

86% to 90% = 04 marks.

91%to 100%= 05 marks.

- **5 Marks for skill development/Business lab activities**

Shall be awarded by the faculty concerned based on Skill Development exercises providedin the syllabus of each subject.

c. With regards to Part-3 called "BUSINESS SKILL DEVELOPMENT COURSE" (BSDC)*, the marks allotment and procedure for marks allotment is given below the course matrix for each semester.

XI. APPEARANCE FOR THE EXAMINATION

a. A candidate shall apply for all the parts in each examination when he/she appears for thefirst time. A candidate shall be considered to have appeared for the examination only if he/she has submitted the prescribed application for the examination along with the required fees to the university.

b. A candidate who has passed any language under Part-I shall be eligible to claim exemption from the study of the language if he/she has studied and

passed the language at the corresponding level.

c. Further, candidates shall also be eligible to claim exemption from studying and passing in those commerce subjects which he/she has studied and passed at the corresponding level, subject to the conditions stipulated by the University.

d. A candidate who is permitted to seek admission to this degree course on transfer from any other University shall have to study and pass the subjects, which are prescribed by the University. Such candidates shall not however, be eligible for the award of ranks.

XII **MINIMUM FOR A PASS:**

Candidates who have obtained a minimum of 35% marks in University examination (i.e. 25 marks out of 70 marks of the theory examination) and 40% in aggregate (i.e. total of university examination and internal assessment marks) in each subject shall be eligible for a pass or exemption in that subject.

XIII CLASSIFICATION OF SUCCESSFUL CANDIDATES

Each semester result shall be declared in terms of Classes on the basis of (i) Percentage of Aggregate Marks scored and (ii) in terms of grading system based on the marks scored. The results of successful candidates at the end of all semesters shall be classified on the basis of aggregate percentage of marks obtained in all the semesters and the Aggregate or Cumulative Grade Point Average (CGPA) for award of Bachelor's Degree in Business Administration

(i) Marks scored of the First to Sixth semester degree examination shall be declared and classified separately as follows:

a. First Class: Those who obtain 60% and above of the total marks of parts I, II & III.

b. Second Class: Those who obtain 50% and above but less than 60% of total marks of parts I, II & III

c. Pass Class: Rest of the successful candidates who secure 40% and above but less than 50% of marks in part I, II & III.

(ii) An eight point letter / alpha - sign grade as described below shall be adopted.

***Table I: Conversion of Percentage of Marks into Grade Points* in a paper**

%M*arks* in a paper pra*ctical*	***Grade Point (GP)***
96-100	10
91-95	9.5
86-90	9.0
81-85	8.5
76-80	8.0
71-75	7.5
66-70	7.*0*
61-65	6.5
56-60	6.0
51-55	5.5
46-50	5.0
41-45	4.5
40	4.0
Below 40	0

1. The Semester Grade Point Average (SGPA) shall be computed by dividing the sum of the Credit Points (CP) of all the subjects of study by the maximum credits for the semester. The CP are in turn calculated as the product of the grade points earned in the paper and the credits assigned to that paper. The details are given in Annexure -1. Annexure 1 gives a summary of marks and credits assigned to different subjects of study in Bachelor Degree programmes { BBA) in all the semesters. In these tables 100, indicates the maximum total mark in a subject of study is 100, while the credit assigned is 2 /3/4.. These tables are followed with illustrations of computing semester grade point averages (SGPA) and aggregate or cumulative grade point averages (CGPA).

2. The Aggregate or Cumulative SGPA (CGPA) at the end of the all the semesters shall be calculated as the weighted average of the semester grade point averages. The CGPA is obtained by dividing the total of semester credit weightages by the maximum credits for the programme.

3. A candidate shall be declared to have passed the UG program if he/she secures at least an aggregate SGPA/CGPA of 4.0 (or Course Alpha-Sign Grade P).

Table II: Final Result / Grades Description

Semester / Program % of Marks	Semester GPA /Progrmme CGPA	Grade Alpha-Sign	Result /Class Description
90.1-100	9.01-10.00	O (Outstanding)	Outstanding
80.1-<90.0	8.01-<9.00	A+ (Excellent)	First Class Exemplary
70.1-<80.0	7.01-<8.00	A (Very Good)	First Class Distinction
60.1-<70.0	6.01-<7.00	B+ (Good)	First Class
55.1-<60.0	5.51-<6.00	B(Above Average)	High Second Class
50.1-<55.0	5.01-<5.50	C (Average)	Second Class
40.1-<50.0	4.01-<5.00	P (Pass)	Pass Class
Below 40	Below 4.00	F (Fail)	Fail/Reappear
Absent	0	Ab (Absent	

xiv. MEDALS AND PRIZES

No candidates passing an external examination shall be eligible for any scholarship, Fellowship, medal, prize or any other award.

XV. TERMS AND CONDITIONS

i. A candidate is allowed to carry all the previous un-cleared papers to the subsequent semester/semesters.

ii. Such of those candidates who have failed/remained absent for one or more papers henceforth called as repeaters, shall appear for exam in such paper/s during any subsequent regular examination, within the maximum period prescribed for completing the programme.. There shall be no repetition for internal assessment test.

iii. The candidate shall take the examination as per the syllabus and the scheme of examination in force during the subsequent appearances.

iv. If any disputes or discrepancy arises, the aggrieved party jurisdiction is Bangalore

XVI PATTERN OF QUESTION PAPER:

Each theory question paper shall carry 70 marks and the duration of examination is 3hours.The Question paper shall ordinarily consist of three sections, to develop testing of conceptual skills, understanding skills, comprehension skills, articulation and application of skills. The question paper setter shall be asked to prepare TWO sets of papers with a maximum of 10% repetition. The Question Paper will be as per the following Model:

SECTION-A **1. a,b,c,d,e,f,g**	(Conceptual questions) Answer any FIVE	(05 X 02 = 10 Marks)
SECTION -B: **2,3,4,5.6**	(Analytical questions) Answer any THREE	(03 X 05 = 15 Marks)
SECTION -C: **7,8,9,10.11**	(Essay type questions) Answer any THREE	(03 X 12 = 36 Marks)
SECTION D **12 (A or B)**	(Skill based/Lab activities question) Compulsory Questions Answer A or B	(01 X 09 = 09 Marks)
Total		**70 Marks**

XVII PROVISION FOR IMPROVEMENT OF RESULTS

The candidate shall be permitted to improve the results of the whole examination or of any Semester or a subject within the prescribed time by the university after the publication of the results. This provision shall be exercised only once during the course and the provision once exercised shall not be revoked. The application for improvement of results shall be submitted to the Registrar (Evaluation) along with the prescribed fee.

XVIII REMOVAL OF DIFFICULTY AT THE COMMENCEMENT OF THESE REGULATIONS

If any difficulty arises while giving effect to the provision of these Regulations, the ViceChancellor may in extraordinary circumstances, pass such orders he may deem fit from time to time

BANGALORE UNIVERSITY

BBA DEGREE (REGULAR) COURSE
(CBCS - SEMESTER SCHEME)
2020 – 2021 COURSE MATRIX

I SEMESTER **Annexure -1**

		Paper	Instruction hrs/week	Duration of Exam (hrs)	Marks			Credits
					IA	Exam	Total	
Part 1 Languages	**Language I:** Kannada / Sanskrit / Urdu / Tamil / Telugu/Malayalam/ Additional English / Marathi /Hindi	1.1	4	3	30	70	100	3
	Language II: English	1.2	4	3	30	70	100	3
Part 2 Optional	Accounting for Business	1.3	4	3	30	70	100	3
	Enterprises Management	1.4	4	3	30	70	100	3
	Corporate Regulations	1.5	4	3	30	70	100	3
	Business Mathematics and Logical Reasoning	1.6	4	3	30	70	100	3
Part 3	Business Skill Development Course(BSDC)* **Medium and Small Scale Industrial {MSME's} Visit Report**	-	-	-	30 (viva voce)	70 Project	100	2
Part 4	Foundation Course*	-	3	3	30	70	100	2
	CC and EC*	-	-	-	50	-	50	1
Total Marks and Total Credits							**850**	**23**

PART-3
BUSINESS SKILL DEVELOPMENT COURSE (BSDC)*INDUSTRIAL VISITS

OBJECTIVES

- To make students aware of Industrial Process and Practices
- To make students understand the Flow of Operations in an Organization

GUIDELINES TO THE INSTITUTION

1. The BBA Department of the college shall organize visit to two business establishments {MSME's} (Manufacturing /Financial/ Banking/Service establishment), in the first semester for the students.
2. The students will have to record the learning from visiting these organization in a record book
3. For every organizational visit, information captured shall include -Profile of the organization consisting of Vision and Mission, Board of Directors, Department details, HR details, Manufacturing Process, Organization Structure, Turnover, Capital, No. of branches, Products/Services Marketed and so on.

MARKS ALLOCATION

a. Each visit should be documented in a practical record book. The external examiner appointed by the university shall award 35 marks per visit, the total of which comes to 70 Marks (35 marks for each record X 2).
b. A Viva Voce to be conducted by the external examiner for 30 Marks (15 + 15 marks -on the basis of each record) to assess the learning outcome of the two visits at the end of the semester.
c. After assessment, marks scored by the candidate to be sent to BU along with IA Marks.
d. Remuneration for the external examiner shall be paid by the University as per the norms from time to time

II SEMESTER

		Paper	Instruction hrs/week	Duration of Exam (hrs)	Marks			Credits
					IA	Exam	Total	
Part 1 Languages	**Language I:** Kannada / Sanskrit / Urdu / Tamil / Telugu/Malayalam/ Additional English / Marathi / Hindi	2.1	4	3	30	70	100	3
	Language II: English	2.2	4	3	30	70	100	3
Part 2 Optional	Financial Accounting	2.3	4	3	30	70	100	3
	Human Resource Management Practices	2.4	4	3	30	70	100	3
	Statistical Applications in Business	2.5	4	3	30	70	100	3
	Production and Inventory Management	2.6	4	3	30	70	100	3
Part 3	Industry Review Project /Business Skill Development Course(BSDC)* **Community ServiceReport**	-	-	-	30 (viva voce)	70 Project	100	2
Part 4	Foundation Course*	-	3	3	30	70	100	2
	CC and EC*	-	-	-	50	-	50	1
Total Marks and Total Credits							**850**	**23**

PART 3
BUSINESS SKILL DEVELOPMENT COURSE (BSDC)*COMMUNITY SERVICE

OBJECTIVES:

- To sensitize the students towards community service
- To enable students to learn about social entrepreneurship

GUIDELINES TO THE INSTITUTION:

1. Each student will have to work in a Social /Charitable Trust /NGO / Red Cross Society/ or any other social service organization / association for THREE WEEKS during the vacation (**after the first semester exam**).
2. The entire batch of students to be divided equally among the BBA department faculty members. The faculty members to help students in the process of community service and preparation of the Community Service report.
3. The students to submit the Certificate of Community Service issued by the organization to the college along with a brief report of not less than 30 pages during the second semester.
4. The report should contain a brief profile of the organization, nature of service provided by them, a write up on the learning outcome of the student from the community service carried out by them.

MARKS ALLOCATION:

a. The external examiner appointed by the university shall award 70 marks on the basis of report submitted by the student

b. A Viva Voce to be conducted by the external examiner for 30 Marks to assess the learning outcome of the community service at the end of the semester

III SEMESTER

		Paper	Instruction hrs/week	Duration of Exam (hrs)	Marks			Credits
					IA	Exam	Total	
Part 1 Language	**Language I :** Kannada / Sanskrit / Urdu / Tamil / Telugu/Malayalam/ Additional English / Marathi / Hindi	3.1	4	3	30	70	100	3
Part 2 Optional	Corporate Skills	3.2	4	3	30	70	100	3
	Corporate Accounting	3.3	4	3	30	70	100	3
	Modern Marketing	3.4	4	3	30	70	100	3
	Financial Institutions and Regulatory Bodies	3.5	4	3	30	70	100	3
	Business Finance	3.6	4	3	30	70	100	3
Part 3	Industry review project /Business Skill Development Course (BSDC)***-Case Study Analysis**		-	-	30 (viva voce)	70 Project	100	2
Part 4	Foundation Course* SDC	-	3	3	30	70	100	2
	CC and EC*	-	-	-	50	-	50	1
Total Marks and Total Credits							**850**	**23**

PART 3
BUSINESS SKILL DEVELOPMENT COURSE (BSDC)*CASE STUDY ANALYSIS

OBJECTIVES:

- To develop thinking and analytical skills
- To develop managerial skills

GUIDELINES TO THE INSTITUTION:

1. Case Study Analysis Record Book should be prepared by the student during the third semester.
2. Five cases of **medium scale industries** relating to subjects studied in the first three semesters have to be analyzed and recorded in the Case Study Analysis Record Book.
3. Students should submit Record Book 20 days before the completion of the third semester for which the marks shall be awarded by the external examiner appointed by the university.

MARKS ALLOCATION:

a. The external examiner appointed by the university shall award 70 marks on the basis of Case Study Analysis Record Book submitted by the student (**for FIVE cases analyzed by the students 5 X 14**)

b. A Viva Voce to be conducted by the external examiner for 30 Marks to assess the learning outcome of the cases analyzed by the students at the end of the semester.

c. After assessment, marks scored by the candidate to be sent to BU along with IA Marks.

d. Remuneration for the external examiner shall be paid by the University as per the norms from time to time

IV SEMESTER

		Paper	Instruction hrs/week	Duration of Exam (hrs)	Marks			Credits
					IA	Exam	Total	
Part 1 Language	**Language I :** Kannada / Sanskrit / Urdu / Tamil / Telugu/Malayalam/ Additional English / Marathi / Hindi	4.1	4	3	30	70	100	3
Part 2 Optional	Cost Accounting	4.2	4	3	30	70	100	3
	Banking Operations and Innovations	4.3	4	3	30	70	100	3
	Business Research Methodology	4.4	4	3	30	70	100	3
	Behviourial Science	4.5	4	3	30	70	100	3
	Advanced Corporate Accounting	4.6	4	3	30	70	100	3
Part 3	Industry review project /Business Skill Development Course (BSDC)* **Preparation of Business Plan for Start-ups**	-	-	-	30 (viva voce)	70 Project	100	2
Part 4	Foundation Course	-	3	3	30	70	100	2
	CC and EC*	-	-	-	50	-	50	1
	Total Marks and Total Credits						**850**	**23**

PART 3
BUSINESS SKILL DEVELOPMENT COURSE (BSDC)* PREPARATION OF BUSINESS PLAN FOR START-UPS

OBJECTIVES:

- To provide exposure for Start-ups and New Age Business Models.
- To develop entrepreneurial mindset among students.

GUIDELINES TO THE INSTITUTION:

1. Each student shall prepare (**during the vacation between the third and fourth semester**) hypothetical /imaginary **small/medium scale entrepreneurship Business Starts Plan /project report** by indicating products /services that will be produced, marketed, key resources that will be used, customer segment that will be targeted to, the investment that will be required, funds that will be raised, cost which will be incurred, turnover that will be achieved and profit that will be attained from the business .
2. Entrepreneurship Project Record Book should be submitted to the college 15 days before completion of the Fourth Semester

MARKS ALLOCATION:

a. The external examiner appointed by the university shall award 70 marks on the basis of **Business Starts Plan /project report** submitted by the student.

b. A Viva Voce to be conducted by the external examiner for 30 Marks to assess the learning outcome of the **project report** submitted by the students at the end of the semester.

c. After assessment, marks scored by the candidate to be sent to BU along with IA Marks.

d. Remuneration for the external examiner shall be paid by the University as per the norms from time to time

V SEMESTER

		Paper	Instruction hrs/week	Duration of Exam (hrs)	Marks			Credits
					IA	Exam	Total	
Part 2 Optional	Income Tax – I	5.1	4	3	30	70	100	3
	Entrepreneurship Development and Star-ups	5.2	4	3	30	70	100	3
	Management Information and Technology	5.3	4	3	30	70	100	3
	Financial Analysis and Reporting	5.4	4	3	30	70	100	3
	Elective 1	5.5	4	3	30	70	100	3
	Elective 2	5.6	4	3	30	70	100	3
Part 3	Industry review project / Business Skill Development Course (BSDC)* A. **Field Study Report**	-	-	-	30 (viva voce)	70 Project	100	2
	B. Skill Enhancement Course (SEC)** Employability Skills Training **(Aptitude and GD Training)**	-	2	-	100	-	100	2
Part 4	Ability Enhancement Compulsory Course(AECC)	-	3	3	30	70	100	2
Total Marks and Total Credits							**900**	**24**

PART 3A
BUSINESS SKILL DEVELOPMENT COURSE (BSDC)*FIELD STUDY

OBJECTIVES:

- To enhance the classroom learning
- To support the students in contextual and experiential learning

GUIDELINES TO THE INSTITUTION:

1. Every student should have taken up field study during the vacation between fourth and fifth semester in the area of Marketing/Human Resource Management/Business Development/Finance/Entrepreneurship or any other aspect of business organization, for example:
    a. Market survey for a product or service
    b. A study on problems and challenges of small entrepreneurs
    c. A study on awareness about various banking services
    d. Student satisfaction survey about the quality of education
    e. Employee satisfaction survey
    f. Any other aspect related to business that can be covered under field study.
2. The Field Study report should essentially include:
    a. Introduction
    b. Design of the Study
    c. Analysis
    d. Findings and Conclusions.

3. The faculty members shall guide the students in field study process and preparation of the report.

MARKS ALLOCATION:

a. The external examiner appointed by the university shall award 70 marks on the basis of Field Study Report submitted by the student.
b. A Viva Voce to be conducted by the external examiner for 30 Marks to assess the learning outcome of the Field Study report submitted by the students at the end of the semester.
c. After assessment, marks scored by the candidate to be sent to BU along with IA Marks.
d. Remuneration for the external examiner shall be paid by the University as per the norms from time to time

PART 3B Skill Enhancement Course:**

EMPLOYABILITY SKILLS TRAINING

OBJECTIVE:
To enable the student to prepare for corporate placements.

GUIDELINES TO THE INSTITUTION:
1. BBA department should conduct Aptitude and GD training for the students of BBA for minimum of two hours per week.
2. The students should be trained in the areas of quantitative aptitude and group discussion.

MARKS ALLOCATION

a) The Relevant marks should be awarded to the students on completion of the training based on Aptitude Test (50 marks) and Mock Group Discussion (50 marks).
b) The Institution should send the marks to the University along with IA Marks scored by them in the Fifth Semester.

EMPLOYABILITY SKILLS TRAINING

Syllabus / Lesson Plan

Objective: To train the student to enhance life skills, with intent to enhance overall personality & perform well at the campus placement process.

Unit 1 : Writing Skills. **(4 hours)**
Learn to write a Cover letter and Resume, highlighting one's skill-set and strengths.

Unit 2:. Profile Presentation **(4 hours)**
Making a PPT or an Audio / Visual of their Purpose Statement to create a profile of self, to cater to the requirements of the market trends

Unit 3: Aptitude Test **(6 hours)**
Management In-basket exercises with intent to do, learn & introspect. Real life exercises. Mixed bag of assessment, involves logical / aptitude reasoning, comprehension, GK and personality test.

Unit 4: Group Discussion **(6 Hours)**

Training on participating in a group discussion.; working in teams, presenting one's viewpoint from a data perceptive, Analyse Case Studies to learn problem solving and decision making.

Unit 5: Assessment Centre **(4 Hours)**

Mock Group Discussion / Personal Interview - To enhance skills to perform well in the selection process in an interview.

SKILL DEVELOPMENT:

- Understand self-better – through the SWOC Analysis and SWOC of a company to understand, analyse and equip the candidate to the jobs' requirement
- Resume writing, Customize Resume accordingly to the job requirements.
- Group Discussion and Case Study Analysis
- Showcase self through A-V profile
- Mock Group Discussion / Personal Interview.

BOOKS FOR REFERENCE:

- Get Your Dream Job: A Step-by -step Guide to Clear Any Interview With Confidence by Piyush Bhatia.
- Interview: The Art of the Interview: The Perfect Answers to Every Interview Question (Interview Questions and Answers, Interviewing, Resume, Interview Tips, Motivational Interviewing, Job Interview) by James Storey.
- A Complete Kit for Group Discussion, by S. Hundiwala.
- Resume: The Secrets to Writing a Resume that is Guaranteed to Get You the Job (Resume Writing, CV,

VI SEMESTER

		Paper	Instruction hrs/week	Duration of Exam (hrs)	Marks			Credits
					IA	Exam	Total	
Part 2 Optional	Income Tax – II	6.1	4	3	30	70	100	3
	Auditing and Attestation	6.2	4	3	30	70	100	3
	Goods and Services Tax	6.3	4	3	30	70	100	3
	Business Regulations	6.4	4	3	30	70	100	3
	Elective 3	6.5	4	3	30	70	100	3
	Elective 4	6.6	4	3	30	70	100	3
Part 3	/Business Skill Development Course (BSDC)* a**. Internship with Business organizations**				30 (viva voce)	70 Project	100	2
	b. Skill Enhancement Course ****Placement Training**		2	-	100	-	100	2
Part 4	Ability Enhancement Compulsory Course (AECC)		3	3	30	70	100	2
	Total Marks and Total Credits						**900**	**24**

PART 3
BUSINESS SKILL DEVELOPMENT COURSE (BSDC)*
A. INTERNSHIP WITH BUSINESS ORGANIZATIONS

OBJECTIVES:

- To enhance the classroom learning
- To provide training and experiential learning opportunities for students
- To provide an opportunity to apply knowledge and skills acquired by the students in the classroom to professional context

GUIDELINES TO THE INSTITUTION:

1. Each student will have to work in a Business Organization for three weeks during the vacation between fifth and sixth semester.
2. The entire batch of students to be divided equally among the department faculty members. The faculty members should be the mentors and guide the students in internship process.
3. The students must submit the Certificate for completion of internship by the organization to the college along with a brief report of not less than 50 pages. The report to contain a brief detail of the organization, nature of business, a write up on the learning outcome from the internship carried out by them.

MARKS ALLOCATION:

a. 70 marks for the Internship Report and 30 marks for Presentation shall be awarded by the Department.
b. The Institution should send the marks to the University along with IA Marks scored by them in the VI Semester.

SKILL ENHANCEMENT COURSE - PLACEMENT TRAINING**

OBJECTIVE:
To prepare the student for corporate placements

GUIDELINES TO THE INSTITUTION:
1. BBA department shall conduct placement training for a minimum of two hours per week.
2. The students should be trained in the areas of personal interview, resume preparation, email-etiquette, corporate etiquette and work discipline.

MARKS ALLOCATION
a) The Relevant marks to be awarded to the students on completion of the training. IA marks shall be awarded on the basis of Practical Record (25 marks), Mock Personal-Interview (25 marks) and Test on Resume-preparation & Etiquettes (50 marks).
b) The Institution should send the marks to the University along with IA Marks scored by them in the VI Semester.

PLACEMENT TRAINING

Syllabus / Lesson Plan

Objective: To train the student to enhance life skills, with an intent to enhance overall personality & perform well at the campus placement process.

Unit 1 : Introduction to CRT **(5 Hours)**

Introduction, Importance of holistic personality development, to add value to portfolio of the student. Self-SWOT: Find strengths and weaknesses to maximize the chance of recruitment through SWOT/C Of the company. End Result: Making of Purpose statement.

Unit 2: Importance of Behavioural traits / Soft skills **(8 hours)**

Importance of Attitude; Explain the concept of Perception, Interpersonal Skills, Body Language, Psycho- metric assessment. Teach Business Communication Skills to learn ETIQUETTES at the workplace including Telephone, Internet, Social Media. How can you add value to the organization? General Knowledge (GK) & awareness of recent market trends.

Unit 3: Personal Interview (PI),Leadership and team Building **(4 hours)**

Preparing to attend a job interview teaching them via Role plays. Understand the importance of technology in PI. Leadership and team Building- Methods and techniques

Unit 4: Interview techniques **(06 Hours)**

Importance of Interviews, Art of conducting and giving interviews, Placement interviews - discipline interviews - appraisal interviews – exit interviews.

SKILL DEVELOPMENT:
- Understand self-better – through the SWOC Analysis and SWOC of a company to understand, analyse and equip the candidate to the jobs' requirements.

- Showcase self through A-V profile
- Personal Interview.

SOURCES OF INFORMATION:

- Job Interview: Top 100 Job Interview Questions and Answers for your Job Interview Preparation; Get Hired Fast with these Job Interview Tips by Dominic Black.
- A Complete Kit for Group Discussion, by S. Hundiwala.
- Resume: The Secrets to Writing a Resume that is Guaranteed to Get You the Job (Resume Writing, CV, Interview, Career Planning, Cover Letter, Negotiating Book by James Storey.

ELECTIVE GROUPS

1 ELECTIVE: ACCOUNTING AND FINANCE

Semester No.	Paper Code	Title of the Paper
V	A&FN1	Advanced Accounting
	A& FN2	Derivatives and Risk management
VI	A& FN3	Costing Methods and Techniques
	A&FN4	Security Analysis and Portfolio Management

2 ELECTIVE : MARKETING AND HUMAN RESOURCE

Semester No.	Paper Code	Title of the Paper
V	MK&HR1	Consumer Behavior and Marketing Research
	MK&HR2	Performance Management
VI	MK&HR3	Logistics and Supply Chain Management
	MK&HR4	Emotional Intelligence

3 ELECTIVE : IT AND DATA ANALYTICS

Semester No.	Paper Code	Title of the Paper
V	IT&DA1	Entrepreneurship Resource planning (ERP)
	IT&DA2	E-Governance
VI	IT&DA3	Data analysis for Social Sciences
	IT&DA4	Business Analytics

FOUNDATION COURSE / SKILL DEVELOPMENT / SKILL ENHANCEMENT COURSE (SEC) / ABILITY ENHANCEMENT COMPULSORY COURSE (AECC) / INTERDISCIPLINARY COURSES

- Common for all programmes, MCQ type of question paper shall be used and use of modern teaching aids and supply of study material is recommended.
  - Constitution of Indian and Human Rights
  - Environmental Science
  - Computer Applications and Information Technology
  - Business Entrepreneurship and Management
  - Philosophy, Psychology and Life Skills
  - Personality Development and Leadership
  - Culture, Diversity and Society
  - Research Methodology
  - Education and Literacy / Science and Society
  - Human Resource Development / Management
  - Any one Foreign Language
  - Commodity & Stock Market
  - Mathematics in finance.
  - Any other Course prescribed by the University from time to time

1. Co-and Extra – Curricular Activities (CC& EC)

A student shall opt for any one of the following activities in the first four semesters offered in the college

- N.S.S / N.C.C./Rotary Activities / Rovers and Rangers
- Sports and Games / Activities related to Yoga
- A Small project work concerning the achievements of Indians in different fields
- Evolution of study groups/seminar circles on Indian thoughts and ideas
- Interaction with local communities in their neighborhood and learn about and from them
- Exploring different aspects of Indian civilizations
- Any other Co- curricular and Extra-curricular activities leading to Student Development as prescribed by the University.

Evaluation of Co-curricular and Extra Curricular Activities as per the procedure evolved by the University from time to time.

1.3 ACCOUNTING FOR BUSINESS

OBJECTIVE:

The objective of this course is to help the students acquire conceptual knowledge of the discipline financial accounting and to impart skills for preparation of financial statements of different undertakings for acquiring practical wisdom

UNIT-1 INTRODUCTION TO ACCOUNTING **06 Hrs**

Meaning, Book keeping & accounting, Need for accounting, (GAAP) Generally Accepted Accounting Principles Concepts and Conventions, list of Indian Accounting Standards, Ind AS-IFRS (Concept only)

UNIT-2 BASIC ACCOUNTING PROCEDURES **12hrs**

(i) Double Entry System of Book-Keeping **–** Golden rules of accounting

(ii) Journal– Books of original entry

(iii) **Ledger** – Posting – Balancing an account - simple problems on Journal & ledger

UNIT-3 SUBSIDIARY BOOKS **14 Hrs**

Purchase book – Sales book – Returns books – Bills of exchange –Bills book – Journal proper.- Cash Book – kinds of cash book & Petty Cash Book Imprest system **–simple problems**

UNIT-4 FINAL ACCOUNTS OF PROPRIETARY CONCERN **14 Hrs**

Classification of Transaction in to revenue and capital- Preparation of Trial balance & Rectification of errors,- Parts of Final Accounts – Income statement and Balance sheet Final Accounts vertical form only

UNIT: 5: CONSIGNMENT **10 hrs**

Meaning, Definitions and Features of Consignment-Parties in Consignment – Consignor and Consignee-Differences between Consignment and Ordinary Sale-Special terminologies In Consignment Accounts – Proforma Invoice, Invoice Price, Account Sales, Non-recurring Expenses, Recurring Expenses, Ordinary Commission, Overriding Commission, Del Credere Commission, Normal Loss, Abnormal Loss. Small Problems on Commission and Valuation of Closing Stock-Consignment Accounts in the books of Consignor – Problems on preparation of Consignment A/c, Consignee A/c and Goods Sent on Consignment A/c in the books of Consignor.

BUSINESS LAB ACTIVITIES:

(Skill developments /Business lab exercises to be executed with recent accounting software packages like Tally, Quick books, SAP-ERP and maintain record)

1. Draft a chart relating to companies maintaining IFRS standard
2. Produce documentary evidence for creating accounting ledgers and groupsent on
3. Prepare a E content on subsidiary books
4. Develop a E content final accounts any sole trader concern
5. Develop E-content for a Consignment Agreement

BOOKS FOR REFERENCE:

1. Dr. S.N. Maheswari, Financial Accounting
2. Grewal and Shukla, Advanced Accounting
3. P.C. Tulasian, Pearson Editions, Introduction to Accounting

4. Jain & Narang. Financial Accounting
5. Accounting Standards - Institute of Chartered Accountants of India
6. Anil Kumar, Rajesh Kumar and Mariyappa, “Financial Accounting”, HPH

1.4 ENTERPRISE MANAGEMENT

OBJECTIVE:

The objective of this course is to enable the students to understand the principles of enterprise management of a business entity and its recent trends

UNIT -1 **NATURE OF MANAGEMENT AND ITS PROCESS-** **14Hrs**

Meaning, Nature and Importance of Management, Differences between Management and Administration, Management Approaches; Management Functions-Principles of Management-Fayol's and Taylor's Principles; Managerial Skills; Task and Responsibilities of Professional Manager

UNIT-2 PLANNING AND ORGANIZATION - 16 Hrs

a) Planning -Concept, Features, Importance, Limitations; Planning process; Types of Plans-Objectives, Strategy, Policy, Procedures, Method, Rule, Budget; Plan vs Programme- Policies and Procedures; Decision making-Types- Process .

b) Organization-Concept, Features, Importance, Limitations; Organizing process; Types of Organization; Flat organization – relevance- trends , work from home prospects; Centralizations and Decentralization; Delegation; Growth in Organization- Task force

UNIT-3 DIRECTION AND COORDINATION- **12 Hrs**

a) Direction: Concept, Features, Importance, Limitations; Elements of Direction –Supervision, Motivation and theories of motivation Leadership, Theories and Styles of leadership

b) **Co-ordination**: Concept, Features, Importance, Types and limitations

UNIT-4 CONTROLLING - **08 Hrs**

Concept, Features, Importance, Limitations; Control Process; Essentials of a Good Control System; Techniques of Control- Traditional and NonTraditional Control Devices; Relationship between planning and controlling

UNIT-5 RECENT TRENDS IN MANAGEMENT 06 Hrs

Change Management-Crisis Management-Global practices-International Manager-Quality of work life –Résistance to management- Risk Management-Total quality Management, Kaizan cross culture (Concepts only)

BUSINESS LAB ACTIVITIES:

1. Develop a Chart on Principles of Management
2. Prepare Chart on steps involved in decision making
3. Develop Chart on organisation structire
4. Construct a Graphic representation of Maslow‟s Theory.
5. List out recent trends in management

BOOKS FOR REFERENCE

1. Stephen P. Robbins,Management, Pearson
2. Koontz andO‟Donnell, Management, McGrawHill.
3. Griffin, Nelson, Manjunath, MGMT and ORGB, Cengage
4. L M Prasad, Principles of management, Sultan Chand and Sons
5. V.S.P Rao/Bajaj, Management process and organization, ExcelBooks.
6. T. Ramaswamy : Principles of Management,HPH.
7. Tripathi& Reddy, Principles of Management. McGraw Hill
8. R.K Sharma Shashi K Gupta Rahul Sharma: Principles of Management Kalyani Publishers

1.5 CORPORATE REGULATIONS

Objective: To create awareness amongst student's fraternity with the prevalent corporate laws and to nurture administration skills

UNIT-1: **INTRODUCTION TO COMPANY** 16 Hrs

Meaning and Definition – Features – Kinds of companies as per companies act 2013 – (Meaning only) – Steps involved in formation of company as per companies Act 2013 – Promotion Stage – Meaning of promoter, Position of Promoter and Functions of Promoter- Incorporation stage – Documents required for incorporation- Memorandum of Association and Articles of Association, Certificate of incorporation; Subscription Stage – E-Prospectus, Statement in lieu of prospects and Book Building; Commencement Stage – Documents to be filed, e-filing, Certificate of Commencement of Business.

UNIT-2 : **CAPITAL OF A COMPANY** 08 Hrs

Share Capital - Meaning of Shares- Kinds of Shares- Debentures and Bonds- Types of debentures and bonds, SEBI guidelines for issue of shares and debentures.

UNIT-3: **COMPANY ADMINISTRATION** 14Hrs

Key Managerial Personnel- Managing Director, Whole Time Directors, Company Secretary, C-suite executives-CEO, CFO, COO, CTO, CKO, CRO and CIO Chief Financial Officer, Resident Director, Independent Director;(Meaning only) Managing Director- Appointment, Powers, Duties and Responsibilities; Audit committee and its functions Company Secretary- Meaning, Types, Qualification, Appointment, Position, Rights, General duties, Liabilities and Removal or dismissal.

UNIT-4: **CORPORATE MEETINGS** 08 Hrs

Types of Meetings, Provisions relating to Annual General meeting, Extraordinary General Meetings, Board Meeting as per companies act 2013, Requisites of a valid meeting; Resolutions and kinds of resolution; Preparation of Agenda and minutes. Corporate governance- composition of BODs- Cadbury Committee report, SAXEN-OXLEY ACT, Narayamurthy and Narechandra Chandra committee recommendation of corporate Governance.

UNIT-5: **WINDING UP OF COMPANIES AND CSR LEGISLATIONS IN INDIA** 10 Hrs

Meaning- Modes of winding up; Official Liquidator-Powers and Duties; Consequences of Winding up Meaning of CSR, Scope for CSR Activities under schedule VII of the companies Act 2013, Provisions of CSR mandate

BUSINESS LAB ACTIVITIES:

1. Prepare a chart showing different types of Companies.
2. Develop e- specimen copy of Memorandum of Association and Articles of Association of any company.
3. Prepare a chart showing qualifications of company secretary as per companies act 2013
4. Draft a Notice of Company Meetings – Annual, Special, Extraordinary and Board Meetings
5. Prepare a Chart showing functions of liquidator

6. Conduct a case study on CSR initiatives of any one company and submit a case study report

BOOKS FOR REFERENCE (Latest Editions)

1. N.D. Kapoor, Company Law and Secretarial Practice, Sultan Chand and Sons.
2. M.C. ShuklaandGulshan, Principles of Company Law, S. Chanda and Co.
3. C.L. Bansal, Business and Corporate law, Excel Books.
4. Chanda, Company Law, Cengage
5. S.S Gulshan, Company Law, New Age International.
6. Maheshwari and Maheshwari, Elements of Corporate Laws, Himalaya Publishers

7 Garg K.C , Chawla R.C and Gupta Vijay Company law Kalyani Publishers

1.6 BUSINESS MATHEMATICS AND LOGICAL REASONING

Objective: This course aims to equip the students with the mathematical background required for business management and skills of numerical abilities and aptitudes for cracking public service examinations and competitive examinations.

UNIT1: THEORY OF SETS **08** Hrs

Theory of Sets – Set Theory- Venn diagram- Applications of set theory- Basic concepts of Permutations & Combinations.

UNIT 2: TYPES OF EQUATIONS AND MATRICES **14 hrs**

Linear equations - Simultaneous equations (only two variables) Eliminations and substitution method only- Quadratic equations – Factorization and formula method ($ax^2 + bx + c = 0$ form only) - Application of equations in business and management.

Matrices: Algebra of Matrices, Inverse of a Matrix and determinants, Problems on linear equations in two variables using Cramer's rule.

UNIT 3: RATIO, PROPORTION, PERCENTAGE, PROFIT AND LOSS **10 hrs**

Ratio- Inverse Ratio- Proportion - Properties of Proportions- Direct proportions- Inverse proportions- -Calculation of percentage, regarding marks, population, money, income etc - Profit & loss- Calculation of profit or loss - Calculation of percentage profit or loss - Calculations of cost price and selling price - Total profit or loss while buying and selling different articles at different rates.

UNIT 4: INTEREST & ANNUITIES **14 hrs**

Simple Interest- Compound interest including half yearly and quarterly calculations - Nominal rat and effective rate of interest - Varying rate of interest- Depreciation - Present value-Net present value - Future value. Annuities - Present value of an annuity-Future value of an annuity-Sinking fund.

UNIT 5: LOGICAL REASONING **10 hrs**

Number series - Coding and Decoding - odd man out- Time and work- Analytical Reasoning- Relationships - Syllogism

BUSINESS LAB ACTIVITIES:

1. Divide your class students into pairs and assign each pair a single **set** concept (such as union, subset, superset, etc.)
2. Develop Business Problems Matrix
3. Prepare a Bank Statement using SI and CI.
4. Develop an Amortization Table for Loan Amount – EMI Calculation.
5. Develop any two logical puzzles
6. Take the previous of UPSC, KPSC, Banks, Insurance company, Railway board question papers and solve numerical aptitude and reasoning segments

BOOKS FOR REFERENCE : (Latest edition)

1. Ayres, Frank Jr. Theory and Problems of Mathematics of Finance. Schaum's Outlines Series. McGraw Hill Publishing Co.
2. Dr. Sancheti & Kapoor: Business Mathematics and Statistic, Sultan Chand and Sons.

3. M Raghavachari – Mathematics for Management: An Introduction - Tata McGraw Hill Note
4. R.G.D Allen – Basic Mathematics; Macmillan, New Delhi
5. Soni, R.S. Business Mathematics. Pitambar Publishing House.
6. Singh J. K. Business Mathematics. Himalaya Publishing House.
7. Ranganath: Business Mathematics, GK Publications, Mumbai.
8. Dr. R.G. Saha & Others – Methods & Techniques for Business Decisions, VBH
9. Selvaraj, Quantitative Methods in Management, Excel Books
10. Study Material of the Institute of Chartered Accountants of India (ICAI) Freely Downloadable from the website of the Institute

2.3 FINANCIAL ACCOUNTING

OBJECTIVE:

The objective of this course is to help the students to acquire knowledge; financial reporting on the global scenario , skills and acumen of accounting treatment in respect of different categories of business undertakings and special type of business,

UNIT-1 INTRODUCTION TO IFRS **4 Hrs**

Need for IFRS-Features of IFRS-Applicability of IFRS-Beneficiaries of Convergence with IFRS (theory only)

UNIT-2 ACCOUNTING FOR HIRE-PURCHASE **14 Hrs**

Meaning of Hire Purchase and Installment Purchase System - Legal provisions - Calculation of interest - when rate of interest and cash price is given - when cash price and total amount payable is given, when rate of interest and installments amount are given but cash price is not given - Calculation of cash price under annuity method - Journal Entries and Ledger Accounts in the books of Hire Purchaser and Hire Vendor (Asset Accrual Method only).

UNIT-3 ROYALTY ACCOUNTS **14Hrs**

Introduction - meaning - technical terms - royalty - landlord - tenant - minimum rent - short workings - recoupment of short working under - fixed period - floating period - recoupment within the life of a lease - treatment of strike, stoppage of work and sub-lease - accounting treatment in the books of lessee(tenant) - when royalty is less than minimum rent - when royalty is equal to minimum rent - when the right of recoupment is lost - when minimum rent account method is followed - passing journal entries and preparation of Ledger Accounts - royalty account - landlord account – short workings account - minimum rent when minimum rent account is followed in the books of lessee only

UNIT-4 SALE OF THE PARTNERSHIP FIRM **16 Hrs**

Introduction - need for conversion - meaning of purchase consideration - methods of calculating purchase consideration - net payment method - net asset method - passing of journal entries and preparation of ledger accounts in the books of vendor - treatment of certain items - dissolution expenses - unrecorded assets and liabilities - assets and liabilities not taken over by the purchasing company - contingent liabilities - non- assumption of trade liabilities- in the books of purchasing company - passing of incorporation entries - treatment of security premium - fresh issue of shares and debentures to meet working capital - preparation of balance sheet as per 'Companies Act' 2013 - under vertical format.

UNIT: 5: ACCOUNTING FOR JOINT VENTURES 08 Hrs

Introduction – Meaning – Objectives – Distinction between joint venture and consignment – Distinction between joint venture and partnership – maintenance of accounts in the books of coverturers – maintaining separate books for joint venture -- problems.

BUSINESS LAB ACTIVITIES:

(Skill development business lab activities to be executed through accounting packages)

1. List out the different areas of applications of IFRS in India
2. Develop EMI calculation mechanism in an auto retailers-Two wheelers and Cars
3. Develop E-content for Royalty Agreement
4. Collect the information on 5 recently converted a firm in to joint stock company business organizations
5. Develop E-content for a Joint Venture Agreement

BOOKS FOR REFERENCE:

1. Dr. S.N. Maheswari, Financial Accounting
2. Grewal and Shukla, Advanced Accounting
3. P.C. Tulasian, Pearson Editions, Introduction to Accounting
4. Jain & Narang. Financial Accounting
5. Accounting Standards - Institute of Chartered Accountants of India
6. Raj Garg &Manpreet Kaur-International Financial Reporting Standards –Kalyani publishers

2.4 HUMAN RESOURCE MANAGEMENT PRACTICES

OBJECTIVE: The objective of this course is to enable the students to gain knowledge and skills of managing human resources in various organisations.

UNIT 1: HUMAN RESOURCE MANAGEMENT 12 Hrs

Human Resources Management – Meaning, Definitions, Characteristics, Objectives, Importance, Functions and Process, Challenges, Recent Trends -Human Resources Manager – Duties and Responsibilities, Paradigms for Post Modern Managers-Meaning, Definitions, Characteristics, Objectives, Importance, Functions and Process of Human Resources Development-Differences between personnel Management and Human Resources Development, difference HRM and SHRM, difference between HRM and IHRM

UNIT 2: HUMAN RESOURCE PLANNING, RECRUITMENT & SELECTION 12 Hrs

Human Resource Planning – Meaning, Importance, Benefits and Scope-Job Analysis, Job Design, Job Description, Job enrichment and Job Evaluation. Recruitment – Meaning, Definitions and Sources of Recruitment: Traditional and Modern sources of recruitment-E-recruitment, Twitter, Blog, Instagram, Linkedin Walk in, talk in, Write in, Artificial intelligence (Robots based) virtual discussion, Selection – Meaning, Definitions and Process of Selection- identification of five dark qualities in an individual before selection process of selection and Placement

UNIT 3: HUMAN RESOURCE PRACTICES 12 Hrs

Induction and Orientation – Meaning, Definitions, Objectives and Purposes-Training – Meaning, Need, Benefits and Methods, Pros and Cons of each Method of Training-Identification of Training & Development Needs-Human Resources Development of Managers and Employees-Performance Management System (PMS) – Meaning, Definitions, Objectives, Methods of Appraising the past performance and current performance of the employee and executive, projecting future performance of an employee, individual employee development difference and performance appraisal and performance management system (PA vs PMS)

UNIT 4: COMPENSATION AND REWARD SYSTEM 10 Hrs

Compensation - Meaning, Definitions, Objectives and Importance-Wages and Salary Perquisites, Fringe Benefits, Bonus and Incentives – Meanings only, incentives in sun rise sector and sun set sector. Performance based pay, merit based pay, skill based pay, and competency based pay, dual system of payment for the same job position. Promotion – Meaning, Definitions, Features, Methods of Promotion –seniority vs meritocracy

UNIT 5: EMPLOYEE COACHING, COUNSELLING AND INDUSTRIAL RELATIONS 06 Hrs

Employee Coaching - Meaning, Definitions, Objectives, Types. Employee Counselling-Meaning Definitions, Objectives, Skills and Techniques Industrial. Relation-meaning, definition and Actors in IRs

BUSINESS LAB ACTIVITIES:

1. Develop the offer letter and appointment order to given to new recruit
2. Develop E- contents for 5 dark qualities of an individual
3. List out the examples for sunrise sector and sun set sectors
4. Develop E-content for the role of artificial intelligence in HR functions
5. Develop the E-Content for employee performance management System

BOOKS FOR REFERENCE:

1. Dr. K Aswathappa -Human resource Management Tata Mcgraw Hills
2. Shashi K Gupta and Rosy Joshi Human Resource Management
3. Managing Human Resources by Wayne F Cascio
4. Subba Rao Human resource management-HPH
5. K Ramachandra and et.,al. Human Resource Management HPH
6. C.B.Mamoria, Personnel management, HPH.
7. Edwin Flippo, Personnel management, McGraw Hill.
8. Michael Porter, HRM and human Relations, Juta & Co.Ltd.

2.5 STATISTICAL APPLICATIONS IN BUSINESS

OBJECTIVE:

The objective of this course is to provide basic knowledge of fundamentals of Statistics for interpreting business data and their commercial application for decision making in a business. Entity

UNIT 1: STATISTICAL DESCRIPTION OF DATA **12 hrs**

a. **Introduction to Statistics** – Definition of Statistics –- Functions – Scope – Limitations

b. b.**Classification and tabulation of data** - Collection of data - census and sample techniques. Classification of data, preparation of frequency distribution and tabulation of data.(simple problems)

c **Statistical Representation of Data** -Diagrammatic representation of data - Bar diagram- subdivided bar diagram- percentage bar diagram and pie diagram Histogram- Frequency polygon- ogives (simple problems).

UNIT 2: MEASURES OF CENTRAL TENDENCY & DISPERSION **14 hrs**

a. Measures of Central Tendency- Arithmetic Mean– Median – Mode (both grouped and ungrouped data including open- end class (Direct Methods only. Weighted Arithmetic Mean & Combined Mean -Empirical relationship between mean, median and mode.

b. **Dispersion** - Range - Quartile deviation - Mean deviation about mean - Standard deviation and their Coefficients. (Direct method only).

UNIT 3: CORRELATION & REGRESSION **12 hrs**

a. **Correlation**- Types of Correlation- Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient- Problems

b. **Regression** - Regression lines -Regression coefficients - The two regression equations Correlation coefficient through regression coefficient- Problems.

UNIT 4 : INDEX NUMBERS AND TIME SERIES **12 hrs**

a. **Index Numbers**- Uses of Index Numbers, Problems involved in construction of Index Numbers, Methods of construction of Index Numbers. Simple Aggregative Method – Simple Average of Price Relative Method – Weighted index method – Laspereys, Paasches and Fisher's Ideal method Consumer Price Index – Problems

b. **Time Series** - Introduction- Components of Time series - Analysis of time series by moving averages – problems on Trend and Least Squares method (Linear) and ordinary least square method (OLS)

UNIT 5: PROBABILITY **6 Hrs**

Meaning and Importance of Probability- Experiment, Event and types of events, Additional & Multiplication theorem of probability.(Simple Problems on addition theorem only)

BUSINESS LAB ACTIVITIES

- Develop a table for number of students studying in different course at your college for a particular period
- Collect data from at least 5 friends about the percentage of marks obtained in SSLC and PUC and present the same in a Bar Diagram Form.
- Collect data from at least 10 friends about the pocket money they receive in a month and their monthly expenditure on Mobile Recharge, Cosmetics, Chats and Other Expenses and Analysis the data by computing standard deviation and coefficient of variation.
- Collect the age statistics of 10 married couples and compute correlation coefficient and regression equations.
- Analyze a particular company monthly share price movement traded in BSE & NSE by using moving average

SUGGESTED BOOKS :

1. Gupta, S. P. Statistical Methods. New Delhi: Sultan & Chand
2. Sharma, J. K. Business Statistics . New Delhi: Pearson Publishers.
3. Vohra, N.D. Quantitative Techniques in Management. Tata McGraw Hill Publishing co
4. Beri, G. C.. Business Statistics . New Delhi: Tata McGraw Hill Educations Pvt Ltd.
5. Ellahance : Statistical Methods
6. Chikodi & Satya Prasad – Quantitative Method for Business
7. Sridhara Bhatt - Quantitative Techniques for Managers , HPH
8. Quantitative Techniques for Managerial Decisions, U K Srivastava, G V Shenoy,S C Shar
9. Bhat B R, Sri venkataramana and K S Madhava Rao, Statistics for Beginners Vol 1 - New Age (P) Ltd,.
10. K Ramachandra and et.,al. Quantitative methods for Business HPH
11. Gurumurthy K H and et.,al. Quantitative analysis for Business decisions HPH

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2.6 PRODUCTION AND INVENTORY MANAGEMENT

Objective:
The objective is to make the student understand the concepts of production, operations and Inventory Management of an industrial undertaking and their benefits.

UNIT 1: INTRODUCTION TO PRODUCTION AND OPERATIONS MANAGEMENT 10Hrs
Meaning and definition – Classification – Objectives, need – types – Advantages and disadvantages of Production and Operations Management, Application of automation, artificial intelligence, volatility , uncertainty , complexity ambiguity (VUCA) in production and operations,

UNIT 2:PLANT LOCATION AND LAYOUT 10 Hrs
Meaning and definition –Factors affecting location, Theory and practices, cost Factor in location – Plant layout Principles – Space requirement – Different types of facilities – Organization of physical facilities – Building, Sanitation, Lighting, Air Conditioning and Safety.

UNIT 3: QUALITY CONTROL 08 Hrs

Quality control – Statistical Quality Control, Quality Management, six- sigma, Control charts and Operating characteristics curves, Accepting Sampling Procedures, Quality circles, Meaning of ISO and TQM.

UNIT 4:INVENTORY MANAGEMENT 12 Hrs

Meaning and Concepts -Objectives, Capacity planning, Corresponding Production Planning, Controlling, Scheduling, Routing. Management of Inventory- JIT ,ABC etc

UNIT 5:MAINTENANCE AND WASTE MANAGEMENT 12 Hrs

Introduction – Meaning – Objectives – Types of maintenance, Breakdown, Spares planning and control, Preventive routine, Relative Advantages, Maintenance Scheduling, Equipment reliability and Modern Scientific Maintenance methods - Waste Management–Scrap and surplus disposal, Salvage and recovery.

BUSINESS LAB ACTIVITIES:

1. Visit any industry and list out the stages of its automation and artificial intelligence with as many details as possible.
2. List out the factors which are important while selecting a plant layout and draw a chart on Plant layout
3. Describe the Functions of Quality Circles in an industry
4. List out the Functions of inventory management in an organization
5. Visit a company and List out Environmental issues. How is inventory managed in a company?

BOOKS FOR REFERENCE

1. Ashwathappa. K & Sridhar Bhatt : Production & Operations Management, HPH.
2. Gondhalekar & Salunkhe : Productivity Techniques, HPH.
3. SN Chary, Production & Operations Management, McGraw Hill.
4 U. Kachru, Production & Operations Management, Excel Books.

5. Alan Muhlemann, John Oaclank and Keith Lockyn, Production & Operations Management, PHI.
6 K KAhuja, Production Management, CBS Publishers.
7 . S.A. Chunawalla & Patel: Production & Operations Management, HPH.
8. Everett E Adam Jr., and Ronald J Ebert, Production & Operations Management, Sage Publishing
9. Dr. L. N. Agarwal and Dr. K.C. Jain, Production Management
10. Thomas E. Morton, Production Operations Management, South Western College.

3.2 CORPORATE SKILLS

OBJECTIVE:
The objective of this course is to develop both Oral and written communication skill concerning organizational and busies issues.

Unit 1: ELEMENTS OF COMMUNICATION 16 Hrs

Meaning, Importance, objectives & Principles of Communication,Process, impediments of effective communication, strategies for effective communication. types –verbal and Non verbal communication -Body Language, Gestures, Postures, Facial Expressions, Dress codes, The Cross Cultural Dimensions of Business Communication, Listening & Speaking, Techniques of Eliciting Response, Probing Questions, Observation, Business and social etiquettes.

Unit 2: PUBLIC SPEAKING AND SPEECH COMPOSITION 10 Hrs
Principles of Effective Speech & Presentations. Technical speeches & Non-technical presentations. Speech of introduction of a speaker - speech of vote of thanks -occasional speech - theme speech. Moderating programs Use of Technology

Unit 3: MEETINGS 08Hrs
Importance, Meetings opening and closing Meetings Participating and Conducting Groupdiscussions. Brain Storming, E- Meetings, Memos, minutes, Circulars & notices.

Unit 4: CORPORATE COMMUNICATION 14 Hrs
Email- meaning, importance, objectives. Messages- meaning, importance, objectives, Video conferencing- importance, advantages and disadvantages. Virtual communication- meaning, advantages, importance & using different online applications for corporate communication. Teleconference,

Business letters: Inquiries, Circulars, Quotations, Orders, Acknowledgments Executions, Complaints, Claims & adjustments, Collection letter, Banking correspondence, Agency correspondence, Job application letters - Bio-data, Covering Letter, Interview Letters,Letter of Reference and other letters

Unit 5: CARRIER PLANNING 08 Hrs
Awareness of different carries sources of information, choosing a carrier, carrier counseling, and Resume preparation preparing for group discussion

BUSINESS LAB ACTIVITIES :

1. Conduct a group teleconference and submit minutes report
2. Conduct a mock meeting and draft minutes of the meeting.
3. Draft a letter of enquiry to purchase a laptop.
4. Draft your bio-data.
5. Prepare your Career Plan.

BOOKS FOR REFERENCE:

1. Rai & Rai- Corporate skill for business
2. Santosh Kumar- Soft skill for business, Himalaya Publications
3. C.G.G Krishnamacharyulu & Lalitha- Soft skill for Personality development
4. Sharma S.P. and others- Business communication
5. Dr. Md. Farooq Pasha and N.K. Ganesh- Corporate Skills, Kalyani Publication

3.3 CORPORATE ACCOUNTING

OBJECTIVE

The objective of this course is to enable the students to have a comprehensive understanding about the provisions of the Company‟s Act and Corporate Accounts.

UNIT 1: REDEMPTION OF SHARES AND DEBENTURES **10 Hrs**

Meaning – legal provisions – treatment regarding premium on redemption – creation of Capital Redemption Reserve Account– Fresh issue of shares – Arranging for cash balance for the purpose of redemption – minimum number of shares to be issued for redemption – issue of bonus shares – preparation of Balance sheet (vertical forms) after redemption.

UNIT 2: VALUATION OF GOODWILL **8Hrs**

Meaning – Circumstances of Valuation of Goodwill – Factors influencing the value of Goodwill – Methods of Valuation of Goodwill - Average Profit Method – Super Profit Method – Capitalization of Super Profit Method – Annuity Method – Capitalization of Profit Method.

UNIT 3: VALUATION OF SHARES **8 Hrs**

Meaning – Need for Valuation – Factors Affecting Valuation – Methods of Valuation – Asset Backing or Intrinsic Value Method – Yield Method – Earning Capacity Method – Fair Value Method - Rights Issue and Valuation of Rights Issue.

UNIT 4: : COMPANY FINAL ACCOUNTS **20 Hrs**

Statutory Provisions regarding preparation of Company Final Accounts – Treatment of Special Items – Managerial Remuneration – Tax deducted at source – Advance payment of Tax – Provision for Tax – Depreciation – Interest on debentures – Dividends – Rules regarding payment of dividends (Theory only) – Transfer to Reserves – Preparation of income statement and balance sheet (vertical column).

UNIT 5: HOLDING COMPANY ACCOUNTS **10 Hrs**

Introduction – Meaning of Holding Company – Subsidiary Company – Steps – Pre Acquisition Profits – Post Acquisition Profits – Minority Interest – Cost of Control or Capital Reserve – Unrealized Profit – Mutual Indebtedness – Preparation of Consolidated Balance Sheet (As per AS21) under vertical format .

Note: 1. The relevant Indian Accounting Standards in line with the IFRS for all the above topics should be covered

2. Any revision of relevant Indian Accounting Standard would become applicable immediately

BUSINESS LAB ACTIVITIES:

- Collect the annual report of 5 Companies and List out its assets and Liabilities as per schedules
- List out the conditions to be fulfilled for redemption of Preference shares
- Collect the annual reports of 2 companies and calculate the value of goodwill under different Methods
- Collect latest final accounts of a company and find out the intrinsic value of shares
- Collect the list of 5 parents and subsidiary company with as many details as possible

BOOKS FOR REFERENCE

1. S. P. Jain and K. L. Narang – Corporate Accounting, Kalyani Publishers.
2. Dr. S.N. Maheswari , Financial Accounting, Jain Book Depot.
3. V.K. Goyal: Corporate Accounting, PHI.
4. R L Gupta, Advanced Accountancy, Sultan Chand and Sons, New Delhi
5. M.A.Arunachalam & K.S.Raman: Corporate Accounting – II, HPH.
6. Soundrarajan A & K. Venkataramana, Corporate Accounting, SHBP.
7. Anil Kumar - Marriappa – Corporate Accounting , HPH.

3.4 MODERN MARKETING

OBJECTIVE:

The objective is to enable students to understand the basic concept of marketing and recent trends in Marketing.

UNIT 1: INTRODUCTION TO MARKETING AND SERVICES **10 Hrs**

Meaning and Definition-Market and Marketing-Nature-Goals-Concepts of Marketing-Functions of Marketing- Importance and Scope of Marketing.. Services - Meaning and Definition, characteristic of services – classification of services – distinction between goods marketing and service marketing, marketing mix in service industry – growth of service sector in India. Service processes –Designing the service process – services blueprint.

UNIT 2: MARKETING ENVIRONMENT (MARCO AND MICRO) **8 Hrs**

Demographic-Economic-Natural-Technological – Political-Legal and Socio-Cultural. Customer Supplier- Manufacturer-Employees-Public and Community Competitors.

UNIT 3: MARKETING MIX **16 Hrs**

Meaning-Elements-Product- Product Mix- Product Lifecycle-Product Planning-New Product Development- Stages-Failure of New Product-Branding-Packing and Packaging. Pricing - Objectives-Factors influencing Pricing and Methods of Pricing. Physical Distribution-Meaning-Factors affecting Channel Selection-Types of Marketing Channels .Promotion- Meaning and Significance of Promotion- Personnel Selling and Advertising (Meaning Only).

UNIT 4 :MARKETING SEGMENTATION AND BEHAVIOUR **8 Hrs**

Meaning and Definition -Bases for Market Segmentation-Requisites for sound Market Segmentation.Consumer Behaviour – Factors influencing Consumer Behaviour and Buying Decision Process.

UNIT 5: RECENT TRENDS IN MARKETING **12 Hrs**

A. **Introduction to E-business**-Tele-marketing-M-Business- Green and Grey Marketing, Brown marketing, Digital Marketing-Advantages and Disadvantages, Relationship Marketing-Retailing- Virtual Marketing, Event Management, Viral Marketing, Reverse Marketing.

B. **Customer Relationship Management**- Meaning and Definition – Role of CRM – Advantages And Disadvantages.

BUSINESS LAB ACTIVITIES :

- Collect and record the effects of micro and macro environmental factors of any company
- Develop an Advertisement copy for a new product
- Develop a E content on Consumer Behaviour of a product of your choice.
- Prepare a market segmentation chart
- Prepare a chart for modern marketing methods for different products.
- Draft a chart of recent marketing trends

BOOKS FOR REFERENCE

1. Philip Kotler, Marketing Management, Prentice Hall
2. J.C. Gandhi - Marketing Management, TMH
3. Stanton W.J. etzal Michael & Walker, Fundamentals of Management, TMH
4. S A Sherlekar & Sherlekar marketing management HPH
5. Sontakki, Marketing Management, HP
6. Nair, S. R.. *Consumer Behaviour and Marketing Research: Text and Cases*. Global Media
7. Karanakaran, Marketing Management, Himalaya Publishers.
8. Sunil B Rao, Marketing and Service management, HPH.
9. K Ramachandra and et.,al. Marketing Management t HPH

3.5 FINANCIAL INSTITUTIONS AND REGULATORY BODIES

Objective:
To enable the students to acquaint about the functioning of Indian financial System with reference to its structure, organization, institutions and regulating bodies.

UNIT: 1AN OVERVIEW OF FINANCIAL SYSTEM 10 hrs
Introduction , Meaning, components of financial system, financial institutions- Financial Market-instruments –services, Impact of financial system on economic development.

UNIT: 2 BANKING INSTITUTIONS 12 Hrs
Meaning, Constitution, Objectives and Functions, Types-schedule , non schedule , public , private banks foreign banks and payment banks, Role of commercial banks, Investment policy of commercial banks, banking sector reforms

UNIT: 3 NON-BANKING INSTITUTIONS 10Hrs
Meaning, Constitution, Objectives and Functions, Types- Nidhi Chit funds RNBC, Insurance, pan shops and payday lending

UNIT: 4 DEVELOPMENTAL INSTITUTIONS 12 Hrs
Meaning, classifications, role, objectives, Functions **and** importance of IDBI, SIDBI, ICICI, IFCL, SFC's, LIC, GIC,EXIM, NABAR**D, IIBI, UTI,NBFC'S NHB ,SIDCO**

UNIT: 5 REGULATORY BODIES IN INDIA AND TRENDS IN BANKING 12 Hrs
a. Meaning, Regulatory bodies in India RBI-Organization, Functions. SEBI- IRD PFRDA, Objectives uions and Functions.
b. Artificial Intelligence, Block chain, Big data, Robotic Process Automation, Cyber security and resilience, voice interfaces. (Concepts only)

BUSINESS LAB ACTIVITIES:
1. Develop E-content for the different components of Indian financial system
2. Draft a chart on recent banking reforms in India
3. List out various regulatory bodies in India
4. Prepare a list of banking and non banking financial institutions
5. Draft a chart on latest developments in banking technology

BOOKS FOR REFERENCE

1. M. Y. Khan; Indian Financial System; Tata McGraw Hill Education.
2. Vasanth desai : The Indian Financial System-TMH. .
3. Gorden and Natarajan- Indian Banking-HPH
4 Preeti Singh, Dynamics of Indian Financial System: Markets, Institutions and Services
5. L. Bhole; Financial Institutions and markets; Tata McGraw-Hill Publishing Pvt. Ltd.
6. .H R Machiraju, Indian Financial System;Vikas Publishing House Pvt Ltd.-New Delhi,
7.R.M Srivastava ,D. Nigam; Dynamics of Financial Markets & Institutions in India, Excel Books.
8. Shankaran-Banking-HPH
9. K Ramachandra et.,al., Indian Financial System HPH

3.6 BUSINESS FINANCE

OBJECTIVE:
The objective is to enable students to understand the basic concepts of Financial Management and the role of Financial Management in decision-making.

UNIT 1: FINANCIAL MANAGEMENT **06Hrs**

Meaning of Finance, Business Finance, Finance Function, Aims of Finance Function – Organization structure of Finance Department. Financial Decisions, Role of a Financial Manager . Financial Planning – Steps– Principles– Factors influencing a sound financial plan.

UNIT 2: FINANCING DECISION **14 Hrs**

Introduction – Meaning of Capital Structure – Factors influencing Capital Structure – Optimum Capital Structure – Computation & Analysis of EBIT, EBT, EPS – Leverages. Simple problems

UNIT 3: INVESTMENT DECISION **14 HRS**

Investment Decision: Introduction – Meaning and Definition of Capital Budgeting – Features – Significance – Process – Techniques: Payback Period, Accounting Rate of Return, Net Present Value, Internal Rate of Return and profitability index Simple Problems

UNIT 4: DIVIDEND DECISION **10Hrs.**

Meaning and nature of dividend –types of dividend, Bonus share, factors determining dividend decision; theories of dividend decisions-WALTER'S GORDON'S model-problems,

UNIT 5: WORKING CAPITAL MANAGEMENT **12 Hrs**

Introduction – Concept of Working Capital – Significance of Adequate Working Capital – Evils of Excess or Inadequate Working Capital – Determinants of Working Capital – Sources of Working Capital. Operating cycle - Problems on working capital

BUSINESS LAB ACTITVIITIES:

1. Draw the organization chart of Finance Function of a company
2. Submit an analyzed report on Capital structure in 5 different industries
3. Evaluate the NPV of an investment made in any one of the capital projects of a company for 5 years.
4. Prepare E-content of dividend policy of a company
5. Develop E-content for working capital management to a service organizations

BOOKS FOR REFERENCE

1. *S N Maheshwari, Financial Management., Sultan Chand.*
2. *R.M.Srivastava : Financial Management –Management and Policy, Himalaya Publishers.*
3. *Khan and Jain, Financial Management, Tata McGraw Hill.*
4. *Sudhindra Bhatt: Financial Management, Excel Books.*

5. *Sharma and Sashi Gupta, Financial Management, Kalyani Publication.*
6. *M.GangadharRao& Others: Financial Management, Himalaya Publishers.*
7. *I M Pandey, Financial Management, Vika Publication House.*
8. *Prasanna Chandra, Financial Management, Tata McGraw Hill.*
9. *15.Brigham,E.F.,1999.Fundamentals of financial management,Dryden press:Florida(partv)*
10. *16.Van Hre, Jmes W. Financial Management and policy,Prentice HallInc.*

4.2 COST ACCOUNTING

OBJECTIVE

The objective of this subject is to familiarize students with the various concepts and elements of cost.

UNIT 1: INTRODUCTION TO COST ACCOUNTING 08 Hrs

Introduction – Meaning& Definition of Cost, Costing and Cost Accounting – Objectives of Costing - Comparison between Financial Accounting and Cost Accounting –Designing and Installing a Cost Accounting System – Cost Concepts - Classification of Costs – Cost Unit – Cost Center – Elements of Cost – Preparation of Cost Sheet – Tenders and Quotations.

UNIT 2: MATERIAL COST CONTROL 14 Hrs

Meaning – Types: Direct Material, Indirect Material. Material Control – Purchasing Procedure – Store Keeping – Techniques of Inventory Control –Levels settings– EOQ – ABC Analysis – VED Analysis – Just In-Time – Perpetual Inventory System – Documents used in Material Accounting - Methods of Pricing Material Issues: FIFO, LIFO, Weighted Average Price Method and Simple Average Price Method - Problems.

UNIT 3: LABOUR COST CONTROL 10 Hrs

Meaning – Types: Direct Labour, Indirect Labour - Timekeeping – Time booking – Idle Time – Overtime – Labour Turn Over. Methods of Labour Remuneration: Time Rate System, Piece Rate System, Incentive Systems (Halsey plan, Rowan Plan & Taylor's differential Piece Rate System) – Problems

UNIT 4: OVERHEAD COST CONTROL 14 Hrs

Meaning and Definition – Classification of Overheads – Procedure for Accounting and Control of Overheads – Allocation of Overheads – Apportionment of Overheads – Primary Overhead Distribution Summary – Secondary Overhead Distribution Summary – Repeated Distribution Method and Simultaneous Equations Method – Absorption of Factor Overheads – Methods of Absorption (Theory Only) – Machine Hour Rate – Problems on Machine Hour Rate.

UNIT 5: RECONCILIATION OF COST AND FINANCIAL ACCOUNTS, EMERGING CONCEPTS IN COSTING. 10 Hrs

Need for Reconciliation – Reasons for differences in Profit or Loss shown by Cost Accounts and Profit or Loss shown by Financial Accounts – Preparation of Reconciliation Statement and Memorandum Reconciliation Account.

BUSINESS LAB ACTIVITIES

1. Identification of elements of cost in services sector by visiting any service sector.
2. Cost estimation for the making of a proposed product.
3. Draft the specimen of any two documents used in material account.
4. Collection and Classification of overheads in an organization on the basis of functions
5. Prepare a reconciliation statement with imaginary figures
6. Collect the latest amendments pertaining to cost sheet elements of ICMA, London

BOOKS FOR REFERENCE

1. M N Arora- Costing-HPH
2. Jain and Narang-cost accounting-Kalyani publishing House
3. Tulsian's- cost accounting-S chand publication
4. J. Made Gowda – Cost and Management Accounting , HPH
5. M.V. Skukla – Cost and Management Accounting
6. N.K. Prasad: Cost Accounting, Books Syndicate Pvt. Ltd.
7. Nigam & Sharma: Cost Accounting , HPH
8. Khanna Pandey & Ahuja – Practical Costing, S Chand

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4.3 BANKING OPERATIONS AND INNOVATIONS

OBJECTIVE

The objective is to familiarize the students with the law, operations and innovations of Banking.

UNIT 1: BANKER AND CUSTOMER RELATIONSHIP 08Hrs

Introduction – Meaning of Bank – Banker - Meaning of Customer - general & Special Relationships.

UNIT 2: BANKING OPERATIONS. 12 Hrs

Collecting Banker and Paying Banker- Meaning – Holder for Value –Holder in Due Course Cheques- collection and payment procedure,- cheques truncation system (CTS0 paper to follow (PTF) Crossing of Cheques, Dishonor of Cheques, Grounds of Dishonor ,Consequences of wrongful dishonor of Cheques.

UNIT 3: CUSTOMERS AND ACCOUNT HOLDERS. 14 Hrs

Procedure and Practice in opening and operating accounts of different customers including Minors - Meaning & Operations of Joint Account Holders, Partnership Firms, Joint Stock companies, Executors and Trustees, Clubs and Associations and Joint Hindu Undivided Family.- E- accounting opening procedure , KYC documents .

UNIT 4: BANK SERVICES 12 Hrs

Principles of lending, Kinds of lending facilities such as Loans, Cash Credit, Overdraft, Bills Discounting, Letters of Credit , criteria for lending loans –CBIL score importance and documents Fee based services-security features, documents , defaults - NPA –meaning types and recovery procedure , Demat

UNIT 5: BANKING INNOVATIONS. 10 Hrs

New technology in Banking – E-services – plastic cards . Internet Banking, ATM based services ,ECS, MICR, RTGS, NEFT, DEMAT, IMPS UPI , AADHAR enabled payment system , USSD, E-Valet and application based payment systems, Role of artificial intelligence in banks, Block Chain – meaning and features

BUSINESS LAB ACTIVITIES:

- Collect and paste pay in slip for SB A/c and Current a/c.
- Draw a specimen of a crossed cheque.
- List out different types of customers and collect KYC documents required for loan
- List out various fee based services offered by a bank in your locality
- List out application based payment systems provided by a commercial bank

BOOKS FOR REFERENCE

1. Maheshwari. S.N.: Banking Law and Practice, Vikas Publication.
2. Kothari N. M: Law and Practice of Banking.
3. Tannan M.L: Banking Law and Practice in India, Indian Law House
4. S. P Srivastava ; Banking Theory & Practice, Anmol Publications
5. Gordon & Natarajan: Banking Theory Law and Practice, HPH.
6. Sheldon H.P: Practice and Law of Banking.
7. Neelam C Gulati: Principles of Banking Management.
8. M. Prakhas, Bhargabhi R: Banking law & Operation, Vision Book House

4.4 BUSINESS RESEARCH METHODOLOGY

OBJECTIVE:
To familiarize students with research process, tools and techniques used along with report generation

UNIT 1: INTRODUCTION TO RESEARCH - 16 Hrs
Research: Meaning –Characteristics of Research- Objectives – Types of Research – Scope of Research – Significance of Research- Research Methods Vs Research Methodology.
Research Design : Review of literature and its significance- Problem Formulation – Sources of problem formulation-Ethics in Research- Plagiarism in research, Measures to overcome Plagiarism, Research Dses ign –Types of research design-Steps involved in designing research design- Types of variables in relation to research design

UNIT 2: SAMPLING METHODS- AND HYPOTHESIS 10 Hrs
Sampling methods- Probability and non-Probability and its applicability- Sampling errors, Confidence interval, Level of significance
Testing of hypothesis-Types –Significance-Steps involved in hypothesis-Formulation of hypothesis- Errors in hypothesis- -

UNIT 3: TOOLS FOR COLLECTION OF DATA - 14 Hrs
Data and its types in research, Sources of data collection, - Primary and secondary - Questionnaire Design-Schedules-Interview-Observation- Survey methods- Scaling measurement techniques: Nominal Scale, Ordinal Scale, Interval Scale, Rating Scale.

UNIT 4: DATA -ANALYSIS 10 Hrs
Classification and Tabulation of data - Analysis of data –Steps involved in analysis of data- Descriptive statistics (Meaning only),Parametric and non- parametric tests applicability (Concepts only) and presentation of Data through charts etc

UNIT 5: REPORT WRITING 06 Hrs
Reports and its types , Format of research report, Report writing – Principles – Steps in report writing-Bibliography, Reference importance and writing style

BUSINESS LAB ACTIVITIES
- Illustrate steps involved in research process
- Prepare a statement of problem by selecting topic of your choice
- Illustrate review of literature and identify research gap
- Construct a questionnaire for collection of primary data keeping in mind the topic chosen for research and make a analysis
- Prepare research report on any research topic of your choice

BOOKS FOR REFERENCE

1. O.R.Krishnaswamy; Research methodology in Social Sciences, HPH,
2. R. Divivedi: Research Methods in Behavior Science, Macmillan India Ltd.,.
3. J.K. Sachdeva: Business Research Methodology HPH
4. S.N. Murthy, V. Bhojanna: Business Research Methods Excel Books
5. Levin &Rubin: Statistics for Management, Prentice Hall of India,
6. Gupta S; Research Methodology and Statistical Techniques, Deep & Deep Publication (P) Ltd.,
7. Thakur D: Research Methodology in Social Sciences, Deep & Deep Publications (P) Ltd.,

8. Tripathi P.C:A Textbook of Research Methodology, Sultan Chand & Sons,
9. Shashi K. Gupta Praneet Singh: Business Research Methods Kalyani Publishers
10. C.R. Kothari, Research Methodology, Vikas Publications 11. Usha Devi N, Santhosh Kumar - Business Research Methodology

4.5 BEHAVIOURIAL SCIENCE

OBJECTIVES:

This course aims to improve students understanding of human behaviour in organizations and the ability to lead people to achieve more effectively toward increased organizational performance.

UNIT 1 INTRODUCTION TO ORGANIZATION BEHAVIOUR 8 Hrs

Introduction to organization and Behavioural Science, role of Behavioural Science in present Business World, organization and managers, manager' roles and skills, behaviour at work, introduction to organization behaviour, major behavioural science disciplines contributing to OB, challenges and opportunities managers have in applying OB concepts, OB model (including motivation models) and levels of OB model

UNIT 2 INDIVIDUAL BEHAVIOR 14 Hrs

Introduction to individual behaviour, values, attitudes, job satisfaction, personality, perception and individual decision making, learning, motivation at work, managing emotions and stress management-meaning-definition Stress and job performance relationship Approaches to stress management, coping with stress

UNIT 3 INTERPERSONAL BEHAVIOR 8 Hrs

Interpersonal Behaviour, Johari Window, Transactional Analysis – ego states, types of transactions, life positions, applications of T.A., managerial interpersonal styles.

UNIT 4 GROUP BEHAVIOR 12Hrs

Introduction to group behaviour, foundations of group behaviour, concept of group and group dynamics, types of groups, formal and informal groups, theories of group formation, group norms, group cohesiveness, group decision making, inter group behaviour, concept of team vs. group, types of teams, building and managing effective teams, leadership theories and styles, power and politics, conflict and negotiation.

UNIT 5 ORGANISATIONAL BEHAVIOR 14 Hrs

Foundations of organization structure, organization design, organization culture, organization Change-resistance ,strategies cultural management , human resource management policies and practices, diversity at work.

BUSINESS LAB ACTIVITIES:

1. Prepare a chart of various organization behaviouriarl models
2. Develop any one motivational models for an organization
3. List out variousFactors influencing perceptions
4. Prepare a chart on various interpersonal behavioral styles.
5. Collect and record the group and organizational behavior of any industry

BOOKS FOR REFERENCE

1. *K. Aswathappa, Organizational Behaviour, HPH.*
2. *N.S. Gupta, Organizational Behaviour, HPH*
3. *Robbins, Organizational Behaviour, International Book House.*

4. *Joh*n W. Newstrom&Kieth Davis, Organizational Behaviour, McGraw Hill.
5. P.G. Aquinas Organizational Behavior, Excel Books.
6. Fred Luthans, Organizational Behaviour. McGraw Hill.
7. . Gangadhar. V.S.P.Rao and P.S.Narayan, Organizational Behaviour
8. M.N.Mishra: OrganisationalBehaviour and Corporate Development, HPH.
9. Sharma R.K & Gupta S.K, Management and Behaviour Process, Kalyani Publishers.

4.6 ADVANCED CORPORATE ACCOUNTING

OBJECTIVE: The objective is to enable the students to develop awareness about Corporate Accounting in conformity with the provisions of Companies Act and latest amendments thereto with adoption of Accounting Standards.

UNIT1: UNDERWRITING OF SHARES **10 hrs.**

Meaning, Underwriting Agreements, Underwriting commission, Underwriter, functions, Advantages.Types of underwriting – marked and unmarked applications. Problems (Excluding Journal entries).

UNIT2: MERGERS AND ACQUISITIONS OF COMPANIES **20 hrs.**

Meaning of Amalgamation and Acquisition, Types of Amalgamation –Amalgamation in the nature of Merger, Amalgamation in the nature of Purchase. Methods of purchase consideration. Calculation of purchase consideration (Ind AS 103) (Old AS 14). Net Asset Method – Net Payment Method. Accounting for Amalgamation. Ledger Accounts in the books of Transferor Company and journal entries in the books of Transferee Company – preparation of new Balance sheet (Vertical Format) (Excluding External Reconstruction).

UNIT 3: INTERNAL RECONSTRUCTION **10 hrs.**

Meaning – Objective –Procedure- Forms of Reduction- Passing of Journal Entries-Preparation of Reconstruction Account. Preparation of Reconstructed Balance sheet (Vertical Format) Problems.

UNIT 4: LIQUIDATION OF COMPANIES. **10 hrs.**

Meaning of liquidation. Types of liquidation. Order of payment- Liquidator – calculation of Liquidators Remuneration – Preparation of Liquidators Final Statement of Account.

UNIT 5: RECENT DEVELOPMENTS IN ACCOUNTING AND ACCOUNTING STANDARDS (Theory Only) **6 hrs.**

Meaning of Recent development. Human Resource Accounting – Environmental Accounting and Social Responsibility Accounting. Forensic accounting

Note: 1. The relevant Ind- AS Standards in line with the IFRS for all the above topics should be covered

2. Any revision of relevant Indian Accounting Standard would become applicable immediately

BUSINESS LAB ACTIVITIES:

1. List out underwriting institutions with their underwriting details .
2. Collect and record the any five recently merged companies
3. List out legal provisions in respect of internal reconstruction
4. Conduct a case study on liquidated company .
5. List out various developments in accounting

BOOKS FOR REFERENCE: (Latest versions)

1. Dr. S N Maheswari. Corporate Accounting.
2. S P Jain and K L Narang – Corporate Accounting
3. Shukla and Grewal – Financial Accounting

4. Tulsian, Advanced Accounting S Chand publishing
5. Dr. A.L Saini, IFRS for India. Snow white publications.
6. R L Gupta; Advanced Accountancy.
7. Arulanandam & Raman ; Corporate Accounting –II
8. Anil Kumar and others: Advanced Corporate Accounting.
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5.1 INCOME TAX-1

OBJECTIVE-The objective of this subject is to make the students to understand the computation of taxable income and tax liability.

UNIT-1: INTRODUCTION TO INCOME TAX. 12hrs

Brief history of Indian Income Tax, legal framework, types of taxes, cannons of taxation, definitions, assessment, assessment year, previous year including exception, assesses, person, income, casual income, gross total income, agricultural income, scheme of taxation, meaning and classification of capital and revenue.

UNIT-2: RESIDENTIAL STATUS 8 hrs

Residential status of an individual's, Determination of residential status, incidence of tax-problems.

UNIT-3: EXEMPTED INCOMES 04 hrs

Introduction, exempted incomes U/S 10. Only in the hands of individuals

UNIT-4: INCOME FROM SALARY 20 hrs

Meaning, definitions, basis of charge, advance salary, arrears of salary, allowances, perquisites, profits in lieu of salary, provident fund, gratuity, commutation of pension, encashment of earned leave, deductions from salary U/S 16, problems on computation of salary income.

UNIT-5:INCOME FROM HOUSE PROPERTY 12 hrs

Basis of charge, deemed owners, exempted income from house property, composite rent, Annual value, determination of Annual value, treatment of unrealized rent, loss due to vacancy, deductions from Annual value U/S 24, problems on computation of income from house property

BUSINESS LAB ACTIVITIES:

1. List out cannons of taxation in India and develop E content on scheme of taxation
2. Prepare a Slab rates chart for different individual assesses,
3. List out any ten exempted income from Tax in India
4. Prepare –E based Chart on perquisites
5. Fill Form No. 49A Online for obtaining PAN and submit the printout to the subject teacher
6. Identify and collect the List of prescribed enclosures pertaining to IT returns in respect of salary and house property incomes

BOOKS FOR REFERENCE LATEST VERSION

1. Dr. viond k. singhania-direct taxes-law and practices, taxmann publication.
2. B B Lal- direct taxes, konark publishers[p] ltd.
3. Dr.Mehrotra and Dr.Goyal- direct taxes-law and practices, sahitya bhavan publication.
4. Dinakar pagare-law and practice of income tax, sultan chand and sons.
5. Gaur and narang- income tax – kalyani publishers.
6. 7 lecturers- income tax-VBH
7. Dr.V Rajesh kumar and Dr. R K sreekantha- income tax 1, vittam publications.

5.2 ENTREPRENEURSHIP DEVELOPMENT AND STARTUPS

Objectives:

This course enables the learner to gain an insight in to starting of his or own enterprise

UNIT 1: ENTREPRENEURSHIP **12 Hrs**

Historic development, Meaning& Definition of Entrepreneur and Entrepreneurship, Functions of Entrepreneur, Factors influencing Entrepreneurship, Advantages and disadvantages, Qualities of an Entrepreneur, Types of Entrepreneurs, brief history about successful entrepreneurs.

UNIT 2: **MICRO, SMALL AND MEDIUM ENTERPRISES (MSME)** **14Hrs**

Meaning & Definition, investment limit Ownership Patterns- Micro, Small and Medium enterprise, Products and services of MSME, Role played by MSME in the development of Indian Economy, Problems faced by MSME and the steps taken to solve the problems, Stages in setting up of MSME.

UNIT 3: START-UPS **12 Hrs**

Meaning, definition features types, benefit and limitation of startups. Players in the promotion of start ups, the role of incubation centers in grooming youngsters for startups preparation of business plan and feasibility reports – Financial, technical, marketing, product service, legal. Causes for success and failure of start-ups in India, Start-ups India scheme, features eligibility, loan facilities matching grant, minimizing section imbalance through the promotion of startups in urban and rural India, Women entrepreneurs in start-ups

UNIT 4: **FINANCIAL AND NON FINANCIAL ASSISTANCE** **12Hrs**

Financial assistance by Commercial banks, co-operative banks, Government Assistance through SFCs SIDBI, IFCI. Non-financial assistance from DIC, SISI, AWAKE, KVIC - Financial incentives for MSMEs and Tax Concessions - Assistance for obtaining Raw Material, Machinery, Land and Building and Technical Assistance - Industrial Estates: Role and Types.

UNIT 5: ARTIFICIAL INTELLIGENCE **06 Hrs**

Meaning and definition, benefits and risks of artificial intelligence , Future progress in Artificial Intelligence AIA based stratups –issues –challenges and prospects. Role of artificial intelligence in developing Enterprises

BUSINESS LAB ACTIVITIES :

1. Prepare a Project report to start a Start-ups Unit.
2. Draft a letter to the concerned authority-seeking license for the proposed MSME Unit
3. Visit a incubation centre and submit report on its activities
4. Prepare a Chart showing financial assistance available to MSME along with rates of interest.
5. List out ethical problems faced by Entrepreneurs/Manager
6. Identify the role of artificial intelligence in developing an Entrepreneurship

BOOKS FOR REFERENCE:

1. Vasant Desai: The Dynamics of Entrepreneurship Development and Management, HPH
2. Mark. J. Dollinger, Entrepreneurship – Strategies and Resources, Pearson Edition.

3. Satish Taneja: Entrepreneur Development, HPH.
4. Udai Pareek and T.V. Rao, Developing Entrepreneurship
5. S.V.S. Sharma, Developing Entrepreneurship, Issues and Problems, SIET, Hyderabad
6. Srivastava, A Practical Guide to Industrial Entrepreneurs, Sultan Chand.
7. Government of India, Report of the committee on small and medium entrepreneurs, 1975
8. VidyaHattangadi ; Entrepreneurship, HPH.
9. N.V.R. Naidu : Management and Entrepreneurship, I.K. International
10. Bharusali, Entrepreneur Development,
11 Anil Kumar : Small Business and Entrepreneurship, I.K. International

5.3 MANAGEMENT INFORMATION ANTECHNOLOGY

OBJECTIVE

The objective of the course is to familiarize the students with latest development in the fields of computers basics of management information systems and Tally for accounting in real time business practices

UNIT 1: INTRODUCTION TO COMPUTER AND COMPUTER NETWORKING: 12 hrs

Computer- Meaning, characteristics of computer, components of computer with block diagram, types of computer, computer software and classification, functions of operating system. Computer networking- Meaning, uses of networking, pros and cons of networking, types of network, network topology, introduction to internet and its services, data base concepts.

UNIT 2: INTRODUCTION TO MANAGEMENT INFORMATION SYSTEM: 12 hrs

MIS- Meaning, characteristics, objectives functions, components, structure of information system, framework for information system, role and importance, critical success factors of MIS implementation.

UNIT 3: MIS AS A COMMUNICATION PROCESS: 10 hrs

MIS planning, establishing an MIS, data- information – data processing, nature of information, characteristics of information, sources of information, information system and phases of decision-making process. Communication –recent changes –virtual communication platforms

UNIT 4: OFFICE AUTOMATION SYSTEM: 12 hrs

Meaning of office and office automation- functions of office- nature of office-virtual office-advantages and disadvantages- measuring for making virtual office- office automation applications. Software's in office automation –accounting marketing and HR software

UNIT5: FUNDAMENTALS OF COMPUTERIZED ACCOUNTING 10 hrs

Computerized accounting Vs manual accounts. Architecture and customization of TALLY – Features of Tally- Configuration of Tally screens and menus – Creation of company and groups – Editing and deleting ledgers – Introduction to vouchers – Entry, payment, receipt, sales, purchase, contract and Journal vouchers- Editing and deleting vouchers.

BUSINESS LAB ACTIVITIES: (Use Accounting Packages)

1. Prepare vouchers for entries for the given transactions.
2. Prepare final accounts from the Trial Balance given with any five adjustments
3. Generate computer networking model
4. List out the factors for success of the MIS
5, Prepare of different flowcharts of office automation

BOOKS FOR REFERENCE:

1. Ashok Arora & Akshaya Bhatia, Management Information System, 1st edition, Excel book, New Delhi, 2001
2. C. S. V Murthy, Management Information System - Himalaya Publication house, 2015
3. Elamsri, Rameez and Navathe , Fundamentals of Database Systems - 5th edition, Pearson Education , New Delhi, 2012
4. Ghosh P K, Office Organization & Management - 12th edition, Himalya Publication , Mumbai 1982

5. Jain S P , Modern Office Organization & Management - 7th Edition, DhanpatiRai and Son publication, New Delhi, 1992
6. Accounting Information Systems, 11/E Marshall B. Romney**,** *Brigham Yo University* Paul J. Steinbart**,** *Arizona State University*, Prentice Hall
7. The Crossroads of Accounting and IT Donna Kay, Ali Ovlia, May 2011, Hardback,
8. Accounting Information Systems International Edition 10th Edition George Bodnar, William Hopwood Aug 2009

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5.4 FINANCIAL ANALYSIS AND REPORTING

OBJECTIVE

The objective of this Course is to enable the students to understand the analysis and interpretation of financial statements with a view to prepare management reports for decision-making.

UNIT 1: FINANCIAL STATEMENTS ANALYSIS 12 Hrs

Management Accounting - Meaning Financial analysis - Introduction -Meaning – Definition – Objectives – Nature and Scope Advantages and limitations , Role of Financial Analyst -Comparative statements, comparative income statement comparative Balance sheet– common size statements – Common size income statement, common size Balance Sheet – Trend percentages. Problems

UNIT 2 : RATIO ANALYSIS 14 Hrs

Meaning and Definition of Ratio, Accounting Ratio and Ratio Analysis – Uses – Limitations - Classification of Ratios – Problems on Ratio Analysis - Preparation of Trading and Profit & Loss Account and Balance Sheet with the help of Accounting Ratios

UNIT 3: **FUND FLOW ANALYSIS** 12Hrs

Meaning and Concept of Fund – Meaning and Definition of Fund Flow Statement – Uses and Limitations of Fund Flow Statement – Procedure of Fund Flow Statement – Statement of changes in Working Capital – Statement of Funds from Operation – Statement of Sources and Application of Funds – Problems.

UNIT 4: CASH FLOW ANALYSIS 12Hrs

Meaning and Definition of Cash Flow Statement – Differences between Cash Flow Statement and Fund Flow Statement – Uses of Cash Flow Statement – Limitations of Cash Flow Statement – Provisions of AS-3 – Procedure of Cash Flow Statement – Concept of Cash and Cash Equivalents - Cash Flow from Operating Activities – Cash Flow from Investing Activities and Cash Flow from Financing Activities – Preparation of Cash Flow Statement according to AS-3 (Indirect Method Only).

UNIT –5**: MANAGEMENT REPORTING** **6Hrs**

Meaning of Management Reporting – Requisites of a Good Reporting System – Principles of Good Reporting System – Kinds of Reports – Drafting of Reports under different Situations.

BUSINESS LAB ACTIVITIES:

- Collect financial statements of any one organization for two years and prepare Comparative statement, common Size Statements and trend percentages
- Collect statements of an Organization and Calculate Important Accounting Ratio's
- Collect financial statements of any one organization and prepare fund flow statement
- Collect financial statements of any one organization and prepare cash flow statement
- Draft a report on any crisis in an organization

BOOKS FOR REFERENCE:

1. Shashi K. Gupta and R. K. Sharma Management Accounting by, Kalyani Publishers
2. Dr. S.N. Maheswari , Management Accounting
3. M. Y .Khan and P. K. Jain Management Accounting– Tata McGraw Hill
4. Monilal Das - Practice in Management Accountancy - Rabindra Library Publication. .
5. Dr. S.N. Goyal and Manmohan, Management Accounting

6. Dr. S. P. Gupta -Management Accounting by Sahitya Bhavan Publications.
7. Sexana, Management Accounting
8. J.Made Gowda - Management Accounting
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6.1 INCOME TAX- II

OBJECTIVE: The objective of this Course is to make the students to understand the computation of taxable Income and tax liability of individual assessees

UNIT 1: PROFITS AND GAINS FROM BUSINESS OR PROFESSION 16 hrs.
Meaning and Definition of Business Profession Vocation, Expenses Expressly Allowed – Allowable Losses, Expenses Expressly Disallowed, Expenses Allowed on payments basis. Problems on Business relating to Sole trader and Problems of Profession relating to Chartered Accountant, Advocate and Medical practitioners.

UNIT 2: CAPITAL GAINS 12 hrs.
Basis of charge ,Capital Assets ,Transfer of Capital Assets ,Computation of capital gains, Exemptions U/S 54, 54B, 54D, 54EC, 54F, 54GA, problems on capital gains.

UNIT 3: INCOME FROM OTHER SOURCES. 10 hrs
Incomes taxable under this head, securities, types of securities ,Rules for grossing up ,Ex- interest securities Cum-interest securities , Band washing transcations, problems on income from other sources.

UNIT4: SET OFF AND CARRY FORWARD OF LOSSES AND DEDUCTIONS FROM GROSS TOTAL INCOME: 8 hrs
Provisions for set-off and carry forward of losses (theory only). Deductions U/S 80C, 80CC, 80CCB, 80D, 80E, 80G, 80GG, 80GGA, and 80U only.- simple problems on 80G only

UNIT5: INCOME TAX AUTHORITIES AND ASSESSMENT OF INDIVIDUALS: 10 hrs
Powers and functions of CBDT, CIT, and AO, Assessment,-Types of Assessment , Computation of total income and Tax liability of an Individuals (problems in case of Income from salary and HP – computed income may be given).

BUSINESS LAB ACTIVITIES:

1. Preparation of Form 16.
2. Prepare table of cost inflation Index.
3. Composition and structure of CBDT
4. Prepare Different type of ITR -1, 2, 3, 4
5. Develop E-content for tax avoidance and tax evasion concepts

BOOKS FOR REFERENCE:

1. Dr. Vinod K. Singhania: Direct Taxes- Law and Practice, Taxamann publication.
2. B B LAL : Direct Taxes. Konark Publishers (p) ltd.
3. Dinakar pagare; Law and Practice of Income Tax . Sultan chand and sons.
4. Gaur and Narang; Income Tax , Kalyani publishers.
5. Dr. H.C. Mehrothra; Income Tax . Sahitya Bhavan publications.
6. 7 lecturers; Income Tax II; VBH
7. Dr. V. Rajeshkumar and Dr. R.K. Sreekantha ; Vittam publishers.

6.2 AUDITING AND ATTESTATION

OBJECTIVE:

This course aims at imparting knowledge about the principles and methods of auditing and their applications

UNIT 1: INTRODUCTION TO AUDITING **12 Hrs**

Introduction – Meaning - Definition – Objectives – Differences between Accountancy and Auditing – Types of Audit - Advantages of Auditing – Preparation before commencement of new Audit – Audit Notebook – Audit Working Papers – Audit Program, Recent Trends in Auditing: Nature & Significance of Tax Audit – Cost Audit - Management Audit. Forensic audit

Tally ERP 9 Auditors Edition: Introduction, features, characteristics – Tally.Net: features – requirements for remote connectivity – Access information via SMS, Safeguard Data – Automated Backup and Recovery. E-Auditing-meaning, uses and limitations, auditing the auditors

UNIT 2: INTERNAL CONTROL **10 Hrs**

Internal Control: Meaning and objectives. Internal Check: Meaning, objectives and fundamental principles. Internal Check as regards: Wage Payments, Cash Sales, Cash Purchases. Internal Audit: Meaning - Advantages and Disadvantages of Internal Audit – Differences between Internal Check and Internal Audit.

UNIT 3: VOUCHING **12 Hrs**

Meaning - Definition – Importance – Routine Checking and Vouching – Voucher -Types of Vouchers – Vouching of Receipts: Cash Sales, Receipts from debtors, Proceeds of the sale of Investments. Vouching of Payments: Cash Purchases, Payment to Creditors, Deferred Revenue Expenditure.

UNIT 4: VERIFICATION AND VALUATION OF ASSETS AND LIABILITIES **12 Hrs**

Meaning and Objectives of verification and valuation– Position of an Auditor as regards the Valuation of Assets – Verification and Valuation of different Items: Assets: Land & Building, Plant & Machinery, Goodwill – Investments - Stock in Trade. Liabilities: Bills Payable - Sundry Creditors – Contingent Liabilities.

UNIT 5: AUDIT OF LIMITED COMPANIES AND OTHERS **10 Hrs**

Company Auditor – Appointment – Qualification - Powers - Duties and Liabilities Professional Ethics of an Auditor - Audit of Educational Institutions – Audit of Insurance Companies- Audit of Cooperative societies. Institutions for Auditing central Vigilance Commission (CVC) comptroller and Auditor General of India (CAG), State Accountant and Auditor General (SAG) –role and functions in Public Account Audits

BUSINESS LAB ACTIVITIES : :

1. Collect the information about types of audit conducted in any one Organization
2. Visit an audit firm write about the procedure followed by them in auditing the books of accounts of a firm.
3. Draft an investigation report on behalf of a Public Limited Company
4. Record the verification procedure with respect to any one fixed asset.
5. Develop E-content for qualified report and clean report of an MNC
6. List the renowned international audit firms

BOOKS FOR REFERENCE:

1. BN Tandon, Practical Auditing, Sultan Chand

2. Dinakar Pagare, Practice of Auditing, Sultan Chand
3. R.G Sexena - Principles and Practice of Auditing, HPH
4. TR Sharma, Auditing, Sahitya BhavaN
5. Kamal Gupta, Practical Auditing, TMH
6. MS Ramaswamy, Principles and Practice of Auditing.

6.3 GOODS AND SERVICES TAX

OBJECTIVE :

This course expose the students to the various provisions and computation of goods and service tax & customs duty and to enable the students to become independent tax practitioners

UNIT 1: INTRODUCTION TO GOODS AND SERVICES TAX (GST) 10Hrs

The concept of GST- The need for GST and the historical background of GST in India differences between the Direct and indirect taxes, the basic features of Indirect taxes and the principal Indirect taxes in India, Taxes Subsumed not subsumed under GST. The framework under GST (Dual Model) and various benefits that are accrued from implementation of GST, The significant amendments made in Constitution (101st Amendment) Act (Union, state and concurrent list), 2016. GST Council-Constitution Power and Functions

UNIT 2: GST ACT's AND IMPORTANT DEFINITIONS IN GST 14Hrs

Salient features of CGST Act, SGST Act (Karnataka State), IGST Act . Definitions of: Goods, Services, Person, Business, Business Vertical, Consideration, Aggregate Turnover, Fixed Establishment, Casual taxable person, Concept of Supply [Section 7 of CGST Act], Taxable Supplies, Exempt Supply, Non- taxable supply, Supply with consideration in course/ furtherance of business, Supply without consideration; Schedule I, II, and III to the GST Act. Classification of rate of Taxes under GST and Composition scheme, Continues supply, Composite supply, Principal supply, Mixed Supply [Section 8], Taxability of Interstate supply and Intra state supply, Concept of Outward supply and Inward supply over Sales and Purchases

UNIT 3:PROCEDURE AND LEVY UNDER GST: 12 Hrs

Registration under GST based on Turnover Limits. Casual registration; Levy and collection of CGST/SGST/IGST (Section 9 of CGST), Composition levy (Section10), Reverse Charge Mechanism (RCM)(Section 9(3)/9(4), Classification of rate of Taxes under GST and Composition scheme. Power of Grant Exemption from Tax [Section 11 of the CGST Act) Tax Invoice and essential elements in Invoice -Both theory and Numerical based problems

UNIT 4: INPUT TAX CREDIT: 12 Hrs

Definition of: Input Goods, Input Services, Capital goods, Input on Capital Goods, Concept of Input tax credit Eligibility and conditions for taking ITC, Cross Utilization of ITC, Apportionment of credit and blocked credits, Availability of credit in special circumstances, availing and utilization of ITC. Treatment of IGST on import of Goods – Problems

UNIT 5: FILING OF RETURNS & PAYMENT OF TAX &TECHNOLOGY 8 hrs

Definition of Returns, Concept of Electronic Credit Ledger, Electronic Cash Ledger, Brief introduction and contents in- Returns for Outward supply (GSTR-1), Returns for Inward Supply (GSTR-2), Final Monthly Returns (GSTR-3), Annual Returns (GSTR-9) Mechanism of GST

Network w.r.t Returns matching of invoices. Filing of First Returns GST Network: Structure, Vision and Mission, Powers and Functions. (Theory only)

BUSINESS LAB ACTIVITIES:

1. Narrate the procedure for calculation of CGST, SGCT and IGST.
2. Prepare chart showing rates of GST.
3. Prepare Tax invoice under the GST Act.
4. Prepare list of exempted goods/ services under GST.
5. Show the flow chart of GST Suvidha Provider (GST).

BOOKS FOR REFERENCE:

1. Deloitte: GST Era Beckons, Wolters Kluwer.
2. Madhukar N Hiregange: Goods and Services Tax, Wolters Kluwer.
3.: V.S Datey - All About GST Taxman's. publication
4.: CA. Rajat Mohan, Guide to GST
5. N.K. Gupta & Sunnania Batia,-Goods & Services Tax – Indian Journey: Barat's Publication
6. Goods & Services Tax: Dr. Sanjiv Agrawal & CA. Sanjeev Malhotra.
7. Dr. B.G. Bhaskara, Manjunath. N & Naveen Kumar GST - Law & Practice: IM,
8.: Kamal Garg, Understanding GST Barat's Publication.
9. Jayaram Hiregange & Deepak Rao, India GST for Beginners, 2nd ed, June 201

6.4 BUSINESS REGULATIONS

OBJECTIVES: The objective of this course is to orient and familiarize students about relevant laws concerning business organizations.

UNIT 1 : INTRODUCTION **10 hrs**

Business Law –Meaning, definition, characteristics, sources and its Significance. Types of business Law, difference between Law and ethics. Case precedent- Meaning of plaintiff, defendant, petitioner, respondents, public prosecutors, advocate General, Solicitor general of India, Judicial Magistrate of First class, civil Judge, Sessions (criminal court judge) Metropolitan magistrate, economic offences. Constitutional provisional relating to business affairs (state list, concurrent list and central list) difference between civil cases and criminal cases, *adalaths*

UNIT 2 CONTRACT LAWS **18 Hrs**

- **Indian Contract Act 1872:** Definition of contract, essentials of valid contract, classification of contract, remedies for breach of contract Termination and Discharge of Contract; Indemnity and Guarantee; Bailment and Pledge; Law of Agency.

- **Sale Of Goods Act 1930:** Definition of contract of sale, essentials of contract of sale, conditions and warrantees, right and duties of buyer, right of unpaid seller.

UNIT 3 : CONSUMER PROTECTION ACT (COPRA) 2019 **06 hrs**

Objective of the Act, important terms- Complaint, Consumer, Consumer dispute, consumer rights, defect, Deficiency, direct selling, E-commerce, Electronics Service providers, HARM, injury, misleading advertisement , product liability. Restrictive trade practice, service unfair trade practice (UTP), Consumer dispute redressal forums- district forum, state commission and national commission. Jurisdiction offences and penalties under the ACT

.

UNIT 4: **INSOLVENCY AND BANKRUPTCY CODE 2016** **08 hrs**

Introduction - rationale and objectives: Need for Insolvency and Bankruptcy Code: Social, Legal, Economic and Financial Perspectives -Authorities and Enforcement Mechanism in IBC 2016 - Role of Adjudicating Authorities - Role of the Insolvency and Bankruptcy Board of India (IBBI) Appellate Authorities -Insolvency of Individuals and Partnership firms

UNIT 5 INTELLECTUAL PROPERTY RIGHT AND INFORMATION TECHNOLOGY ACT **14 hrs**

(a) Intellectual Property Right: Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design –IPR in India ,IPR in abroad - Major International Instruments concerning Intellectual Property Rights

(b) Information Technology Act, 2000: objective of the Act, Meaning of Cyber Law ,Cyberspace, digital signature, private key, public key, encryption, digital signature certificate, Cyber Crimes- Meaning and types, offences and penalties. Information Technology (Amendment 2018) –special provisions relating to online gaming, provision of adequate safeguards against dangerous gaming resources and online material that disturbs the cultural values and ethos.

BUSINESS LAB ACTIVITIES:

1. Prepare a chart showing sources of business law and Indian Constitution Articles having economic significance
2. Draft an agreement on behalf of an MNC to purchase raw materials indicating therein terms and conditions and all the essentials of a valid contract.
3. List out recently adjudicated IBC cases in India
4. Draft digital signature certificate
5. Collect leading cyber-crimes cases and form groups in the class room and conduct group discussion for giving innovative remedial measures

BOOKS FOR REFERENCE

1. N.D. Kapoor, Business Laws, Sultan chand publications.
2. Tulsion Business Law, TMH
3. S.S Gulshan – Business Law
4. S.C. Sharma: Business Law I.K. International Publishers
5. K. Aswathappa, Business Laws, HPH,
6. Bulchandni, Business Laws, HPH.
7. Ramachandra et.,al, "Legal aspect of business text and cases" HPH

8 K. Venkataramana, Business Regulations, SHBP.

Elective I : ACCOUNTING AND FINANCE

5.5 ADVANCED ACCOUNTING

OBJECTIVE:
The objective is to acquaint the students and make them familiar with the process and preparation of accounts of different types of organizations.

UNIT 1: ACCOUNTS OF BANKING COMPANIES 16 Hrs

Business of banking companies – some important provisions of Banking Regulation Act of 1949 – minimum capital and reserves – restriction on commission – brokerage – discounts – statutory reserves – cash reserves – books of accounts – special features of bank accounting, final accounts - balance sheet and profit and loss account – interest on doubtful debts – rebate on bill discounted – acceptance – endorsement and other obligations – problems as per new provisions.

UNIT 2: ACCOUNTS OF INSURANCE COMPANIES 16 Hrs

Meaning of life insurance – accounting concepts relating to life insurance companies - Preparation of Final accounts of life insurance companies – revenue account and balance sheet. - General insurance – Meaning accounting concepts- Preparation of Final accounts.

UNIT 3: INFLATION ACCOUNTING 10 Hrs

Need – Meaning – definition – importance and need – role – objectives – merits and demerits – problems on current purchasing power method (CPP) and current cost accounting method (CCA).

UNIT 4: FARM ACCOUNTING 10Hrs

Meaning – need and purpose – characteristics of farm accounting – nature of transactions – cost and revenue – apportionment of common cost – by product costing – farm accounting – recording of transactions – problems.

UNIT 5: INVESTMENT ACCOUNTING 04 Hrs

Introduction – classification of Investment – Cost of Investment – cum-interest and ex-interest – securities – Bonus shares- right shares – disposal of Investment – valuation of investments – procedures of recording shares – (theory only)

BUSINESS LAB ACTIVITIES:

1. Collect any banking companies final accounts and prepare schedules
2. Visit any insurance company and collect the financial statement and prepare financial statement

3. Collect data and prepare chart showing companies practicing CAA and CPP methods of accounting
4. Prepare a chart on apportionment of common farm cost
5. List out various investment valuation methods

BOOKS FOR REFERENCE:

1. S. P. Jain and K. L. Narang – advanced accountancy, Kalyani publication
2. S.N. Maheswari , Advanced Accountancy, Vikas Publishers . .
3. R L Gupta, Advanced Accountancy, Sultan Chand
4. Shukla and Grewal, Advanced Accountancy, S Chand
5. Made Gowda – Advanced Accounting, HPH
6. Jawaharlal, Managerial Accounting, HPH
7. Soundrarajan A & K. Venkataramana, Advanced Accountancy, SHBP.
8. Anil Kumar, etal-Advanced Accounting-HPH

5.6 DERIVATIVES & RISK MANAGEMENT

OBJECTIVE

The objective is to introduce the students to the key concepts of Risk Management and provide an understanding of Derivatives as financial instruments to mitigate the risk.

Unit 1: RISK MANAGEMENT **10hrs**

Introduction, Risk and Uncertainty, Classification of Risks, Scope, Objectives, Process, Role of Risk Management in Business, Introduction to Derivatives, Evolution of Derivatives, Meaning & Definition, Characteristics, Functions, Types of Derivatives – Introduction, Meaning & Definition, Participants, Uses, Economic Benefits of Derivatives, Factor Contributing to the growth of Derivatives in India, recent trend in Derivatives.

Unit 2: DERIVATIVE INSTRUMENTS **18hrs**

Forward Contract: Meaning & Definition, Features, Terminologies, Pricing of Forward Contract, Limitations, Explanation of Forward Contract with a simple example.

Futures Contract: Meaning & Definition, Terminologies, Participants, Types of Futures Contract, Futures v/s Forwards, Pricing of Futures: Theoretical Pricing of Derivatives - Cost of Carry Model (Theory Only), Explanation of Future Contract with a simple example, Futures Market in India – Recent Developments

Options Contracts: Meaning & Definition, Terminologies, Types of Options Contract, Options v/s Futures v/s Forwards, Participants, Pricing of Options: Theoretical Pricing of Derivatives: Black Sholes Model & Binomial Distribution Model, Explanation of Option Contract with a simple example, Option Market in India – Recent Developments

Swaps Contracts: Meaning & Definition, Terminologies, Types of Swaps Contract, Swaps v/s Options v/s Futures v/s Forwards, Participants, Pricing of Swaps, Back to Back Loan, LIBOR & MIBOR, Explanation of Swaps Contract with a simple example, Swaps Market in India – Recent Developments

Unit 3: SPECULATION, ARBITRATION, HEDGING **08hrs**

Introduction, Meaning & Definition, Objectives, Functions, Types, Strategies, Speculation v/s Arbitration v/s Hedging, Can Speculation / Arbitration / Hedging mitigate financial risk for Companies?

Unit 4: TRADING, CLEARING & SETTELMENT - DERIVATIVES **08hrs**

Introduction, Meaning, Types, Order System in Stock Exchange, Types of Orders, Mechanism of Trading, Clearing & Settlement in Derivatives Segment, Recent updates in Trading of Derivatives in Stock Exchange

Unit 5: STOCK EXCHANGES IN INDIA **10hrs**

Introduction, Meaning & Definition, Members, Brokers & Participants in Stock Exchange, Derivative Contracts in Stock Exchange, Demat account – Introduction & Types of orders processing, Investment v/s Speculation, Practical exposure of Futures & Options Market traded in Indian Stock Exchanges.

BUSINESS LAB ACTIVITIES:

1. Understand the elements of financial Risk Management. Adequate exposure to the functioning of financial Risk Management tools.
2. Prepare a chart on working mechanism of Forwards, Futures, Options and Swaps.

3. Describe the trading pattern, clearing and settlement procedure followed in BSE & NSE.
4. Prepare a chart on guidelines given by SEBI for trading in Derivatives.
5. Prepare a chart consisting of the movement of major stock indices of world – S&P, Sensex, Nikkei, Dow Jones, Nasdaq, FTSE, Hang Seng.

REFERENCE BOOKS

1. Dun & Bradstreet: Financial Risk Management, Tata McGraw-Hill Publication.
2. Kotreshwar, G: Risk Management- Insurance and Derivatives, Himalaya Publishing House
3. Trieshmann, Gustavson & Hoyt: Risk management & Insurance, Thomson Learning Inc
4. Crouhy M. Dan Galai and Robert P. Mark: Risk Management, McGraw-hill Co.
5. Paul Hopkin, Fundamentals of Risk Management
6. George E Rejda and Michael McNamara, Principles of Risk Management & Insurance
7. John C. Hull, Risk Management & Financial Institutions
8. Merton M Miller, Derivatives,

6.5 COSTING METHODS AND TECHNIQUES

Objective :

To familiarize the students on the uses and applications of cost accounting methods in different businesses. Sectors

UNIT1: INTRODUCTION TO COSTING METHODS AND TECHNIQUES ,JOB COSTING AND CONTRACT COSTING. 16 hrs

Meaning of Costing Methods and Techniques-Types-Meaning of Job Costing-Features- Meaning of Contract costing –Features – similarities and dissimilarities between job and contract costing, procedure of contract costing, profit on incomplete contracts-Problems.

UNIT 2: PROCESS COSTING 14 hrs

Introduction, meaning and definition, Features of Process Costing, applications, comparison between Job costing and Process Costing, advantages and disadvantages, treatment of normal loss, abnormal loss and abnormal gain, rejects and rectification Joint and by-products costing – problems under reverse cost method

UNIT 3: OPERATING COSTING 12 Hrs

Introduction, Meaning and application of Operating Costing, - Power house costing or boiler house costing, canteen or hotel costing, hospital costing (Theory only) and Transport Costing – Meaning, Classification of costs, collections of costs, ascertainment of Absolute Passenger Kilometers, ton kilometers- Problems.

UNIT4: ACTIVITY BASED COSTING 10 hrs

Meaning, Differences between Traditional and Activity based costing. Characteristics of ABC, Cost drives and cost pools, Product costing using AABC system: uses- limitations-Steps in implementation of ABC- Simple problems.

UNIT 5: TARGET COSTING 4hrs

Meaning. Nature, Methodology,Methods of Establishment of cost. Just in Time (JIT)- Features, Implementation and benefits.(Theory only).

BUSINESS LAB ACTIVITIES:

1. List out industries located in your area and collect the details of methods of costing adopted by any two organizations
2. Collect data for Job costing pertaining to printing press and repair shops
3. Develop E-content for the significance of contract costing applicable to leading builder and developers
4. Develop E-content for operating costing of a renowned transport company
5. Prepare an Activity base cost statement of a company

BOOKS FOR REFERENCE

1. Jain &Narang, Cost Accounting-KP
2. M.N. Arora, Cost Accounting. HP

3. Nigam and Sharma, Advanced Costing.
4. N. K Prasad, Costing
5. Ravi M. Kishore – *Cost Management*
6. S. Mukherjee & A. P. Roychowdhury – *Advanced Cost and Management Accountancy*
7. K.S Thakur- Cost Accounting
8. Ashish K Bhattacharyya: cost accounting for business managers.
9. Palaniappan and Hariharan-Cost Accounting-I.K. International Publishers
10. J. MadeGowda Cost Accounting
11. Rathnam : Cost Accounting

6. 6 SECURITY ANALYSIS & PORTFOLIO MANAGEMENT

OBJECTIVE

To familiarize the students about investment decisions and portfolio decisions.

UNIT 1: INTRODUCTION TO SECURITIES **14hrs**

Investment – Meaning & Definition, Types or Avenues of Investment, Investment v/s Gambling v/s Speculation v/s Arbitration v/s Hedging, Factors to be considered for Investment, Investment Policy, Risk and Return Analysis, Types of Risk Appetite, Types of Risks in Investment, Sources of Risk, Risk Measurement – Standard Deviation, Covariance, Beta, Correlation (problems), Legal framework and Regulatory cover for Investment in India.

UNIT 2: SECURITY ANALYSIS **14hrs**

Introduction to Fixed and Variable Income Securities, Equity Valuation Models, Fixed Income Securities Valuation Models: Bonds, Introduction to – Fundamental Analysis, Economic Analysis, Industry Analysis, Company Analysis, Technical Analysis – Modern Tools for Technical Analysis – Line, Point and Figure, Candlestick, **Renko Chart, Heikin Ashi, etc. Price Patterns of Stock**, Price Trends of Stock, Practical explanation on Technical Indicators used in Stock Market.

UNIT 3: PORTFOLIO MANAGEMENT **12hrs**

Meaning of Portfolio Management, Need, Objectives, Process, Selection of securities, Capital Asset Pricing Model, CML, SML, Beta Factor – Alpha and Beta Coefficient – Problems, Single Index Model (Theory), Arbitrage pricing theory (Theory)

UNIT 4: PORTFOLIO EVALUATION & REVISION **08hrs**

Portfolio Evaluation Strategies - Sharpe Model – Jensen Model – Treynor Model and MM Model - Problems Portfolio Revision, Active and Passive Management, Formula Plans, Recent development in strategies

UNIT 5: GLOBAL MARKETS **08hrs**

Global Investment Benefits – Introduction to ADRs, GDRs, IDRs, Green Bond, Masala Bond, FCCBs, External Commercial Borrowings, Foreign Bonds, Global Mutual Funds – Relationship between Trends in Global Markets and the Domestic Markets, International Investing, International Funds Management, Emerging Opportunities.

BUSINESS LAB ACTIVITIES

1. Prepare an imaginary investment portfolio for individual with a salary of 10 lakhs per annum.
2. List of 10 companies approached SEBI for IPO
3. Prepare a technical analysis chart on Blue Chip Companies of BSE.
4. Collect information regarding GDRs, ADRs, IDRs and various Bonds and make a chart.
5. Watch market movement for a day and analyze the trend of Nifty-Fifty Index.

BOOKS FOR REFERENCES:

1. A. Brahmiah & P. Subba Rao, Financial Futures and Options, HPH.
2. Singh Preeti, Investment Management, HPH

3. Alexander Fundamental of Investments, Pearson Ed.
4. Hangen: Modern Investment theory. Pearson Ed.
5. Kahn: Technical Analysis – Plain and sample Pearson Ed.
6. Ranganthan: Investment Analysis and Port folio Management.
7. Chandra Prasanna: Managing Investment – Tata Mc Gram Hill.
8. Alexander, shampe and Bailey – Fundamentals of Investments Prentice Hall of India
9. Newyork Institute of Finance – How the Bond Market work – PHI.
10. Mayo Investment Thomason hearning

ELECTIVE II : MARKETING AND HUMAN RESOURCE MANAGEMENT

5.5 CONSUMER BEHAVIOUR AND MARKETING RESEARCH

UNIT :1 INTRODUCTION TO CONSUMER BEHAVIOUR 14 hrs

Introduction to Consumer Behaviour - Definition of Consumer behavior, Consumer and Customer, Buyers and Users -A managerial & consumer perspective; Need to study Consumer Behaviour; Applications of consumer behaviour knowledge; current trends in Consumer Behaviour; Market segmentation & consumer behaviour.

UNIT :2 ONLINE BUYING CONSUMER BEHAVIOUR AND ENVIRONMENTAL DETERMINANTS 12 Hrs

Introduction to Online Buying Behaviour-Meaning and Definition of Online Buying Behaviour-Reasons for Buying Through Online Channel-Consumer decision making Process towards online shopping -Factors Affecting Consumer Behaviour

UNIT 3: CONSUMER SATISFACTION & CONSUMERISM 12 hrs

Concept of Consumer Satisfaction; Working towards enhancing consumer satisfaction; sources of consumer dissatisfaction; dealing with consumer complaint. Concept of consumerism; consumerism in India; The Indian consumer; Reasons for growth of consumerism in India; Consumer protection Act 1986.

UNIT 4: MARKETING RESEARCH DYNAMICS 10 Hrs

Introduction, Meaning of Research, Research Characteristics, Various Types of Research , Marketing Research and its Management, Nature and Scope of Marketing Research , Marketing Research in the 21st Century (Indian Scenario), Marketing Research: Value and Cost of Information

UNIT 5 METHODS OF DATA COLLECTION AND RESEARCH PROCESS 10 Hrs

Introduction, Meaning and Nature of Secondary Data, Advantages of Secondary Data, Drawbacks of Secondary Data, Types of Secondary Data Sources, Primary Data and its Types

Research Process: An Overview, Formulation of a Problem, Research Methods, Research Design, Data Collection Methods, Sample Design, Data Collection, Analysis and Interpretation, Report Writing.

BUSINESS LAB ACTIVITIES

- Collect information on behavior of consumers at an unorgnised retail outlets
- Prepare a questionnaire to conduct consumer survey to assess the important factors motivates their purchase like mobiles, shoes, bags etc
- Collect and record feedback on customer satisfaction online shopping
- List out the modern marketing research techniques
- Write a report on the marketing problem faced by any organization of your choice

BOOKS FOR REFERENCE

1. Philip Kotler, Marketing Management, Prentice Hall. 34
2. Bose Biplab, Marketing Management, Himalaya Publishers.
3. J.C. Gandhi, Marketing Management, Tata McGraw Hill.

4. Ramesh & Jayanti Prasad: Marketing Management, I.K. International
5. William J. Stanton, Michael J.Etzel, Bruce JWalker, Fundamentals of Marketing, McGraw Hill Education.
6. Sontakki, Marketing Management, Kalyani Publishers.
7. Kuranakaran, Marketing Management, Himalaya Publishers.

5.6 PERFORMANCE MANAGEMENT

OBJECTIVE:

To familiarize the students with the concepts ,process, methods and techniques used for performance appraisal in an organization

UNIT 1***INTRODUCTION TO PERFORMANCE MANAGEMENT****:* *8 Hrs*

Definition of Performance Evaluation, Evolution of Performance Management, Definitions and Differentiation of Terms Related to Performance Management. What a Performance Management System Should Do? Importance of Performance Management, Linkage of Performance Management to Other HR Processes

UNIT 2***PROCESS OF PERFORMANCE MANAGEMENT:*** ***10 hrs***

Overview of Performance Management Process, Performance Management Process, Performance Management Planning Process, Mid-cycle Review Process, End-cycle Review Process, Performance Management Cycle at a Glance

UNIT 3***MECHANICS OF PERFORMANCE MANAGEMENT PLANNING AND DOCUMENTATION****:* *14 hrs*

The Need for Structure and Documentation, Manager's Responsibility in Performance Planning Mechanics and Documentation, Employee's Responsibility in Performance Planning Mechanics and Documentation, Mechanics of Performance Management Planning and Creation of PM Document - ***Performance Appraisal****:* Definitions and Dimensions of PA, Purpose of PA and Arguments against PA, Importance, Characteristics of Performance Appraisal, Performance Appraisal Process, Limitations

UNIT 4 ***PERFORMANCE APPRAISAL METHODS****:* *14 hrs*

Performance Appraisal Methods, Traditional Methods, Modern Methods, including 360 and 720 models and Performance Appraisal of Bureaucrats – A New Approach

UNIT 5 ***ISSUES IN PERFORMANCE MANAGEMENT****:* *10 hrs*

Role of Line Managers, Performance Management and Reward: Role of Line Managers in Performance Management, Performance Management and Reward, Concepts related to Performance and Reward, Linking Performance to Pay – A Simple System Using Pay Band, Linking Performance to Total Reward, Challenges of Linking Performance and Reward - *Facilitation of Performance Management System through Automation - Ethics in Performance Appraisal*

BU SINESS LAB ACTIVITIES :

1. Develop E content on Latest Performance Appraisal Techniques
2. Collect performance appraisal documents of a selected organizations
3. Prepare a chart on different automation tools used in performance appraisal
4. Conduct a case study on a performance v/s reward methods adopted by organization in your locality
5. List out various latest issues in performance appraisal

BOOKS FOR REFERENCE:

1. A.M Sheikh, Human Resource development and Management, 3rd Revised edition, S Chand publication

2. Snell and Bohlander, Human Resource Management, South-Western Cengeage Learning. Indian Edition.
3. Uday Kumar Haldar and JuthikaSankar, Human Resource Management. Oxford Higher Education,
4. SeemaSanghi, Human Resource Management, VikasPubllications,
5. SharouPande and SwapnalekaBasak, Human Resource Management, Pearson Education,
6. K. Aswathappa, Human Resource Management, McGraw Hill Education 7th edition,
7. D Gopalakrishna, Case incidents in Human resource Management, IK International Publishers,

6.5 LOGISTICS AND SUPPLY CHAIN MANAGEMENT

OBJECTIVE: To provide an insight on the fundamentals of logistics and supply chain networks, tools and techniques.

UNIT 1 : INTRODUCTION TO LOGISTICS **08** Hrs.

Meaning and definition of logistics-- Scope and Importance of logistics. Evolution. Logistic strategies. Logistics performance and obstacles.

UNIT 2 ROLE OF LOGISTICS **14 Hrs.**

.

Role of logistics in distribution-Objectives of Logistics- Functions-- Customer Service, Warehousing, Material Storage ,Material Handling, Transportation, Packaging. Differences between Logistics and Supply Chain- Factors influencing Logistics- Logistics Network- Meaning- Definition- Role of logistic network. Network Tools and Designs.

UNIT 3 SUPPLY CHAIN MANAGEMENT **14 Hrs.**

.

Introduction to supply Chain Management- Meaning and Definition of supply Chain Management – Scope and Importance of supply Chain Management-Evolution of supply Chain .Competitive and Supply Chain Strategies- Drivers of supply chain performance and obstacles.

UNIT 4 SUPPLY CHAIN NETWORK AND DESIGN **10 Hrs.**

.

Role of Distribution in supply chain-Factors influencing Distribution Network-Design option for Distribution Network- Value Addition- Models for Facility Location- Framework for network Decisions. Impact of uncertainty for Network Design.

UNIT 5 LOGISTICS IN SUPPLY CHAIN **10 Hrs.**

Role of Logistics in supply chain- Make Vs Buy Decisions- Creating Worldwide Source Inventory- Managing Safety and cycle Inventory. Coordination in Supply chain- Design option for transportation network- Tailored transportation-routing and scheduling in Transportation.

BUSINESS LAB ACTIVITIES :

- Visit a Logistic Company/ Firm and collect the information regarding their main functions.
- Develop E content on the limitations in adopting Supply Strategies.
- Conduct a comparative study on the culture of two companies and its impact on Marketing.
- Prepare a chart on logistics practice of a manufacturing unit
- Develop an E content on latest logistics approach followed

BOOKS FOR REFERENCE

1. Janat Shah, Supply Chain Management – Text and Cases, Pearson Education,
2. Sunil Chopra and Peter Meindl, Supply Chain Management-Strategy Planning and Operation, PHI Learning / Pearson Education, Sixth edition,
3. K Sridhara Bhat - Logidstics and supply chain management – HPH
4. D. K Agarwal -Logidstics and supply chain management, Macmillan India Pv New Delhi
5. Ballou Ronald H, Business Logistics and Supply Chain Management, Pearson Education, 5 th

Edition,
6. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, Designing and Managing the Supply
7. Chain: Concepts, Strategies, and Cases, Tata McGraw-Hill,.
8. Altekar Rahul V, Supply Chain Management-Concept and Cases, PHI,.
9. Shapiro Jeremy F, Modeling the Supply Chain, Cengage, Second Reprint ,.
10. Joel D. Wisner, G. Keong Leong, Keah-Choon Tan, Principles of Supply Chain Management-A Balanced Approach, South-Western, Cengage,
11. Raghuram G.- Logidstics and supply chain management PHI

6.6 EMOTIONAL INTELLIGENCE

OBJECTIVE

To develop students to be emotionally intelligent human beings , enabling them to respond to self and others emotions and to apply them in corporate career or in their own business.

UNIT 1: INTRODUCTION **12 Hrs.**

Introduction: Fundamentals of Emotional Intelligence Emotions, Emotional Competencies, Executive EQ, Emotions and Enneagram, Rational Emotive Therapy, Emotional Transformation, Role of Emotions, Emotions and Attitude, Measuring Emotional Intelligence, Emotional Intelligence and self- awareness; self -regulation; motivation; empathy, and; social skills, Emotional Intelligence: Modelling, Measurement and Future Applications.

UNIT 2: INDIVIDUAL AND ORGANIZATIONAL LEARNING **12 Hrs.**

Theories of Learning, Learning processes, Kolb's Learning Styles, How to create a learning Organization, Behavioral Intelligence and Team Work, Interpersonal Communication and Conversational Intelligence

UNIT 3: EMOTIONAL INTELLIGENCE **10 Hrs.**

Fundamentals of Emotional Intelligence, the Emotional Competence Framework, Benefits of Emotional Intelligence, Strategies to improve Emotional Intelligence, Corporate Strategy and Business Strategy: Success through Emotionally Intelligent Leadership

UNIT 4: MANAGERIAL EFFECTIVENESS **12 Hrs.**

Emotional Intelligence in the Workplace, Role of Emotional Intelligence in improving Managerial Effectiveness, Challenges faced by Organizations, managers. Understanding Organizational goals, creativity, optimizing resources, Execution skills (PDCA)

UNIT 5: EMOTIONAL INTELLIGENCE AND DECISION MAKING **10Hrs**

Emotional Intelligence and Entrepreneurs, Professionalism and Ethics in Managerial Decision making, Understanding Emotional Intelligence in Leadership, Leadership Traits and Emotional Intelligence, Emotional Intelligence as a Key Leadership Skill.

BUSINESS LAB ACTIVITIIES

1. Conduct a Group activities to assess the emotional dimensions and submit outcome of it
2. Create Emotional Intelligence Self Inventory
3. Conduct a Case studies on Emotional Intelligence: Success and Failure Stories
4. Prepare a list of Strategies adopted by organizations for high ensuring EQ
5. Develop E content on role of Emotional intelligence in managerial effectiveness

BOOKS FOR REFERENCE

1. Emotional Intelligence, "Aristotle's Challenge" and "When Smart is Dumb", Daniel Goleman
2. EQ and Leadership by P.T. Joseph: Tata McGraw-Hill

3. Emotional Intelligence: Why It Can Matter More Than IQ by Daniel Goleman Get Better or Get Beaten: 31 Leadership Secrets from GE's Jack Welch by Robert Slater, Jack Welch , McGraw-Hill School Education Group
4. Leadership: The Power of Emotional Intelligence by Daniel Goleman
5. The Brain and Emotional Intelligence: New Insights by Daniel Goleman
6. The Emotionally Intelligent Workplace by Daniel Goleman, 2001
7. Primal Leadership: Realizing the Power of Emotional Intelligence by Daniel Goleman, 2002
8. Destructive Emotions: A Scientific Dialogue with the Dalai Lama – 2003
9. Emotional Intelligence: Key Readings on the Mayer and Salovey Model by John D. Mayer (Editor), Marc A. Brackett (Editor), Peter Salovey (Editor)
10. The Emotionally Intelligent Manager: How to Develop and Use the Four Key Emotional Skills of Leadership by David R. Caruso and Peter Salovey

ELECTIVE III : IT AND DATA ANALYSIS

5.5 ENTERPRISE RESOURCE PLANNING (ERP)

OBJECTIVE:

The objective of this course is to enable the students to know the basics of ERP, its application and to explore future trends in ERP

UNIT-1: INTRODUCTION TO ENTERPRISE RESOURCE PLANNING: 12Hrs

Introduction, Benefits of ERP, Business Process Reengineering, Data Warehousing, Data Mining, Supply Chain Management.

UNIT-2: REASONS FOR THE GROWTH OF ERP: 12Hrs
Reasons for the Growth of ERP, Scenario and Justification of ERP in India, Evaluation of ERP, Various Modules of ERP, Advantages of ERP.

UNIT-3: UNDERSTANDING ERP: 12Hrs
Overview of Enterprise, Integrated Management Information, Business Modelling, ERP for Small Businesses, ERP for Make to Order Companies.

UNIT-4: BUSINESS PROCESS MAPPING: 10Hrs
Business Process Mapping in ERP, ERP Implementation Process, Hardware Environment for ERP Implementation.

UNIT-5: ERP IMPLEMENTATION: 10Hrs
Precautions in ERP Implementation, ERP Post Implementation Options, Marketplace – Dynamics – SAP AG – Oracle – PeopleSoft.

BUSINESS LAB ACTIVITIES:

1. Prepare a list of companies that provide ERP packages and their features.
2. Develop a E content on Data Mining
3. Develop a E content on current scenario of ERP
4. Prepare a chart on E content on ERP business modeling
5. Draft a mapping for ERP Business Process

BOOKS FOR REFERENCES :

1. Alexis Leon, “ERP DEMYSTIFIED”, Tata McGraw Hill, Second Edition, 2008.
2. Mary Sumner, “Enterprise Resource Planning”, Pearson Education, 2007.
3. Jim Mazzullo,”SAP R/3 for Everyone”, Pearson,2007.
4. Jose Antonio Fernandz, “ The SAP R /3 Handbook”, Tata McGraw Hill, 1998.

5.6 E-GOVERANCE

OBJECTIVE:
The objective of this course is to enable the student to understanding basics of e-governance strategies and acquaint how an effective strategic plan can be developed through a process.

UNIT – I INTRODUCTION TO E- GOVERNANCE 12 Hrs

Introduction to e- Governance, Different Stages of e-Governance, Advantages, Problems and Challenges of e-Governance, National Statues, International Status, Securities in e-Governance.

UNIT – 2 PLANNING AND IMPLEMENTING E-GOVERNANCE 12 Hrs

E-governance architecture, Planning and Implementing e-Governance, Legal Framework of e-Governance, Enterprise Business Architecture Development, Public Management and Administration ,Business Models for Implementation of e-Governance.

UNIT – 3 E-GOVERNANCE MODELS 10 Hrs

Evolution of e-Governance in India: Past, Study of e-Governance models of different countries, Finding the gaps in each model, E-Governance Maturity Model.

UNIT – I4 EMERGING ISSUES IN E-GOVERNANCE 10 Hrs

Emerging national and international issues: New emerging topics, Debate on Individual Privacy v/s National Security, Role of Social Media in eGovernance, Big data Analytics in e-Governance, Semantic web Analytics

UNIT – 5 E- GOVERNANCE CASE STUDIES 12 Hrs

Case Study: Election Commission, Indian Railway Reservation, Aadhar – UID, Income Tax, SAKALA, Bhoomi and Case Studies of e-Governance outside India.

BUSINESS LAB ACTIVITIES :

- Identify the concept and need of e-Governance Projects
- Analyze advantages and disadvantages of e-government programs
- identify major issues and strategies behind e-government programs
- Compare the different e-governance projects and analyze the maturity among models
- prioritize types of e-government services

BOOKS FOR REFERENCES :

1. E-Governance by Pankaj Sharma, APH Publishing, 2004
2. E Governance A Comprehensive Framework, 2008, D N Gupta, Jain Books
3. E Governance, Nidhi Sharma, 2018, Jain Books
4. E-governance: A Global Perspective on a New Paradigm, edited by Toshio Obi, Publisher: IOS Press, 2007

5. Governance and Information Technology From Electronic Government to Information Government edited by Viktor Mayer-Schönberger and David Lazer, Publisher: Massachusetts Institute of Technology, 2007
6. The World Wide Web Consortium (2008). Web Content Accessibility Guidelines (WCAG) 2.0. Downloaded on 10th January, 2012 from http://www.w3.org/
7. Government of India (2009). Guidelines for Indian Government websites. Downloaded on 15th January, 2012 from http://darpg.nic.in/
8. E-governance for Development : A Focus on India , Shirin Madon , Palgrave Macmillan , 2009
9. E-governance : case studies, Ashok Agarwal, University Press India, 2007
10. IT-e-Governance in India , Kamalesh N. Agarwala, Murli D. Tiwari , Macmillan , 2002
11. E-government : from vision to implementation: a practical guide with case studies, Subhash C. Bhatnagar, SAGE , 2004
12. E-Governance: Concepts And Case Studies, C.S.R. Prabhu ,PHI ,2011

6.5 DATA ANALYSIS FOR SOCIAL SCIENCE

OBJECTIVE

To enable the students to understand various concepts and software's in statistics applicable to analyse the sociological problems /issues

UNIT-1: INTRODUCTION TO DATA ANALYSIS, 10 hrs
Meaning of Data Types of Measurement, Reliability and validity

UNIT-2: MEASURES OF CENTRAL TENDENCY AND DISPERSION, 12 Hrs
Different types of distributions, Selection of appropriate data analysis technique, Inferential statistics I, Inferential statistics II

UNIT-3: INTRODUCTION TO SPSS, 12 Hrs
T-test and one-way ANOVA and ANCOVA using SPSS (Theory and Practical Case study), Correlation and simple Regression using SPSS

UNIT-4: INTRODUCTION TO MULTIVARIATE DATA ANALYSIS, 12Hrs
Multiple regression analysis, Multiple regression analysis using SPSS, Logistic regression using SPSS

UNIT-5: DATA ANALYSIS METHODS **10 HRS**
Common method bias issue in survey research, Common Method bias using unmeasured method factor using SPSS

BUSINESS LAB ACTIVITIES:

1. Choose and apply appropriate descriptive and bivariate statistical techniques to address research questions and hypotheses:
2. Formulate the hypothesis and test it using imaginary data
3. Use SPSS for univariate and bivariate data analyses: Interpret findings; using APA format;
4. List out various data analysis methods with their applicability
5. Conduct stastical test on any social issue using SPSS and submit a report

BOOKS FOR REFERENCES

1. Malhotra, N. K., & Birks, D. F. (2012). Marketing research: An applied approach. Pearson Education.6th edition.
2. Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). Business research methods. Cengage Learning.
3. Levin, R. I. (2011). Statistics for management. Pearson Education India.
4. Wooldridge, Jeffrey. 2008. IntroductoryEconometrics: A Modern Approach. SouthWestern Colle ge Pub; 4th Edition, ISBN=9780324581621.
5. Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2013). Multivariate data analysis, 7/e. Pearson India.
6. Hayes, A. F. (2017). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. 2nd edition, Guilford Press.

6.6 BUSINESS ANALYTICS

OBJECTIVE:

The objective of this course is to expose the students for fundamental techniques, approaches for data-driven decision-making.and develop skills for decision-making in the face of uncertainty

UNIT-1: INTRODUCTION: 12 Hrs

Business –Terminology-Business Analytics process- Relationship of BA and Organization.

UNIT-2: IMPORTANCE OF BUSINESS ANALYTICS 10 Hrs

Business Analytics - Strategy for competitive advantage-Importance of BA with new data.

UNIT-3: RESOURCE CONSIDERATIONS FOR BUSINESS **A NALYTICS** 12 hrs

Business Analytics Personal, Business Analytics data, Business Analytics Technology

UNIT-4: ORGANIZATION STRUCTURES ALIGNING BUSINESS A NALYTICS 10 Hrs

Organization structure - Management Issues –Managing Change.

UNIT-5: CASE STUDY EXAMPLE IN A BUSINESS ANALYTICS PROCESS 12 hrs

Descriptive Analysis- Predictive analysis-A simple illustration of data mining.

BUSINESS LAB ACTIVITIES:

1. Build better predictive algorithms using Machine learning
2. Develop a E content on trends using data
3. Integrate external or new datasets
4. Create visualizations, building APIs for data consumption.
5. Develop a E content on tics Business Analytics process

BOOKS FOR REFERENCE

1. Bartlett, R. (2013) A Practitioner's Guide to Business Analytics . McGraw-Hill, New York, NY.
2. Business Analytics: Data Analysis & Decision Making, Book by S. Christian Albright and Wayne L. Winston
3. Data Mining for Business Intelligence" by Galit Shmueli, Nitin R. Patel, and Peter C. Bruce
4. Business Analytics: Methods, Models and business decisions by James R. Evans
5. Elbing, A.O. (1970) Behavioral Decisions in Organizations . Scott Foresman and Company, Glenview, IL.
6. Business Analytics –Principles, concepts and Applications, What, Why, and How MarcSchniederjans Dara G. Schniederjans Christopher M. Starke .
7. Elbing, A.O. Behavioral Decisions in Organizations . Scott Foresman and Compan Glenview, IL.

BANGALORE UNIVERSITY

SCHEME AND SYLLABUS

For the course

BACHELOR OF COMPUTER APPLICATIONS (BCA)

NEP2021 Scheme

Academic Year 2021-22 and onwards

Department of Computer Science and Applications
BANGALORE UNIVESITY, BANGALORE

MEMBERS OF THE BoS IN COMPUTER SCIENCE

1	Dr. Muralidhara B L Professor Department of Computer Science Bangalore University	CHAIRPERSON
2	Dr. Guru D.S Professor PG Department of Computer Science Mysore Univeristy	Member
3	Dr. Susesha Professor, PG Department of Computer Science Mysore Univeristy	Member
4	Dr. Prabhakar C.J Professor Kuvempu University, Shimogga	Member
5	Dr. Chandrakanth Naikodi Associate Professor Department of Computer Science Davanagere University	Member
6	Dr. Prathibha V Kalburgi Ramaiah College of Arts Science, and Commerce Bangalore	Member
7	Mrs. Amalorpavam Sambram Academi of Management Studies Bangalore	Member
8	Dr. H.K. Gundurao Associate Professor Vijaya College, Bangalore	Member
9	Dr. Bhagyawana S Mudigowda Associate Professor Maharani Cluster University, Bangalore	Member
10	Smt. Nagarathnamma S.M Associate Professor Maharani Cluster Univeristy, Bangalore	Member

BCA SYLLABUS (NEP)

Semester	Course Code	Title of the Paper	Credits	Languages, Skill Enhancement (SEC), and Ability Enhancement Courses	Credits	Total Credits
I	CA-C1T	Discrete Structure	3	OE1: Open Elective	3	26
	CA-C2T	Problem solving Techniques	3	Language L1	3	
	CA-C3T	Data Structure	3	Language L2	3	
	CA-C4L	Problem solving Lab	2	SEC I : Office Management Tools	2	
	CA-C5L	Data Structure Lab	2	Physical Education	1	
				Health & Wellness	1	
II	CA-C6T	Computer Architecture	3	OE2: Open Elective	3	26
	CA-C7T	Object Oriented Programming using Java	3	Language L1	3	
	CA-C8T	Database Management System	3	Language L2	3	
	CA-C9L	Java Lab	2	Environmental studies	2	
	CA-C10L	Database Management System Lab	2	Physical Education	1	
				NCC/NSS/CL/R&R	1	
III	CA-C11T	Operating Systems	3	OE3: Open Elective	3	26
	CA-C12T	Computer Networks	3	Language L1	3	
	CA-C13T	Python Programming	3	Language L2	3	
	CA-C14L	Computer Networks Lab	2	SEC II : Computer Assembly and Repair	2	
	CA-C15L	Python Programming Lab	2	Physical Education	1	
				NCC/NSS/CL/R&R	1	
IV	CA-C16T	Software Engineering	3	OE4: Open Elective	3	26
	CA-C17T	Design and Analysis of Algorithm	3	Language L1	3	
	CA-C18T	Internet Technologies	3	Language L2	3	
	CA-C19L	Design and Analysis of Algorithm Lab	2	The Constitution of India	2	
	CA-C20L	Internet Technologies Lab	2	Physical Education	1	
				NCC/NSS/CL/R&R	1	
V	CA-C21T	Artificial Intelligence	3	CA-V1 Vocation Course I : Quantitative	3	23
	CA-C22T	Data Analytics	3	CA-E1 Elective I : a. Data Mining b. Computer Graphics	3	
	CA-C23T	Web Programming	3	SEC III : Cyber Crime, Cyber Law, and Intellectual Property Right	2	
	CA-C24L	Data Analytics Lab	2	Physical Education	1	

Semester	Course Code	Title of the Paper	Credits	Languages, Skill Enhancement (SEC), and Ability Enhancement Courses	Credits	Total Credits
	CA-C25L	Web Programming Lab	2	NCC/NSS/CL/R&R	1	
Semester	**Course Code**	**Title of the Paper**	**Credits**	**Languages, Skill Enhancement (SEC), and Ability Enhancement Courses**	**Credits**	**Total Credits**
VI	CA-C26T	Theory of Computation	3	CA-V2 Vocation Course II : Electronic Content Design	3	23
	CA-C27T	Machine Learning	3	CA-E2 Elective II : a. Operations Research b. Software Testing	3	
	CA-C28T	Mobile Application Development	3	Professional Communication	2	
	CA-C29L	Machine Learning Lab	2	Physical Education	1	
	CA-C30L	Mobile Application Development Lab	2	NCC/NSS/CL/R&R	1	
VII	CA-C31T	Cloud Computing	3	CA-V3 Vocation Course III : Technical Writing	3	21
	CA-C32T	Internet of Things	3	CA-E3 Elective III : a. Modeling and Simulation b. Compiler Design	3	
	CA-C33T	Internship	2	Research Methodology	3	
	CA-C34L	Cloud Computing Lab	2			
	CA-C35L	Internet of Things Lab	2			
VIII	CA-C36T	Block Chain Technologies	3	CA-V4 Vocation Course IV : Project Management	3	20
	CA-C37T	Cryptography and System Security	3	CA-E4 Elective IV : a. Human Computer Interface b. Parallel Algorithms	3	
	CA-C38T	Block Chain Technologies Lab	2	Research Project	6	

CA-C1T: DISCRETE STRUCTURES

Total Teaching Hours: 48 No. of Hours / Week: 03

UNIT – I [12 Hours]

Set Theory and Logic: Fundamentals of Set theory, Set Operations and the Laws of Set Theory, Counting and Venn Diagrams, Cartesian Products and Relations, Functions–One-to-One, Onto Functions, Function Composition and Inverse Functions. Mathematical Induction, The well ordering principle, Recursive Definitions, Structural Induction, Recursive algorithms. Fundamentals of Logic, Propositional Logic, Logical Connectives and Truth Tables, Logic Equivalence, Predicates and Quantifiers.

UNIT - II [12 Hours]

Counting and Relations: Basics of counting, Pigeonhole Principle, Permutation and Combinations, Binomial coefficients. Recurrence relations, Modeling with recurrence relations with examples of Fibonacci numbers and the tower of Hanoi problem. Divide and Conquer relations with examples (no theorems). Definition and types of relations, Representing relations using matrices and digraphs

UNIT - III [12 Hours]

Matrices: Definition, order of a matrix, types of matrices, operations on matrices, determinant of a matrix, inverse of a matrix, rank of a matrix, linear transformations, applications of matrices to solve system of linear equations.

UNIT - IV [12 Hours]

Graph Theory: Graphs: Introduction, Representing Graphs, Graph Isomorphism, Operations on graphs. Trees: Introduction, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees, Prim's and Kruskul's Algorithms. Connectivity, Euler and Hamilton Paths, Planar Graphs. Directed graphs: Fundamentals of Digraphs, Computer Recognition - Zero-One Matrices and Directed Graphs, Out-degree, in-degree, connectivity, orientation, Eulerian and Hamilton directed graphs, tournaments.

Text Books:

1. Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5thEdition, Pearson Education, 2004.
2. C. L. Liu: Elements of Discrete Mathematics, Tata McGraw-Hill, 2000.
3. F. Harary: Graph Theory, Addition Wesley, 1969.
4. Richard Bronson, Schaum's Outline of Matrix Operations, McGraw-Hill publications, 2nd Edition, 2011

Reference Books:

1. Kenneth H Rosen. Discrete Mathematics and its Applications, McGraw-Hill publications, 7th edition, 2007.
2. J. P. Tremblay and R.P. Manohar. Discrete Mathematical Structures with applications to Computer Science, Mc Graw Hill Ed. Inc. 1975.
3. Charles G Cullen. Matrices and Linear Transformations, Dover Publications Inc., Second Edition, 1990

Web Resources:

1. https://www.my-mooc.com/en/categorie/mathematics
2. http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html
3. https://ocw.mit.edu/courses/mathematics/

CA-C2T: PROBLEM SOLVING TECHNIQUES

Total Teaching Hours: 48 No. of Hours / Week: 03

UNIT - I [12 Hours]

Introduction: The Role of Algorithms in Computing, Algorithms as a technology, Analyzing algorithms, Designing algorithms, Growth of Functions, Asymptotic notation, Standard notations and common functions. Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial Computation, Generating of the Fibonacci sequence, Reversing the digits of an integer, Character to number conversion.

UNIT - II [12 Hours]

C Programming: Getting Started, Variables and Arithmetic expressions. Input and Output: Standard input and output, formatted output- printf, variable length argument list, formatted input-scanf. Control Flow: Statements and Blocks, If-else, else-if, switch, loops: while loop, for loop, do while, break and continue, goto and labels. Pointers and Arrays: pointers and address, pointers and function arguments, multidimensional array, initialization of pointer arrays, command line arguments.

UNIT - III [12 Hours]

Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers, computing the prime factors of an integer, generation of pseudo random numbers, raising a number to a large power. Array Techniques: Array order Reversal, Array counting or Histogramming, Finding the maximum number in a set, removal of duplicates from an ordered array, partitioning an array, Finding the kth smallest element, multiplication of two matrices.

UNIT - IV [12 Hours]

Merging: the two-way merge. Sorting: Sorting by selection, sorting by exchange, sorting by insertion, sorting by diminishing increment, sorting by partitioning. Searching: binary search, hash search. Text processing and Pattern searching: text line length adjustment, keyword searching in text, text line editing, linear pattern search

Text Books:

1. R.G.Dromey, “How to Solve it by Computer”, Pearson Education India, 2008.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, 3rd Edition, The MIT Press Cambridge, Massachusetts London, England, 2008
3. Brain M. Kernighan, and Dennis M. Ritchie, “The C Programming Language”, 2nd edition, Princeton Hall Software Series, 2012.

Reference Books:

1. Steven S. Skiena, “The Algorithm Design Module”, 2nd Edition, Springer-Verlag London Limited, 2008.
2. Donald E. Knuth, The Art of Computer Programming”, Volume 1: Fundamental Algorithms, 3rd Edition, Addison Wesley Longman, 1997.
3. Donald E. Knuth, The Art of Computer Programming”, Volume 2: Seminumerical Algorithms, 3rd Edition, Addison Wesley Longman, 1998.
4. Greg Perry and Dean Miller, “C programming Absolute Beginner’s Guide”, 3rd edition, Pearson Education, Inc, 2014.

Web Resources:

1. http://algorithmsforinterviews.com “Algorithms for Interviews”

CA-C3T: DATA STRUCTURES

Total Teaching Hours: 48 No. of Hours / Week: 03

UNIT-I [12 Hours]

Introduction and Overview: Definition, Elementary data organization, Data Structures, data Structures operations, Abstract data types, algorithms complexity, time-space trade off. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms. Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory,Traversing Linear arrays, Inserting and deleting, Multi-dimensional arrays, Matrices and Sparse matrices.

UNIT-II [12 Hours]

Linked list: Definition, Representation of Singly Linked List in memory,Traversing a Singly linked list, Searching in a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list. Stacks: Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Conversion of infix expression to postfix expression, Evaluation of Post fix expression, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack. Queues: Definition, Array representation of queue, Linked list representation of queues. Types of queue: Simple queue, Circular queue, Double-ended queue, Priority queue, Operations on Queues, Applications of queues.

UNIT-III [12 Hours]

Binary Trees: Definitions, Tree Search, Traversal of Binary Tree, Tree Sort, Building a Binary Search Tree, Height Balance: AVL Trees, Contiguous Representation of Binary Trees: Heaps, Lexicographic Search Trees: Tries, External Searching: B-Trees, Applications of Trees. Graphs: Mathematical Back ground, Computer Representation, Graph Traversal, Topological Sorting

UNIT-IV [12 Hours]

Searching: Introduction and Notation, Sequential Search, Binary Search, Comparison of Methods. Sorting: Introduction and Notation, Insertion Sort, Selection Sort, Shell Sort, Divide And Conquer, Merge sort for Linked List, Quick sort for Contiguous List. Hashing: Sparse Tables, Choosing a Hash function, Collision Resolution with Open Addressing, Collision Resolution by Chaining.

Text Books:

1. Seymour Lipschutz, “Data Structures with C”, Schaum’s outLines, Tata Mc Graw Hill, 2011.
2. Robert Kruse, C.L.Tondo, Bruce Leung,Shashi Mogalla,“Data Structures and Program Design using C”, Pearson Education, 2009.

ReferenceBooks:

1. Mark Allen Weiss,“ Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 2013.
2. Forouzan,“A Structured Programming Approach using C”,2nd Edition, Cengage LearningIndia,2008.

CA-C4P: Problem Solving Lab using C

Write, and execute C program for the following:

1. to read radius of a circle and to find area and circumference
2. to read three numbers and find the biggest of three
3. to check whether the number is prime or not
4. to read a number, find the sum of the digits, reverse the number and check it for palindrome
5. to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
6. to read percentage of marks and to display appropriate message (Demonstration of else-if ladder
7. to find the roots of quadratic equation
8. to read marks scored by n students and find the average of marks (Demonstration of single dimensional array)
9. to remove Duplicate Element in a single dimensional Array
10. to perform addition and subtraction of Matrices
11. to find factorial of a number
12. to generate fibonacci series
13. to remove Duplicate Element in a single dimensional Array
14. to find the length of a string without using built in function
15. to demonstrate string functions
16. to read, display and add two m x n matrices using functions
17. to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
18. to Swap Two Numbers using Pointers
19. to demonstrate student structure to read & display records of n students
20. to demonstrate the difference between structure & union.

CA-C5P: DATA STRUCTURES LAB

NOTE: For all the programs write the output, flowchart and number of basic operations performed.

1. Given {4,7,3,2,1,7,9,0} find the location of 7 using Linear and Binary search and also display its first occurrence.
2. Given {5,3,1,6,0,2,4} order the numbers in ascending order using Bubble Sort Algorithm
3. Perform the Insertion and Selection Sort on the input {75,8,1,16,48,3,7,0} and display the output in descending order.
4. Write a program to insert the elements {61,16,8,27} into singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion.
5. Write a program to insert the elements {61,16,8,27} into linear queue and delete three elements from the list. Display your list after each insertion and deletion.
6. Write a program to insert the elements {61,16,8,27} into circular queue and delete 4 elements from the list. Display your list after each insertion and deletion.
7. Write a program to insert the elements {61,16,8,27} into ordered singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion.
8. Write a program to add $6x^3+10x^2+0x+5$ and $4x^2+2x+1$ using linked list.
9. Write a program to push 5,9,34,17,32 into stack and pop 3 times from the stack, also display the popped numbers.
10. Write a recursive program to find GCD of 4,6,8.
11. Write a program to inert the elements {5,7,0,6,3,9} into circular queue and delete 6,9&5 from it(using linked list implementation)..
12. Write a program to convert an infix expression x^y/(5*z)+2 to its postfix expression
13. Write a program to evaluate a postfix expression 5 3+8 2 - *.
14. Write a program to create a binary tree with the elements {18,15,40,50,30,17,41} after creation insert 45 and 19 into tree and delete 15,17 and 41 from tree. Display the tree on each insertion and deletion operation
15. Write a program to create binary search tree with the elements {2,5,1,3,9,0,6} and perform inorder, preorder and post order traversal.
16. Write a program to Sort the following elements using heap sort {9.16,32,8,4,1,5,8,0}
17. Given S1={“Flowers”} ; S2={“are beautiful”} I. Find the length of S1 II. Concatenate S1 and S2 III. Extract the substring “low” from S1 IV. Find “are” in S2 and replace it with “is”

CA-C6T: COMPUTER ARCHITECTURE

Total Teaching Hours: 48 No. of Hours / Week: 03

UNIT - I [12 Hours]

Number Systems: Binary, Octal, Hexa decimal numbers, base conversion, addition, subtraction of binary numbers, one's and two's complements, positive and negative numbers, character codes ASCII, EBCDIC. Computer Arithmetic: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations. Structure of Computers: Computer types, Functional units, Basic operational concepts, Von-Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Digital Logic Circuits: Logic gates, Boolean algebra, Map Simplification. Combinational Circuits: Half Adder, Full Adder, flip flops.Sequentialcircuits:Shiftregisters,Counters,IntegratedCircuits,Mux,Demux,Encoder,Decoder.Data representation: Fixed and Floating point.

UNIT - II [12 Hours]

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC

UNIT - III [12 Hours]

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit. Micro-programmed Control: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit. Input Output: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. Instruction level parallelism: Instruction level parallelism (ILP)-over coming data hazards, limitations of ILP

UNIT - IV [12 Hours]

Memory System: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID. Multiprocessors And Thread level Parallelism: Characteristics of multiprocessors, Multi-Threaded Architecture, Distributed Memory MIMD Architectures, Interconnection structures,

TEXT BOOKS:

1. Mano M Morris, ”Computer System Architecture”, 3rd edition Pearson India(2019).
2. William Stallings, “Computer Organization and Architecture designing for performance”, 10th edition, Pearson(2016)

REFERENCE BOOKS

1. Subrata Ghoshal, “Computer Architecture And Organization”, Pearson India(2011).
2. Andrew S. Tanenbaum “ Structured Computer Organization”, 5th edition, Pearson Education Inc(2006).
3. Carl Hamacher, Zvonks Vranesic,SafeaZaky, “Computer Architecture And Organization”, 5th edition McGraw Hill New Delhi,India(2002).
4. Kai Hwang, “Advanced Computer Architecture - Parallelism, Scalability, Programmability”, Tata Mcgraw-Hill (2008).

CA67T: OBJECT ORIENTED PROGRAMMING USING JAVA

Total Teaching Hours: 48 No. of Hours / Week: 03

UNIT-I [12 Hours]

Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java. Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference

UNIT-II [12 Hours]

Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

UNIT-III [12 Hours]

Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism. I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.

UNIT-IV [12 Hours]

Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

Textbooks:

1. E. Balagurusamy, Programming with JAVA, McGraw Hill, New Delhi, 2007

Reference Books:

1. Raj Kumar Buyya, Object Oriented Programming with JAVA, McGraw Hill, 2009
2. Herbert Schildt, Java A Beginner's Guide – Create, Compile, and Run Java Programs Today, Sixth Edition, Oracle Press, 2014
3. Ken Arnold, James Gosling, "The Java Programming Language, Fourth Edition, Addison Wisely, 2005
4. Herbert Schildt, 'The Complete Reference Java, 7th Edition, McGraw Hill, 2007

Web Resources

1. https://docs.oracle.com/javase/tutorial/
2. https://javabeginnerstutorial.com/core-java-tutorial/

CA-C8T: DATABASE MANAGEMENT SYSTEMS

Total Teaching Hours: 48 No. of Hours / Week: 03

UNIT - 1 [12 Hours]

Databases and Database Users: Introduction, An example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS. Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures, Classification of Database Management Systems.

UNIT - 2 [12 Hours]

Data Modeling Using Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design Company Database Diagrams, Naming Conventions and Design. Issues, File organization and storage, secondary storage devices, type of single level ordered index, multi-level indexes, indexes on multiple keys, other types of indexes.

UNIT – 3 [12 Hours]

Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from SET Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra. Relational Database Design: Anomalies in a database, functional dependency, normal forms, lossless join and dependency, BCNF, normalization through synthesis, higher order normal forms. SQL- SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views(Virtual Tables) in SQL, Embedded SQL, Dynamic SQL,

UNIT – 4 [12 Hours]

Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, transaction support in SQL. Concurrency control techniques: two-phase locking techniques, concurrency control based on timestamp ordering. Recovery techniques: recovery concepts, recovery in multi-database systems, database backup and recovery from catastrophic failures.

Text Books:

1. Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison -Wesley, 2016.
2. Silberschatz, Korth and Sudharshan Data base System Concepts, 7th Edition, Tata McGraw Hill, 2019.

References:

1. C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education, 2009
2. Database Management Systems :Raghu Ramakrishnan and Johannes Gehrke: , 3rd Edition, McGraw-Hill, 2003

CA-C9P: JAVA PROGRAMMING LAB

1. Write a simple java application, to print the message, “Welcome to java”
2. Write a program to display the month of a year. Months of the year should be held in an array.
3. Write a program to demonstrate a division by zero exception
4. Write a program to create a user defined exception say Pay Out of Bounds. .
5. Write a java program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.
6. Write a program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations.
7. Write a program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object’s member variable values.
8. Write a java program to create a student class with following attributes: Enrollment_id: Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The pass mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declaredas zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details.
9. In a college first year class are having the following attributesName of the class (BCA, BCom, BSc), Name of the staff No of the students in the class, Array of students in the class
10. Define a class called first year with above attributes and define a suitable constructor. Also write a method called best Student () which process a first-year object and return the student with the highest total mark. In the main method define a first-year object and find the best student of this class
11. Write a Java program to define a class called employee with the name and date of appointment. Create ten employee objects as an array and sort them as per their date of appointment. ie, print them as per their seniority.
12. Create a package‘ student.Fulltime.BCA‘ in your current working directory
    a. Create a default class student in the above package with the following
    attributes: Name, age, sex. b. Have methods for storing as well as displaying
13. Write a small program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values.
14. Write a program to handle Null Pointer Exception and use the “finally” method to display a message to the user.
15. Write a program which create and displays a message on the window
16. Write a program to draw several shapes in the created window
17. Write a program to create an applet and draw grid lines
18. Write a program which creates a frame with two buttons father and
    mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother also appear.
19. Create a frame which displays your personal details with respect to a button click
20. Create a simple applet which reveals the personal information of yours.
21. Write a program to move different shapes according to the arrow key pressed.
22. Write a java Program to create a window when we press M or m the window displays Good Morning, A or a the window displays Good After Noon E or e the window displays Good Evening, N or n the window displays Good Night
23. Demonstrate the various mouse handling events using suitable example.
24. Write a program to create menu bar and pull-down menus.

CA- C10P: DATABASE MANAGEMENT SYSTEMS LAB

PART – A

1. Draw E-R diagram and convert entities and relationships to relation table for a given scenario. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college)

   Consider the Company database with following Schema

   EMPLOYEE (FNAME, MINIT, LNAME, SSN, BDATE,ADDRESS,SEX,SALARY, SUPERSSN, DNO)

   DEPARTMENT (DNAME, DNUMBER,MGRSSN,MSRSTARTDATE)

   DEPT_LOCATIONS (DNUMBER, DLOCATION)

   PROJECT (PNAME, PNUMBER, PLOCATION, DNUM)

   WORKS_ON (ESSN, PNO<HOURS)

   DEPENDENT (ESSN, DEPENDENT_NAME, SEX, BDATE, RELATIONSHIP)

2. Perform the following:

   a. Viewing all databases, Creating a Database, Viewing all Tables in a Database,

   Creating Tables (With and Without Constraints), Inserting/Updating/Deleting

   Records in a Table, Saving (Commit) and Undoing (rollback)

3. Perform the following:

   a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a

   Database.

4. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause).

5. Execute the fallowing queries

   a. How the resulting salaries if every employee working on the ‘Research’ Departments is given a 10% raise.

   b. Find the sum of the salaries of all employees of the ‘Accounts’ department, as well as the maximum salary, the minimum salary, and the average salary in this department

6. Execute the fallowing queries
   a. Retrieve the name of each employee Controlled by Department number 5 (use EXISTS operator).
   b. Retrieve the name of each dept and number of employees working in each Department which has at least 2 employees

7. Execute the fallowing queries
   a. For each project, retrieve the project number, the project name, and the number of employee who work on that project.(use GROUP BY)
   b. Retrieve the name of employees who born in the year 1990’s

8. For each Department that has more than five employees, retrieve the department number and number of employees who are making salary more than 40000.

9.For each project on which more than two employees work, retrieve the project number, project name and the number of employees who work on that project.

10. For a given set of relation tables perform the following: Creating Views (with and without check option), Dropping views, Selecting from a view

PART B

Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries.

BRANCH (Branchid, Branchname, HOD)
STUDENT (USN, Name, Address, Branchid, sem)
BOOK (Bookid, Bookname, Authorid, Publisher, Branchid)
AUTHOR (Authorid, Authorname, Country, age)
BORROW (USN, Bookid, Borrowed_Date)

1. Perform the following:
   a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
   Execute the following Queries:

2. a. List the details of Students who are all studying in 2nd sem BCA.
   b. List the students who are not borrowed any books.

3. a. Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_ Date of 2nd sem BCA Students who borrowed books.
   b. Display the number of books written by each Author.

4. a. Display the student details who borrowed more than two books.
   b.Display the student details who borrowed books of more than one Author.

5. a. Display the Book names in descending order of their names.
   b. List the details of students who borrowed the books which are all published by the same publisher.

Consider the following schema:
STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA)

6. Perform the following:
   a. Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

7. Execute the following queries:
   a. Find the GPA score of all the students.
   b. Find the students who born on a particular year of birth from the date_of_birth column.

8. a. List the students who are studying in a particular branch of study.
   b. Find the maximum GPA score of the student branch-wise.

CA-C11T: OPERATING SYSTEMS

Total Teaching Hours: 48 No. of Hours / Week: 03

UNIT - I [12 Hours]

Introduction: Computer System Organization, Architecture, Structure, Operations, Process Management, Memory Management, Storage Management, Kernel Data Structures, Computing Environments. Operating System Structures: Services, System Calls, Types, Operating System Structure, System Boot. Processes: Process Concept, Scheduling, Operations, Interprocess Communication. Multithreaded Programming: Multicore Programming, Multithreading Models.

UNIT –II [12 Hours]

Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronisation Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples. Process Scheduling: Criteria, Scheduling Algorithms, Multi-Processor Scheduling, Real-time CPU Scheduling. Deadlocks: System model, Characterization, Methods for handling deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery from deadlock.

UNIT – III [12 Hours]

Memory Management Strategies: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table. Virtual Memory Management: Demand Paging; Copy-on-Write, Page Replacement; Allocation of Frames; Thrashing, Memory-Mapped Files, Allocating Kernel Memory. File System: File Concept, Access Methods, Directory and Disk Structure, Protection. File-System Implementation: Structure

UNIT - IV [12 Hours]

File-System and Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery. Mass-Storage Structure: Overview, Disk Scheduling, Disk Management. Distributed Systems: Advantages, Types of Network- based OS, Robustness, Design Issues, Distributed File Systems. Case Studies: The Linux System, Windows 10 (Process, Memory, storage management).

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating Systems Concepts, 9thEdition, 2016 India, Wiley.

Reference Books:

1. William Stallings, "Operating Systems-Internals and Design Principles", Pearson, IX Edition, 2018
2. D M Dhamdhere: Operating Systems – A Concept Based Approach, III Edition, Tata McGraw – Hill, 2015.
3. Harvey M Deitel, Paul J Deitel, Dr Choffnes,"Operating Systems", Pearson Education Limited (Publisher), 3rd Edition, 2013.
4. J. Archer Harris, John Cordani, " Operating Systems", Schaum's Outline, Indian Edition, Mc Graw Hill Education (India), First Edition
5. Gary Nutt, Nabendu Chaki, Sarmistha Neog, "Operating Systems" Pearson Education Limited, 3rd Edition, 2016.

CA-C12T: COMPUTER NETWORKS

Total Teaching Hours : 48 No. of Hours / Week: 03

UNIT - I [12 Hours]

Introduction: Data Communications, Networks, Network Types, Internet History, Network Models: Protocol Layering, The OSI Model, TCP/IP Protocol Suite, Introduction to Physical Layer: Transmission Impairments, Data Rate Limits, Performance, Introduction to Data-Link- Layer: Link-Layer Addressing, Error Detection and Correction: Block Coding, Cyclic Codes, Checksum

UNIT - II [12 Hours]

Data Link Control: Data-Link Layer Protocols, HDLC, Point-To-Point (PPP), Media Access Control (MAC): ALOHA, CSMA, CSMA/CD, CSMA/CA, Reservation, Polling, Token Passing, FDMA, TDMA, CDMA

UNIT - III [12 Hours]

Introduction to Network Layer: Network-Layer Services, Packet Switching, Network-Layer Performance, IPV4 Addresses, Network Layer Protocols: Internet Protocol (IP), ICMPv4, Mobile IP, Unicast Routing: Routing Algorithms, Unicast Routing Protocols, Next Generation IP: IPv6 Addressing

UNIT - IV [12 Hours]

Introduction to Transport Layer: Introduction, Transport-Layer Protocols, Transport-Layer Protocols: User Datagram Protocol, Transmission Control Protocol: TCP Services, TCP Features, Segment, A TCP Connection, TCP Congestion Control, Flow Control, Error Control, Application Layer: WWW, E-MAIL, Domain Name System (DNS), Quality of Service: Flow Control To Improves QoS, Integrated Services

Text Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", 5th Edition, McGraw HillEducation, 2013.

Reference Books:

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks", 5th Edition, Prentice Hall,2011.
2. Larry L. Peterson and Bruce S. Davie, "Computer Networks A System Approach", 5th Edition, MKP, 2012.
3. James F. Kurose , Keith W. Ross, " Computer Networking, A Top-Down Approach", 5thEdition, Pearson, 2012.

Web Resources:

1. https://www.geeksforgeeks.org/computer-network-tutorials/
2. https://codescracker.com/networking/
3. https://youtube.com/playlist?list=PLxCzCOWd7aiGFBD2-2joCpWOLUrDLvVV_

CA-C13T: PYTHON PROGRAMMING

Total Teaching Hours : 48 No. of Hours / week: 03

UNIT - I [12 Hours]

Parts Python Programming Language: Python Interpreter/Shell, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() function and Is operator, Dynamic and Strongly Typed Language.**Control Flow Statements:**The if Decision Control Flow Statement, The if…else DecisionControl FlowStatement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, TheforLoop, The continue and break Statements. **Functions**: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Life time of Variables, Default Parameters, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String operations,Accessing Characters in StringbyIndexNumber, String Slicing and Joining, String methods

UNIT - II [12 Hours]

Lists: Creating Lists, BasicListOperations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, ThedelStatement, **Dictionaries:** Creating Dictionary, Accessing and modifying key:value pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary methods, ThedelStatement**. Tuples and Sets:** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples,Built-In Functions Used onTuples, Relations between Tuples and Lists, Relations between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Frozenset.

UNIT - III [12 Hours]

Files: Types of files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files,The Pickle module, Reading and writing CSV files, **Object-Oriented Programming:** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data attributes, Encapsulation, Inheritance, The Polymorphism.

UNIT - IV [12 Hours]

D**ata Visualization:** Generating Data-Installing Matplotlib, Plotting a Simple Line Graph, Random Walks, Rolling Dice with Plotly. Downloading Data- The CSV File Format, Mapping Global Data Sets: JSON Format, **Working with APIs:** Using a Web API, Visualizing Repositories Using Plotly.

Text Books:

1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372. [Unit I&II- 2,3,4,5,6,7,8,9 Unit III-11,12].
2. Eric Matthes, "Python Crash Course- A Hands-On, Project-Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.[Unit III-15, Unit IV-16]
3. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education, 2016. [Unit IV- 2,5].

Reference Books:

1. Kamthane, A. N., & Kamthane, A.A. , "Programming and Problem Solving with Python", McGraw Hill Education, 2017.
2. Mark Lutz, "Learning Python", 5th edition, Orelly Publication, 2013, ISBN 978- 1449355739.
3. Ljubomir Perkovic, "Introduction to Computing Using Python- An Application Development Focus",Wiley,2012.

CA-C14L: COMPUTER NETWORKS LAB

1. Execute the following commands:
   arp, ipconfig, hostname, netdiag, netstat, nslookup, pathping, ping route, tracert
2. Study of different types of network cables.
3. Practically implement the cross-wired cable and straight wired cable using crimping tool.
4. Study of network IP address configuration: (Classification of address, static and dynamic address)
5. Study of network IP address configuration: (IPv4 and IPv6 , Subnet, Supernet)
6. Study of network devices: (Switch, Router, Bridge)
7. Configure and Connect the computer in LAN.
8. Block th e website using "Windows Defender Firewall" in windows 10.
9. Share the folder in a system, and access the files of that folder from other system using IP address .
10. Share the printer in Network, and take print from other PC.
11. Configuration of wifi hotspot, and connect other devices (mobile / laptop).
12. Configuration of switches.
13. Configuration of I/O box fixing.
14. Making your own patch cord.
15. Configuration of VLAN using Packet Tracer/ GNS3
16. Configuration of VPN using Packet Tracer/ GNS3

References:

1. Paul Browning, "101 CompTIA Networs+ LABS", 2018, Reality Press Ltd.

Web References:

1. youtube.com/watch?v=rurs7cdT5cc
2. https://www.youtube.com/watch?v=_IOZ8_cPgu8
3. https://www.alphr.com/block-websites-windows/

CA-C15L: PYTHON PROGRAMMING LAB

1. Write a program to demonstrate basic data type in python
2. Create a list and perform the following methods
   1) insert() 2) remove() 3) append()
   4) len() 5) pop() 6) clear()
3. Create a tuple and perform the following methods
   1) Add items 2) len() 3) check for item in tuple 4)Access items
4. Create a dictionary and apply the following methods
   1) Print the dictionary items 2) access items 3) use get()
   4)change values 5) use len()
5. Write a program to create a menu with the following options
   1. TO PERFORM ADDITITON 2. TO PERFORM SUBTRACTION
   3. TO PERFORM MULTIPICATION 4. TO PERFORM DIVISION
   Accepts users input and perform the operation accordingly. Use functions with arguments.
6. Write a python program to print a number is positive/negative using if-else.
7. Write a program for filter() to filter only even numbers from a given list.
8. Write a python program to print date, time for today and now
9. Write a python program to add some days to your present date and print the date added.
10. Write a program to count the numbers of characters in the string and store them in a dictionary data structure
11. Write a program to count frequency of characters in a given file.
12. Using a numpy module create an array and check the following: 1. Type of array 2. Axes of array 3. Shape of array 4. Type of elements in array
13. Write a python program to concatenate the dataframes with two different objects
14. Write a python code to read a csv file using pandas module and print the first and last five lines of a file.
15. Write a python program which accepts the radius of a circle from user and computes the area (use math module)
16. Use the following data (load it as CSV file) for this exercise. Read this file using Pandas or NumPy or using in-built matplotlib function.

Months	Pen	Book	Marker	Chair	Table	Pen stand	Total units	Total profit
1	2500	1500	5200	9200	1200	1500	21100	211000
2	2630	1200	5100	6100	2100	1200	18330	183300
3	2140	1340	4550	9550	3550	1340	22470	224700
4	3400	1130	5870	8870	1870	1130	22270	222700
5	3600	1740	4560	7760	1560	1740	20960	209600
6	2760	1555	4890	7490	1890	1555	20140	201400
7	2980	1120	4780	8980	1780	1120	29550	295500
8	3700	1400	5860	9960	2860	1400	36140	361400
9	3540	1780	6100	8100	2100	1780	23400	234000
10	1990	1890	8300	10300	2300	1890	26670	266700
11	2340	2100	7300	13300	2400	2100	41280	412800
12	2900	1760	7400	14400	1800	1760	30020	300200

a. Get total profit of all months and show line plot with the following Style properties
Generated line plot must include following Style properties: –

9

- Line Style dotted and Line-color should be blue
- Show legend at the lower right location.
- X label name = Months
- Y label name = Sold units
- Line width should be 4

b. Display the number of units sold per month for each product using multiline plots. (i.e., Separate Plotline for each product.

c. Read chair and table product sales data and show it using the bar chart.
   - The bar chart should display the number of units sold per month for each product. Add a separate bar for each product in the same chart.

d. Read all product sales data and show it using the stack plot

10

SEC II: COMPUTER ASSEMBLY

1. Demonstration of Hardware peripherals: CPU, RAM, SMPS, Motherboard, NIC card, Processor, Processor cooling fan, PCI card, HDD.
2. Demonstration of various ports: CPU , VGA port, PS/2 (keyboard, mouse) ,USB, LAN, Speaker, Audio.
3. Identify the Computer Name and Hardware Specification (RAM capacity, Processor type, HDD, 32 bit/ 64 bit)
4. Identify and Troubleshoot the problems of RAM (beep sound with blue screen), SMPS and motherboard (CPU is not switched ON)
5. Configure BIOS settings- disable and enable USB and LAN.
6. Identify, how to recover the hidden files from corrupted pendrive using command.
7. Recover the contents from crashed Hard Disk using Disk Drill software.
8. Install Operating System – Windows family (Windows 7/ Windows 10) and also make partitions.
9. Install Operating System - Unix family (Linux/UBUNTU)
10. Install Application software – python 3.8, MS- Office 2010/2013, MySQL, TOAD, Openoffice, etc.,
11. Install any one of the antivirus software (Avast, Kaspersky, etc.,) and observe the variations before and after installation.
12. Add new Hardware device (keyboard, mouse, Speaker, Microphone)
13. Connect the LCD Projector with Laptop / CPU.
14. Adding additional RAM to the system.(expanding RAM size).
15. Graphic Card insertion.
16. Assemble and Disassemble Desktop System.

References:

1. Dan Gookin ,Troubleshooting & Maintaining Your PC ALL-IN-ONE, 3rd Edition,2017, John Wiley & Sons.
2. Mike Meyers, Scott Jernigan, Dan Lachance, "CompTIA Fundamentals + Exam Guide (All-in-One), 2nd Edition, 2019, Mc Graw Hill Education.

Web References:

1. https://www.youtube.com/watch?v=ItxwyMR0SnY&list=PLeH4ngtDM7eE-1_mdWuXWyZrI_FMHnyJ0&index=5
2. https://www.cleverfiles.com/howto/crashed-hard-drive-recovery.html

11

CA-C16T : SOFTWARE ENGINEERING

Total Teaching Hours: 48 **No. of Hours / Week: 03**

UNIT – I [12 Hours]

Introduction to Software Engineering: Evolution and impact of Software engineering, software life cycle models: Waterfall, prototyping, Evolutionary, and Spiral models. Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.

Agile development: Agile, Agility and cost of change; Agile Process, Extreme programming; Other agile process models.

UNIT - II [12 Hours]

Formal Modeling and verification: The cleanroom strategy; Functional specification; Cleanroom design; Cleanroom testing; Formal methods: Concepts; Applying mathematical notation for formal specification; Formal specification languages. Software Project Management: The management spectrum; The management of people, product, process and project; The W5HH Principle; Critical practices. **Software testing strategies**: A Strategic Approach to Software Testing, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps, System Testing, Software Testing Fundamentals, White-Box Testing, Black-Box Testing

UNIT - III [12 Hours]

Software Project Scheduling: Basic concepts and principles of project scheduling; Defining task set and task network; Scheduling; Earned value analysis. Risk Management: Reactive versus proactive strategies; Software risks; risk identification; Risk projection; Risk refinement; Risk mitigation, monitoring and management; The RMMM plan. Maintenance and Reengineering: Software maintenance; Software supportability; Reengineering; Business process reengineering; Software reengineering; Reverse engineering; Restructuring; Forward engineering; The economics of reengineering.

UNIT - IV [12 Hours]

Software Process Improvement (SPI): Approaches to SPI; Maturity models; The SPI process; The CMMI; The People CMM; Other SPI frameworks: SPICE, Bootstrap, PSP and TSP, ISO; SPI return on investment. Software Configuration Management (SCM): Basic concepts; SCM repository; The SCM process; Configuration management for web applications; SCM standards.

Text Books:

1. Fundamentals of Software Engineering by Rajib Mall, – PHI-3rd Edition, 2009.
2. Roger S. Pressman, "*Software Engineering*: A Practitioner's Approach", Alternate Edition, 7th Edition, McGraw Hill, 2010.

Reference Books:

1. Software Engineering, by Ian Sommerville, Pearson Education Inc., New Delhi, (2009).
2. Software Engineering: A Practitioner"s Approach", by Roger S. Pressman, McGraw-Hill. (2005).
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa Publishing House Pvt Ltd, Darya Ganj, New Delhi 110002

12

CA-C17T : THE DESIGN AND ANALYSIS OF ALGORITHMS

Total Teaching Hours: 48 **No. of Hours / Week: 03**

UNIT - I [12 Hours]

Introduction: Algorithms, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental Data Structures. Fundamentals of the Analysis of Algorithm Efficiency: The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive and Recursive Algorithms, Empirical Analysis of Algorithms

UNIT – II [12 Hours]

Brute Force Method: Selection Sort and Bubble Sort, Sequential Search, Brute-Force String Matching, Exhaustive Search, Depth-First Search and Breadth-First Search. Decrease and Conquer: Insertion Sort, Topological Sorting, Algorithms for Generating Combinatorial Objects, Decrease-by-a-Constant-Factor Algorithms. Divide and Conquer: Merge Sort, Quick Sort, Binary Tree Traversals and Related Properties, Strassen's Matrix Multiplication.

UNIT - III [12 Hours]

Space and Time Tradeoffs: Sorting by Counting, Input Enhancement in String Matching, Hashing. Dynamic programming: Binomial Coefficient, Principle of Optimality, Optimal Binary Search Trees, Knapsack Problem and Memory Functions, Warshall's and Floyd's Algorithms. Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees.

UNIT – IV [12 Hours]

Limitations of Algorithm Power: Lower-Bound Arguments, Decision Trees, P, NP and NP Complete Problems .Coping with the Limitations of Algorithm Power: Back Tracking: n Queens problem, Hamiltonian Circuit Problem, Subset-Sum Problem. Branch-and-Bound: Assignment Problem, Knapsack Problem, Traveling Salesman Problem.

Textbooks:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson, 2012.
2. Horowitz, Sahni, Rajasekaran, "Fundamentals of Computer Algorithms", 2/e, Universities Press, 2007.

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, The MIT Press, 2009.
2. A.V. Aho, J.E. Hopcroft, J.D. Ullmann, "The design and analysis of Computer Algorithms", Addison Wesley Boston, 1983.
3. Jon Kleinberg, Eva Tardos, "Algorithm Design", Pearson Education, 2006.

13

CA-C18T : INTERNET TECHNOLOGIES

Total Teaching Hours : 48 No. of Hours / Week: 03

UNIT - I [12 Hours]

INTERconnected NETwork: Internet**:** The Giant Wide Area Network, Communicating over the Internet, Accessing the Internet, Internet Organisations, Cyber Ethics, **Internet Applications:** Internet services, Electronic Mail(E-Mail), File Transfer, Real-Time User Communication, Remote Login,
Usenet, **World Wide Web**: The Web, The Working Web, Web Terminology, Web Architecture, World Wide Web Challenges.

UNIT - II [12 Hours]

Hypertext Transfer Protocol (HTTP):HTTP, HTTP Version, HTTP connections, HTTP Communication, Hypertext Transfer Protocol Secure, Hypertext Transfer Protocol State Retention: Cookies, Hypertext Transfer Protocol Cache**, Evolution of Web:** The Generations of Web, Web 1.0, Web 2.0, Web 3.0, Big Data: A Special Discussion, **Web IR: Information Retrieval on the Web:** Web Information Retrieval, Web Information Retrieval Tools, Web Information Retrieval Architecture (Search Engine Architecture), Web Information Retrieval Performance Metrics, Web Information Retrieval Models, Google PageRank.

UNIT - III [12 Hours]

Web Development Basics: Elements of Web Development , Client-Side and Server-Side Scripting, Model-View-Controller Architecture for Web Application Development**, Client-Side Technologies:** HTML: Hypertext Markup Language, CSS: Cascading Style Sheets, JavaScript, Bootstrap Framework, AngularJS Framework, **Server-Side Technologies:** Server-Side Scripting, Personal Home Pages, Node.js: Server-Side JavaScript.

UNIT - IV [12 Hours]

Web Application Frameworks: Django ,Ruby on Rails**.Web Databases:** Web Database, Structured Query Language: Relational Databases, NoSQL Databases: Non-relational and Distributed Data, Understanding Popular Databases. **Research Trends on the Web:** Contextual Information Retrieval, Web Mining.

TEXT BOOKS:

1. Akshi Kumar, "Web Technology: Theory and Practice", CRC Press, 2019.

REFERENCE BOOKS :

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI, Learning, Delhi, 2013.
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011.

CA-C19L : Algorithms Lab

1. Write a program to implement linear search algorithm Repeat the experiment for different values of n, the number of elements in the list to be searched and plot a graph of the time taken versus n.

2. Write a program to implement binary search algorithm. Repeat the experiment for different values of n, the number of elements in the list to be searched and plot a graph of the time taken versus n.

3. Write a program to solve towers of honai problem and execute it for different number of disks

4. Write a Program to Sort a given set of numbers using selection sort algorithm. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

5. Write a program to find the value of a^n (where a and n are integers) using both brute-force based algorithm and divide and conquer based algorithm

6. Write a Program to Sort a given set of elements using quick sort algorithm. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n.

7. Write a Program to find the binomial co-efficient C(n, k), [where n and k are integers and n > k] using brute force based algorithm and also dynamic programming based algorithm

8. Write a Program to implement Floyd's algorithm and find the lengths of the shortest paths from every pairs of vertices in a given weighted graph

9. Write a program to evaluate a polynomial using brute-force based algorithm and using Horner's rule and compare their performances

10. Write a Program to solve the string matching problem using Boyer-Moore approach.

11. Write a Program to solve the string matching problem using KMP algorithm

12. Write a program to implement BFS traversal algorithm

13. Write a program to find the minimum spanning tree of a given graph using Prim's algorithm

14. Write a Program to obtain the topological ordering of vertices in a given digraph. Compute the transitive closure of a given directed graph using Warshall's algorithm.

15. Write a Program to Find a subset of a given set S = {s1,s2, ,sn} of n positive integers whose ..... sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions {1,2,6} and {1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

15

CA-C20L :INTERNET TECHNOLOGIES LAB

1. Demonstrate E-Mail working (Sending ,Receiving, forward)
2. How to create, organize meeting in Zoom/ GoogleMeet
3. Create a form by using various attributes of the input tags (text box, multiline textbox, option button, check box)
4. Create a simple HTML page by using some of the basic tags (hyperlink, marquee, image)
5. Create a web page with multiple types of style sheet used in a single page
6. Write a CGI sample program to send output back to the user
7. Create Time-Table using table tag
8. Creation of Frames in browser window using HTML.
9. Write a java script program to create dialogue boxes using alert, confirm and prompt methods
10. Write a java script program on Form Validations.
11. Write a java script program to perform four arithmetic operations: Addition, Subtraction, Multiplication and Division on two numbers.
12. Create a web site of our College.

16

BANGALORE UNIVERSITY

(According to NEP – 2020 Regulations)
SYLLABUS & REGULATIONS
OF
Bachelor of Commerce (B.Com.)

2021-22 Onwards

DEPARTMENT OF COMMERCE
Jnanabharathi Campus, Bangalore University, Bangalore - 560056
www.bangaloreuniversity.ac.in

B.Com Programme Structure

SEMESTER I

Sl No.	Course Code	Title of the Course	Category of courses	Teaching hours per week (L+T+P)	SEE	CIE	Total Marks	Credits
1	Lang.1.1	Language – I	AECC	3+1+0	60	40	100	3
2	Lang.1.2	Language – II	AECC	3+1+0	60	40	100	3
3	B.Com. 1.1	Financial Accountancy	DSC	3+0+2	60	40	100	4
4	B.Com. 1.2	Business Management & Startups	DSC	4+0+0	60	40	100	4
5	B.Com. 1.3	Principles of Marketing	DSC	4+0+0	60	40	100	4
6	B.Com. 1.4	Digital Fluency/ Spreadsheet for Business	SEC-SB	1+0+2	50	50	100	2
7	B.Com. 1.5	Financial Literacy / Business Documents	OEC	3+0+0	50	50	100	3
8		Physical Education - Yoga	SEC-VB	0+0+2				1
9		Health and Wellness	SEC-VB	0+0+2				1
Sub - Total (A)					400	300	700	25

Notes:

- One Hour of Lecture is equal to 1 Credit.
- One Hour of Tutorial is equal to 1 Credit (Except Languages).
- Two Hours of Practical is equal to 1 Credit

Acronyms Expanded

AECC : Ability Enhancement Compulsory Course
DSC © : Discipline Specific Core (Course)
SEC-SB/VB : Skill Enhancement Course-Skill Based/Value Based
OEC : Open Elective Course
DSE : Discipline Specific Elective
SEE : Semester End Examination
Ø CIE : Continuous Internal Evaluation
Ø L+T+P : Lecture+Tutorial+Practical(s)

Note: Practical Classes may be conducted in the Business Lab or in Computer Lab or in Class room depending on the requirement. One batch of students should not exceed half (i.e., 50 or less than 50 students) of the number of students in each class/section. 2 Hours of Practical Class is equal to 1 Hour of Teaching, however, whenever it is conducted for the entire class (i.e., more than 50 students) 2 Hours of Practical Class is equal to 2 Hours of Teaching

Name of the Programme: Bachelor of Commerce (B.Com.)

Course Code: B.Com. 1.1 (DSC)

Name of the Course: Financial Accountancy

Course Credits	No. of Hours per week	Total No. of Teaching Hours
4 Credits	4 Hrs.	56 Hrs.

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies ,field work etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- Understand the Basic Concepts of Accountancy
- Exercise the accounting treatments for consignment transactions & events in the books of consignor and consignee.
- Demonstrate various accounting treatments for dependent branches
- Learn various methods of accounting for hire purchase transactions.
- Outline the emerging trends in the field of accounting
- Demonstrate e-Treatment of Accountancy

Syllabus

Module No. 1: Introduction to Accountancy (10 Hrs.)

Introduction – Meaning, Definition of Accounting – Uses & Users of Accounting – Accounting Principles - Accounting process – Types of Reconciliation (Concepts) – Recognition of Capital & Revenue and Problems on Accounting Equation (Operating in Spreadsheet).

Module No. 2: Consignment Accounts (12 Hrs.)

Introduction-Meaning of Consignment - Consignment Vs Sales -Proforma Invoice -Accounts Sales -Types Commission - Accounting for Consignment Transactions & Events in the books of Consignor only - Treatment of Normal & Abnormal Loss. - Valuation of Closing Stock-Goods sent at Cost Price and Invoice Price. (Operating in Spreadsheet)

Module No. 3: Accounting for Branches (12 Hrs.)

Introduction – Meaning – Objectives – Types of Branches –Meaning and features of Branches - Dependent Branches – Independent Branches – Foreign Branches – methods of Maintaining books of Accounts by Head office – Meaning & Feature of Debtor system, stock & Debtor system, wholesale branch system and Final Account system – Supply of Goods at Cost Price & Invoice Price - Problems on preparation of Dependent Branch A/c in the books of Head Office under Debtor system only. (Operating in Spreadsheet)

Module No. 4: Leasing & Hire Purchase (14 Hrs.)

Leasing – Elements of lease – Major Components of Lease Agreement – Types of Leasing – Leasing Financial institution in India. (Theory) - Hire Purchase - Meaning of Hire Purchase and Instalment Purchase System- difference between Hire Purchase and Instalment Purchase – Important Definitions – Hire Purchase Agreement – Hire Purchase Price – Cash Price – Hire Purchase Charges – Net Hire Purchase Price – Net Cash Price – Calculation of Interest – Calculation of Cash Price – Journal Entries and Ledger Accounts in the books of Hire Purchaser (Asset Accrual Method only). (Calculation of EMI in Spreadsheet)

Module No. 5: Emerging Trends in Accounting (08 Hrs.)

Digital Transformation of Accounting-Big Data Analytics in Accounting- Accounting through Cloud Computing - Green Accounting - Human Resource Accounting - Inflation Accounting - Database Accounting (Concepts only)

Skill Developments Activities:

- Preparation of Proforma invoice and accounts sales with imaginary figures.
- Collect hire purchase agreements and draft hire purchase agreements with imaginary figures.
- Collect the procedure and documentations involved in the establishment of various branches.
- List out Capital & Revenue Items
- Identify latest innovations and developments in the field of accounting.
- Any other activities, which are relevant to the course.

Reference Books:

- ICAI Study Materials on Principles & Practice of Accounting, Accounting and Advanced Accounting.
- SP Iyengar (2005), Advanced Accounting, Sultan Chand & Sons, Vol. 1.
- Robert N Anthony, David Hawkins, Kenneth A. Merchant, (2017) Accounting: Text and Cases, McGraw-Hill Education, 13th Edition.
- Charles T. Horngren and Donna Philbrick, (2013) Introduction to Financial Accounting, Pearson Education, 11th Edition.
- J.R. Monga, Financial Accounting: Concepts and Applications. Mayur PaperBacks, New Delhi, 32nd Edition.
- S.N. Maheshwari, and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi, 6th Edition.
- B.S. Raman (2008), Financial Accounting Vol. I & II, United Publishers & Distributors
- Compendium of Statements and Standards of Accounting. The Institute of Chartered Accountants of India, New Delhi.

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce (B.Com.)

Course Code: B.Com. 1.2 (DSC)

Name of the Course: Business Management & Startups

Course Credits	No. of Hours per week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies , field work etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- Design and demonstrate the strategic plan for the attainment of organizational goals.
- Compare and choose the different types of motivation factors and leadership styles.
- Understand startups Opportunities and Financial Issues of Startups
- Understand the support extended by Incubators & Major Startups Incubators in India.
- Understands Government Initiatives for Startups in India.

Syllabus

Module No. 1: Principles & Functions of Management (12 Hrs)

Introduction – Meaning – Definitions – Importance & scope of management - Principles of Management. **Managerial Functions:** Meaning, Definition, Characteristics, benefits & Limitations of Planning, organizing, Directing, Coordinating & Controlling - Task & Responsibilities of Professional Manager.

Module No. 2: Leadership & Motivation (14 Hrs)

Leadership: concept – Importance – Major Theories of leadership (Likert's scale Theory, Blake & Mouton's Managerial Grid theory, House Path Goal theory, Fred Fielder's situational leadership). Modern Leadership styles in the changing world (Charismatic leadership, Transformational leadership, Visionary Leadership, Transactional Leadership, Servant Leadership, Situational Leadership).

Motivation: Concept & importance of Motivation – Contemporary Motivation Theories (Expectancy Theory, Equity Theory, Goal Setting Theory, Reinforcement theory)

Module No. 3: Startups & Its Financial Issues (10 Hrs)

Introduction- Meaning – Features – Types of Startups – Ideation – Design Thinking, Entrepreneurship Lessons for Startups, 3 Pillars to Initiate startup (Handholding, Funding & Incubation). Startup Financial issues: feasibility Analysis- The cost & Process of Raising capital – Unique Funding issues of a High tech Ventures – funding with equity – Financing with debt – funding strategies with bootstrapping – Crowdfunding – Venture Capital.

Module No. 4: Incubation Support to startups (10 Hrs)

Introduction- Meaning & definition of Incubation support – Objectives & Functions of Incubation Centers - Services Types – Incentives for Incubators – Role of Incubators in startup Policy, List of Major Startups Incubators in India - Case studies on Startups.

Module No. 5: Government Initiatives for Startups in India (10 Hrs)

Government Initiatives – Startup India Initiative, Seed Fund – ASPIRE –SAMRIDDHI Scheme – Mudra Scheme (Sishu, Kishore & Tarun) – ATAL Innovation Mission – MSME Multiplier Grants Scheme – Credit Guarantee fund trust for micro & small business – Software Technology Park – Venture Capital Assistance Scheme – Single Point Registration scheme – M-SIPS – Self Employment & Talent Utilization (SETU)

Skill Developments Activities:

- Visit any business organization and collect the information on types of planning adopted by them & organizational structure
- Analyse the leadership styles of any select five companies of different sectors.
- Prepare a Business Plan for startups.
- List out Major Startups Incubators In your State
- Visit to Nearest Bank or Financial institution and prepare a Report on Financial Incentives Provided to startups
- Any other activities, which are relevant to the course.

Reference Books:

- Harold Koontz and Heinz Weihrich (2017), Essentials of Management: An International and Leadership Perspective, McGraw Hill Education, 10th Edition.
- Stephen P Robbins and Madhushree Nanda Agrawal (2009), Fundamentals of Management: Essential Concepts and Applications, Pearson Education, 6th Edition.
- James H. Donnelly, (1990) Fundamentals of Management, Pearson Education, 7th Edition.
- B.P. Singh and A.K.Singh (2002), Essentials of Management, Excel Books
- P C Tripathi & P N Reddy (2005), Principles of Management, TMH Publications, 3rd Edition.
- Koontz Harold (2004), Essentials of Management, Tata McGraw Hill.
- Kathleen R Allen, Launching New Ventures, An Entrepreneurial Approach, Cengage Learning, 2016.
- Anjan Raichaudhuri, Managing New Ventures Concepts and Cases, Prentice Hall International, 2010.
- S.R. Bhowmik and M. Bhowmik, Entrepreneurship, New Age International, 2007.
- Steven Fisher, Ja-nae Duane, The Startup Equation -A Visual Guidebook for Building Your Startup, Indian Edition, McGraw Hill Education India Pvt. Ltd, 2016.
- Donald F Kuratko, Jeffrey S. Hornsby, New Venture Management: The Entrepreneurs Road Map, 2e, Routledge, 2017.
- Vijay Sathe, Corporate Entrepreneurship, 1e, Cambride, 2009

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce (B.Com.)

Course Code: B.Com. 1.3 (DSC)

Name of the Course: Principles of Marketing

Course Credits	No. of Hours per week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies , field work etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- Understand the basic concepts of marketing and assess the marketing environment.
- Analyse the consumer behaviour in the present scenario and marketing segmentation.
- Discover the new product development & identify the factors affecting the price of a product in the present context.
- Judge the impact of promotional techniques on the customers & importance of channels of distribution.
- Outline the recent developments in the field of marketing.

Syllabus

Module No. 1: Introduction to Marketing (12 Hrs)

Fundamentals of Marketing : Importance and Scope of Marketing; Elements of Marketing Mix; Approaches of Marketing.

Analyzing the Marketing Environment: Components of Environment; Micro & Macro Environment; Environment specific to the firm; Global Environment , consumer environment, technology environment, competition environment.

Value Philosophy in Marketing: Understanding the value philosophy, Meaning of value; Value Creation and Delivery; Value Delivery Process; Value Delivery and Upstream Marketing; Value Innovation; Co-creation of value

Module No. 2: Consumer Behaviour & Market segmentation (12 Hrs)

Introduction - Factors influencing Consumer Behaviour; Buying Decision Process; Theories of Consumer Decision Making

Marketing Research Key terms and process of market research; Role of Market Research in the decision making system.

Market Segmentation, Targeting, Differentiation & Positioning: Levels of Segmentation; Basis for Segmenting Consumer and Business Markets; Market Targeting , Developing, Communicating and Positioning Strategy.

Module No. 3: Product and Pricing Strategy (12 Hrs)

Product Levels; Classifying products; Product Range, Line, Mix; Product Life Cycles; New Product Development, New Service Development; Stages of Product Development; Adoption Process.

Pricing to Capture Value: Pricing Environment; Consumer Psychology & Pricing; Pricing Philosophy; Methods of Pricing; Price Adaptations; Initiating Price Changes; Responding to Competitors' Price Changes

Module No. 4: Marketing Channels & Promotional Strategy (12 Hrs)

Marketing channels, Functions; Physical Distribution. and Value Networks; Channel Design Decisions; Channel Management Decisions; Channel Integration and Systems; E-commerce, E- Retailing.

Promoting Value: Marketing Communications; Personal Influencers; Marketing Communications Mix - Advertising, Sales Promotion, Personal Selling, Direct Marketing; Public Relations.

Module No. 5: Advancements in Marketing: (Concepts only) (08 Hrs)
Advancements in Marketing - Social Marketing, online marketing - Search Engine Optimization (SEO)- Green marketing, Rural Marketing; Mobile Marketing - Marketing Analytics - Social Media Marketing - Email Marketing - Live Video Streaming Marketing - Network Marketing, Affiliate Marketing , Chatbots, Influencer Marketing, Global Marketing, Experiential Marketing, Relationship Building and Customer Retention, Strategic Alliances and Networks

Skill Developments Activities:

- Analyse the marketing environment of your locality and identify need, wants & purchasing power of customers
- Collect consumer behaviour towards home appliances in your locality.
- Visit any organisation and collect the information towards pricing of the products.
- Visit any wholesalers/Retailers, collect the role of them in marketing.
- Identify the recent developments in the field of marketing.

Any other activities, which are relevant to the course.

Reference Books:

- Philip Kotler (2015), Principles of Marketing. 13th edition. Pearson Education.
- Saxena Rajan, (2017) Marketing Management, Tata McGraw-Hill Publishing Company Ltd., New Delhi. Fifth Edition.
- Kumar Arun & Meenakshi N (2016), Marketing Management, Vikas Publishing House Pvt. Ltd., New Delhi. Third Edition
- Panda Tapan (2008), Marketing Management, Excel books, New Delhi, Second Edition.
- Michael, J. Etzel, Bruce J. Walker, William J Stanton and Ajay Pandit. Marketing: Concepts and Cases. (Special Indian Edition)., McGraw Hill Education
- William D. Perreault, and McCarthy, E. Jerome., Basic Marketing. Pearson Education.
- Majaro, Simon. The Essence of Marketing. Pearson Education, New Delhi.
- Iacobucci and Kapoor, Marketing Management: A South Asian Perspective. Cengage Learning.
- Chhabra, T.N., and S. K. Grover. Marketing Management. Fourth Edition

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce

Course Code: B.Com 1.4 (SEC – SB)

Name of the Course: Digital Fluency

Course Credits	No. of Hours per week	Total No. of Teaching Hours
2 Credits	3 Hrs	28 Hrs

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies, Lab , field work etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- Understand the Fundamentals of computers.
- Work in Word Processor effectively.
- Discover the arena of the Internet and its possibilities.
- Effectively communicate through Email

Syllabus

Module No. 1: Fundamentals of Computer (04 Hrs)

Introduction – Objectives - Computer, Mobile/ Tablet and their application - Components of a Computer System - Central Processing Unit- Common Input & Output devices - USB ports and Pen Drive - Connecting Power cord, Keyboard, Mouse, Monitor and Printer to CPU

Module No. 2: Word Processor (16 Hrs)

Introduction – Objective -Word Processing Basic - Opening Word Processing Package - Title Bar, Menu Bar, - Toolbars & Sidebar - Creating a New Document - Opening and Closing Documents- Opening Documents - Save and Save As - Closing Document - Using The Help - Page Setup - Print Preview - Printing of Documents - PDF file and Saving a Document as PDF file - Document manipulation & Formatting - Text Selection - Cut, Copy and Paste - Font, Color, Style and Size selection - Alignment of Text - Undo & Redo - Spelling & Grammar - Shortcut Keys

Module No. 3: Internet (04 Hrs)

Introduction – Objectives – Internet - protocols: HTTP, HTTPS, FTP - Concept of Internet & WWW - Website Address and URL - Applications of Internet - Modes of Connecting Internet (Hotspot, Wi-Fi, LAN Cable, Broadband, USB Tethering) - Popular Web Browsers (Internet Explorer/Edge, Chrome, Mozilla Firefox,) - Exploring the Internet - Surfing the web - Popular Search Engines - Searching on Internet

Module No. 4: E-mail (04 Hrs)

Introduction -Objectives - Structure - protocols: SMTP, IMAP, POP3 - Opening Email account - Mailbox: Inbox and Outbox - Creating and Sending a new E-mail - CC – BCC- Replying -Mail Merge- Forwarding - attachments – Scheduling – Password Protect – Delete.

Skill Developments Activities:

- Use word processor to prepare Resume
- Draft a covering letter using Word Processor
- Systematically draft different emails
- Prepare a Letter of Internship requisition and send email.
- Install and uninstall a Web Browser and Record the Steps

Any other activities, which are relevant to the course.

Reference Books:

- Fundamentals of Computers, by Rajaraman V , Adabala N
- Fundamentals of Computers by Manoj Wadhwa (Author)
- Fundamentals of Computers by (V. Rajaraman)
- Learning MS-Word and MS-Excel, by Rohit Khurana
- Microsoft Word 2019 Step by Step Joan Lambert (Author)
- MICROSOFT WORD FOR BEGINNERS 2021: LEARN WORD PROCESSING SKILLS by RICHARD STEVE

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce

Course Code: B.Com 1.4 (SEC – SB)

Name of the Course: Spreadsheet for Business

Course Credits	No. of Hours per week	Total No. of Teaching Hours
2 Credits	3 Hrs	28 Hrs

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies , field work etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- Understand the basic concepts of Spreadsheet
- Summarize data using Functions
- Apply Conditions using formulas and Functions
- Implement Basic financial Concepts in Spreadsheet

Syllabus

Module No. 1: Introduction (08 Hrs)

Introduction to spreadsheets - Office Suite overview - Basic text and cell formatting - Basic arithmetic calculation - Special paste - Freeze pane - Auto completion of series - Sort and filter - Charts.

Module No. 2: Summarize data using functions (12 Hrs)

Perform calculations by using the SUM function- Perform calculations by using MIN and MAX functions - Perform calculations by using the COUNT function - Perform calculations by using the AVERAGE function - Perform logical operations by using the IF function - Perform logical operations by using the SUMIF function - Perform logical operations by using the AVERAGEIF function - Perform statistical operations by using the COUNTIF function.

Module No. 3: Text Functions (08 Hrs)

Data validation - Text Functions : LEN, TRIM, PROPER, UPPER, LOWER, CONCATENATE.

Skill Developments Activities:

- Enter class data into rows and columns
- Create Draft Marks Card in Spreadsheet
- Create Draft profit and Loss and Balance Sheet in Spreadsheet
- Create GST Invoice in Spreadsheet with Tax Rate

Any other activities, which are relevant to the course.

Reference Books:

- Learning MS-Word and MS-Excel, by Rohit Khurana
- Excel Formulas and Functions 2020: The Step by Step Excel Guide with Examples on How to Create Powerful Formulas: 1 by Adam Ramirez
- Excel 2013 in Simple Steps by Kogent Learning Solutions Inc.
- Excel Formulas and Functions: The Step by Step Excel Guide on how to Create Powerful Formulas by Harjit Suman

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce (B.Com.)

Course Code: B.Com. 1.5 Open Elective Course (OEC)

Name of the Course: Financial Literacy

Course Credits	No. of Hours per week	Total No. of Teaching Hours
3 Credits	3 Hrs	42 Hrs

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies , field work etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- Describe the importance of financial literacy and list out the institutions providing financial services;
- Prepare financial plan and budget and manage personal finances;
- Open, avail, and manage/operate services offered by banks;
- Open, avail, and manage/operate services offered by post offices;
- Plan for life insurance and property insurance & select instrument for investment in shares

Syllabus

Module No. 1: Introduction to Financial Literacy (07 Hrs)

Meaning, importance and scope of financial literacy; Prerequisites of Financial Literacy – level of education, numerical and communication ability; Various financial institutions – Banks, Insurance companies, Post Offices; Mobile App based services. Need of availing of financial services from banks, insurance companies and postal services.

Module No. 2: Financial Planning and Budgeting (07 Hrs)

Meaning, importance and need for financial planning; Personal Budget, Family Budget, Business Budget; Procedure for financial planning and preparing budget; avenues for savings from surplus.

Module No. 3: Banking Services (10 Hrs)

Types of banks; Banking products and services –Types of bank deposit accounts – Savings Bank Account, Term Deposit, Current Account, Recurring Deposit, PPF, NSC etc.; Formalities to open various types of bank accounts, PAN Card, Address proof, KYC norm; Various types of loans – short term, medium term, long term, micro finance, and related interest rates offered by various nationalized banks and post office; Cashless banking, e-banking, Check Counterfeit Currency; CIBIL, ATM, Debit and Credit Card, and APP based Payment system; Banking complaints and Ombudsman. Unified Payment Interface (UPI).

Module No. 4: Post Office Financial Services (08 Hrs)

Post office Savings Schemes: Savings Bank, Recurring Deposit, Term Deposit, Monthly Income Scheme, Kishan Vikas Patra, Senior Citizen Savings Scheme (SCSS), Sukanya Samriddhi Yojana/ Account (SSY/SSA); India Post Payments Bank (IPPB). Money Transfer: Money Order, E-Money order. Instant Money Order, collaboration with the Western Union Financial Services; MO Videsh, International Money Transfer Service, Electronic Clearance Services (ECS), Money gram International Money Transfer, Indian Postal Order (IPO).

Module No. 5: Protection and Investment Related Financial Services (10 Hrs)

Insurance Services: LifeInsurance Policies: Life Insurance, Term Life Insurance, Endowment Policies, Pension Policies, ULIP, Health Insurance and its Plans, Property Insurance: Policies offered by various general insurance companies. Post office life Insurance Schemes: Postal Life Insurance and Rural Postal Life Insurance (PLI/RPLI). Housing Loans: Institutions providing housing loans, Loans under Pradhan Mantri Awas Yojana – Rural and Urban.

Investment avenues in Equity and Debt Instruments: Portfolio Management: Meaning and importance; Share Market and Debt Market, Sensex and its significance; Investment in Shares – Mutual Fund – SIP.

Skill Developments Activities:

- Visit banks, post offices, and insurance companies to collect information and required documents related to the services offered by these institutions and to know the procedure of availing of these services.
- Fill up the forms to open accounts and to avail loans and shall attach photocopies of necessary documents.
- Prepare a personal and family budget for one/six/ twelve month on imaginary figures.
- Try to open a Demat account and trade for a small amount and submit the report on procedure on opening of Demat account and factors considered for trading.

Any other activities, which are relevant to the course.

Reference Books:

- Avadhani, V. A. (2019). Investment Management. Mumbai: Himalaya Publishing House Pvt. Ltd.
- Chandra, P. (2012). Investment Game: How to Win. New Delhi: Tata McGraw Hill Education.
- Kothari, R. (2010). Financial Services in India-Concept and Application. New Delhi: Sage Publications India Pvt. Ltd.
- Milling, B. E. (2003). The Basics of Finance: Financial Tools for Non-Financial Managers. Indiana: universe Company.
- Mittra, S., Rai, S. K., Sahu, A. P., & Starn, H. J. (2015). Financial Planning. New Delhi: Sage Publications India Pvt. Ltd.
- Zokaityte, A. (2017). Financial Literacy Education. London: Palgrave Macmillan.

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce (B.Com.)

Course Code: B.Com. 1.5 Open Elective Course (OEC)

Name of the Course: Business Documents

Course Credits	No. of Hours per week	Total No. of Teaching Hours
3 Credits	3 Hrs	42 Hrs

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies , field work etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- Develop self-confidence to fulfill the documentation.
- Able to understand the formalities of bank & day to day transactions.
- Get in-depth knowledge in LIC & Office Documents

Syllabus

Module No. 1: Documents & Transactions (10 Hrs)

Preparation of Invoice – Receipts – Voucher - Delivery Challan - Entry cum Gate Pass - Debit and Credit Note.

Transactions: Receipts – Vouchers – Debit Note – Credit Note.

Module No. 2: Banking Transaction Documents (12 Hrs)

Banking: Drawings, Endorsing and Crossing of Cheques - Filling up of pay in slips - Application and preparation of Demand Drafts – Pass Book . Account opening form for SB account, Current account and Term Deposits – Fixed Deposit account and FD Receipts, Bills of Exchange – Promissory Note.

Module No. 3: Insurance Transaction Documents (12 Hrs)

Filling up of an application form of LIC policy - premium form - premium notice and Challan for remittance receipts

Procedure for lapsed policy - procedure for settling an account while the insured is alive or dead.

Module No. 4: Office Documents (10 Hrs)

Circulars – Notice – Memo – Agenda – Minute of meetings –Resolutions - Stock list – offer letter – Appointment letter – Quotation - Purchase order – sales order – Payroll Reports.

Skill Developments Activities:

- Obtaining Aadhar/PAN/Voter ID/ Passport of self.
- Filling up the forms to open Bank accounts
- Documents required to avail LIC Policy and necessary documents to be attached.
- Draft a circular.
- Preparation of Appointment Letter.
- Creation of draft Invoice.

Any other activities, which are relevant to the course.

Reference Books:

- Business Communication by Rai and Rai
- Drafting Pleading and Appearances - Taxman
- Document and information by J K Khanna
- Model Business Letters, Emails and Other Business Documents - by Taylor
- Other E - Books

Note: Latest edition of textbooks and reference Books may be used

BANGALORE UNIVERSITY
Jnanabharathi, Bengaluru- 560056

(According to NEP – 2020 Regulations)
Syllabus of 2nd Semester
Bachelor of Commerce (B.Com.)

2021-22 Onwards

DEPARTMENT OF COMMERCE
Jnanabharathi Campus, Bangalore University, Bengaluru- 560056
www.bangaloreuniversity.ac.in

B.Com Programme Structure

SEMESTER II

Sl No.	Course Code	Title of the Course	Category of courses	Teaching hours per week (L+T+P)	SEE	CIE	Total Marks	Credits
1	Lang.2.1	Language – I	AECC	3+1+0	60	40	100	3
2	Lang.2.2	Language – II	AECC	3+1+0	60	40	100	3
3	B.Com. 2.1	Advanced Financial Accounting	DSC	3+0+2	60	40	100	4
4	B.Com. 2.2	Business Ethics	DSC	4+0+0	60	40	100	4
5	B.Com. 2.3	Banking Innovations	DSC	4+0+0	60	40	100	4
6	B.Com. 2.4	E-Business / Fundamentals of Investments in Capital Market.	OEC	3+0+0	60	40	100	3
7	B.Com. 2.5.1	A) Digital Fluency / Spreadsheet for Business. or B) Environmental Studies.	SEC - SB or AECC	1+0+2 or 2+0+0	30 or 30	20 or 20	50 or 50	2 or 2
8	B.Com. 2.5.2	Sports	SEC-VB	0+0+2	-	25	25	1
9	B.Com. 2.5.3	NCC/NSS/R&R (S&G)/Cultural	SEC-VB	0+0+2	-	25	25	1
Sub - Total (B)					390	310	700	25

Notes:

- One Hour of Lecture is equal to 1 Credit.
- One Hour of Tutorial is equal to 1 Credit (Except Languages).
- Two Hours of Practical is equal to 1 Credit

Acronyms Expanded

AECC : Ability Enhancement Compulsory Course
DSC © : Discipline Specific Core (Course)
SEC-SB/VB : Skill Enhancement Course-Skill Based/Value Based
OEC : Open Elective Course
DSE : Discipline Specific Elective
SEE : Semester End Examination
Ø CIE : Continuous Internal Evaluation

Ø L+T+P : Lecture+Tutorial+Practical(s)

Note: Practical Classes may be conducted in the Business Lab or in Computer Lab or in Class room depending on the requirement. One batch of students should not exceed half (i.e., 50 or less than 50 students) of the number of students in each class/section. 2 Hours of Practical Class is equal to 1 Hour of Teaching, however, whenever it is conducted for the entire class (i.e., more than 50 students) 2 Hours of Practical Class is equal to 2 Hours of Teaching.

Name of the Programme: Bachelor of Commerce (B.Com.)

Course Code: B.Com. 2.1 (DSC)

Name of the Course: Advanced Financial Accounting

Course Credits	No. of Hours per week	Total No. of Teaching Hours
4 Credits	4 Hrs.	56 Hrs.

Pedagogy: Classroom lecture, Tutorials, Group discussion, Seminar, Case studies, Fieldwork etc.,

Course outcomes: On successful completion of the course, the Students will be able to

- Understand and compute the amount of claim for loss of stock and the concept of loss of profit.
- Deal with the inter-departmental transfers and their accounting treatment.
- Prepare financial statements from incomplete records.
- Learn to deal with accounting for royalty transactions.
- Compute Average Due Date and preparation of Account current.

Syllabus

Module No. 1: Insurance Claims for Loss of Stock and Loss of Profit (10 Hrs.)

Meaning of fire claim - Features and Principles of Fire Insurance. Concept of Loss of Stock - Loss of Profit and Average Clause. Computation of Claim for loss of stock (including Over valuation and Under Valuation of Stock, Abnormal Items) and application of Average Clause.

Module No. 2: Departmental Accounts (12 Hrs.)

Meaning - Advantages - Disadvantages. Method of departmental accounting. Basis of allocation of common expenditure among various departments. Types of departments and inter-department transfers at cost price and invoice price (Theory and proforma journal entries). Preparation Departmental Trading and Profit and Loss Account including inter departmental transfers at Cost Price only.

Module No. 3: Conversion of Single Entry into Double Entry (12 Hrs.)

Meaning - Features - Merits - Demerits - Types of Single Entry System - Differences between Single Entry System and Double Entry System - Need and Methods of conversion of Single Entry into Double Entry - Problems on Conversion of Single Entry into Double Entry (Simple Problems only).

Module No. 4: Royalty Accounts (12 Hrs.)

Royalty and Royalty agreement - Introduction - Meaning - Definition - Differences between Rent and Royalty - Types of Royalty - Terms used in Royalty – Lessor – Lessee – Short Workings – Irrecoverable Short Workings - Recoupment of Short Workings – Surplus Royalty - Methods of Recoupment of Short Workings – Fixed and Floating methods - Preparation of Royalty Analysis Table (Excluding Government Subsidy) - Journal Entries and Ledger Accounts in the books of Lessee only – i) When Minimum Rent Account is opened ii) When Minimum Rent Account is not opened. Note: Problems including Strikes and Lockouts, but excluding sub-lease.

Module No. 5: Average Due Date and Account Current (10 Hrs.)

Average Due Date: Meaning - Concept - Uses of. Calculation of Average Due Date: i)Where amount is lent in one installment ii)Where amount is lent in various installments iii)Taking Grace Days into account iv)Calculation of Due Date few months after date / Sight.

Account Current: Meaning – Need and Situation leading to Account Current Preparation Account Current with the help of : i) Interest table. ii) By Means of Product.

Skill Developments Activities:

- Identify the procedure and documentation involved in Insurance Claims.

- Visit to the nearest Departmental Organization, Identify the common expenditures and the basis of allocation of the same among departments practiced there
- Visit any five Sole Proprietary Firm/ Partnership Firm, collect the information about the types of Single entry system they have adopted with accounting data and convert them into Double Entry system
- Collect Royalty Agreement and study about drafting the same. Also develop E-content for Royalty Agreement
- Collect information about bills of exchange of nearby firms and calculate Average Due Date in different situations.
- Any other activities, which are relevant to the course.

Reference Books:

- ICAI/ ICMA/ICSI Study Materials on Principles and Practices of Accounting
- Double Entry Book-Keeping by T S Grewal
- Fundamentals of Advanced Accounting – Volume I by R S N Pillai, Bhagavathi and S Uma
- Modern Accountancy – Volume I By M Hanif and A Mukherjee
- Accounting by Tulsian
- Advanced Accounting – Volume I by Gupta and Radhaswamy
- Advanced Accounting – Volume I by Shukla and Grewal
- Advanced Accounting – Volume I by S N Maheshwari
- Advanced Accounting – Volume I by K S Arulanandam
- Advanced Accounting – Volume I by Jain and Narang
- Any other relevant books including E-Books

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce (B.Com.)

Course Code: B.Com. 2.2 (DSC)

Name of the Course: Business Ethics

Course Credits	No. of Hours per week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Pedagogy: Classroom lecture, Tutorials, Group discussion, Seminar, Case studies, Fieldwork etc.,

Course outcomes: On successful completion of the course, the Students will be able to

- Understanding the importance of ethical behavior in business and the community.
- Provide skills for recognising and resolving ethical issues in business;
- Critical self-examination of one's own values, as well as appreciation for the relevance of personal values in the business/workplace.
- Encourage self-reflection on the ethical dimensions of your own decisions in the workplace.

Syllabus

Module No. 1: Nature and Essence of Business Ethics (08 Hrs)

Meaning of Ethics, Scope & Importance of Ethics, Types of Ethics. Business Ethics: Introduction, Meaning, Characteristics, Importance, Factors Influencing Business Ethics, Principles & Scope of Business Ethics, Approaches to the study of Business Ethics, Arguments for and against Business Ethics.

Module No. 2: Personal & Professional Ethics (12 hours)

Personal Ethics - Meaning, Principles of Personal Ethics, Importance, Emotional Honesty, Virtue of Humility, Karma Yoga concept (Meaning & Principles).

Professional Ethics - Concept & Emergence of Professional Ethics, Need for Professional Ethics, Ethical Dilemmas in Profession – Healthcare, Education, Corporate, Social work. Reasons for the crisis of Professional Ethics (Nepotism, favoritism etc.), Moral Entrepreneur (Meaning only).

Module No. 3: Business Ethics in Marketing & Finance (12 hours)

Meaning of Marketing, Need of Ethics in Marketing, Ethical dilemmas in Marketing, Unethical practices in Marketing, Ethical issues in Advertising, Promotions and Distribution, Common deceptive marketing practices, Role of Consumerism.

Meaning of Finance, Ethics in Finance, Need of Ethics in Finance, Scope & Code of Ethics in Finance, Unethical practices in Finance.

Creative Accounting – Definition, Importance and Methods; Earnings Management & Accounting Fraud; Hostile takeovers in India; Case study: Kingfisher Airlines Scam, Satyam Scam.

Module No. 4: Business Ethics in HRM & IT (12 hours)

HRM – Meaning, Definition, Need and Types. Areas of HRM ethics, Ethical issues in HR, Unethical practices of HRM, Meaning & Importance of Workplace Ethics, Role of Management in inculcating workplace ethics, Factors shaping ethical behavior at work, Importance of Employee Code of Conduct, Ethical Leadership (meaning).

IT – Ethical issues relating to Computer Applications, Information Security, Security Policies & Procedures, Information Protection, Ethical codes in Information Technology, Reducing threat to Information Systems.

Objectives and Features of Cyber Laws in India, Objectives and Features of The Information Technology Act 2000, Computer Crime & Computer Viruses – Meaning, Types & Prevention.

Ecological Ethics: Environment Protection and pollution control by businesses.

Module No. 5: Corporate Governance & Corporate Social Responsibility (12 hours)

Corporate Culture - Meaning, Characteristics, Importance, Positive and negative impact of corporate culture in business, Role of CEOs in shaping business culture.
Corporate Governance - Meaning, Scope, Characteristics, Principles, Benefits, Limitations, Corporate Governance Norms, Changes in Corporate Governance issues as per Companies Act 2013.
Various Committees on Corporate Governance – Board of Directors, Appointment & Duties; Cadbury Committee, Narasimhan Committee, Narayana Murthy Committee.
CSR: Concept, Scope, Types, CSR Principles & Strategies, Importance of CSR in contemporary society, Various models of CSR.

Skill Developments Activities:

- Prepare a chart showing types of values.
- Make a list of unethical aspects of finance in any organization.
- Make a list of ethical issues that functional managers face.
- Prepare a note on the CSR activities undertaken by any two Indian Corporate.
- Create a list of ethical issues involved in Corporate Governance.
- Prepare a list of unethical aspects of advertising.
- Any other activities, which are relevant to the course.

Reference Books:

- Murthy CSV: Business Ethics and Corporate Governance, HPH
- Bholananth Dutta, S.K. Podder – Corporation Governance
- H.R.Machiraju: Corporate Governance
- K. Venkataramana, Corporate Governance, SHBP.
- N.M.Khandelwal : Indian Ethos and Values for Managers
- S Prabhakaran; Business ethics and Corporate Governance
- C.V. Baxi: Corporate Governance
- R. R. Gaur, R. Sanghal, G. P. Bagaria; Human Values and Professional ethics
- B O B Tricker, Corporate Governance; Principles, Policies and Practices
- Michael, Blowfield; Corporate Responsibility

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce (B.Com.)
Course Code: B.Com. 2.3 (DSC)
Name of the Course: Banking Innovations

Course Credits	No. of Hours per week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Pedagogy: Classroom lecture, Tutorials, Group discussion, Seminar, Case studies, Fieldwork etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- Understand the Banking System in India.
- Understand the procedure involved in opening and operating different accounts.
- Understand the procedure involved in Availing different types of Loans.
- Examine the different types of negotiable instruments & their relevance in the present context.
- Understand the technology in Banking.

Syllabus

Module No. 1: Banking System in India (12 Hrs)
Meaning, Definitions and Features of a Bank. Meaning, Definitions and Features of Banking. Features of Indian Banking System. Reserve Bank of India – Role and Functions. Commercial Banks - Meaning, Nature and Functions. Special types of banks - Women Bank, Payments Bank, Savings Bank, Microfinance Banks, Regional Rural Banks, Foreign Banks, Industrial Development Banks, Cooperative Banks, Agricultural Development Banks. Public Sector and Private Sector Banks. Banking Sector Reforms - Narasimham Committee Report – I and II. Basel Norms I, II and III. CIBIL – Meaning, Objectives, Features and Benefits.

Module No. 2: Banker and Customer Relationship (10 Hrs)
Meaning of Banker and Customer. Importance of Banker-Customer Relationship. Types of Banker Customer Relationship - Special and General Relationship - Debtor and Creditor, Pledger and Pledgee, Licensor and Licensee, Bailor and Bailee, Trustee and Beneficiary, Agent and Principal , Advisor and Client. Termination of Relationship. Statutory Protection available to a Banker. Meaning Duties and Responsibilities of Collecting Banker, Paying Banker, Lending Banker. Banking Ombudsman – Meaning, Features and Benefits.

Module No. 3: Banking Products (18 Hrs)
Bank Accounts - Savings Bank Account, Current Account, Recurring Deposits Account, Fixed Deposits Account, Non Resident Indians Accounts, Pigmy Deposit Accounts, Other Special Accounts, Procedures and Documents involved in opening bank accounts (Online and Offline).
Bank Advances - Principles of Bank Lending, Kinds of Loans – Short-term Loans, Cash Credit, Overdraft, Pledge, Hypothecation, Discounting and Purchase of Bills of Exchange, Letters of Credit, Retail Banking Services - Home loans, Auto Loans, Personal loans, Safe Lockers, Jewel Loans, Consumer Durable Loans, Education Loans.
Auxiliary Services - Investment Services, Insurance services, Currency Exchange, Household payment services.
Negotiable Instruments: Meaning, Definitions, Features and Types of Negotiable Instruments. Parties to Negotiable Instruments. Crossing, Endorsements, Payments and Collection of Cheques. Dishonor of Cheques and Cheques Truncation System.

Module No. 4: Innovations in Banking (10 Hrs)

Meaning and need of Banking Innovations. Core banking, E-Banking, Telebanking, Internet Banking, Mobile Banking, NEFT, RTGS, EFT, UPI, IMPS, ATM, ATM Card, Debit Card, Credit Card, Truncated Cheques, MICR Cheques, CryptoCurrency, Central Bank Digital Currency, SWIFT.

Module No. 5: Technologies used in Banking (06 Hrs)

Types of Technology used in Banking - Augmented Reality, Block Chain, Robotic Process Automation, Quantum Computing, Artificial Intelligence, API Platforms. Prescriptive security - Meaning, Features and Benefits.

Skill Developments Activities:

- Visit any two category of banks and collect the specimen Copy of various Account Opening Forms
- Visit a Bank and collect the Loan Schemes extended to the Entrepreneurs
- Conduct a Survey of street vendors/Petty shops on usage of digitalization in business transactions
- Develop a E-Content on the process and uses of UPI APP like BHIM, Paytm, Phone pay, Google Pay, Airtel Pay and Amazon Pay
- List out the procedure for investment banking -Mutual Funds , stocks etc

Any other activities, which are relevant to the course.

Reference Books:

- Gordon & Natarajan, Banking Theory Law and Practice, HPH, 24th Edition
- S. P Srivastava (2016), Banking Theory & Practice, Anmol Publications
- Maheshwari. S.N. (2014), Banking Law and Practice, Kalyani Publishers, 11 edition
- Shekar. K.C (2013), Banking Theory Law and Practice, Vikas Publication, 21st Edition.
- Dr. Alice Mani (2015), Banking Law and Operation, SBH.

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce (B.Com.)
Course Code: B.Com. 2.4 Open Elective Course (OEC)
Name of the Course: E - Business

Course Credits	No. of Hours per week	Total No. of Teaching Hours
3 Credits	3 Hrs	42 Hrs

Pedagogy: Classroom lecture, Tutorials, Group discussion, Seminar, Case studies, Fieldwork etc.,

Course outcomes: On successful completion of the course, the Students will be able to

- Understand the basic concepts of E-commerce;
- Have the knowledge of the different types of E-Commerce Models.
- Understand the processes of developing and implementing E-Payments.
- Be aware of the ethical, social, and security issues of E-commerce.
- Distinguish the different stages of developing a website.

Syllabus

Module No. 1: Introduction to E - Business and E - Commerce (10 Hrs)
Meaning, Features and Benefits of E-Commerce. E-Commerce VS Traditional Commerce. Media Convergence, Business Applications & Need for E-Commerce, Meaning, Nature and Benefits of E-Business, Business Application of E-Commerce, Business-to-Consumer (B2C), Business-to-Business (B2B), Consumer-to-Consumer (C2C), and Consumer-to-Business (C2B). Differences between E-Commerce and E-Business

Module No. 2: E - Payment Systems (12 Hrs)
Meaning and Features of E – Payment System. E - Payment System VS Traditional Payment System. Types of E- Payment Systems - Electronic Clearing Services, Credit and Debit Card Payments, Contactless Cards, Rupay Cards, UPI, RTGS, NEFT, IMPS, AePS, E-Money. Benefits and Limitations of E – Payment System.

Module No. 3: Securities in E - Commerce (08 Hrs)
Meaning, Definitions, Dimensions and Scope of E – Security. E-Commerce Security Environment. Threats in Computer Systems: Virus, Hacking, Sniffing, Cyber – Vandalism, Etc.,

Module No. 4: E - Start ups (12 Hrs)
Meaning, Definition and Nature of E – Startups. Challenges and Steps of Launching Online Business. Benefits and Limitations of Online Business. Meaning and benefits of E-Procurement. Types & Drivers of e- procurement. Components of e- procurement systems. Implementation of e- procurement system. Reasons behind the success of e-commerce companies - Case studies of Walmart, Amazon, IKEA, Starbucks, PhonePe, Flipkart, Big Basket, Justdial, OLX and OYO.

Skill Developments Activities:

- List out any five examples for each E-commerce model.
- Write a step to install and set up a UPI account in Mobile.
- Write a brief case study on the online shopping system in India.
- Derive or discuss case study for E-Commerce Security Issues and Solutions
- Any other activities, which are relevant to the course.

Reference Books:

- Dr. C. S. Rayudu – E Commerce, HPH
- C.S.V Murthy- E Commerce, HPH

- Kamlesh K. Bajaj, ―E-Commerce- The Cutting Edge of Business‖, Tata McGraw-Hill, 1 st Edition, 2005.
- J. Christopher Westland, Theodore H. K Clark, ―Global Electronic Commerce- Theory and Case Studies‖, University Press, 1st Edition, 1999.
- Dr. Sudeshna Chakraborty , Priyanka Tyagi - E Commerce for Entrepreneurs-1st edition BPB Publications
- S.J. P.T. Joseph-E-COMMERCE : An Indian Perspective- 6th edition -PHI Learning Pvt. Ltd

Note: Latest edition of textbooks and reference Books may be used

Name of the Programme: Bachelor of Commerce (B.Com.)
Course Code: B.Com. 2.4 Open Elective Course (OEC)
Name of the Course: Fundamentals of Investments in Capital Market.

Course Credits	No. of Hours per week	Total No. of Teaching Hours
3 Credits	3 Hrs	42 Hrs

Pedagogy: Classroom lecture, Tutorials, Group discussion, Seminar, Case studies, Fieldwork etc.,

Course Outcomes: On successful completion of the course, the Students will be able to

- Increasing public understanding of SEBI, its goals, powers, management, and functions.
- Introduce the mechanisms of stock market activities.
- Understanding the practical aspects of primary market operations & book building process
- Creating an insight into the functions of stock exchange and their working

Syllabus

Module No. 1: An overview of capital market (12 Hours)
Financial System – Meaning, Definitions, Features and Functions of Financial System. Classification of Financial System. Meaning and Importance of Capital Market and Money Market. Basic functions of Capital Market and Money Market. Differences between Capital Market and Money Market. Classification of Capital Market. Kinds of Financial Instruments in the Industrial Securities Market.

Module No. 2: Primary and Secondary Market (14 Hours)
Primary Market - Meaning and Role of Primary Market. Methods of floating New Issue - IPO, FPO, Public Issue, Bonus Issue, Right Issue, Private Placement, Intermediaries (Players) in the New Issue Market. Benefits and Limitations of Primary Market.
Secondary Market - Meaning and Role of Secondary Market. Structure & Functions of Secondary Market. Benefits and Limitations of Secondary Market. Differences between Primary Market and Secondary Market.
Stock Exchange - Meaning and Role of Stock Exchange. Functions, Benefits and Limitations of Stock Exchange. Trading and Settlement System in Stock Exchanges. DEMAT A/C – Procedure for Opening and operating DEMAT A/C. Online Trading (Investment) Procedure in Stock Exchanges; Stock Brokers - Types and Functions. Objectives of NSE, BSE & OTCEI.

Module No. 3: Investment Avenues (8 Hours)
Meaning and Objectives of Investment. Meaning and Types of Investment Avenues - Bank Fixed Deposits in Banks, Fixed Deposits in Companies, Post Office Monthly Income and Other Schemes, Public Provident Fund, National Pension Scheme, Equity and Preference Shares, Mutual Funds, Debentures, Systematic Investment Plans (SIPs), Gold ETF, RBI Bonds, Unit Linked Insurance Plan (ULIP)

Module No. 4: Securities and Exchange Board of India SEBI (8 Hours)
SEBI - Constitution and Objectives of SEBI. Powers and Functions of SEBI. SEBI Committees, SEBI Departments, SEBI Guidelines for Primary and Secondary Markets. Role of SEBI in the protection of investor interests.

Skill Developments Activities:

- Enlist the functions of Stock Exchanges in India.
- Visit a nearest stock broking company and enlist the procedure for stock trading.
- Organize a Mock Stock Exchange Activity and prepare a related Report.
- List out and understand a few Recent Developments in Secondary Market
- Any other activities, which are relevant to the course.

Reference Books:

- Gurusamy, Financial Markets and Institutions, 3rd edition, Tata McGraw Hill.
- Saunders, Financial Markets and Institutions, 3rd edition, Tata McGraw Hill.
- K. Venkataramana, Stock & Commodity Markets, SHBP.
- B. Kulkarni – Commodity Markets & Derivatives.
- Khan, Indian Financial Systems, 6th edition, Tata McGraw Hill
- Bhole, L.M. (2000), Indian Financial Institutions, Markets and Management, McGraw Hill, New York.
- Srivastava R.M ; Management of Indian Financial Institutions
- E. Gordon : Capital Market in India; Himalaya Publishing House
- Sanjeev Aggarwal : Guide to Indian Capital Market; Bharat Law House
- Shashi K Gupta : Financial Institutions and Markets ; Kalyani Publishers

Note: Latest edition of textbooks and reference Books may be used

Bangalore University
Department of Physics

Jnanabharathi Campus
Bengaluru – 560 056

Syllabus for
1st & 2nd Semester Physics Papers
Under-Graduate(UG) Program

Framed according to the National Education Policy (NEP 2020)

(Effective from the Academic Year 2021-22)

Board of Studies in Physics (UG) Members

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Dr. Kamsali Nagaraja	Dept. Physics, Bangalore University, Bengaluru-56
Smt Seeta Vasudevrao	Head of Dept. Physics, First Grade College, Kengeri, Bengaluru-60

Date: 18 September 2021
Place: Bengaluru

Names	Members	Signature
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Dr. Wajeeha Sultana, Associate Professor, Department of Physics, Maharani Science College For Women, Cluster University, Bengaluru-560001.	Member	
Dr. Ramakrishna Damle, Professor, (Invited) Department of Physics, Bangalore University Jnanabharthi Campus, Bengaluru-560056.	Member	
Dr. B N Meera, Associate Professor (Invited) Department of Physics, Bangalore University Jnanabharthi Campus, Bengaluru-560056.	Member	B. N. Meera
Dr. Kamsali Nagaraja, Associate Professor, (Invited) Department of Physics, Bangalore University Jnanabharthi Campus, Bengaluru-560056.	Member	
Dr. Seeta Vasudevrao, Assistant Professor, (Invited) Government First Grade College, Kengeri, Bengalore-560002.	Member	

Introduction

The NEP-2020 offers an opportunity to effect a paradigm shift from a teacher-centric to a student-centric higher education system in India. It is based on Outcome Based Education, where the Graduate Attributes are first kept in mind to reverse-design the Programs, Courses and Supplementary activities to attain the graduate attributes and learning outcomes. The learning outcomes-based curriculum framework for a degree in B.Sc. (Honours) Physics is intended to provide a comprehensive foundation to the subject and to help students develop the ability to successfully continue with further studies and research in the subject while they are equipped with required skills at various stages. The framework is designed to equip students with valuable cognitive abilities and skills so that they are successful in meeting diverse needs of professional careers in a developing and knowledge-based society. The curriculum framework takes into account the need to maintain globally competitive standards of achievement in terms of the knowledge and skills in Physics, as well as to develop scientific orientation, spirit of enquiry problem solving skills and human and professional values which foster rational and critical thinking in students.

Graduate attributes in Physics

Some of the characteristic attributes a graduate in Physics should possess are:

- Disciplinary knowledge and skills:
- Skilled communication:
- Critical thinking and problem solving capacity:
- Sense of inquiry:
- Team player/worker:
- Project Management Skills:
- Digital and ICT efficiency:
- Ethical awareness / reasoning:
- National and international perspective:
- Lifelong learning

Flexibility

- The programmes are flexible enough to allow liberty to students in designing them according to their requirements. Students may choose a single Major, one Major with a Minor, and one Major with two Minors. Teacher Education or Vocational courses may be chosen in place of Minor/s. Below listed are the various options students may choose from.
- One Major subject/discipline, Two Languages, Generic Electives, Ability Enhancement, Skill Development and Vocational courses including Extracurricular Activities.
- One Major and one Minor subject/discipline along with Languages, Generic Electives, Ability Enhancement, Skill Development and Vocational courses including Extracurricular Activities
- Two Major subject/disciplines along with Languages, Generic Electives, Ability Enhancement, Skill Development and Vocational courses, including Extracurricular Activities (subject to fulfilling the requirements as stated in 3.i and 3.ii)
- One Major subject/discipline and one Vocational course along with Languages, Generic Electives, Ability Enhancement and Skill Development and courses including Extracurricular Activities.
- One Major Discipline and One Education Discipline along with Languages, Generic Electives, Ability Enhancement and Skill Development Courses including Extracurricular Activities.

Progressive Certificate, Diploma, Bachelor Degree or Bachelor Degree with Honours Provided at the End of Each Year of Exit of the Four-year Undergraduate Programme/ Five-year Integrated Master's Degree Programme

EXIT OPTIONS	Credits required
Certificate upon the Successful Completion of the First Year (Two Semesters) of the multidisciplinary Four-year Undergraduate Programme/Five-year Integrated Master's Degree Programme	44 - 48
Diploma upon the Successful Completion of the Second Year (Four Semesters) of the multidisciplinary Four-year Undergraduate Programme/Five-year Integrated Master's Degree Programme	88 - 96
Basic Bachelor Degree at the Successful Completion of the Third Year (Six Semesters) of the multidisciplinary Four- year Undergraduate Programme/Five-year Integrated Master's Degree Programme	132 - 144
Bachelor Degree with Honours in a Discipline at the Successful Completion of the Fourth Year (Eight Semesters) of the multidisciplinary Four-year Undergraduate Programme/Five-year Integrated Master's Degree Programme	176 - 192
Master's Degree in a Discipline at the Successful Completion of the Fifth Year (Ten Semesters) of the Five- year Integrated Master's Degree Programme	224- 240

Aims of UG program in Physics

The aims and objectives of our UG educational programs in sciences in general and Physics in particular should be structured to

- Create the facilities and environment in all the educational institutions to consolidate the knowledge acquired at +2 level and to motivate and inspire the students to create deep interest in Physics, to develop broad and balanced knowledge and understanding of physical concepts, principles and theories of Physics.
- Learn, design and perform experiments in the labs to demonstrate the concepts, principles and theories learned in the classrooms.
- Develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Physics.
- Expose the student to the vast scope of Physics as a theoretical and experimental science with applications in solving most of the problems in nature spanning from 10^{-15} m to 10^{26}m in space and 10^{-10} eV to 10^{25}eV in energy dimensions.
- Emphasize the discipline of Physics to be the most important branch of science for pursuing the interdisciplinary and multidisciplinary higher education and/or research in interdisciplinary and multidisciplinary areas.
- To emphasize the importance of Physics as the most important discipline for sustaining the existing industries and establishing new ones to create job opportunities at all levels of employment.

The progressive curriculum shall position knowledge and skills required on the transformation of novice problem solvers (at entry level of the program) to expert problem solvers (by the time of graduation) as given below:

- At the end of first year – Ability to solve well defined problems
- At the end of second year – Ability to solve broadly defined problems
- At the end of third year – Ability to solve complex problems that are ill-structure that require multi-disciplinary skills to solve them
- During fourth year – Experience of workplace problem solving in the form of internship or Research Experience preparing for higher education or Entrepreneurship and employment.

Curriculum Framework for Multidisciplinary Four- year Undergraduate Programme/ Five-year Integrated Master's Degree Programme

Year	Objectives	Nature of Courses	Outcome	No. of courses
1st year – (1st & 2nd Semesters)	Understanding and Exploration	1. Discipline based Core Courses 2. Open Elective 3. Languages, 4. Ability Enhancement Compulsory Courses 5. Skill Enhancement/ Development Courses	Understanding of Disciplines Language Competency Gaining perspective of context/Generic skills Basic skills sets to pursue any vocation	2+2 1+1 2+2 1+1 1+1
Exit option with Certification				
2nd Year - (3rd & 4th Semesters)	Focus and Immersion	1. Discipline based Core Courses 2. Open Elective 3. Ability Enhancement 4. Skill based/Vocational 5. Extra Curricular Activities	Understanding of disciplines Gaining perspective of context Skill sets to pursue vocation Development of various domains of mind & Personality	2+2 1+1 1+1 1+1 1+1
Exit Option with Diploma				
3rd Year - (5th & 6th Semesters)	Real time Learning	1. Major Discipline Core and Elective Courses 2. Minor Discipline/ Generic or Vocational Electives/Field based Learning/ Research Project	In depth learning of major and minor disciplines, Skill sets for employability. Exposure to discipline beyond the chosen Subject Experiential learning/ Research.	2+2 1+1 1+1
Exit option with Bachelor Degree				
4th Year - (7th&8th Semesters)	Deeper Concentration	Major Discipline Core and Elective courses Research/ Project Work with Dissertation	Deeper and Advanced Learning of Major Discipline Foundation to pursue Doctoral Studies & Developing Research competencies	4+4
Bachelor Degree with Honours				
5th Year - (9th & 10th Semesters)	Master of the subject	Major Discipline Core and Elective courses/ Research/ Project Work with Dissertation	Deeper and Advanced Learning of the Major Discipline towards gaining proficiency	4+4/6+6

			over the subject	
Master's Degree				

Course Structure
(Major Discipline: Physics)
Semester 1 - 10

SEMESTER	Discipline Core Theory (DSCT)	Core Papers
SEMESTER -1	Phy.DSCT1	Mechanics & Properties of Matter
SEMESTER -2	Phy.DSCT2	Electricity and Magnetism
SEMESTER -3	Phy.DSCT3	Wave motion and optics
SEMESTER -4	Phy.DSCT4	Thermal Physics & Electronics
SEMESTER -5	Phy.DSCT5 Phy.DSCT6	1. Classical Mechanics and Quantum Mechanics- I 2. Elements of Atomic, Molecular Physics
SEMESTER -6	Phy.DSCT7 Phy.DSCT8	1. Elements of Nuclear Physics and Nuclear Instruments 2. Elements of Condensed Matter Physics
SEMESTER -7	Phy.DSCT9 Phy.DSCT10 Phy.DSCT11	1. Mathematical Methods of Physics – I 2. Classical Electrodynamics. 3. Experimental methods of Physics 4. Research Methodology
SEMESTER -8	Phy.DSCT12 Phy.DSCT13 Phy.DSCT14	1. Classical Mechanics and Quantum Mechanics-II 2. Statistical Mechanics 3. Astrophysics & Astronomy 4. Research Project* (Select Two DSE subjects from the Pool B-II shown below) *In lieu of the research Project, two additional elective papers/ Internship may be offered.
SEMESTER -9	Phy.DSCT15	1. Mathematical Methods of Physics – II (Select One DSE subjects from the Pool B-III shown below) 2. Research Project
SEMESTER -10	Phy.DSCT17	1. Quantum Mechanics – III (Select One DSE subjects from the Pool B-IV shown below) 2. Research Project

Open Electives

1st Semester	
1.	Phy-OE1: Energy Sources
2.	*Phy-OE2: Physics for All.
2nd Semester	
3.	Phy-OE3: Atmospheric Science
4.	Phy-OE4: Sports Science
3rd Semester	
5.	Phy-OE5: Optical Instruments
6.	Phy-OE6: Elements of Astronomy and Astrophysics
4th Semester	
7.	Phy-OE7: Medical Physics
8.	Phy-OE8: Nanotechnology
9.	Phy-OE9: Electrical Instruments

***Students who have chosen Phy-DST1 are not eligible to take Open Elective paper Phy-OE2.**

Discipline Specific Electives for 7 to 10 Semesters

7th Sem Electives Pool B-I (Select any two)		**8th Sem Electives Pool B-II (Select any two)**	
A.	Condensed Matter Physics-1	A.	Atomic & Molecular Physics-1
B.	Nuclear and Particle Physics	B.	Materials Physics & Nano materials
C.	Theoretical and Computational Physics-I	C.	Lasers and non-linear optics
D.	Biophysics	D.	Plasma Physics
E.	Astronomy and Astrophysics	E.	Physics of Semiconductor devices

9th Sem Electives (Specialization papers) Pool B-III		**10th Sem Electives (Specialization papers) Pool B-IV**	
A.	Condensed Matter Physics-2	A.	Condensed Matter Physics-3
B.	Nuclear and Particle Physics-2	B.	Nuclear and Particle Physics-3
C.	Atomic & Molecular spectroscopy-1	C.	Atomic & Molecular spectroscopy-2

D.	Materials Physics & Nanophysics –1	D.	Materials Physics & Nanophysics -2
E.	Theoretical and Computational Physics-I	E.	Theoretical and Computational Physics-2
F.	Astronomy and Astrophysics-1	F.	Astronomy and Astrophysics-2

Detailed Syllabus for 1st & 2nd Semesters

1st Semester

Phy-DSCT1: Mechanics and Properties of Matter	Course Credits (L+T+P) : 4+0+0
Total Contact Hours: 52	Duration of ESA: 3 hours

Course Outcomes (COs):

1. Fixing units, tabulation of observations, analysis of data (graphical/analytical).
2. Accuracy of measurement and sources of errors, importance of significant figures.
3. Knowledge of how g can be determined experimentally and derive satisfaction.
4. Understanding the difference between simple and torsional pendulum and their use in the determination of various physical parameters.
5. Knowledge of how various elastic moduli can be determined.
6. Measuring surface tension and viscosity and appreciate the methods adopted.
7. Hands on experience of different equipments.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6
Fixing units, tabulation of observations, analysis of data (graphical/analytical)	x					
Accuracy of measurement and sources of errors, importance of significant figures		x				
Knowledge of how g can be determined experimentally and derive satisfaction.	x					
Understanding the difference between simple and torsional pendulum and their use in the determination of various physical parameters					x	
Knowledge of how various elastic moduli can be determined	x					
Measuring surface tension and viscosity and appreciate the methods adopted	x					
Hands on experience of different equipments.	x					

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'x' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content Phy.DSCT1: Mechanics & Properties of Matter		Hrs
Unit – 1 **(13 hours of teaching includes 3 hours of activities)**		
Chapter No. 1	**Units and measurements:** System of units (CGS and SI), measurement of length, mass and time, dimensions of physical quantities, dimensional formulae. Minimum deviation, errors.	4
Chapter No. 2	**Momentum and Energy**: Work and energy, Conservation of linear momentum, Conservation of energy with examples, Motion of rockets	4
Chapter No. 3	**Special Theory of Relativity:** Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities.	5
Topics for Self-study	Variable mass problem & Rocket motion Twin paradox	
	Suggested Activities	
Activity No. 1	i). Measure diameters of small balls of different size and estimate their volumes. ii). Measure lengths of nails of different size. iii). Measure volume of a liquid. iv). Measure distances and put the result both in CGS and SI units in 2, 3 and 4 significant figures. Mention the precision of the measurement. v). Estimate standard deviations wherever possible.	
Activity No. 2	Understand conservation of energy in every day examples like i) What happens in solar energy conversion panels ii) Pushing an object on the table iii) Moving car hits a parked car causes parked car to move. In these cases, it is known that energy is conserved. How? Understand and verify if possible.	
Unit – 2 **(13 hours of teaching includes 3 hours of activities)**		
Chapter No. 4.	**Laws of Motion:** Newton's Laws of motion, Dynamics of single particle and a system of particles, Centre of mass.	3

Chapter No. 5.	**Dynamics of Rigid bodies**: Rotational motion about an axis, Relation between torque and angular momentum, Rotational energy, Moment of inertia (M.I): M.I of a rectangular lamina and solid cylinders, Flywheel, Theory of compound pendulum and determination of g.	6
Chapter No. 6.	**Gravitation:** Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's laws (statements). Satellite in a circular orbit.	4
Topics for self study	Geosynchronous orbits Basic idea of global positioning system (GPS).	
	Suggested Activities	
Activity No. 3	Moment of inertia is an abstract concept. It simply gives a measure of rotational inertia of a rigid body and it is proportional to the product of the square of radius, r of the body and its mass, m. Refer to different websites to construct and perform simple experiments to verify that M.I.	
	Reference : www.khanacademy.org, www.pinterest.com, www.serc.cerleton.edn	
Activity No. 4	Prepare suitable charts and give seminar talks in the class.	
	Reference : Weblink/Youtube/Book	
Unit – 3 **(13 hours of teaching includes 3 hours of activities)**		
Chapter No. 7	**Elasticity:** Hooke's law - Stress-strain diagram, elastic moduli-relation between elastic constants, Poisson's Ratio-expression for Poisson's ratio in terms of elastic constants. Work done in stretching and work done in twisting a wire-Twisting couple on a cylinder. Beams, bending of beams, expression for bending moment, theory of single cantilever. Torsional pendulum, expression for time-period of torsional oscillations, determination of rigidity modulus (static and dynamic methods) and moment of inertia, determination of q, η and σ by Searle's double bar with necessary theory.	13
Topics for self study	Time period of oscillations of a spring-mass system with non-negligible mass of the spring.	

	Suggested Activities	
Activity No. 5	Arrange a steel spring with its top fixed with a rigid support on a wall and a meter scale along side. Add 100 g load at a time on the bottom of the hanger in steps. This means that while putting each 100g load, we are increasing the stretching force by 1N. Measure the extension for loads up to 500g. Plot a graph of extension versus load. Shape of the graph should be a straight line indicating that the ratio of load to extension is constant. Go for higher loads and find out elastic limit of the material.	
	Reference : Weblink/Youtube/Book	
Activity No.6	Repeat the above experiment with rubber and other materials and find out what happens after exceeding elastic limit. Plot and interpret.	
	Reference : Weblink/Youtube/Book	
Unit – 4 **(13 hours of teaching includes 3 hours of activities)**		
Chapter No. 8	**Surface tension:** Definition of surface tension. Surface energy, relation between surface tension and surface energy, pressure difference across curved surface example, excess pressure inside spherical liquid drop, angle of contact.	7
	Text Book : Units/sections to be Referred:	
Chapter No. 9	Topics to be covered: **Viscosity:** Streamline flow, turbulent flow, equation of continuity, determination of coefficient of viscosity by Poisulle's method, Stoke's method. Problems	6
	Text Book : Units/sections to be Referred:	
Topics for self study	Capillarity determination of surface tension by drop weight method.	
	Suggested Activities	
Activity No.7	Measure surface tension of water and other common liquids and compare and learn i) Why water has high ST? think of reasons. ii) Check whether ST is a function of temperature? You can do it by heating the water to different temperatures and measure ST. iii) Plot ST versus T and learn how it behaves.	

	Mix some quantity of kerosene or any oil to water and measure ST. Check whether ST for the mixture is more or less than pure water. Think of reasons.	
	Reference : Weblink/Youtube/Book	
Activity No. 8	Collect a set of different liquids and measure their viscosity. i) Find out whether sticky or non sticky liquids are most viscous. Think of reasons. ii) Mix non sticky liquid to the sticky liquid in defined quantities and measure viscosity. Find out viscosity is increasing or decreasing with increase of non-sticky liquid concentration. iii) Do the above experiment by mixing sticky liquid to the non sticky liquid. Find out change in viscosity with increase of concentration of sticky liquid. Think why anyone should know viscosity of a liquid.	
	Reference : Weblink/Youtube/Book	

Text Books

Sl No	Title of the Book	Author(s)	Publisher	Year of Publication
1	Mechanics	D. S. Mathur	S.Chand &Co.	2000
2	Mechancis and Relativity (3rd Edition)	Vidwan Singh Soni,	PHI Learning Pvt. Ltd.	2013
3	Mechanics (In SI Units): Berkeley Physics Course Vol 1	Charles Kittel, Walter Knight, et al	Tata McGraw-Hill	2007
4	Properties of Matter	Brij Lal & Subrahmanyam	S.Chand &Co.	2002

References Books

Sl No	Title of the Book	Author(s)	Publisher	Year of Publication
1	Principles of Physics	David Halliday, Jearl Walker & Robert Resnick	Wiley India Pvt. Ltd	2010
2	Physics (8^{th} Edition)	David Halliday & Robert Resnick	Wiley India Pvt Ltd	2008

Paper Code: Phy-DSCP1 - Lab I (2 credits, 4 hours per week)
List of Experiments to be performed in Lab I

1.	Determination of g using bar pendulum (L versus T and L versus LT^2 graphs)
2.	Determination of moment of inertia of a Fly Wheel.
3.	Determination of rigidity modulus using torsional pendulum
4.	Verification of parallel and perpendicular axis theorems.
5.	Determine the Young's Modulus a bar by uniform bending method
6.	Determination of elastic constants of a wire by Searle's method
7.	Young's modulus by Koenig's method
8.	Modulus of rigidity of a rod –Static torsion method.
9.	Viscosity by Stokes method
10.	Radius of capillary tube by mercury pellet method
11.	Verification of Hook's law.
12.	Determination of surface tension of a liquid and the interfacial tension between two liquids using drop weight method.
13.	Critical pressure for stream line flow
14.	Determine the Young's Modulus a bar by single cantilever method.
15.	Study of motion of a spring and to calculate Spring constant, g and unknown mass.

Note: A minimum of EIGHT experiments to be carried out

Reference Books for Laboratory Experiments

Sl No	**Title of the Book**	**Authors Name**	**Publisher**	**Year of Publication**
1	Physics through experiments	B. Saraf	Vikas Publications	2013
2	A laboratory manual of Physics for undergraduate classes, 1st Edition,	D P Khandelwal	Vikas Publications.	1985
3	B.Sc. Practical Physics (Revised Edition)	C. L Arora	S.Chand & Co.	2007
4	An advanced course in practical physics.	D. Chatopadhyay, PC Rakshit, B. Saha	New Central Book Agency Pvt Ltd.	2002

Course Content: 2nd Semester

Phy-DSCT2: Electricity and Magnetism	Course Credits (L+T+P) : 4+0+0=4
Total Contact Hours: 52	Duration of ESA: 3 hours

Course Outcomes (COs):

1. Demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.
2. Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.
3. Apply Gauss's law of electrostatics to solve a variety of problems.
4. Describe the magnetic field produced by magnetic dipoles and electric currents.
5. Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.
6. Describe how magnetism is produced and list examples where its effects are observed.
7. Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.
8. Apply various network theorems such as Superposition, Thevenin, Norton, Reciprocity,• Maximum Power Transfer, etc. and their applications in electronics, electrical circuit analysis, and electrical machines.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6
Demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point, line, surface, and volume distributions of charges.	x	x				
Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.	x					
Apply Gauss's law of electrostatics to solve a variety of problems.	x	x			x	
Describe the magnetic field produced by magnetic dipoles and electric currents.	x					
Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.	x					
Describe how magnetism is produced and list examples where its effects are observed.	x				x	x
Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.	x	x			x	x
Apply various network theorems such as Superposition, Thevenin, Norton, Reciprocity,• Maximum Power Transfer, etc. and their applications in electronics, electrical circuit analysis, and electrical machines.	x	x			x	x

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark '**X**' in the intersection cell if a course outcome addresses a particular program outcome.

Course Content Phy-DSCT2:Electricity and Magnetism		Hrs
Unit – 1 **(13 hours of teaching includes 3 hours of activities)**		
Chapter No. 1	**Electric charge and field:** Coulomb's law, electric field strength, electric field lines, point charge in an electric field and electric dipole, work done by a charge (derivation of the expression for potential energy)	3
Chapter No. 2	**Gauss law:** Gauss's law and its applications - electric fields of a (i) spherical charge distribution, (ii) line charge and (iii) an infinite flat sheet of charge.	3
Chapter No. 3	**Electrostatic potential** Electric potential, line integral, gradient of a scalar function, relation between field and potential. Potential due to point charge and distribution of charges (Examples: potential associated with a spherical charge distribution, infinite line charge distribution, infinite plane sheet of charges). Constant potential surfaces, Potential due to a dipole and electric quadrupole.	7
Topics for self study	Concept of Voltage and Current Sources, Kirchhoff's Laws	
	Suggested Activities	
Activity No. 1	(i) Learn the difference between and DC and AC electricity and their characteristics. (ii) Voltage and line frequency standards in different countries. (iii) A small project report on production of electricity as a source of energy: Different methods	
	Reference : Weblink/Youtube/Book	
Activity No. 2	(i) Learn to use a multimeter (analog and digital) to measure voltage, current and resistance. Continuity testing of a wire. (ii) Learn about household electrical connection terminals: Live, neutral and ground and voltage between the terminals. Role of earthing and safety measures	
	Reference : Weblink/Youtube/Book	

Unit – 2 (13 hours of teaching includes 3 hours of activities)		
Chapter No. 4.	**Conductors in electrostatic field:** Conductors and insulators, conductors in electric field. Capacitance and capacitors, expression for capacitance in a parallel plate capacitor, parallel plate capacitor with dielectric, Dielectrics: an atomic view. Energy stored in a capacitor, Dielectric and Gauss's law.	6
Chapter No. 5.	**DC currents:** Electric currents and current density. Electrical conductivity and Ohm's law. Physics of electrical conduction, conduction in metals and semiconductors, circuit elements and circuits: Transient currents in RC, LR and LCR circuits. Force on a moving charge.	7
Topics for self study	Currents and voltage in combination of R, L and C circuits	
	Suggested Activities	
Activity No. 3	(i) Learn about electrical appliances which work with AC and DC supply. (ii) Learn about types of resistors and their colour codes and types of capacitors (electrolytic and non-electrolytic)	
	Reference : Weblink/Youtube/Book	
Activity No. 4	(i) Learn about power transmission: 3-phase electricity, voltage and phase (ii) Visit a nearby electrical power station. Interact with line men, Electrical engineers and managers. Discuss about power loss in transmission. How to reduce it? (iii) Prepare a small project report on street lighting and types of electrical bulbs.	
	Reference : Weblink/Youtube/Book	

Unit – 3 **(13 hours of teaching includes 3 hours of activities)**		
Chapter No.6	**Magnetism:** Definition of magnetic field, Ampere's law and Biot-Savart law (magnetic force and magnetic flux), Magnetic force on a current carrying conductor, Hall effect in a conductor. Electromagnetic induction, conducting rod moving in a magnetic field, Faraday's laws of induction, Lenz's Law, expression for self-inductance and energy stored in a magnetic field. Mutual inductance.	7
Chapter No. 7	**AC circuits:** RMS and average value of AC, Response of series RL, RC, LC, LCR circuits using j-operator method, quality factor, admittance and impedance, power and energy in AC circuits.	6
Topics for self study	Response of parallel RL, RC, LC, LCR circuits using j-operator method	
	Suggested Activities	
Activity No. 5	(i) Prepare a small project report on street lighting and types of electrical bulbs. (ii) Learn the measurement of electric current using tangent galvanometer.	
	Reference : Weblink/Youtube/Book	
Activity No.6	Build a small coil with insulated copper wire. Connect an ammeter micro/milli ammeter. Verify magnetic induction using a powerful bar magnet.	
	Reference : Weblink/Youtube/Book	
Unit – 4		
Chapter No. 8	**Electromagnetic waves:** Equation of continuity, Maxwell's equations, displacement current, equation for propagation of electromagnetic wave, transverse nature of electromagnetic wave, energy transported by electromagnetic waves. Poynting vector, magnetic moment of a point charge moving in a circular loop, electric current in atoms, electron spin and magnetic moment, magnetization and magnetic susceptibility.	8

Chapter No. 9	**Magnetic materials:** Magnetic intensity and magnetic induction, Intensity of magnetization, Susceptibility, Permeability, Types of magnetic materials: diamagnetic, paramagnetic and ferromagnetic materials. Classical Langevin's theory of diamagnetism, B-H hysteresis curves, Hard and soft magnetic materials.	5
Topics for self study	1. Super conductivity 2. At least two Applications of magnetic materials	
	Suggested Activities	
Activity No.7	(i) Prepare a small project report on production of magnetic field: Permanent magnets, electromagnets and superconducting magnets. (ii) Learn the principle of working of a Gauss meter to measure magnetic field	
	Reference : Weblink/Youtube/Book	
Activity No. 8	(i) Model the earth's magnetic field with a diagram. (ii) Explain the effect of tilt of the earth's axis and reasons for the change in the tilt of the earth's axis over thousands of years.	
	Reference : Weblink/Youtube/Book	

Text Books

Sl No	**Title of the Book**	**Author(s)**	**Publisher**	**Year of Publication**
1	Physics-Part-II,	David Halliday and Robert Resnick	Wiley Eastern Limited	2001
2	Berkeley Physics Course, Vol-2, Electricity and Magnetism, Special Edition	Edward M Purcell	Tata Mc Graw-Hill Publishing Company Ltd, New Delhi	2008

Paper Code: Phy-DSCP1-Lab II

List of Experiments to be performed in Lab II

1.	Experiments on tracing of electric and magnetic flux lines for standard configuration.
2.	Determination of components of earth's magnetic field using a Ballistic galvanometer.
3.	Determination of capacitance of a condenser using B.G.
4.	Determination of high resistance by leakage using B.G.
5.	Determination of mutual inductance using BG.
6.	Charging and discharging of a capacitor (energy dissipated during charging and time constant measurements).
7.	Frequency response of LCR Series resonance circuit.
8.	Frequency response of LCR Parallel resonance circuit.
9.	Impedance of series RC circuits - determination of frequency of AC.
10.	Study the i-v characteristics of a series RC and RL Circuit.
11.	Determination of self-inductance of a coil.
12.	Verification of laws of combination of capacitances and determination of unknown capacitance using de-Sauty bridge.
13.	Maxwell's impedance bridge to determine L.
14.	Determination of B_H using Helmholtz double coil galvanometer and potentiometer.

Note: A minimum of EIGHT experiments to be performed.

Reference Books for Laboratory Experiments

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	Physics through experiments	B. Saraf	Vikas Publications	2013
2	A laboratory manual of Physics for undergraduate classes, 1st Edition,	D P Khandelwal	Vikas Publications.	1985
3	B.Sc. Practical Physics (Revised Edition)	C. L Arora	S.Chand & Co.	2007
4	An advanced course in practical physics.	D. Chatopadhyay, PC Rakshit, B. Saha	New Central Book Agency Pvt Ltd.	2002

Open Elective Papers
Phy-OE1: Energy Sources (Credits:3)
3 hours of teaching per week

Unit-I: Non-Renewable energy sources	**Hrs.**
Introduction: Energy concept-sources in general, its significance & necessity, Classification of energy sources: Primary and Secondary energy, Commercial and Non-commercial energy, Renewable and Non-renewable energy, Conventional and Non-conventional energy, Based on Origin-Examples and limitations. Importance of Non-commercial energy resources (5 hours) **Conventional energy sources:** Fossil fuels & Nuclear energy- production & extraction, usage rate and limitations. Impact on environment and their issues & challenges. Overview of Indian & world energy scenario with latest statistics- consumption & necessity. Need of eco-friendly & green energy & their related technology. (8 hours)	**13**
Unit-II: Renewable energy sources	
Introduction: Need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity. (05 hours) **Solar energy**: Solar Energy-Key features, its importance, Merits & demerits of solar energy, Applications of solar energy. Solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell -brief discussion of each. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems. (8 hours)	**13**
Unit-III	
Wind and Tidal Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies, Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices, Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy. (8 hours) **Geothermal and hydro energy:** Geothermal Resources, Geothermal Technologies (2 hours), Hydropower resources, hydropower technologies, environmental impact of hydro power sources, Carbon captured technologies, cell, batteries, power consumption (3 hour)	**13**

Suggested Activities

1. Demonstration of on Solar energy, wind energy, etc, using training modules at Labs.
2. Conversion of vibration to voltage using piezoelectric materials.
3. Conversion of thermal energy into voltage using thermoelectric (using thermocouples or heat sensors) modules.
4. Project report on Solar energy scenario in India
5. Project report on Hydro energy scenario in India
6. Project report on wind energy scenario in India
7. Field trip to nearby Hydroelectric stations.
8. Field trip to nearby to wind energy stations.
9. Field trip to nearby to solar energy parks.
10. Videos on solar energy, hydro energy and wind energy.

Reference Books

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand and Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
4. Godfrey Boyle, “Renewable Energy, Power for a sustainable future”, 2004, Oxford University Press, in association with The Open University.
5. Dr. P Jayakumar, Solar Energy: Resource Assessment Handbook, 2009
6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
7. http://en.wikipedia.org/wiki/Renewable_energy

Phy-OE2: Physics for all (Credits:3)
3 hours of teaching per week

Unit-I	Hrs.
Energy and Power: Explosions and energy; Energy, heat and its units; Energy table and discussions; Discussion of cost of energy; Measuring energy; Power; Different power sources; Kinetic energy.	**13**
Unit-II	
Gravity, Force and Space: The force of Gravity; Newton's third law; Weightlessness; Low earth orbit; Geosynchronous satellites; Spy satellites; Medium Earth Orbit satellite; Circular Acceleration; momentum; Rockets; Airplanes, helicopters and fans; Hot air and helium balloons; angular momentum and torque..	**13**
Unit-III	
Nuclei and radioactivity: Radioactivity; Elements and isotopes; Radiation and rays; Seeing radiation; The REM – The radiation poisoning; Radiation and cancer; The linear hypothesis; Different types of radiation; The half-life rule; Smoke detectors; measuring age from radioactivity; Environmental radioactivity; Glow of radioactivity; Nuclear fusion.	**13**

References Book

This course is extracted from the book titled "Physics and Technology for Future Presidents: An Introduction to the Essential Physics Every World Leader Needs to Know" by Richard A Muller, WW Norton and Company, 2007. (Units 1 to 3 are from chapters 1, 3, 4 respectively).

Phy-OE3: Atmospheric Science (Credits:3)
3 hours of teaching per week

Unit-I	Hrs.
Atmosphere: Atmospheric Science (Meteorology) as a multidisciplinary science. Physical and dynamic meteorology, Some terminology, difference between weather and climate, weather and climate variables, composition of the present atmosphere: fixed and variable gases, volume mixing ratio (VMR), sources and sinks of gases in the atmosphere. Green house gases. Structure (layers) of the atmosphere. Temperature variation in the atmosphere, temperature lapse rate, mass, pressure and density variation in the atmosphere. Distribution of winds.	**13**
Unit-II	
Climate Science: Overview of meteorological observations, measurement of : temperature, humidity, wind speed and direction and pressure. Surface weather stations, upper air observational network, satellite observation. Overview of clouds and precipitation, aerosol size and concentration, nucleation, droplet growth and condensation (qualitative description). Cloud seeding, lightning and discharge. Formation of trade winds, cyclones. Modelling of the atmosphere: General principles, Overview of General Circulation Models(GCM) for weather forecasting and prediction. Limitations of the models. R and D institutions in India and abroad dedicated to climate Science, NARL, IITM, CSIR Centre for Mathematical Modeling and Computer Simulation, and many more.	**13**
Unit-III	
Global Climate Change: Green house effect and global warming, Enhancement in concentration of carbon dioxide and other green house gases in the atmosphere, Conventional and non-conventional energy sources and their usage. EL Nino/LA Nino Southern oscillations. Causes for global warming: Deforestation, fossil fuel burning, industrialization. Manifestations of global warming: Sea level rise, melting of glaciers, variation in monsoon patterns, increase in frequency and intensity of cyclones, hurricanes, tornadoes. Geo-engineering as a tool to mitigate global warming, Schemes of geo-engineering.	**13**

Suggested Activities

1. Try to find answer to the following questions:
   (a) Imagine you are going in a aircraft at an altitude greater than 100 km. The air temperature at that altitude will be greater than 200^{o}C. If you put your hands out of the window of the aircraft, you will not feel hot.
   (b) What would have happened if ozone is not present in the stratosphere.
2. Visit a nearby weather Station and learn about their activities.
3. Design your own rain gauge for rainfall measurement at your place.
4. Learn to determine atmospheric humidity using wet bulb and dry bulb thermometers.
5. Visit the website of Indian Institute of Tropical Meteorology (IITM), and keep track of occurrence and land fall of cyclone prediction.
6. Learn about ozone layer and its depletion and ozone hole.
7. Keep track of melting of glaciers in the Arctic and Atlantic region through data base available over several decades.
8. Watch documentary films on global warming and related issues (produced by amateur film makers and promoted by British Council and BBC).

Reference Books

1. Basics of Atmospheric Science – A Chndrashekar, PHI Learning Private Ltd. New Delhi, 2010.
2. Fundamentals of Atmospheric Modelling- Mark Z Jacbson, Cambridge University Press, 2000.

Phy-OE4: Sports Science (Credits:3)
3 hours of teaching per week

Unit-I	Hrs.
Measurement: Physical quantities, Standards and Units, International system of Units, Standards of time, length and mass, Precision and significant figures (4 hours) **Newton's laws of motion**: Newton's first law. Force, mass. Newton's second law. Newton's third law, Mass and weight. Applications of Newton's laws. (5 hours) **Projectile motion**: Shooting a falling target, Physics behind Shooting, Javelin throw and Discus throw. (4 hours) **Topics for self study:** https://www.real-world-physics-problems.com/physics-of_sports.html	**13**
Unit-II	
Conservation laws: Conservation of linear momentum, collisions – elastic and inelastic. Angular momentum. (Physics behind Carom, Billiards, Racing) (4 hours) **Centre of mass**: Physics behind Cycling, Rock climbing, Skating (5 hours) **Gravitation**: Origin, Newton's law of gravitation, Archimedes's principle, Buoyancy & Physics behind swimming (4 hours) **Topic for self-study:** Archimedes' Principle: Made EASY | Physics in You tube	**13**
Unit-III	
Food and Nutrition: Proteins, Vitamins, Fat, Blood pressure. Problems due to the deficiency of vitamins. (4 hours) **Energy:** Different forms of Energy, Conservation of mass-energy (3 hours) **Physical exercises:** Walking, Jogging and Running, Weight management. (3 hours) **Topic for self-study:** 10 Best Exercises for Everyone – Healthline	**13**

Suggested Activities

1. Identify the methods of measurement of time, length and mass from ancient time and build models for them. **(**Reference : History of measurement - Wikipedia *https://en.wikipedia.org › wiki › History_of_measurement*)
2. Identify Physics principles behind various Sports activities. **https://www.real-world-physics-problems.com/physics-of-sports.html**
3. List the difficulties experienced in Gymnastics, Cycling and Weight lifting.
4. List the difficulties experienced in swimming.
5. Learn breathing exercises.
6. Write an essay on Physical health v/s Mental health or conduct a debate on Physical health v/s Mental health.

Text Books

1. Yakov Perelman. Physics for Entertainment. Createspace Independent Pub, 2010.
2. Yakov Perelman. Physics Everywhere. Prodinnova Publishers, 2014.
3. Yakov Perelman. Mechanics for Entertainment. Prodinnova Publishers, 2014.
4. Vassilios McInnes Spathopoulos. An Introduction to the Physics of Sports. Createspace Independent Publishing Platform, 2013.
5. Walter Lewin. For the Love of Physics. Taxmann Publications Pvt. Ltd., 2012.
6. Swaminathan M. Handbook of Food and Nutrition. Bangalore Press. 2012.
7. Srilakshmi B. Food Science. New Age International Pub. 2015.

Internet Resources for Reference: Internet resources

https://www.topendsports.com/biomechanics/physics.htm
https://www.real-world-physics-problems.com/physics-of-sports.html
https://www.healthline.com/
https://www.mayoclinic.org/
https://www.who.int/news-room/

COURSE PATTERN & SCHEME OF EXAMINATION for B.Sc. / B.Sc. (Hons.) as per NEP-2020

Semester	Title of the Paper	Total No of hours	Hours per week	Marks		Duration of Examination (hours)	Total Marks	Credits
				Theory/Practicals	Internal Assessment (IA)			
				Max	Max			
1st Semester	Phy-DSCT1: Mechanics and Properties of Matter	52	4	60	40	3	100	4
	Phy-DSCP1-Lab I	40	4	25	25	3	50	2
	Phy-OE1 : Energy Sources OR Phy-OE2: Physics for All	39	3	60	40	3	100	3
2nd Semester	Phy-DSCT2: Electricity and Magnetism	52	4	60	40	3	100	4
	Phy-DSCP2-Lab II	40	4	25	25	3	50	2
	Phy-OE3:Atmospheric Science OR Phy-OE4: Sports Science	39	3	60	40	3	100	3

Formative/Internal Assessment for Theory Papers	
Assessment Occasion	Marks
Test-1 (Attendance+Activity + Self-study related)	20
Test-2 (Theory based)	20
Total	40

***Questions should not be set on activity and self-study topics during end semester examinations.**

Distribution of Marks for the Practical Examination (Phy-DSCP1 & Phy-DSCP2)		
Sl No	Particulars	Marks
1	Writing Principle/Statement/Formulae with symbols, units and explanations.	03
2	Drawing illustrative diagrams and expected graphs	03
3	Setting up of the experiment & taking readings	06
4	Calculations and graphs drawn based on experimental data.	05
5	Accuracy of results with units	03
6	Valuation of Practical Record	05
Total Marks		25

QUESTION PAPER PATTERN (INDICATIVE TEMPLATE)

I Semester B.Sc Examination, April/May (September/October) 2022

CBCS - 2021 ONWARDS

Subject: Physics

Phy-DSCT1: Mechanics and Properties of Matter

Time: 2 hours **Max. Marks: 60**

Instruction: Answer *any* FOUR questions from *each* part

PART- A

Each question carries 2 marks (concept based)

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 1,2,3,4,5,6)

PART-B (20 marks)

Each question carries 5 marks (numerical problems)**

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 7,8,9,10,11,12)***

PART-C (32 marks)

Each question carries 8 marks

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 13,14,15,16,17,18)*

*In each part of the question paper first three questions should be set from the first TWO units of the syllabus and next three questions should be set from second half (last TWO units) of the syllabus.
**Questions in Part-B should contain numerical problems in the specific cases of discipline core subjects, where problem solving is an essential component of learning.
*** Questions of Part B and Part C may contain subdivisions i.e., (i) questions 7 to 12 of Part B may be split into a, b & division of marks in such cases should be clearly indicated – for example 2 + 3=5 marks or 1+4=5 marks. Similarly (ii) question 13 to 18 of Part C may be split into a, b, c with division of marks clearly indicated – for example 3+5=8 marks or 2+6=8 marks or 2+3+3=8 marks and so on).

I Semester B.Sc Examination, April/May (September/October) 2022

CBCS - 2021 ONWARDS

Subject: Physics

Phy-OE1 : Energy Sources (Open Elective)

Time: 2 hours **Max. Marks: 60**

Instruction: Answer *any* FOUR questions from *each* part

PART- A

Each question carries 2 marks (concept based)

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 1,2,3,4,5,6)

PART-B (20 marks)

Each question carries 5 marks (numerical problems)**

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 7,8,9,10,11,12)***

PART-C (32 marks)

Each question carries 8 marks

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 13,14,15,16,17,18)**

* All parts should have TWO questions each from 3 units of the open elective syllabus.
** Questions of Part B and Part C may contain subdivisions i.e., (i) questions 7 to 12 of Part B may be split into a, b & division of marks in such cases should be clearly indicated – for example 2 + 3=5 marks or 1+4=5 marks. Similarly (ii) question 13 to 18 of Part C may be split into a, b, c with division of marks clearly indicated – for example 3+5=8 marks or 2+6=8 marks or 2+3+3=8 marks and so on).

Bangalore University
Department of Physics

Jnanabharathi Campus
Bengaluru – 560 056

Syllabus for
3rd & 4th Semester Physics Papers
Under-Graduate(UG) Program

Framed according to the National Education Policy (NEP 2020)

(Effective from the Academic Year 2021-22)

Board of Studies in Physics (UG) Members

Professor Usha Devi A R (Chairperson)	Dept. Physics, Bangalore University, Bengaluru-56
Sri Nanjundaiah	The Rural College, Kanakapura-562 117
Sri. Balakrishna M T	The Rural College, Kanakapura-562 117
Dr. Wajeeha Sulthana	Maharani Science College for Women, Bengaluru-01
Dr Manjunath H C	Govt. Boys College, Kolar-563 101

Board of Studies Members as Invitees

Professor Ramakrishna Damle	Dept. Physics, Bangalore University, Bengaluru-56
Smt Seeta Vasudevrao	Head of Dept. Physics, First Grade College, Kengeri, Bengaluru-60

Date: 23.08.2021
Place: Bengaluru

Department of Physics
Bangalore University, Bangalore-56

Proceedings of the BoS (UG) Physics meeting
held at 11.30 am on 23rd August 2022 at the Department of Physics, BUB

The following agenda was discussed: (1) B.Sc 3rd and 4th Semester Syllabus of Physics papers (2) Panel of Examiners for UG for the academic year 2022-2023 and BOE (Proposed) for the academic year 2022-23. After elaborate discussions and suitable modifications, the members of the BoS approved both the agenda.

Sl. No.	Name & Affiliation of the BoS Member	Signature
1	Dr. Usha Devi A R, Professor & Chairperson Dept. Physics, Bangalore University, Bengaluru-56	
2	Dr. Venkateshappa Y Govt. First Grade College, Vijayanagar, Bengaluru-04	- ABSENT -
3	Sri Nanjundaiah The Rural College, Kanakapura-562 117	
4	Sri Ramesh T Govt. First Grade College, Channapattana-571 501.	- ABSENT -
5	Sri. Balakrishna M T The Rural College, Kanakapura-562 117	
6	Dr. Wajeeha Sulthana Maharani Science College for Women, Bengaluru-01	Wajeeha Sulthana 23/08/22
7	Sri Krishnappa H Fattepur (Superannuated) The National Degree College, Basavanagudi, Bengaluru-04	- ABSENT -
8	Dr Manjunath H C Govt. Boys College, Kolar-563 101	H.C. M 23/8/22
	Invitees	
9	Professor Ramakrishna Damle Dept. Physics, Bangalore University, Bengaluru-56	R@amle
10	Smt Seeta Vasudevrao Head of Dept. Physics, First Grade College, Kengeri, Bengaluru-60	Seeta V 23/08/202

The Chairperson 23.08.2022
Department of Physics
Bangalore University
Bangalore - 560056

Course Structure
(Major Discipline: Physics)
Semester 1 - 10

SEMESTER	Discipline Core Theory (DSCT)	Core Papers
SEMESTER -1	Phy.DSCT1	Mechanics & Properties of Matter
SEMESTER -2	Phy.DSCT2	Electricity and Magnetism
SEMESTER -3	**Phy.DSCT3**	**Wave motion and optics**
SEMESTER -4	**Phy.DSCT4**	**Thermal Physics & Electronics**
SEMESTER -5	Phy.DSCT5 Phy.DSCT6	1. Classical Mechanics and Quantum Mechanics- I 2. Elements of Atomic, Molecular Physics
SEMESTER -6	Phy.DSCT7 Phy.DSCT8	1. Elements of Nuclear Physics and Nuclear Instruments 2. Elements of Condensed Matter Physics
SEMESTER -7	Phy.DSCT9 Phy.DSCT10 Phy.DSCT11	1. Mathematical Methods of Physics – I 2. Classical Electrodynamics. 3. Experimental methods of Physics 4. Research Methodology
SEMESTER -8	Phy.DSCT12 Phy.DSCT13 Phy.DSCT14	1. Classical Mechanics and Quantum Mechanics-II 2. Statistical Mechanics 3. Astrophysics & Astronomy 4. Research Project* (Select Two DSE subjects from the Pool B-II shown below) *In lieu of the research Project, two additional elective papers/ Internship may be offered.
SEMESTER -9	Phy.DSCT15	1. Mathematical Methods of Physics – II (Select One DSE subjects from the Pool B-III shown below) 2. Research Project
SEMESTER -10	Phy.DSCT17	1. Quantum Mechanics – III (Select One DSE subjects from the Pool B-IV shown below) 2. Research Project

Open Electives

1st Semester	
1.	Phy-OE1: Energy Sources
2.	*Phy-OE2: Physics for All.
2nd Semester	
3.	Phy-OE3: Atmospheric Science
4.	Phy-OE4: Sports Science
3rd Semester	
5.	**Phy-OE5: Optical Instruments**
6.	**Phy-OE6: Elements of Astronomy and Astrophysics**
4th Semester	
7.	**Phy-OE7: Medical Physics**
8.	**Phy-OE9: Electrical Instruments**

***Students who have chosen Phy-DST1 are not eligible to take Open Elective paper Phy-OE2.**

Discipline Specific Electives for 7 to 10 Semesters

7th Sem Electives **Pool B-I (Select any two)**		**8th Sem Electives** **Pool B-II (Select any two)**	
A.	Condensed Matter Physics-1	A.	Atomic & Molecular Physics-1
B.	Nuclear and Particle Physics	B.	Materials Physics & Nano materials
C.	Theoretical and Computational Physics-I	C.	Lasers and non-linear optics
D.	Biophysics	D.	Plasma Physics
E.	Astronomy and Astrophysics	E.	Physics of Semiconductor devices

9th Sem Electives (Specialization papers) **Pool B-III**		**10th Sem Electives (Specialization papers)** **Pool B-IV**	
A.	Condensed Matter Physics-2	A.	Condensed Matter Physics-3
B.	Nuclear and Particle Physics-2	B.	Nuclear and Particle Physics-3
C.	Atomic & Molecular spectroscopy-1	C.	Atomic & Molecular spectroscopy-2
D.	Materials Physics & Nanophysics –1	D.	Materials Physics & Nanophysics -2
E.	Theoretical and Computational Physics-I	E.	Theoretical and Computational Physics-2
F.	Astronomy and Astrophysics-1	F.	Astronomy and Astrophysics-2

Detailed Syllabus
for 3rd & 4th Semester Physics Papers
Under-Graduate(UG) B.Sc/B.Sc (Hon) Program
Framed according to the National Education Policy (NEP)

3rd Semester B.Sc

Phy-DSCT3: Wave Motion and Optics	**Course Credits (L+T+P) : 4+0+0**
Total Contact Hours: 52	**Duration of ESA: 4 hours**

Program Outcomes	
1.	Disciplinary knowledge
2.	Communication Skills
3.	Critical thinking, Reflective thinking, Analytical reasoning, Scientific reasoning
4.	Problem-solving
5.	Research-related skills
6.	Cooperation/ Teamwork/ Leadership readiness/Qualities
7.	Information/ Digital literacy/Modern Tool Usage
8.	Environment and Sustainability
9.	Multicultural competence
10.	Multi-Disciplinary
11.	Moral and ethical awareness/Reasoning
12.	Lifelong learning / Self Directed Learning

Prerequisites

Fundamentals of waves

Course Learning Outcomes

At the end of the course it should be ensured that students understand the following concepts:

1. Identify different types of waves by looking into their characteristics.
2. Formulate a wave equation and obtain the expression for different parameters associated with waves.
3. Explain and give a mathematical treatment of the superposition of waves under different conditions, such as, when they overlap linearly and perpendicularly with equal or different frequencies and equal or different phases.
4. Describe the formation of standing waves and how the energy is transferred along the standing wave in different applications, and mathematically model in the case of stretched string and vibration of a rod.
5. Give an analytical treatment of resonance in the case of open and closed pipes in general and Helmholtz resonators in particular.
6. Describe the different parameters that affect the acoustics in a building, measure it and control it.
7. Give the different models of light propagation and phenomenon associated and measure the parameters like the wavelength of light using experiments like Michelson interferometer, interference and thin films.
8. Explain diffraction due to different objects like singles slit, two slits, diffraction of grating, oblique incidence, circular aperture and give the theory and experimental setup for the same.
9. Explain the polarization of light and obtain how the polarization occurs due to quarter wave plates, half wave plates, and through the optical activity of a medium.

Course Articulation Matrix													
Mapping of Course Outcomes (CO) & Program Outcomes (PO)													
Course Outcomes / Program Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1.	Identify different types of waves by looking into their characteristics.	X	X	X	X	X	X					X	X
2.	Formulate a wave equation and obtain the expression for different parameters associated with waves.	X	X	X	X	X	X					X	X
3.	Explain and give a mathematical treatment of the superposition of waves under different conditions such as when they overlap linearly and perpendicularly with equal or different frequencies and equal or different phases.	X	X	X	X	X	X					X	X
4.	Describe the formation of standing waves and how the energy is transferred along the standing wave in different applications, and mathematically model in the case of stretched string and vibration of a rod.	X	X	X	X	X	X					X	X
5.	Give an analytical treatment of resonance in the case of open and closed pipes in general and Helmholtz resonators in particular.	X	X	X	X	X	X					X	X
6.	Describe the different parameters that affect the acoustics in a building, measure it and control it.	X	X	X	X	X	X					X	X
7.	Give the different models of light propagation and phenomenon associated and measure the parameters like the wavelength of light using experiments like Michelson interferometer, interference and thin films.	X	X	X	X	X	X					X	X
8.	Explain diffraction due to different objects like singles slit, two slits, diffraction grating, oblique incidence, circular aperture and give the theory and experimental setup for the same.	X	X	X	X	X	X					X	X
9.	Explain the polarization of light and obtain how the polarization occurs due to quarter wave plates, half wave plates, and through the optical activity of a medium.	X	X	X	X	X	X					X	X

Course Content Phy.DSCT3: Wave Motion and Optics		Hrs
Unit – 1: Waves and Superposition of Harmonic Waves (11 hours of teaching plus 2 hours of activities)		
Chapter No. 1	**Waves:** Plane and Spherical Waves. Longitudinal and Transverse Waves. Characteristics of wave motion, Plane Progressive (Travelling) Wave and its equation (derivation), Wave Equation – Differential form (derivation). Particle and Wave Velocities - Relation between them, Energy Transport – Expression for intensity of progressive wave, Newton's Formula for Velocity of Sound. Laplace's Correction (Derivation). Brief account of Ripple and Gravity Waves. **(Text Books : 1-4)**	**5 hours**
Chapter No. 2	**Superposition of Harmonic Waves** : Linearity and superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats) – Analytical treatment. Superposition of two perpendicular harmonic oscillations: Lissajous Figures with equal and unequal frequency- Analytical treatment. Uses of Lissajous' figures. **(Text Books : 1-4)**	**6 hours**
Topics for Self-study	Study of coupled pendulum. Explain the impact on the motion of one pendulum due to that of the other pendulum by varying the length, and mass of pendulum. Prepare a report.	
Suggested Activities (Any two activities to be conducted compulsorily)		
Activity No. 1	We know that sound is produced because of vibration. Look into at least 10 musical instruments and identify the regions of vibrations that produces the sound and those parts which enhances the sound because of reverberation. 1. Identify one common element in all of these. 2. Identify equipments which creates beats and try to explain the underlying basic principles. Demonstrate the examples of beats using two tuning forks. 3. Identify what will happen when you drop a stone in a standing water, and when your drop two stones side by side. Make your observations sketch them and comment on it in a report.	
Activity No. 2	Draw two sine waves (Amplitude vs time) one shifted with other in phase. Identity where the resonation occurs for each phase shift. Plot phase vs time taken for resonance.	
Activity No. 3	Take smooth sand, place a pointed edged pen vertically on the sand. To the mid of the pen, connect two perpendicular threads. Pull these perpendicular threads by varying the forces and timings. Note down the different shapes produced on the sand. Try to interpret the shapes. Make a report of it	
Activity No. 4	Hang a pot with sand, which has a hole in the bottom. Gently pull the pot on one side and observe the pattern formed by the sand on the floor. Report the observations.	

Activity No. 5	Take a stretched spring. Stretch it across two edges. Put a weight on the string, pluck it and measure the amplitude of the vibration. Students should measure the total damping time of oscillating spring. (Using mobile or scale) And plot graphs by 1.Varying load on the spring and amplitude at the centre. 2. Take another weight and put that in another place and measure the amplitude of vibration at the centre. 3. Vary the load in the centre of the spring and measure the amplitude at the centre. **Note for the teachers for the activity:** Make 3 groups among students and assign each group the activity of drawing one of the 3 graphs given below. Provide a few days to complete the activity. On the specific day, each group has to make a ppt presentation of the following three slides. On the day of the presentation select a member from each group randomly to make the presentation. Based on the work and presentation, teacher shall assign marks to each group, wherein all members of the group will get equal marks. 1. The first slide will explain the process of doing the experiment. 2. In the second slide. Students will show the graph of measurement. 3. In the third slide, they will list three observations from that study.

Topic Learning Outcomes

At the end of the topic, students should be able to understand the following concepts:

SL No	TLO's	CO	PO
1.	Explain the difference between plane and spherical waves, longitudinal and transverse waves and give their characteristics.	**1**	**1-6, 11-12**
2.	Write down an equation for the progressive wave in its differential form.	**1**	**1-6, 11-12**
3.	Obtain the relation between particle and wave velocity.	**1**	**1-6, 11-12**
4.	Obtain an expression for intensity of progressive waves.	**1**	**1-6, 11-12**
5.	Obtain Newton's formula for the velocity of sound and discuss the factors for which sound velocity is dependent.	**2**	**1-6, 11-12**
6.	Apply the Laplace's correction to the equation of motion of a progressive wave.	**2**	**1-6, 11-12**
7.	With examples explain ripple and gravity waves.	**2**	**1-6, 11-12**
8.	Give the theory of superposition of two linear waves having equal frequencies and different frequencies.	**3**	**1-6, 11-12**
9.	Discuss the formation of different Lissajous figures under different conditions of amplitude and frequency when they superimpose perpendicularly.	**3**	**1-6, 11-12**
10.	Give some applications of an Lissajous figures.	**3**	**1-6, 11-12**

Unit – 2 - Standing Waves and Acoustics
(11 hours of teaching plus 2 hours of activities)

Chapter No. 3	**Standing Waves :** Velocity of transverse waves along a stretched string (derivation), Standing (Stationary) Waves in a String - Fixed and Free Ends (qualitative). Theory of Normal modes of vibration in a stretched string, Energy density and energy transport of a transverse wave along a stretched string. Vibrations in rods – longitudinal and transverse modes (qualitative). Velocity of Longitudinal Waves in gases (derivation). Normal Modes of vibrations in Open and Closed	**8 hours**

	Pipes – Analytical treatment. Concept of Resonance, Theory of Helmholtz resonator. **(Text Books: 1-4)**	
Chapter No. 4	**Acoustics**: Absorption coefficient, Reverberation time - Sabine's Reverberation formula (derivation), Factors affecting acoustics in buildings, Requisites for good acoustics. Acoustic measurements – intensity and pressure levels. **(Text Books : 1-4)**	**3 hours**
Topics for Self-study	List different phenomenon where standing waves are found in nature. Identify the phenomena and reason for standing waves. Also identify the standing waves in musical instruments. Make a report of it**.**	
Suggested Activities (Any two activities to be conducted compulsorily)		
Activity No. 6	1. Go to 5 different newly constructed houses when they are not occupied and when they are occupied. Make your observations on sound profile on each room. Give the reasons. Make a report of it**.** 2. Visit three very good auditoriums, list out different ways in which the acoustic arrangements have been done (as decoration and Civil works). Look for the reasons in Google and identify which is acoustically the best auditorium among the three you visited. Make a report of it**.**	
Activity No. 7	Take a bowl of different liquids (water, milk, kerosene, salt water, Potassium Permanganate (KMNO4) solution. Place a small non oily floating material (ex: thin plastic) on the surface of the liquid. Drop a marble on the liquid at the centre of the bowl. Repeat the experiment by dropping the marble from the different heights. Plot a graph of- 1. Height v/s time of oscillation 2. Weight of the marble v/s time of oscillation **Note for the teachers for the activity:** Make 3-4 groups among students and assign each group the activity of drawing one of the graphs given below. Provide a few days to complete the activity. On the specific day, each group has to make a ppt presentation of the following three slides. On the day of the presentation select a member from each group randomly to make the presentation. Based on the work and presentation, teacher shall assign marks to each group, wherein all members of the group will get equal marks. 1. The first slide will explain the process of doing the experiment. 2. In the second slide. Students will show the graph of measurement. 3. In the third slide, they will list three observations from that study.	
Activity No. 8	Take two marbles of same weight. Drop both the marbles on the surface of the liquid from some height. With the help of the mobile take the picture and measure the position of interface of two wave fronts formed in the liquid. Plot graphs for different activities by doing the following activities. 1. By dropping two marbles of same weight from different heights. 2. By dropping two marbles of different weight from the same height **Note for the teachers for the activity:** Make 3-4 groups among students and assign each group the activity of drawing one of the graphs given below. Provide a few days to complete the activity. On the specific day, each group has to make a ppt presentation of the following three slides. On the day of the presentation select a member from each group randomly to make the presentation. Based on the work and presentation, teacher shall assign marks to each group, wherein all members of the group will get equal marks. 1. The first slide will explain the process of doing the experiment. 2. In the second slide. Students will show the graph of measurement. 3. In the third slide, they will list three observations from that study.	

Topic Learning Outcomes At the end of the topic, students should be able to understand the following concepts				
SL No	**TLO's**	**BL**	**CO**	**PO**
1.	Discuss the Transverse waves produced in stretched string and obtain the expression for the same.	**L2**	**3**	**1-6, 11-12**
2.	Give a qualitative treatment of vibration of a string when it's both ends are fixed and free.	**L2**	**3**	**1-6, 11-12**
3.	Explain normal modes of a stretched string. Obtain an expression for the energy density and discuss how this energy is transported along a stretched string.	**L2**	**3**	**1-6, 11-12**
4.	Quantitatively bring about the mode of vibrations created in a rod.	**L2**	**4**	**1-6, 11-12**
5.	Explain types of waves that are produced in gas. Obtain an expression for the same.	**L2**	**4**	**1-6, 11-12**
6.	With an analytical treatment explain the concept of resonance using the normal modes of vibrations of open and closed pipes.	**L2**	**5**	**1-6, 11-12**
7.	Give the theory of Helmholtz resonator and explain how it is used to calculate some parameters of the way the standing waves are set in there.	**L2**	**5**	**1-6, 11-12**
8.	Define Reverberation, Reverberation time and absorption coefficient of a material.	**L1**	**5**	**1-6, 11-12**
9.	Obtain Sabine's Reverberation formula and discuss what are the factors on which the Reverberation time depends on.	**L2**	**5**	**1-6, 11-12**
10.	List out which are different parameters within a building which effects the acoustics.	**L1**	**6**	**1-6, 11-12**
11.	Explain what are good acoustics of a building and how acoustics is measured in terms of intensity and pressure inside a building.	**L2**	**6**	**1-6, 11-12**
Teaching and Learning Methodology				
Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc				
Formative Assessment Techniques				

One minute paper/ Predict-Observe-Explain/ Think-Pair-Share/ Class Test/ Quiz/ Crosswords/ Group Assessment/ Assignment/ Peer-to-Peer Evaluation/Seminar etc

<table>
<tr><th colspan="3">Unit – 3: Nature of light and Interference
(11 hours of teaching plus 2 hours of activities)</th></tr>
<tr><td>Chapter No. 5</td><td>Nature of light : Corpuscular theory- laws of reflections and refraction; The Wave model, Group velocity & wave velocity - relation between them, Maxwell’s electromagnetic waves. (Text Book No 5)</td><td>2 hours</td></tr>
<tr><td>Chapter No. 6</td><td>Interference of light by division of wave front: Coherent source-Interference of light waves by division of wave-front, Young’s double slit interference- theory and experiment, Fresnel Biprism- theory and experiment (determination of wavelength) (Text Book No 5)</td><td>4 hours</td></tr>
<tr><td>Chapter No. 7</td><td>Interference of light by division of amplitude: Interference at thin films - reflected and transmitted light, Colours of thin films; Theory of air wedge; Theory of Newton's rings (Reflection). Determination of Refractive index of a liquid, Michelson Interferometer-Determination of wavelength of light (Text Book No 5)</td><td>5 hours</td></tr>
<tr><td>Topics for Self-study</td><td colspan="2">Why colour strips are seen in paddles on roads in rainy seasons? Give reasons. Make a report of it.</td></tr>
<tr><th colspan="3">Suggested Activities (Any two activities need to be conducted compulsorily)</th></tr>
<tr><td>Activity No. 9</td><td colspan="2">In the table given below explore which phenomenon can be explained by what and prepare report explaining it.
<table>
<tr><th>Sl No</th><th>Phenomenon</th><th>Corpuscular Nature</th><th>Wave Nature</th></tr>
<tr><td>1.</td><td>Formation of images on lenses</td><td></td><td></td></tr>
<tr><td>2.</td><td>Formation of images on mirror</td><td></td><td></td></tr>
<tr><td>3.</td><td>Interference</td><td></td><td></td></tr>
<tr><td>4.</td><td>Polarization</td><td></td><td></td></tr>
<tr><td>5.</td><td>Diffraction due to single slit</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Activity No. 10</td><td colspan="2">Take a bowl of different liquids (water, milk, kerosene, salt water, Potassium Permanganate (KMNO4) solution). Place a small non oily floating material (ex: thin plastic) on the surface of the liquid. Drop two marbles of same weight (mass) from the same height on to the surface of the water but at the different time intervals. Analyze the wavefronts and draw pictures of different observations.

Note to the teachers for the activity: Make 3-4 groups among students and assign each group the activity of drawing one of the graphs given below. Provide a few days to complete the activity. On the specific day, each group has to make a ppt presentation of the following three slides. On the day of the presentation select a member from each group randomly to make the presentation. Based on the work and presentation, teacher shall assign marks to each group, wherein all members of the group will get equal marks.
1. The first slide will explain the process of doing the experiment.
2. In the second slide. Students will show the graph of measurement.
3. In the third slide, they will list three observations from that study.</td></tr>
<tr><td>Activity No. 11</td><td colspan="2">Teachers should demonstrate the formation of Lissajous Figure using a CRO. Give different shapes of Lissajous Figure with varying frequency and amplitude. Then ask the students to comment on the observations and prepare a report.</td></tr>
<tr><td colspan="3"></td></tr>
</table>

Topic Learning Outcomes **At the end of the topic, students should be able to understand the following concepts**				
SL No	**TLO's**	**BL**	**CO**	**PO**
1.	Discuss the wave model and the Corpuscular model of light.	**L2**	**7**	**1-6, 11-12**
2.	Give the Huygen theory of wave-front.	**L1**	**7**	**1-6, 11-12**
3.	Define Interference. Give some examples of Interference.	**L1**	**7**	**1-6, 11-12**
4.	Give the theory of interference due to two coherent sources of light and obtain an expression for the wavelength of monochromatic source of light (Young's double slit experiment)	**L2**	**7**	**1-6, 11-12**
5.	Explain how using personal biprism, a monochromatic coherent source of light are obtained. Using this experimental setup explain how the wavelength of monochromatic sources of light is determined.	**L2**	**7**	**1-6, 11-12**
6.	Give the theory of interference due to division of amplitude by parallel and non-parallel plates.	**L1**	**7**	**1-6, 11-12**
7.	Explain how Newton's rings are obtained and discuss how the wavelength of light is determined using this experiment.	**L2**	**7**	**1-6, 11-12**
Teaching and Learning Methodology				
Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.				
Formative Assessment Techniques				
One minute paper/ Predict-Observe-Explain/ Think-Pair-Share/ Class Test/ Quiz/ Crosswords/ Group Assessment/ Assignment/ Peer-to-Peer Evaluation/Seminar etc				

Unit – 4 - Diffraction and Polarisation

Chapter No. 8	**Fraunhofer diffraction**: Introduction- Fraunhofer diffraction- Theory of single slit diffraction, Two slit diffraction pattern, Theory of diffraction Grating, Normal and oblique incidence – experimental determination of wavelength, Resolving power – Rayleigh criterion, Expression for resolving power of grating and telescope (Text Book No 5)	**4 hours**
Chapter No. 9	**Fresnel Diffraction**- Concept of Fresnel half period zones, Comparison of Zone plate with lens, Theory of diffraction at a straight edge, Qualitative discussion on diffraction by a circular aperture and diffraction by an opaque disc (Text Book No 5)	**3 hours**
Chapter No. 10	**Polarisation:** Production of polarized light, Malus' law, Phenomenon of double refraction in crystals, Quarter wave plate and half wave plate, Optical activity, Laurent's half shade polarimeter (Text Book No 5**)**	**4 hours**
Using CDs and DVDs as diffraction Grating Ref:https://www.nnin.org/sites/default/files/files/Karen_Rama_USING_CDs_AND_DVDs_AS_DIFFRACTION_GRATINGS_0.pdf Obtain the diffraction pattern using a CD and design an experiment to find the distance between the tracks on it. (Ref: https://www.brighthubeducation.com/science-lessons-grades-9-12/39347-diffraction-experiment-measuring-groove-spacing-on-cds/, https://silo.tips/download/diffraction-from-a-compact-disk)		

Explain polarization of light with the help of a chart. List out the surfaces that reflect polarized light. Learn how polarization of light can be learnt by both transmission and reflection.
What is the physics behind making 3D movies? Group Discussion (https://www.slideserve.com/rae/physics-behind-3d-movies-powerpoint-ppt-presentation)
List out different types of zone plates and look for their applications in day-to-day life. Prepare a report.
Collect information and study how optically polarizing lenses are made. Visit a nearby lens making facility. Learn the principle behind sunglasses. Prepare a report.

TLO's	**BL**	**CO**	**PO**
Define Fraunhofer diffraction.	**L2**	**8**	**1-6, 11-12**
Give a qualitative treatment of single slit/diffraction double slit diffraction.	**L2**	**8**	**1-6, 11-12**
Explain the theory of diffraction due to grating and the normal and oblique incidence.	**L2**	**8**	**1-6, 11-12**
Explain how the resolving power of a grating depends of the number of slits used.	**L2**	**8**	**1-6, 11-12**
Give the theory of Fersnel half period zones.	**L2**	**8**	**1-6, 11-12**
Discuss zone plates with respect to convex lenses.	**L2**	**8**	**1-6, 11-12**
Explain optical polarization and polaroids.	**L2**	**9**	**1-6, 11-12**
Give different types of polaroids.	**L2**	**9**	**1-6, 11-12**
Give the theory of phenomenon of double refraction and explain what are ordinary and extraordinary rays.	**L2**	**9**	**1-6, 11-12**
Give the theory of quarter wave plates and half wave plates.	**L2**	**9**	**1-6, 11-12**
Explain optical activity with theory. Give an experimental method to measure the optical activity of a material.	**L2**	**9**	**1-6, 11-12**

Textbooks

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	The Physics of Waves and Oscillations,	N K Bajaj	Tata McGraw-Hill Publishing Company Ltd., Second Edition,	1984
2	Waves and Oscillations	N Subramanyam and Brij Lal	Vikas Publishing House Pvt. Ltd., Second Revised Edition	2010
3	A Text Book of Sound	D R Khanna and R S Bedi	Atma Ram & Sons, Third Edition	1952
4	Oscillations and Waves	Satya Prakash	Pragathi Prakashan, Meerut, Second Edition	2003
5	A Text Book of Optics	Brij Lal, M N Avadhanulu & N Subrahmanyam	S. Chand Publishing	2012

References Books

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	Optics	Ajoy Ghatak	McGraw Hill Education (India) Pvt Ltd	2017

2	Berkeley Physics Course – Waves,	Frank S Crawford Jr.	Tata Mc Graw-Hill Publishing Company Ltd., Special Indian Edition,.	2011
3	Optics	E. Hecht	Pearson Paperback	2019
4	Introduction To Optics	F. L. Pedrotti, L.M. Pedrotti & L.S. Pedrotti	Pearson India	2008
5	Fundamentals of Optics	F. Jenkins & H. White	McGraw Hill Education	2017

Paper Code: Phy-DSCP3 - Lab III

List of Experiments to be performed in Lab III	
1.	Velocity of sound through a wire using Sonometer.
2.	Frequency of AC using Sonometer.
3.	Study of Lissajous' Figures
4.	To verify the laws of transverse vibration using Melde's apparatus.
5.	Helmholtz resonator using tuning fork.
6.	Helmholtz resonator using electrical signal generator.
7.	Study of Lissajous figures using CRO
8.	To determine refractive index of the material of a prism using sodium source.
9.	To determine refractive index of a liquid by parallax method.
10.	To determine the dispersive power and Cauchy constants of the material of a prism using Hg source.
11.	To determine wavelength of sodium light using Fresnel Biprism.
12.	Determination of radius of curvature of a lens using Newton's rings.
13.	To determine the thickness of a paper using air-wedge.
14.	Study of Fraunhofer diffraction at single slit
15.	Study of Diffraction at a straight edge.
16.	To determine wavelength of spectral lines of Hg source using plane diffraction grating.
17.	To determine dispersive power and resolving power of a plane diffraction grating.
18.	To verify Brewster's law.
19.	To determine specific rotation of a solution using Polarimeter.

Note: A minimum of EIGHT experiments must be performed

One hour of Laboratory time every week has to be dedicated for suggested activities in the theory paper DSCT3: Wave Motion and Optics. Note that this is in addition to a total of 8 hour of time allotted during theory teaching during the entire semester (2 hours each for every Unit of the theory paper).

Reference Books for Laboratory Experiments

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	Advanced Practical Physics for students	B.L. Flint and H.T. Worsnop	Asia Publishing House.	1971
2	A Text Book of Practical Physics	I. Prakash & Ramakrishna	Kitab Mahal, 11th Edition	2011

3	Advanced level Physics Practicals	Michael Nelson and Jon M. Ogborn	Heinemann Educational Publishers, 4th Edition	1985
4	A Laboratory Manual of Physics for undergraduate classes	D.P.Khandelwal	Vani Publications.	1985

4th Semester B.Sc

Phy-DSCT4: Thermal Physics & Electronics	**Course Credits (L+T+P) : 4+0+0**
Total Contact Hours: 52	**Duration of ESA: 4 hours**

Program Outcomes:	
1.	Disciplinary knowledge
2.	Communication Skills
3.	Critical thinking, Reflective thinking, Analytical reasoning, Scientific reasoning
4.	Problem-solving
5.	Research-related skills
6.	Cooperation/ Teamwork/ Leadership readiness/Qualities
7.	Information/ Digital literacy/Modern Tool Usage
8.	Environment and Sustainability
9.	Multicultural competence
10.	Multi-Disciplinary
11.	Moral and ethical awareness/Reasoning
12.	Lifelong learning / Self Directed Learning

Prerequisites
Exposure of the topic in Pre-University

Course Learning Outcomes	
At the end of the course students will be able to understand the following concepts.	
1.	Apply the laws of thermodynamics and analyze the thermal system.
2.	Apply the laws of kinetic theory and radiation laws to the ideal and practical thermodynamics systems through derived thermodynamic relations.
3.	Use the concepts of semiconductors to describe different Semiconductor devices such as diode transistors, BJT, FET etc and explain their functioning.
4.	Explain the functioning of OP-AMPS and use them as the building blocks of logic gates.
5.	Give the use of logic gates using different theorems of Boolean Algebra followed by logic circuits.

Course Articulation Matrix													
Mapping of Course Outcomes (CO) - Program Outcomes (PO)													
Course Outcomes / Program Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1.	Apply the laws of thermodynamics and analyze the thermal system.	X	X	X	X	X	X					X	X
2.	Apply the laws of kinetic theory and radiation laws to the ideal and practical thermodynamics systems through derived thermodynamic relations.	X	X	X	X	X	X					X	X
3.	Use the concepts of semiconductors to describe different Semiconductor devices like diode transistors, BJT, FET etc and explain their functioning.	X	X	X	X	X	X					X	X
4.	Explain the functioning of OP-AMPS and them as the building blocks of logic gates.	X	X	X	X	X	X					X	X
5.	Give the use of logic gates using different theorems of Boolean Algebra followed by logic circuits.	X	X	X	X	X	X					X	X

Course Content **Phy.DSCT4: Thermal Physics & Electronics**		**Hrs**
Unit – 1: Thermodynamics **(11 hours of teaching plus 2 hours of activities)**		
Chapter No. 1	**Laws of Thermodynamics**: Review of the concepts of Heat and Temperature – the zeroth law of thermodynamics, Thermodynamic variables - extensive and intensive, Equations of state, PV diagrams.	**2 hours**
Chapter No. 2	**First Law of Thermodynamics:** Differential form of the First Law of Thermodynamics, Work done in an isothermal and adiabatic process for an ideal gas, Internal Energy as a state function, Equation of state for an adiabatic process Application of the first law for (i) Cyclic Process (ii) Adiabatic Process (iii) Isochoric Process (iv) Isobaric Process and (v) Isothermal Process.	**3 hours**
Chapter No. 3	**Second Law of Thermodynamics:** Second law of thermodynamics (Kelvin's & Clausius' statements and their equivalence); Reversible and irreversible processes with examples; Heat engines: Carnot Engine; Carnot Cycle and its efficiency, Practical internal combustion engines - Otto and Diesel Cycles (qualitative treatment); Carnot theorem, Refrigerator- Coefficient of performance. Concept of Entropy, Second Law of Thermodynamics in terms of Entropy, Entropy in reversible process, Entropy in irreversible process, Principle of increase of entropy, Entropy change in (i)	**6 hours**

	adiabatic process (ii) free expansion (iii) cyclic process (iv) isobaric process **Third Law of Thermodynamics(Nernst Heat theorem):** Statement, Significance and Unattainability of Absolute Zero	
Topics for Self-study	(1) Discuss when the temperature of the body is locked until what time you hold the thermometer in contact with a body. Discuss it in contact with laws of thermodynamics. (2) Discuss why when a person works or does exercise, he sweats. Reason it with the laws of thermodynamics.	

Suggested Activities (Any two activities to be conducted compulsorily)

Activity No. 1	We feel cold because coldness enters our body. Discuss the statement in day-to-day life. Approximately give examples of a) open system b) closed system and c) isolated system
Activity No. 2	Take four different sizes of same metal, preferable of same shape and give one piece to each group. Heat it uniformly on a hot plate. Keep a beaker of water with a thermometer immersed in it. Drop one hot metal into the water and record the temperature with time. Repeat the experiment for the other heated metal pieces of different sizes. 1. Plot a graph for the volume of the metal piece used v/s respective temperature change observed. 2. Determine the heat capacity and specific heat of the metal used. All groups shall also do the following activity: **Note for the teachers for the activity:** Make 3-4 groups among students and assign each group the activity of drawing one of the graphs given below. Provide a few days to complete the activity. On the specific day, each group has to make a ppt presentation of the following three slides. On the day of the presentation select a member from each group randomly to make the presentation. Based on the work and presentation, teacher shall assign marks to each group, wherein all members of the group will get equal marks. 1. The first slide will explain the process of doing the experiment. 2. In the second slide. Students will show the graph of measurement. 3. In the third slide, they will list three observations from that study.
Activity No. 3	Take ice cubes of different size and immerse in water and measure the temperature change with time and repeat the experiment. Graph the observations. **Note for the teachers for the activity:** Make 3-4 groups among students and assign each group the activity of drawing one of the graphs given below. Provide a few days to complete the activity. One the specific day, each group has to make a ppt presentation of the following three slides. One the day of the presentation select a member from each group randomly to make the presentation. Based on the work and presentation, teacher shall assign marks to each group, wherein all members of the group will get equal marks. 1. The first slide will explain the process of doing the experiment. 2. In the second slide. Students will show the graph of measurement. 3. In the third slide, they will list three observations from that study.

Topic Learning Outcomes

At the end of the topic, students should be able to understand the following concepts.

SL No	TLO's	BL	CO	PO
1.	Explain the first law of thermodynamics.	**L1**	**1**	**1-6, 11-12**
2.	Give the differential form of the first law of thermodynamics and define what is the internal energy.	**L2**	**1**	**1-6, 11-12**
3.	Obtain an expression for work done in isothermal and adiabatic processes.	**L2**	**1**	**1-6, 11-12**

4.	Give two systems of units of temperature measurement and give their equivalence.	**L2**	**1**	**1-6, 11-12**
5.	Describe and Discuss heat engine based on Carnot cycle.	**L2**	**1**	**1-6, 11-12**
6.	Explain how the efficiency of refrigeration is measured?	**L2**	**1**	**1-6, 11-12**
7.	Detail out the application of the Carnot engine to a locomotion system.	**L1**	**1**	**1-6, 11-12**
8.	State the third law of thermodynamics and give its significance using the third law of thermodynamics describing why absolute zero temperature is not unattainable.	**L2**	**1**	**1-6,11-12**

Teaching and Learning Methodology

Lecture/ PPT/ Videos/ Animations/ Role Plays/ Think-Pair-Share/ Predict-Observe-Explain/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/ Flipped Classroom/ Jigsaw/ Field based Learning/ Project Based Learning/ Mini Projects/ Hobby Projects/ Forum Theatre/ Dance/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Collaborative Learning/ Experiential Learning / Self Directed Learning etc.

Assessment Techniques

One minute paper/ Predict-Observe-Explain/ Think-Pair-Share/ Class Test/ Quiz/ Crosswords/ Group Assessment/ Assignment/ Peer-to-Peer Evaluation/Seminar etc

Unit – 2

(11 hours of teaching plus 2 hours of activities)

Chapter No. 4	**Thermodynamic Potentials**: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy, properties and applications **Maxwell's Thermodynamic Relations**: Internal Energy; Enthalpy; Helmholtz free energy; Gibbs free energy and their significance; Maxwell's thermodynamic relations (using Thermodynamic potentials), Applications of Maxwell's Relations (1) Gibbs potential, First order Phase Transitions with examples, Clausius - Clapeyron Equation (2) Liquifaction of gases, regenerative cooling coupled with Joule Thomson cooling; Adiabatic expansion with Joule Thomson cooling (qualitative)	**5 hours**
Chapter No. 5	**Kinetic Theory of Gases**: Maxwell's law of distribution of velocity (without derivation), Deduction of most probable velocity, mean velocity and root mean square velocity, Degrees of Freedom, Law of Equipartition of Energy. Dearivation of Specific heats of ideal gas.	**3 hours**
Chapter No. 6	**Black body radiation** and its spectral energy distribution; Kirchhoff's law, Stefan-Boltzmann's law, Wien's displacement law, Rayleigh-Jeans law (Statements), Planck's law – deduction of Wien's Law & Rayleigh – Jeans Law.	**3 hours**
Topics for Self-study	(1) Equilibrium between phases - triple point of water. (2) Methods of producing low temperatures: (i) Joule Thomson (Joule Kelvin / Throttling / Porous plug) experiment.	

Suggested Activities (Any two activities to be conducted compulsorily)

Activity No. 4	1. Watch the you tube video: https://www.youtube.com/watch?v=bODiX2PjCPE and write a report on the difference between heat and temperature. 2. Watch the you tube video https://www.youtube.com/watch?v=v5zAiWSi7rs "A simple animation showing the thermoelectric effect"(Seebeck effect) and explain it in your own words.
Activity No. 5	Take two containers (cylindrical jars) A and B of identical size (volume 500 ml). Connect them to a reservoir (huge bottle containing water) though pipes of equal length, but of different radii of cross-section. Let container A be connected using a pipe of inner radius of 5 mm and container B be connected using a pipe of inner radius 1.5 mm. Sketch the graphs for the rise of water levels in containers A and B as a function of time when water was allowed to flow from the reservoir to the containers. Explain the results. What happens if the diameter of the containers A is larger than that of B, but pipes of equal length connecting the containers with the reservoir have same inner radii.
Activity No. 6	A hot object at a temperature T_1 is placed in an environment at a temperature T_0. The temperature of the object will be some function of time, T(t). This function will satisfy the equation: $\frac{dT}{dt} = -A(T - T_0)$ (a) Explain "what this equation explains" in your own words. (b) Show that the function $T(t) = T_0 + ce^{-At}$ satisfies the above equation. (c) Plot T(t) as a function of time t.
Activity No. 7	Take two dissimilar metal wires. Spot weld them forming two junctions. Dip one junction in ice and heat the other junction with a burner. Plot a graph of time of heating v/s Thermo EFM generated in the voltmeter. **Note for the teachers for the activity:** Make 3-4 groups among students and assign each group the activity of drawing one of the graphs given below. Provide a few days to complete the activity. One the specific day, each group has to make a ppt presentation of the following three slides. One the day of the presentation select a member from each group randomly to make the presentation. Based on the work and presentation, teacher shall assign marks to each group, wherein all members of the group will get equal marks. 1. The first slide will explain the process of doing the experiment. 2. In the second slide. Students will show the graph of measurement. 3. In the third slide, they will list three observations from that study.

Topic Learning Outcomes

At the end of the topic, students should be able to understand the following concepts.

SL No	TLO's	BL	CO	PO
1.	State Maxwell relations.	**L1**	**2**	**1-6, 11-12**
2.	Give examples where Maxwells relations are used.	**L1**	**2**	**1-6, 11-12**
3.	Explain the phase transition. Which is called as first order phase transition? Give Examples	**L2**	**2**	**1-6, 11-12**
4.	State Clausius - Clapeyron Equation.	**L1**	**2**	**1-6, 11-12**
5.	Obtain an equation for difference in C_P - C_V.	**L2**	**2**	**1-6, 11-12**
6.	State Joule-Thomson effect and Joule-Thomson coefficient.	**L1**	**2**	**1-6, 11-12**

7.	Obtain an expression, giving the relation between pressure, volume and temperature for a real gas (Vander Waals gas).	**L2**	**2**	**1-6, 11-12**
8.	Explain how low temperature is achieved by the liquefaction of gases?	**L2**	**2**	**1-6, 11-12**
9.	State Maxwell-Boltzmann Law of Distribution of velocities in Ideal gases.	**L1**	**2**	**1-6, 11-12**
10.	Explain the mean RMS and most probable speeds in ideal gases.	**L1**	**2**	**1-6, 11-12**
11.	Explain degrees of freedom associated with particles in an ideal gas.	**L2**	**2**	**1-6, 11-12**
12.	Define the specific heat of a gas.	**L1**	**2**	**1-6, 11-12**
13.	Explain black body radiation and its spectral distribution.	**L1**	**2**	**1-6, 11-12**
14.	Explain the different laws used to describe different parts of the curves of a spectral distribution of black body radiation.	**L2**	**2**	**1-6, 11-12**
15.	Define ultraviolet radiation catastrophe? Discuss its importance in the explanation of black body radiation.	**L2**	**2**	**1-6, 11-12**
16.	Define Planck's law of radiation and discuss how it could describe the whole black body radiation curve.	**L2**	**2**	**1-6, 11-12**
Teaching and Learning Methodology				
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Assessment Techniques				
One minute paper/ Predict-Observe-Explain/ Think-Pair-Share/ Class Test/ Quiz/ Crosswords/ Group Assessment/ Assignment/ Peer-to-Peer Evaluation/Seminar etc				

Unit – 3: Semiconductor devices **(11 hours of teaching plus 2 hours of activities)**		
Chapter No. 8	**Semiconductor devices**: Intrinsic semiconductors, concept of holes , effective mass expression for carrier concentration Intrinsic semiconductors - concept of holes – effective mass - expression for carrier concentration and electrical conductivity – extrinsic semiconductors and electrical conductivity p-n junction and its characteristics and parameters, diode current, P-N Junction as a rectifier ,Half wave rectifier, full wave rectifier, Zener diode as voltage regulator, regulator circuit with no load & loaded regulator.	**5 hours**
Chapter No. 9	**Junction Transistors**: Basics of Bipolar Junction Transistors (BJT), BJT operation, Common Base, Common Emitter and Common Collector Characteristics. Field Effect Transistor (FET) and its characteristics. Transistor as an Amplifier and Oscillator.	**6 hours**
Topic for Self-study	Diode approximations	
Suggested Activities (Any two activities need to be conducted compulsorily)		

Activity No. 8	a. Learn to identify the terminals of different types (packages) of BJTs. b. In the case of power transistors, learn how to fix a heat sink for the transistor. c. Learn the difference between BJT and FET from operational characteristics.
Activity No. 9	Take any 3 diodes and assign one each to three groups of students. Ask them to measure diode resistance when dipped in ice and while heating the ice till it boils. Using this data, plot calibration curve of temperature v/s resistance and also the cooling curve of temperature v/s time for the diode by each group. **Note for the teachers for the activity:** Form 3 groups. Assign each group the activity of drawing one of the graphs. Provide a few days to complete the activity. On the specific day, each group has to make a ppt presentation of the following three slides. Select a member from each group randomly to make the presentation. Based on the work and presentation, teacher shall assign marks to each group, wherein all members of the group will get equal marks. 1. The first slide will explain the process of doing the experiment. 2. In the second slide. Students will show the graph of measurement. 3. In the third slide, they will list three observations from that study.
Activity No. 10	Prepare a table consisting of (i) name of the semiconductor diode (Zener diode, Light Emitting Diode, Rectifier Diode, Schottky diode) (ii) its application/s (3) attach a sample photo for each type of semiconductor diode (4) give a link for the website where you got the sample photo of the diode.

Topic Learning Outcomes

At the end of the topic, students should be able to understand the following concepts.

SL No	TLO's	BL	CO	PO
1.	Define Semiconductors and Band Gap. Explain on what basis they are classified as intrinsic and extrinsic.	**L2**	**3**	**1-6, 11-12**
2.	Define PN junction. Explain its functioning in forward and reverse bias.	**L1**	**3**	**1-6, 11-12**
3.	Explain the approximation used in a real diode with respect to an ideal PN Junction?	**L2**	**3**	**1-6, 11-12**
4.	With a schematic diagram, explain half wave and full wave rectifiers.	**L1**	**3**	**1-6, 11-12**
5.	Define a Zener diode and explain how it is different from an ordinary diode using V-I curves?	**L2**	**3**	**1-6, 11-12**
6.	With the schematic diagram, explain the working of voltage regulators of different types using a Zener diode.	**L1**	**3**	**1-6, 11-12**
7.	Give the basic concepts used in the instruction of bipolar junction transistor and its operation.	**L1**	**3**	**1-6, 11-12**
8.	Compare the V-I curve of common base common emitter and common collector BJT curves while explaining their working principles.	**L2**	**3**	**1-6, 11-12**
9.	Define FET. Give its characteristics.	**L1**	**3**	**1-6, 11-12**
10.	Explain how a transistor can be used as an amplifier and an oscillator using a circuit diagram.	**L2**	**3**	**1-6, 11-12**

Teaching and Learning Methodology		
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Assessment Techniques		
One minute paper/ Predict-Observe-Explain/ Think-Pair-Share/ Class Test/ Quiz/ Crosswords/ Group Assessment/ Assignment/ Peer-to-Peer Evaluation/Seminar etc		
Unit – 4: Electronics		
Chapter No. 10	**Electronics**: Integrated Circuits (Analog and Digital), Operational Amplifier, Ideal characteristics of Op-Amp, Inverting and Non-Inverting Configurations. Applications- Voltage Follower, Addition and Subtraction.	**4 hours**
Chapter No. 11	**Digital Electronics:** Switching and Logic Levels, Digital Waveform. Number Systems: Decimal Number System, Binary Number System, Converting Decimal to Binary, Hexadecimal Number System: Converting Binary to Hexadecimal, Hexadecimal to Binary. **Boolean Algebra Theorems:** De Morgan's theorem. Digital Circuits: Logic gates, NOT Gate, AND Gate, OR Gate, NAND Gate, NOR Gate, Algebraic Simplification, Implementation of NAND and NOR functions.	**7 hours**
Topics for Self-study	(i)Understand the concept of virtual ground of an OP-AMP. (ii)Learn the different types of op-amps used for different applications. (iii)What is a buffer? Prepare a report on buffers and its application in instrumentation electronics.	
Suggested Activities (Any two activities need to be conducted compulsorily)		
Activity No. 12	Learn how to implement logic functions (AND, OR, NOT) using just diodes and resistors. With a circuit diagram show how different types of gates can be built by X-NOR gates.	
Activity No. 13	A bulb in a staircase has two switches, one switch being at the ground floor and the other one at the first floor. The bulb can be turned ON and also can be turned OFF by one of the switches irrespective of the state of the other switch. Explain switching of the bulb in terms of logic gate operation.	
Activity No. 14	A man has to take a wolf, a goat, and some cabbage across a river. His rowboat has enough room for the man plus either the wolf or the goat or the cabbage. If he takes the cabbage with him, the wolf will eat the goat. If he takes the wolf, the goat will eat the cabbage. Only when the man is present are the goat and the cabbage safe from their enemies. All the same, the man carries wolf, goat, and cabbage across the river. How? Write the truth table for the above story and implement using digital gates.	
Activity No. 15	A locker has been rented in the bank. Express the process of opening the locker in terms of digital operation.	

Topic Learning Outcomes

At the end of the topic, students should be able to understand the following concepts.

SL No	TLO's	BL	CO	PO
1.	Define op-amps and give the characteristics of an ideal op-amp.	L1	4	1-6, 11-12
2.	Explains an inverting and non-inverting configuration of typical op-amps, with a schematic diagram.	L2	4	1-6, 11-12

3.	Explain how op-amps can be used as a voltage follower, with a schematic diagram and with relevant expressions.	**L2**	**4**	**1-6, 11-12**
4.	Explain how op-amps can be used as a voltage follower, adder and subtractor, with a schematic diagram and with relevant expressions.	**L2**	**4**	**1-6, 11-12**
5.	Give different digital wave forms and explain how one can visualize the switching and logic levels.	**L1**	**5**	**1-6, 11-12**
6.	Write any four-digit numbers other than zero in the decimal number system and convert that into binary and hexadecimal.	**L2**	**5**	**1-6, 11-12**
7.	Write any number in a Binary System of 8 digits other than zero and convert it into decimal and hexadecimal.	**L2**	**5**	**1-6, 11-12**
8.	Write any number in the hexadecimal system of 4 digits other than zero and converted it into a binary and decimal number.	**L2**	**5**	**1-6, 11-12**
9.	Give simplified diagram for a given Boolean circuit diagram of logic gates, and verify using the De-Morgans theorem.	**L2**	**5**	**1-6, 11-12**
10.	Why are X-NOR gates called Universal Gates?	**L2**	**5**	**1-6, 11-12**

Teaching and Learning Methodology

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Assessment Techniques

One minute paper/ Predict-Observe-Explain/ Think-Pair-Share/ Class Test/ Quiz/ Crosswords/ Group Assessment/ Assignment/ Peer-to-Peer Evaluation/Seminar etc

Textbooks

Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1.	Heat and Thermodynamics	Brij lal, N. Subrahmanyam and P.S.Hemne	S. Chand Publishing	2001
2.	Heat and Thermodynamics	D. S. Mathur	S. Chand Publishing	2008
3.	Heat and Thermodynamics	M.W. Zemansky and Richard Dittman	McGraw-Hill Education	2017
4.	Thermal Physics	S C Garg, R M Bansal & C K Ghosh	McGrawHill Education (India)	2013
5.	Fundamentals of Classical Thermodynamics	G. J. V. Wylen, R. E. Sonntag, C. Borgnakke	John Wiley	1994
6.	Integrated Electronics	J. Millman, C. Halkias & C. Parikh	McGraw Hill Education	2017
7.	Digital Fundamentals	T. L. Floyd	Pearson Education	2005
8.	Principals of Electronics	V.K Mehta and Rohit Mehta	S. Chand Publishing	2020

References Books				
Sl No	Title of the Book	Authors Name	Publisher	Year of Publication
1	A Treatise on Heat	M. Saha & B.N.Srivastava	Hafner Publishing Company, Indian Press	1958
2	Thermodynamics, Kinetic theory & Statistical Thermodynamics	F. W. Sears & G. L. Sailinger	Pearson Education	1975
3	Electronic Principles	A Malvino and D J Bates	McGraw Hill Education	2017
4	Electronic Devices and Circuits	David A. Bell	PHI, New Delhi	2004

Paper Code: Phy-DSCP4 - Lab IV

List of Experiments to be performed in Lab IV **Note: A minimum of EIGHT experiments must be performed in Lab IV of which FOUR experiments should be chosen from 1-13 and FOUR experiments should be chosen from 14-24.**	
1.	Specific heat by Newton's law of cooling
2.	Verification of Newton's law of cooling
3.	Calibration of thermocouple for Temperature measurement
4.	Thermal conductivity of a bad conductor by Lee's and Charlton's method
5.	Thermal conductivity of rubber
6.	Mechanical Equivalent of Heat by Callender and Barne's method
7.	Coefficient of thermal conductivity of Copper by Searle's method
8.	Coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method
9.	Determination of Stefan's constant/ Verification of Stefan's law
10.	Variation of thermo-emf across two junctions of a thermocouple with temperature
11.	Verification of Clausius-Clapeyron equation
12	Study of Gaussian distribution using Monte Carlo method.
13	Determination of Planck's constant.
Any FOUR of the above listed experiments 1-13 must be conducted in Lab IV	
14.	V-I Characteristics of Silicon & Germanium PN Junction diodes (FB & RB)
15.	(i) V-I Characteristics of Zener Diode (ii) Regulated power supply (using zener diode).
16.	Characteristics of BJT in Common Emitter Configuration
17.	Half Wave and Full Wave Rectifier without Filter
18.	Half Wave and Full Wave Rectifier with Filter
	Determination of transistor h-parameters.
19.	Frequency response of a CE amplifier.
20.	Frequency response of CC Amplifier (Emitter Follower).
21.	Applications of Operational Amplifier: (i) Non-inverting and Inverting op-amp circuits (ii) Voltage follower, Adder and Subtractor circuits
22.	Truth table verification of logic gates using TTL 74 series ICs.
23.	Logic Gates; Combinational Circuits; Sequential Circuits
24.	Transfer characteristics of a TTL gate using CRO.
Any FOUR of the above listed experiments 14-24 must be conducted in Lab IV	
One hour of Laboratory time every week has to be dedicated for suggested activities in the theory paper DSCT3: Thermal Physics & Electronics. Note that this is in addition to a total of 8 hour during theory teaching during the entire semester (2 hours each for every Unit of the theory paper).	

Reference Books for Laboratory Experiments				
Sl No	**Title of the Book**	**Authors Name**	**Publisher**	**Year of Publication**
1	Advanced Practical Physics for students	B.L. Flint and H.T. Worsnop	Asia Publishing House.	**1971**
2	Basic Electronics Lab Manual 2015-16,	National Institute of Science Education and Research, Bhubaneswar, 2015.	NISER, Bhubaneswar	**2015**
3	Engineering Practical Physics	S. Panigrahi, B. Mallick	Cengage Learning India Pvt. Ltd	**2015**

OPEN ELECTIVE PAPERS

Phy-OE5: Optical Instruments (Credits:3)
3 hours of teaching per week

Unit-I	Hrs.
Basics of Optics: Scope of optics, optical path, laws of reflection and refraction as per Fermat's principle, magnifying glass, Lenses (thick and thin), convex and concave lenses, Lens makers formulae for double concave and convex lenses, lens equation. Focal and nodal points, focal length, image formation, combination of lenses, dispersion of light: Newton's experiment, angular dispersion and dispersion power. Dispersion without deviation. (No derivations; concepts to be discussed qualitatively).	**13**
Unit-II	
Camera and microscopes: Human eye (constitution and working), Photographic camera (principle, construction and working), construction, working and utilities of (i) Simple microscopes (ii) Compound microscope (iii) Electron microscopes (iv) Binocular microscopes **Self study:** Experimental determination of magnifying power of a microscope.	**13**
Unit-III	
Telescopes and Spectrometer: Construction, working and utilities of (i) Astronomical telescopes (ii) Terrestrial telescopes (iii) Reflecting telescopes, Construction, working and utilities of Eyepieces or Oculars (Huygen, Ramsden's, Gauss) Spectrometer – Construction, working and utilities, measurement of refractive index.	**13**
Self study — Telescopes used at different observatories in and outside India.	

Suggested Activities

1. Find position and size of the image in a magnifying glass and magnification.
2. Observe rain bows and understand optics. Create a rainbow.
3. Find out what makes a camera to be of good quality.
4. Observe the dispersion of light through prism.
5. Make a simple telescope using magnifying glass and lenses.
6. Learn principle of refraction using prisms.
7. Check bending of light in different substances and find out what matters here.
8. Learn about different telescopes used to see galaxies and their ranges.

Weblinks: **https://spark.iop.org, http://www.yenka.com, https://publiclab.org** etc

Reference Books

1. Galen Duree. Optics for Dummies. Wiley. 2011.
2. Blaker J W. Optics: An Introduction for Students of Engineering. Pearson, 2015.
3. Hecht E. Optics. Pearson. 5th Edition, 2019.
4. Khurana A K. Theory And Practice Of Optics & Refraction. Elsevier India. 2016.
5. FlexBooks® 2.0 https://flexbooks.ck12.org/cbook/ck-12-middle-school-physical-science-flexbook-2.0/section/19.9/primary/lesson/optical-instruments-ms-ps/

Phy-OE6: Elements of Astronomy & Astrophysics (Credits:3)
3 hours of teaching per week

Unit-I : History and Introduction	Hrs.
Ancient Astronomy: Greek Observations, Sumerian Observations, Mayan Observations, Arabic Observations ,Chinese Observations (2 hours) **Indian Astronomy:** Vedic Astronomy, Ancient Astronomy – Aryabhata, Varahamihira, Bhaskara, Astronomy in Indian Scriptures, Precession of the Equinox, Celebrations of Equinox (2 hours) **Medieval & Modern Astronomy:** Invention of Telescopes, Models of the Solar System & Universe, Observations by Tycho Brahe, Kepler, Galileo, Herschel and Other, Modern Astronomy (3 hours) **Optical Tools for Astronomy:** Pin Hole, Binoculars, Telescopes & Imaging (1 hour) **Mathematical Methods of Observations:** Angular Measurement, Trigonometric functions, Stellar Parallax (2 hour) **Observational Terminologies:** Cardinal Directions, Azimuth, Altitude, Measurements using Compass and Hand. Equatorial Co-ordinates, Light years, Magnitude, Colors etc. (3 hours)	**13**
Unit-II: Observations of the Solar System	
The Sun: Ecliptic and the Orientation of the Earth, Seasons - Solstices and Equinox, Observations of the Sun from Earth during seasons. Eclipses, Zero-shadow day, Sunspots (3 hours) **The Moon:** Earth-Moon system – Phases, Lunar Eclipses, Ecliptic and Lunar Orbital Plane – Nodes, Lunar Month, Full Moon Names (3 hours) **Inner Planets: Mercury & Venus** - Observational History, Observational Windows, Appearance, Apparitions, Elongations, Superior Conjunctions, Inferior Conjunctions, Transits. (4 hours) **Outer Planets: Mars, Jupiter & Saturn** - Observational History. Observational Windows, Appearance, Frequency of Oppositions, Conjunctions, Moons Eclipses. Galilean Moons, Saturn's Rings (3 hours)	**13**
Unit-III: Major Astronomy Observations	
March to June: Prominent Stars and Constellations Visible during this period, Methods of Spotting. (4 hours) **June to September:** Prominent Stars and Constellations Visible during this period, Methods of Spotting. (3 hours) **September to December:** Prominent Stars and Constellations Visible during this period, Methods of Spotting. (3 hours) **December to March**: Prominent Stars and Constellations Visible during this period, Methods of Spotting. (3 hours)	**13**

Suggested Activities

1. Measuring Seasons using Sun's Position.
2. Measuring Distance using Parallax
3. Estimation of the Stellar Diameter using Pin Hole
4. Measuring Height of an Object Using Clinometer.
5. Star spotting using constellation maps
6. Constellation spotting using Skymaps
7. Estimation of 'Suitable Periods' to observe deep sky objects using Planisphere.
8. Estimation of the Size of the Solar System in using Light Years.
9. Identification of Lunar Phases across a year.
10. Measuring Constellation of the Sun using Night Sky maps or Planispheres

Reference Books

1. The Stargazer's Guide - How to Read Our Night Sky by Emily Winterburn
2. A guide to the Night Sky – Beginner's handbook by P.N. Shankar
3. The Complete Idiot's guide to Astronomy by Christopher De Pree and Alan Axelro

Phy-OE7: Medical Physics (Credits:3)
3 hours of teaching per week

Unit-I: Human Anatomy and Physiology	
Overview of human anatomy - cells, cell structure, type of cells and their functions, tissues, organs, and their functions. Different systems in the human body, their structure and function, physiological properties of the circulatory system, digestive system, respiratory system, reproductive system, excretory system, endocrine system and nervous system	(13 hours)
Unit-II: Physics of Medical Diagnostics	
Principle of production of X-rays. Use of X-rays in medical diagnosis, X-ray imaging systems. Computed Tomography (CT): principle and generation of CT. Magnetic Resonance Imaging (MRI): basic principle and image characteristics. Ultrasound Imaging: Interaction of sound waves with body tissues, production of ultrasound, transducers, acoustic coupling, image formation, modes of image display and color Doppler.	(13 hours)
Unit-III: Physics of Radiotherapy	
Clinical aspects of radiation therapy: Biological basis of radiotherapy, radiation sources, radiation dose, time dose fractionation. External beam radiation therapy, radiation therapy modalities, production of radioisotopes, use of radioisotopes in therapy, particle and ion beam radiotherapy. Brachytherapy - principle of brachytherapy and classification of brachytherapy techniques.	(13 hours)

Suggested Activities

Unit I: Students may demonstrate the shape, size, positions and functions of different organs in the body with the help of models.

Unit II: The use of X-rays in the diagnosis of the fractured bone can be demonstrated with the help of a gamma source and a gamma ray survey meter. As the density of materials between the source and the detector changes the reading on the meter (or intensity of the beefing sound) changes.

Unit III: (i) Students can be asked to list out different type of cancers and possible causative factors. They can be asked to list out the healthy practices to reduce the risk of cancers.

(ii) As there will be students from different disciplines in the OE course, group discussion can be arranged to discuss about their programme and outcome. This will be an opportunity for the students to know about other disciplines.

Other related activities/projects

1. Visit to nearby hospitals/diagnostic centers to study the working of X-ray machines.
2. Visit to ultrasound diagnostic centers to study the principle and use of ultrasound in diagnosis.
3. Project on principle and use of X-ray films in imaging.
4. Visit to radiotherapy centers to study the modalities of radiotherapy.

Text Books

1. C. H. Best and N. B. Taylor. A Test in Applied Physiology. Williams and Wilkins Company, Baltimore, 1999.
2. C. K. Warrick. Anatomy and Physiology for Radiographers. Oxford University Press, 2001.
3. Jerrold T. Bushberg. The Essential Physics for Medical Imaging (2nd Edition). Lippincott Williams & Wilkins, 2002.
4. Jean A. Pope. Medical Physics: Imaging. Heinemann Publishers, 2012.
5. Faiz M. Khan and Roger A. Potish. Treatment Planning in Radiation Oncology. Williams and Wilkins, USA, 2003.
6. D. Baltas. The physics of modern brachytherapy for oncology. Taylor and Francis, 2007.

Reference Books

1. J. R. Brobek. Physiological Basis of Medical Practice. Williams and Wilkins, London, 1995.
2. Edward Alcamo, Barbara Krumhardt. Barron's Anatomy and Physiology the Easy Way. Barron's Educational Series, 2004.
3. Lippincott, Anatomy and Physiology. Lippincott Williams & Wilkins, 2002.
4. W. E. Arnould Taylor. A textbook of anatomy and physiology, Nelson Thornes, 1998.
5. G. S. Pant. Advances in Diagnositc Medical Physics. Himalaya Publishing House, 2006.
6. Sabbahaga, Diagnositc Ultrasound applied to OBG. Maryland, 1980.
7. Faiz M Khan. The Physics of Radiation Therapy (3rd edition). Lippincott Williams & Wilkins, USA, 2003.
8. Jatinder R. Palta and T. Rockwell Mackie. Intensity Modulation Radiation Therapy. Medical Physics publishing, Madison, Wisconsin, 2003.
9. AAPM Report No. 72. Basic Applications of Multileaf collimators, AAPM, USA, 2001.
10. AAPM Report No. 91. Management of Respiratory motion in radiation oncology, 2006.
11. CA Joslin, A. Flynn, E. J. hall. Principles and Practice of Brachytherapy. Arnold publications, 2001.
12. Peter Hoskin, Catherine Coyle. Radiotherapy in Practice. Oxford University Press, 2011.
13. W. R. Handee. Medical Radiation Physics. Year Book Medical Publishers Inc., London, 2003.
14. Donald T. Graham, Paul J. Cloke. Principles of Radiological Physics. Churchill Livingstone, 2003.
15. Thomas S. Curry. Christensen',s Physics of Diagnostic Radiology (4th Edition). Lippincott Williams & Wilkins, 1990.
16. Madison. MRI – Perry Sprawls – Medical Physics Publishing. Wisconsin, 2000.
17. Steve Webb. The Physics of Three–Dimensional Radiotherapy. Institute of Physics Publishing, Bristol and Philadelphia, 2002.
18. Radiation oncology physics: A Handbook for teachers and students. IAEA publications, 2005.
19. F. M. Khan. The Physics of Radiation Therapy (3rd Edition), Lippincott Williams and Wilkins, U.S.A., 2003.

Phy-OE8: Electrical Instruments (Credits:3)
3 hours of teaching per week

Content		Hrs
Unit - 1		
Chapter No. 1	Voltage and current sources, Kirchoff's current and voltage laws, loop and nodal analysis of simple circuits with dc excitation. Ammeters,voltmeters: (DC/AC)	03
Chapter No. 2	Representation of sinusoidal waveforms, peak and rms values, power factor. Analysis of single-phase series and parallel R-L-C ac circuits. Three-phase balanced circuits, voltage and current relations in star and delta connections. Wattmeters: Induction type, single phase and three phase wattmeter, Energy meters: AC. Induction type single phase and three phase energy meter	05
Chapter No. 3	Instrument Transformers: Potential and current transformers, ratio and phase angle errors, phasor diagram, methods of minimizing errors; testing and applications.	05
Topics for self study (If any)	Types of switches and Circuits, Safety precautions and rules in handling electrical appliances, Electric shock, first aid for electrical shocks, Fuses, MCB, ELCB and Relays, Filament lamp, Tube light, CFL and LED	
	Suggested Activities	
Activity No. 1	Identify variety of electrical switches and note down their applications/utility.	
	Reference: Weblink/Youtube/Book	
Activity No. 2	Identify the hazards involved in handling electrical circuits and instruments, make a list of safety precautions as well as first aid for electrical shocks.	
	Reference : Weblink/Youtube/Book	
Unit - 2		
Chapter No. 4.	Galvanometers: General principle and performance equations of D'ArsonvalGalvanometers, Vibration Galva nometer and Ballistic Galvanometer.	03
Chapter No. 5.	Potentiometers: DCPotentiometer, Crompton potentio meter, construction, standardization, application. AC Potentio meter, Drysdalepolar potentio meter; standardization, application.	03
Chapter No. 6.	DC/AC Bridges: General equations for bridge balance, measurement of self inductance by Maxwell's bridge (with variable inductance & variable capacitance), Hay's bridge, Owen's bridge, measurement of capacitance by Schearing bridge, errors, Wagner's earthing device, Kelvin's double bridge.	07
Topics for self study	Importance of grounding and Earthing, Methods for Earthing,	

Suggested Activities		
Activity No. 3	Make a study of importance of grounding in electrical circuits. Reference : Weblink/Youtube/Book	
Activity No. 4	Prepare a detailed account of various methods of earthing and their utility/applications Reference : Weblink/Youtube/Book	
Unit - 3		
Chapter No.7	Transducer: Strain Gauges, Thermistors, Thermocouples, Linear Variable Differential Transformer (LVDT), Capacitive Transducers, Peizo-Electric transducers, Optical Transducer, Hall Effect Transducer	06
Chapter No. 8	CRO: Block diagram, Sweep generation, vertical amplifiers, use of CRO in measurement of frequency,phase, Amplitude and rise time of a pulse. Digital Multi-meter: Block diagram, principle of operation	03
Chapter No. 9	Basics of lead acid batteries, Lithium Ion Battery , Battery storage capacity, Coulomb efficiency, Numerical of high and low charging rates, Battery sizing.	04
Topics for self study (If any)	Basic study of Fuses, MCB, ELCB and Relays, Filament lamp, Tube light, CFL and LED	
Suggested Activities		
Activity No. 5	Prepare a document on evolution of incandescent bulbs to the present-day LED lights Reference : Weblink/Youtube/Book	
Activity No.6	Make a comparative study of Fuses, MCB, ELCB and Relays highlighting their use and applications Reference : Weblink/Youtube/Book	

Text Books

1. A. K.Sawhney, A Course in Electrical.and Electronic Measurements & Instrumentation **, Dhanpat Rai & Sons, 1978**
2. A.D. Helfrick, W.D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, **Prentice Hall India, 1992.**

References Books

1. D C Kulshreshtha, Basic Electrical Engineering, Mc Graw Hill Publications,**2019**
2. David G Alciatore and Michel B Histand, Introduction to Mechatronics and Measurement Systems, 3rd, Tata McGraw Hill Education Private Limited, New Delhi., 2005
3. Vincent Del Toro, Electrical Engineering Fundamentals Prentice Hall India, **2009**

COURSE PATTERN & SCHEME OF EXAMINATION for B.Sc. / B.Sc. (Hons.) as per NEP-2020

Semester	Title of the Paper	Total No of hours	Hours per week	Marks		Duration of Examination (hours)	Total Marks	Credits
				Theory/ Practicals	Internal Assessment (IA)			
				Max	Max			
3rd Sem.	Phy-DSCT3: Wave motion and Optics	52	4	60	40	$2\frac{1}{2}$	100	4
	Phy-DSCP3-Lab III	40	4	25	25	3	50	2
	Phy-OE5 : Optical Instruments OR Phy-OE6: Elements of Astronomy and Astrophysics	39	3	60	40	$2\frac{1}{2}$	100	3
4th Sem.	Phy-DSCT4: Thermal Physics & Electronics	52	4	60	40	$2\frac{1}{2}$	100	4
	Phy-DSCP4-Lab II	40	4	25	25	3	50	2
	Phy-OE7: Medical Physics OR Phy-OE8: Electrical Instruments	39	3	60	40	$2\frac{1}{2}$	100	3

Formative/Internal Assessment for Theory Papers	
Assessment Occasion	Marks
Test-1 (Attendance+Activity + Self-study related)	20
Test-2 (Theory based)	20
Total	40

***Questions should not be set on activity and self-study topics during end semester examinations.**

Distribution of Marks for the Practical Examination (Phy-DSCP1 & Phy-DSCP2)		
Sl No	Particulars	Marks
1	Writing Principle/Statement/Formulae with symbols, units and explanations.	03
2	Drawing illustrative diagrams and expected graphs	03
3	Setting up of the experiment & taking readings	06
4	Calculations and graphs drawn based on experimental data.	05
5	Accuracy of results with units	03
6	Valuation of Practical Record	05
Total Marks		25

$3^{rd}/4^{th}$ Semester B.Sc Examination, April/May (September/October) 2023

CBCS - 2021 ONWARDS

Subject: Physics

Phy-DSCT3/Phy-DSCT4: …….

Time: $2\frac{1}{2}$ hours **Max. Marks: 60**

Instruction: Answer *any* FOUR questions from *each* part

PART- A

Each question carries 2 marks (concept based)

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 1,2,3,4,5,6)

PART-B (20 marks)

Each question carries 5 marks (numerical problems)**

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 7,8,9,10,11,12)***

PART-C (32 marks)

Each question carries 8 marks

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 13,14,15,16,17,18)**

*In each part of the question paper first three questions should be set from the first TWO units of the syllabus and next three questions should be set from second half (last TWO units) of the syllabus.

**Questions in Part-B should contain numerical problems in the specific cases of discipline core subjects, where problem solving is an essential component of learning.

*** Questions of Part B and Part C may contain subdivisions i.e., (i) questions 7 to 12 of Part B may be split into a, b & division of marks in such cases should be clearly indicated – for example 2 + 3=5 marks or 1+4=5

marks. Similarly (ii) question 13 to 18 of Part C may be split into a, b, c with division of marks clearly indicated – for example 3+5=8 marks or 2+6=8 marks or 2+3+3=8 marks and so on).

3rd/4th Semester B.Sc Examination, April/May (September/October) 2023

CBCS - 2021 ONWARDS

Subject: Physics

Phy-OE5/OE6/OE7/OE8 : ……..(Open Elective)

Time: 2 $\frac{1}{2}$ hours **Max. Marks: 60**

Instruction: Answer *any* FOUR questions from *each* part

PART- A

Each question carries 2 marks (concept based)

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 1,2,3,4,5,6)

PART-B (20 marks)

Each question carries 5 marks **

6 QUESTIONS TO BE SET*

(Question Numbers: 7,8,9,10,11,12)***

PART-C (32 marks)

Each question carries 8 marks

6 QUESTIONS TO BE SET* (Answer any 4 questions)

(Question Numbers: 13,14,15,16,17,18)**

* All parts should have TWO questions each from 3 units of the open elective syllabus.
** Questions of Part B and Part C may contain subdivisions i.e., (i) questions 7 to 12 of Part B may be split into a, b & division of marks in such cases should be clearly indicated – for example 2 + 3=5 marks or 1+4=5 marks. Similarly (ii) question 13 to 18 of Part C may be split into a, b, c with division of marks clearly indicated – for example 3+5=8 marks or 2+6=8 marks or 2+3+3=8 marks and so on).

BANGALORE UNIVERSITY B.Sc.(CBCS)
PHYSICS

Approved Syllabus effective from
Academic year 2016-17

BANGALORE UNIVERSITY
Scheme of Instruction & Examination for B.Sc. PHYSICS , CBCS

Serial Number	Paper Number	Teaching hours per week	Examination duration	Maximum marks		Maximum total marks	Credits
				Final exam	Internal Assessment		
01	PHY T101	4	3 hours	70	30	150	2
02	PHY P102	3	3 hours	35	15		1
03	PHY T201	4	3 hours	70	30	150	2
04	PHY P202	3	3 hours	35	15		1
05	PHY P301	4	3 hours	70	30	150	2
06	PHY T302	3	3 hours	35	15		1
07	PHY T401	4	3 hours	70	30	150	2
08	PHY P402	3	3 hours	35	15		1
09	PHY T501	3	3 hours	70	30	150	2
10	PHY P502	3	3 hours	35	15		1
11	PHY T503	3	3 hours	70	30	150	2
12	PHY P504	3	3 hours	35	15		1
13	PHY T601	3	3 hours	70	30	150	2
14	PHY P602	3	3hours	35	15		1
15	PHY T603	3	3 hours	70	30	150	2
16	PHY P604	3	3hours	35	15		1
Grand total						1200	16(T) 8(P)

Note-I:

- The paper number is a three digit number with ' **0** ' in the middle
- The digit to the left of ' **0** ' indicates the semester number
- Odd number to the right of ' **0** ' indicates a theory paper
- Even number to the right of ' **0** ' indicates a practical paper
- The prefix **T** indicates Theory paper and **P** indicates Practical

Note-II:

The marks distribution for the final practical examination is as follows:

1. Writing Principle / Statement/ Formula with explanation of symbols and units	05 Marks
2. Diagram/Circuit Diagram / Expected Graph	05 Marks
3. Setting up of the experiment + Tabular Columns + taking readings	10 Marks
4. Calculations (explicitly shown) + Graph	07 Marks
5. Accuracy of results with units	03 Marks
6. Class Records (to be valued at the time of practical examination)	05 Marks
Total for Practical Examination	**35 Marks**
Note : Wherever explicit setting up of experiments does not exist like in the case of spectral charts or pre – acquired data is involved(astrophysics or atmospheric experiments) , the marks for setting up of experiment may be provided for additional graphs and formulae	

Note-III:

- A minimum of **EIGHT** (8) experiments must be performed in each practical paper
- Experiments marked "Mandatory" should be performed necessarily

Syllabus for I Sem BSc, (Physics) Paper –I : Phy-T101:

MECHANICS – 1 , HEAT AND THERMODYNAMICS – 1

UNIT – I

- **MOTION** : Newton's Laws of Motion (Statement and illustration), Motion in a resistive medium; Drag force& Drag Coefficient, Drag force with v dependence (only vertical) and v^2 dependence (only vertical) – derivation for velocity and position- graphs with and without resistance, concept of terminal velocity

4 hours

- **FRICTION** : Static and Dynamic Friction – Friction as a self adjusting force, Coefficient of Static and dynamic friction; Expression for acceleration of a body moving along an inclined plane with and without friction, Free Body Diagrams for the following cases (i)Two masses connected by a string hanging over a frictionless pulley (ii)Two masses in contact and masses connected by strings (horizontal only) (iii)Two masses connected by a string passing over a frictionless pulley fixed at the edge of a horizontal table.

4 hours

- **PLANETARY & SATELLITE MOTION** : Motion along a curve - radial and transverse components of acceleration(derivation); Newton's law of gravitation (vector form only), Kepler's laws (statements only);Gravitational Field and Potential – relation between them; Field and Potential due to a solid sphere (derivation); Orbital and Escape Velocity (derivation), Satellite in circular orbit and applications; Geostationary and Geosynchronous orbits.

5 hours

UNIT – II

- **WORK & ENERGY :**Work done by a constant and variable force; Work energy theorem; Work and potential energy; examples of potential energy; Work done by gravitational force; Work done by a spring force; Conservative and non – conservative force; Conservation of mechanical energy **4 hours**
- **SYSTEM OF PARTICLES :**Centre of mass of rigid bodies – General expression; Newton's law for a system of particles; Linear momentum for a particle and a system of particles; Conservation of linear momentum; System with varying mass; Single stage Rocket

motion – Velocity & Acceleration with and without gravity; Elastic and inelastic collisions (only 2D)

4 hours

- **BLACK BODY RADIATION** : Black body radiation and its spectral energy distribution; Kirchhoff's law, Stefan-Boltzmann's law, Wien's displacement law, Rayleigh-Jeans law (Statements), Derivation of Planck's law – deduction of Wien's Law & Rayleigh – Jeans Law, Solar constant and its determination using Angstrom's Pyrheliometer; Estimation of the surface temperature of the sun

5 hours

UNIT – III

- **KINETIC THEORY OF GASES :**Basic assumptions of kinetic theory; Derivation of - deduction of perfect gas equation; Maxwell's law of distribution of velocity *(without derivation)*- deduction of most probable velocity, mean velocity and root mean square velocity; Derivation of expression for mean free path $\left(\lambda = \frac{3}{4\pi\sigma^2 n}; Maxwell's distribution law: \lambda = \frac{1}{\sqrt{2}\pi\sigma^2 n}\right)$; Degrees of freedom and principle of equipartition of energy; Derivation of , Specific heats of an ideal gas, atomicity of gases

6 hours

- **TRANSPORT PHENOMENA** :

Viscosity and thermal conduction in gases *(*with derivation) ;Relation between coefficient of viscosity and coefficient of thermal conductivity of a gas

2 hours

- **Real Gases :** Derivation of van der Waal's equation of state; Andrews experiments on Carbon dioxide; Derivation of the critical constants; Comparison of van der Waal's isotherms with Andrew's isotherms

5 hours

UNIT – IV

- **Basic Concepts and the Zeroth law of thermodynamics**

Macroscopic and microscopic descriptions of a system; Thermal Equilibrium - Zeroth Law of Thermodynamics; Concept of temperature; Thermodynamic equilibrium;

Thermodynamic coordinates - extensive and intensive; Equations of state; Various processes - PV indicator diagrams **3 hours**

- **First Law of Thermodynamics**

  The first law of Thermodynamics; Sign convention for heat and work; Derivation of equation of state $PV^{\gamma} = const$; Work done in an isothermal and adiabatic process for an ideal gas; Internal energy as a state function; Application of the first law for (i) Cyclic Process (ii) Adiabatic Process (iii) Isochoric Process (iv) Isobaric Process and (v) Isothermal Process. **3 hours**

- **Second Law of Thermodynamics**

  Reversible and irreversible processes; Carnot Engine; Carnot Cycle and its efficiency (with derivation); Second law of thermodynamics (Kelvin's & Clausius' statements and their equivalence); Practical internal combustion engines - Otto and Diesel Cycles (qualitative treatment); Carnot theorem (proof); Refrigerator- Coefficient of performance

  4 hours

- **Entropy**

  The concept of entropy; Entropy of an ideal gas; Entropy - reversible process, Entropy - irreversible process; Entropy and the second law; Clausius inequality; Principle of increase of entropy; Entropy change in (i) adiabatic process (ii) free expansion (iii) cyclic process (iv) isobaric process; TdS diagram of a Carnot cycle; Entropy and disorder

  3 hours

References:

1. Fundamentals of Physics- R.Resnik,D. Halliday and Walker; Wiley 6ed(**2001**)
2. Physics-Classical and Modern, FJ Keller, E Gettys and J J Skove, McGraw Hill Second Revised Edition(**1993**)
3. Classical Mechanics-K N Sreenivasa Rao, Universities Press- Orient Longman (**2003** ed)
4. Concepts of Physics Vol (1)-H C Verma, Bharathi Bhavan Publishers, **2004** Edition

5. University Physics- F W Sears, M W Zemansky & H D Young, Pearson Education First ed.(**2014**)

6. Mechanics- J C Upadhaya, Himalaya (**2014** ed)

7. Mechanics- Berkeley Physics Course Vol(1)- SI units CharlesKittel etal, McGrawHill Education (India) 2e (2011)

8. Elements of Properties of matter – D S Mathur, S.chand(GL) 7 Co Ltd,Dehi 1ed(**2010**)

9. Properties of Matter - Brijlal & Subramanyam, S Chand & Co, (**2002)**

10. Newtonian Mechanics- A P French, Nelson & Sons UK, (**1971**)

11. Mechanics & Thermodynamics, G Basavaraju & Dipan Ghosh, McGrawHill Education (India) 1ed (**1985**)

12. A treatise on general properties of matter, Sengupta and Chatterjee, New Central Book Agency Pvt Ltd, Calcutta (7th Revised edition -**2010**)

13. Waves & Oscillations, P K Mittal & Jai Dev Anand, Hari Anand Publications Pvt Ltd (2011ed)

14. Heat and Thermodynamics- M M Zemansky,McGrawHill Education (India) 8ed (**2011**)

15. Heat & Thermodynamics, MWZemansky & RHDittman, McGraw Hill Book company,Inc.US Seventh Revised edition(**1997**)

16. Heat and Thermodynamics- Brij Lal and N Subramanyam, SChand & Co, New Delhi -1985

17. Heat and Thermodynamics – D S Mathur, SChand & Co, New Delhi, 5th Edition(2004)

18. Heat, Thermodynamics & Stastical Mechanics, BrijLal & Subramanyam, S. Chand & Company,Delhi; (**2008** ed)

19. Thermodynamics & Statistical Physics, Sharma & Sarkar, Himalaya Publishing House, Third Edition(1991)

20. Thermodynamics, Kinetic theory & Statistical Thermodynamics, FWSears & GLSalinger, Narosa Publishing House (Third Edition **1998**)

21. Fundamentals of Classical Thermodynamics, Gordon J V Wylen & Richard E Sonntag, John

Wiley Eastern Limited; 4th ed (**1994**)

22. Thermal Physics, S C Garg, R M Bansal & C K Ghosh, McGrawHill Education (India) Second ed (**2013**)

PHYSICS – P102, PRACTICAL PHYSICS – I

1. Error Analysis – Data analysis techniques and graphing techniques to be learnt (**Mandatory**)
2. Atwood machine – with photogate
3. Determination of coefficients of static, kinetic and rolling frictions
4. Verification of principle of conservation of energy
5. Simple pendulum - dependence of T on amplitude
6. Determination of coefficient of viscosity by Stokes' method
7. Determination the Acceleration due to Gravity and Velocity for a freely falling body, using Digital Timing Techniques.
8. Work done by variable force
9. Interfacial tension by drop weight method
10. Thermal behavior of a torch filament
11. Specific heat by Newton's law of cooling
12. Verification of Newton's law of cooling and Stefan's law of radiation
13. Determination of Stefan's constant by emissivity method
14. Determination of Solar constant
15. Calibration of Thermistor for Temperature measurement
16. Calibration of thermocouple for Temperature measurement

Note: A minimum of EIGHT (8) experiments must be performed

References:

1. B Saraf etc, - Physics through experiments, Vikas Publications (**2013**)
2. D P Khandelwal – A Laboratory Manual of Physics for Undergraduate Classes, Vikas Publications First ed (**1985**)
3. Advanced Practical Physics for Students – Worsnop & Flint, Methuen & Co, London

4. An Advanced Course in Practical Physics , D Chattopadhyay, P C Rakshit, B Saha, New Central Book Agency (P) Limited, Kolkata, Sixth Revised Edition, (**2002)**

5. BSC, Practical Physics, CL Arora, SChand & Co, New Delhi, (**2007**) Revised Edition

Syllabus for II Sem BSc (Physics) Paper II-Phy-T201:

MECHANICS – 2 , HEAT AND THERMODYNAMICS – 2

UNIT – I

- **OSCILLATIONS :** SHM ; Differential equation of SHM and its solutions, Kinetic and Potential energy, Simple and compound pendulum; oscillations of two masses connected by a spring; damped oscillations – over damped, under damped and un-damped oscillations; forced oscillations - concept of resonance; Coupled Oscillators - in phase and out of phase oscillations- energy transfer. **6 hours**
- **ELASTICITY**: Hooke's law, Stress – Strain diagram, definitions of three elastic moduli; Relationship between three elastic constants (derivation); Poisson's ratio; Work done in stretching a wire; Bending of beams; Bending moment, Theory of single cantilever, Couple per unit twist, Torsional oscillations.
  7 hours

UNIT – II

- **Thermodynamic potentials :** Internal Energy; Enthalpy; Helmholtz free energy; Gibbs free energy and their significance; Maxwell's thermodynamic relations (using Thermodynamic potentials) and their significance; TdS relations; Energy equations and Heat Capacity equations; Third law of thermodynamics (Nernst Heat theorem)
  4 hours
- **Phase transitions of the first order :** Melting, vaporization and sublimation; Condition of equilibrium of phases in terms of Gibbs potential;Clausius-Clapeyron equation - elevation of boiling point, depression of freezing point; Equilibrium between phases - triple point **3 hours**
- **Low Temperature Physics :** Methods of producing low temperatures: (i) Joule Thomson (Joule Kelvin / Throttling / Porous plug) experiment, Joule Thomson

Coefficient, inversion temperature (ii) Adiabatic demagnetization - working and theory **4 hours**

- **Liquefaction of gases :** Regenerative cooling coupled with Joule Thomson cooling; Adiabatic expansion with Joule Thomson cooling (qualitative)

2 hours

UNIT – III

- **FRAMES OF REFERENCE :** Inertial and Non inertial frames of reference - Importance of Inertial frame, Linearly accelerated frames, Concept of frame dependent forces; Galilean relativity - Transformation of Position, Distance/Length, Velocity (Non-relativistic velocity addition theorem), Acceleration; Principle of Invariance, Michelson – Morley Experiment, Search for ether

5 hours

- **SPECIAL THEORY OF RELATIVITY :** Postulates of the special theory of relativity; Lorentz Transformations – Length Contraction, Time Dilation – twin paradox, Velocity Addition Theorem; Variation of mass with velocity; Mass – Energy equivalence; Relativistic momentum and kinetic energy

8 hours

UNIT – IV

- **MOMENT OF INERTIA** : Review of rotational motion of Rigid bodies; Kinetic energy of rotation-Moment of Inertia of a body; Theorem of Moment of Inertia-Parallel and perpendicular axes theorem with proofs (2-D case); Calculation of moment of inertia of a disk, annular ring, solid sphere and rectangular bar; Conservation of angular momentum with illustrations.

9 hours

- **WAVES :** Wave Equation, Speed of transverse waves on a uniform string; Speed of longitudinal waves in a fluid; Group velocity and Phase velocity – relation between

them; **4 hours**

References:

1. **References:**
2. Fundamentals of Physics- R.Resnik,D. Halliday and Walker; Wiley 6ed(**2001**)
3. Physics-Classical and Modern, FJ Keller, E Gettys and J J Skove, McGraw Hill Second Revised Edition(**1993**)
4. Classical Mechanics-K N Sreenivasa Rao, Universities Press- Orient Longman (**2003** ed)
5. Concepts of Physics Vol (1)-H C Verma, Bharathi Bhavan Publishers, **2004** Edition
6. University Physics- F W Sears, M W Zemansky & H D Young, Pearson Education First ed.(**2014**)
7. Mechanics- J C Upadhaya, Himalaya (**2014** ed)
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12. Mechanics & Thermodynamics, G Basavaraju & Dipan Ghosh, McGrawHill Education (India) 1ed (**1985**)
13. A treatise on general properties of matter, Sengupta and Chatterjee, New Central Book Agency Pvt Ltd, Calcutta (7th Revised edition -**2010**)
14. Waves & Oscillations, P K Mittal & Jai Dev Anand, Hari Anand Publications Pvt Ltd (2011ed)
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16. Heat & Thermodynamics, MWZemansky & RHDittman, McGraw Hill Book company,Inc.US

Seventh Revised edition(**1997**)

17. Heat and Thermodynamics- Brij Lal and N Subramanyam, SChand & Co, New Delhi -1985
18. Heat and Thermodynamics – D S Mathur, SChand & Co, New Delhi, 5th Edition(2004)
19. Heat, Thermodynamics & Stastical Mechanics, BrijLal & Subramanyam, S. Chand & Company,Delhi; (**2008** ed)
20. Thermodynamics & Statistical Physics, Sharma & Sarkar, Himalaya Publishing House, Third Edition(1991)
21. Thermodynamics, Kinetic theory & Statistical Thermodynamics, FWSears & GLSalinger, Narosa Publishing House (Third Edition **1998**)
22. Fundamentals of Classical Thermodynamics, Gordon J V Wylen & Richard E Sonntag, John Wiley Eastern Limited; 4th ed (**1994**)
23. Thermal Physics, S C Garg, R M Bansal & C K Ghosh, McGrawHill Education (India) Second ed (**2013**)
24. Physics of Waves, University Leadership Project, Prasaranga, Bangalore University
25. Perspectives of Modern Physics, Arthur Beiser, Mc- Graw Hill;
26. Introduction to Special Theory of Relativity, Rober Resnick, John Wiley and Sons First Edition

27. Special Relativity, A P French, MIT, w.w.Nortan and CompanyFirst Ed (**1968)**

28. Concepts of Modern physics McGraw hill Education(India) Pvt Ltd;6th ed **(2000)**

PHYSICS – P202, PRACTICAL PHYSICS – II

1. Torsional pendulum – to determine C and Rigidity modulus
2. Bar pendulum – determination of g
3. Spring mass- (a) static case to determine 'k'
   (b) dynamic case to determine 'k'
   (c) 'k' as a function of L of spring
4. Rigid pendulum – T and decay of amplitude
5. Coupled oscillator – string coupled with change of tension
6. Rolling dumb bell - on parallel inclined rails
7. Verification of parallel and perpendicular axis theorem
8. Searle's double bar
9. Cantilever of negligible mass to find Young's modulus
10. q- by Stretching
11. q by uniform bending
12. q by single cantilever
13. q by Koenig's method
14. n by dynamic method
15. Fly wheel
16. Verification of Clausius-Clapeyron equation using pressure cooker
17. Thermal conductivity of a bad conductor by Lee's and Charlton's method
18. Thermal conductivity of rubber
19. Determination of thermal conductivity of a good conductor by Angstrom method / Searle's method

Note: A minimum of EIGHT (8) experiments must be performed

References:

1. B Saraf etc, - Physics through experiments, Vikas Publications
2. D P Khandelwal – A Laboratory Manual of Physics for Undergraduate Classes, Vani Publications
3. Advanced Practical Physics for Students – Worsnop & Flint, Methuen & Co, London
4. An Advanced Course in Practical Physics , D Chattopadhyay, P C Rakshit, B Saha, New Central Book Agency (P) Limited, Kolkata, Sixth Revised Edition, 2002

5. BSC, Practical Physics, C L Arora, S Chand & Co, New Delhi, 2007 Revised Edition

Syllabus for III Sem BSc (Physics) Paper III-Phy-T301:

ELECTRICITY and MAGNETISM

UNIT – I

DC CIRCUIT ANALYSIS : Concept of Voltage and Current Sources, Kirchhoff's Current Law, Kirchhoff's Voltage Law (statements). Principle of Duality (voltage and current source equivalents). Thevenin's Theorem (statement and proof), Superposition Theorem(statement and proof), Norton's Theorem (Statement and explanation). Reciprocity Theorem. Maximum Power Transfer Theorem (statement and proof).

8 hours

Transient currents : Self inductance – definition, explanation, expression $L = \frac{\mu N^2 A}{l}$; Magnetic field energy stored in an inductor; Growth and decay of charge in series RC circuit, Growth and decay of current in series LR circuit, Decay of charge in series LCR circuit - Damped, under-damped and over-damped conditions

5 hours

UNIT – II

Magnetic Field and Forces : Force on a moving charge in a magnetic field, Lorentz force and definition of **B**, force on a current carrying conductor in uniform magnetic field, Force between parallel conductors; Definition of ampere;

Biot – Savart's law, Magnetic field due to a straight current carrying conductor (Derivation for Finite/Infinite Length, Amperes swimming rule, Right hand palm rule), Magnetic field of a circular loop; Force and torque on a circular current loop in a magnetic field, magnetic dipole moment, Field on the axis of a solenoid (derivation and explanation), Principle and theory of a moving coil BG, Concept of dead beat galvanometer, determination of high resistance by leakage, theory of HTG, Ampere's Circuital law (statement), Application of Ampere's law to straight wire, solenoid and toroid

13 hours

UNIT III

Scalar and vector fields : Gradient of a scalar function (use of del operator), Divergence and Curl product rules (explanation with geometrical representation), Line, surface and volume integrals

(explanation with examples), Fundamental theorem for divergence and curl (statements only).

3 hours

ELECTROMAGNETIC WAVES : Equation of Continuity, Displacement Current, Maxwell's equations in differential form (Derivation and physical significance), Derivation of wave equation (for one dimension), Velocity of em waves in free space and isotropic dielectric medium(derivation), Relation between refractive index and permittivity (qualitatively), Transverse nature of Plane em waves, , Poynting Vector, Energy density in electromagnetic field, Momentum and Pressure of em waves (derivation), Electromagnetic waves in a conducting medium – skin effect and skin depth

10 hours

UNIT IV

ALTERNATING CURRENT : rms and average value of ac – definition and expressions, Representation of sinusoids by complex numbers (brief explanation), response of LR, CR and LCR series circuit to sinusoidal voltage – j operator method, series and parallel resonant (LR parallel C) circuits (mention condition for resonance with expressions for impedance and current), expression for Q factor, band width, AC bridge - Maxwell bridge (derivation of condition for balance , determination of self-inductance of a coil).

6 hours

THERMOELECTRICITY : Seebeck effect (brief explanation, experiment and temperature dependence), Thermoelectric series, Neutral temperature, Laws of thermoelectricity (qualitative), Peltier effect, Peltier coefficient (qualitative analysis), Thomson effect, Thomson coefficient (qualitative analysis), Theory of thermoelectric circuits using thermodynamics (Application of thermodynamics to a thermocouple and connected relations with derivation), Thermoelectric diagrams and uses (in finding the Seebeck Coefficients, Peltier coefficient, Thomson coefficient, total emf of a thermocouple, neutral temperature) Applications of thermoelectricity - Boys' Radio-micrometer, thermopile and thermoelectric pyrometer (brief explanation with experimental setup).

7 hours

References:

1. Electricity and magnetism by Brij Lal and N Subrahmanyam, Rathan Prakashan Mandir, Nineteenth Edition, 1993

2. Principles of Electronics by VK Mehta and Rohit Mehta, SChand & Company, Eleventh Edition, **2008**

3. Feynman Lecture series, VolII, RPFeynnman et al, Narosa Publishing House, New Delhi

4. Electricity & Magnetism, NSKhare & SSSrivastava, AtmaRam & Sons, New Delhi

5. Electricity & Magnetism, DLSehgal, KLChopra, NKSehgal, SChand & Co, Sixth Edition, (**1988**)

6. Electricity & Electronics, DCTayal, Himalaya Publishing House, Sixth Edition(**1988**)

7. Basic Electronics & Linear Circuits, NN Bhargava, DC Kulshrestha & SC Gupta, TMH Publishing Company Limited, 28th Reprint, (**1999**)

8. Fundamentals of Physics by Halliday, Resnick and Walker, Asian Books Private Limited, New Delhi, 5th Edition, (**1994**)

9. Introduction to Electrodynamics by DJ Griffiths Pearson Education (**2015**)

10. Electromagnetism by BB Laud 2ed

11. Electrical Networks, Theraja 3rd revised edition

PHYSICS – P302, PRACTICAL PHYSICS – III

1. To find L and C by equal voltage method
2. Energy consumption in an electrical circuit - to find power factor
3. Resonance in LCR series circuit
4. Resonance in LCR parallel circuit
5. Mirror galvanometer- figure of merit
6. High resistance by leakage using BG
7. Thermoelectric circuit - find Seebeck coefficients
8. Verification of Law of intermediate metals
9. Study of thermo emf as a heat pump
10. Load regulation of constant current source

11. Black box - identify & measure R, L and C
12. Verification of Thevenin's theorem
13. Verification of Superposition theorem
14. Verification of maximum power transfer theorem
15. Maxwell's impedance bridge
16. Desauty's bridge
17. Anderson's bridge

Note: A minimum of EIGHT (8) experiments must be performed

References:

1. Physics through experiments, BSaraf etc,Vikas Publications **1987**
2. Advanced practical physics, Chauhan & Singh, Pragathi Publications 1ed
3. Practical Physics, DChattopadhyaya et al, Central Publications
4. An Advanced Course in Practical Physics , D Chattopadhyay, PC Rakshit, B Saha, New Central Book Agency (P) Limited, Kolkata, Sixth Revised Edition, **2002**
5. Practical Physics, D C Tayal **2002**

Syllabus for IV Sem BSc (Physics) Paper IV - PhyT401:

OPTICS and FOURIER SERIES

UNIT I

WAVE OPTICS: Huygen's wave theory of light; Huygen's principle, construction Huygen's wave front, Laws of reflection and refraction using spherical wave for at a plane surface (derivation of image distance = object distance using Huygen's construction, derivation of Snells law).

3 hours

INTERFERENCE :

Coherent sources and their production; Conditions for observing interference (mention); Conditions for

constructive and destructive interference (mention)

1 hour

Coherent sources by division of wave front

Biprism-theory and working, experiment to determine wavelength; Effect of thin film in the path of one of the beams; Calculation of thickness of the **5 hours**

Coherent sources by division of amplitude:

Interference at thin films - reflected and transmitted light, Colours of thin films; Theory of air wedge; Theory of Newton's rings (Only reflected System). Determination of Refractive index of a liquid **4 Hours**

Unit - II

Diffraction - Fresnel diffraction

Concept of Fresnel's half period zones; Theory of rectilinear propagation; Fresnel diffraction, Construction and working of Zone plate; Comparison of Zone plate with lens; Cylindrical Wavefront (Half period strips – qualitative), Theory of diffraction at a straightedge **7 hours**

Fraunhoffer diffraction

Theory of single slit diffraction; Theory of grating - normal and oblique incidence - Experimental determination of wavelength; Discussion of Dispersive power; Resolving power, Rayleigh's criterion; Expression for resolving power of grating and telescope; Comparison of prism and grating spectra **6 Hours**

UNIT III

Polarization

Review of plane polarized light and method of production; Double refraction at crystals; Huygens' explanation of double refraction; Theory of retarding plates - Quarter wave plates and Half wave plates; Theory of superposition of two plane polarized waves with perpendicular vibrations, Production and detection of linearly , elliptically and circularly polarized light; Optical activity - Fresnel's explanation, Laurent's half shade polarimeter. **6 Hours**

Lasers

Introduction; Spontaneous and stimulated emission; Einstein's coefficients and optical amplification; Population inversion; Main components of a laser; Lasing action; Ruby Laser - construction and working - energy level diagram; He-Ne Laser - construction and working - energy level diagram;
Spatial Coherence and directionality, estimates of beam intensity, temporal coherence and spectral energy density

7 hours

UNIT IV

Fourier Series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series {Example : Fourier Series for

(i) $f(x) = e^x if -\pi < x < \pi$

(ii) $f(x) = \begin{cases} -1 - \pi \leq x \leq 0 \\ 10 \leq x \leq \pi \end{cases}$

(iii) $f(x) = x^2 \in theinterval[-1, +1]$ }

Expansion of functions with arbitrary period.
(Concept of change of scale; Fourier Series for Periodic Rectangular Wave; Half – Wave rectifier; Trapezoidal wave :

$$f(x) = \begin{cases} x, 0 \leq x \leq 1 \\ 1, 1 \leq x \leq 2 \\ 3 - x, 2 \leq x \leq 3 \end{cases}$$

)Application to Square wave, triangular Wave and Saw Tooth Wave (superposition of first three components to be shown graphically) . **9 hours**

Optical Fibres

Optical fiber-principle, description and classification; Why glass fibers? Coherent bundle; Numerical aperture of fiber; Attenuation in optical fibers - limit Multimode optical fibers; Ray dispersion in multi-mode step index fibers; **4 hours**

References:

1. Optics, Ajoy Ghatak, Tata Mc Graw Hill, 4th Edition

2. Introduction to Modern Optics, Ajoy Ghatak, Tata McGraw Hill Publications (**2009**)

3. Fundamentals of Physics by Halliday, Resnick and Walker, Asian Books Private Limited, New Delhi, 5th Edition, (**1994)**

4. A K Ghatak and K Thyagarajan, Contemporary Optics, Macmillan/Premium Publishing Corp (**1978**)

5. Jenkins and White, Optics, McGraw Hill Education India Pvt Ltd 4th ed(**2011**)

6. Optics, Brij Lal and Subramaniam, SChand & Company, 22nd Edition, (**1994**)

7. Principles of Optics, B K Mathur, Gopal Printing Press, Kanpur, 6th Edition, (**1996**)

8. An Introductions to LASERS-Theory & Applications, M N Avadhanulu, S Chand & Co, (**2001**)

9. Introduction to Fibre Optics, Ajoy Ghatak & K Thyagarajan, Cambridge University Press, First Edition Reprint,(**2002**)

10. Optical Fibre Communications, Gerd Keiser, McGraw Hill, 3rd Edition, (**2000**)

10. Fibre Optic Communication, DCAgarwal, Wheeler Publications, Second Edition Reprint,(**1996**)

11. Optics, Klein and Furtak, Wiley Publications Pvt Ltd 2ed (**2011**)

12. B B Laud, Lasers and Non-Linear optics. NewAge International Pvt Ltd Publishers (**2011**)

13. Physics of Waves, University Leadership Project, Prasaranga, Bangalore University(1ed **1981**)

14. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 10th ed(**2003**)

15. Mathematical Physics, B D Gupta, Vikas Publshing House, 4th ed (**2016**)

PHYSICS – P402, PRACTICAL PHYSICS – IV

1. Verification of Brewster's law
2. Refractive index of a liquid by parallax method
3. Focal length of combination of lenses separated by a distance
4. Biprism – determination of wavelength of light
5. Air wedge – determination of thickness of object
6. Newton's rings – determination of radius of curvature of lens surface
7. Newton's rings – determination of refractive index of a liquid.
8. Diffraction grating in minimum deviation position
9. Diffraction grating in normal incidence position
10. Resolving power of telescope
11. Resolving power of a grating
12. Diffraction at straight edge
13. Polarimeter – determination of specific rotation of a solution
14. Diffraction of LASER at a wire
15. Measurement of numerical aperture of an optical fibre.
16. Fraunhoffer diffraction of LASER at single slit
17. Diffraction of LASER at graduations of a metal scale

Note: A minimum of EIGHT (8) experiments must be performed

References:

1. An Advanced Course in Practical Physics , D Chattopadhyay, P C Rakshit, B Saha, New Central Book Agency (P) Limited, Kolkata, Sixth Revised Edition, **2002**

2. Practical Physics, Experiments with He-Ne laser, R S Sirohi 2nd ed

3. Advanced Practical Physics, Worsnop & Flint Asia Pub.(1979)

4. BSc, Practical Physics, C L Arora, S Chand & Company, New Delhi, Revised Edition, **2007**

Syllabus for V Sem. B.Sc. (Physics) Paper V – Phy T501:

STATISTICAL PHYSICS, QUANTUM MECHANICS – I, ATMOSPHERIC PHYSICS AND NANOMATERIALS

UNIT I : STATISTICAL PHYSICS (15 HOURS)

Specification of state of the system, Macro state, Micro State, Phase Space, Stirling's Approximation, Thermodynamic Probability and its calculation (Description of each with an example); Entropy and Thermodynamic probability ($S = kln\Omega$). Basic postulates of Statistical Physics ; Ensemble (Micro – canonical, canonical and grand canonical ensembles)

2 hours

Maxwell – Boltzmann Statistics : Maxwell – Boltzmann Distribution function (Derivation of $n_i = \frac{g_i}{e^{\alpha+\beta E_i}}$, Energy distribution function $f(E_i) = \frac{n_i}{g_i}$); Maxwell – Boltzmann law of velocity distribution (mention- most probable velocity, average velocity, rms velocity) Limitations of M – B statistics **3 hours**

Bose – Einstein Statistics : B-E distribution function (Derivation of $n_i = \frac{g_i}{e^{\alpha+\beta E_i-1}}$) Bose-Einstein condensation properties of liquid He (qualitative) [Mention of expression of Bose Temperature T_B– Concept BE Condensation –variation of N_o (number of particles in Zero energy state) and N_e (number of particles in non-Zero energy state) with temperature- BE condensation properties of Liquid He^4 (Qualitative description)]

Radiation as photon gas, Bose's derivation of Planck's law, Rayleigh-Jeans law, Wein's law ; Specific Heat capacity of metals [Einstein's theory of specific heat capacity of solids – [Derivation of the equation where $\theta = h\nu/k$] **5 hours**

Fermi – Dirac Statistics :

Fermi-Dirac distribution function; Fermi sphere and Fermi energy, Fermi gas; Electronic Specific heat Capacity in metals (Mention of the contribution to specific heat capacity from free electrons)

Comparison of Maxwell – Boltzmann, Bose – Einstein and Fermi – Dirac distribution functions

5 hours

UNIT II : QUANTUM MECHANICS – I

Failure of Classical Physics to explain the phenomena such as stability of atom, atomic spectra, black body radiation, photoelectric effect, Compton effect and specific heat of solids, Planck's quantum theory, Explanation of the above effects on the basis of quantum mechanics

[Experimental observation, failure of classical theory, quantum mechanical explanation, Photoelectric effect -Einstein's explanation, Compton Effect – mention of expression for wavelength shift (no derivation), Specific heat of solids -Einstein's and Debye's explanation of specific heat (qualitative). Stability of atom and atomic spectra, Black body radiation [Mention of Planck's equation, arrive at Wien's and Rayleigh-Jean's equation for energy distribution from Planck's equation]. **5 hours**

de Broglie's hypothesis of matter waves (λ in terms of momentum, energy, temperature for monoatomic gas molecules); Thomson's experiment; Davisson and Germer's experiment – normal incidence method; Concept of wave packet, Group velocity and particle velocity (relation between group velocity and particle velocity) Heisenberg's uncertainty principle - different forms; Gamma ray microscope experiment; Application to Non – existence of electron in nucleus **10 hours**

UNIT III : ATMOSPHERIC PHYSICS

Fixed gases and variable gases; Temperature structure of the atmosphere; Hydrostatic balance, Variation of pressure with altitude, scale height; Relative and Absolute humidity **4 hours**

Beer's law (derivation); Global energy balance for earth – atmosphere system, Greenhouse effect; Atmosphere dynamics –Accelerated rotational frames of reference – Centripetal and Coriolis force (derivation), Gravity and pressure gradient forces (with derivation), Applications of Coriolis force – Formation of trade winds, cyclones, erosion of river banks **6 hours**

NANOMATERIALS

Nanomaterials – Introduction, classification – (0D, 1D, 2D). Quantum dots, nanowires and nanofilms, Multilayered materials- Fullerene, Carbon Nano Tube (CNT), Graphene (Mention of structures and properties); Synthesis techniques (Top down- Explanation of Milling & bottom up - Sol gel process). Characterisation techniques- (brief description of SEM, TEM, AFM).

Electron confinement (0D, 1D, 2D- energy levels as a particle in a box); Size effect-Surface to volume ratio; distinction between nanomaterials and bulk materials in terms of energy band. Distinct properties of nano materials (Mention- optical, electrical, mechanical and magnetic properties);

Mention of applications: (Fuel cells, catalysis, phosphors for HD TV, next generation computer chips, elimination of pollutants, sensors) **5 hours**

References :

1. Quantum Mechanics, ***B.H. Bransden and C.J. Joachain***, 2nd Edition, Pearson Education (**2004**)
2. Introduction to Quantum Mechanics, ***David J. Griffiths***, 2nd Edition, Pearson Education ,(**2005**)
3. Modern Quantum Mechanics, ***J.J. Sakurai***, Pearson Education, (**2000**)
4. Principles of Quantum Mechanics, ***Ghatak and Lokanathan***, Macmillan, (**2004**)
5. Statistical Mechanics, An Introduction, **Evelyn Guha**, Narosa (**2008**)
6. Statistical Mechanics, ***R.K.Pathria***, 2nd edition, Pergamon Press (**1972**)
7. Statistical and Thermal physics, ***F.Reif***, McGraw Hill International(**1985**)
8. Statistical Mechanics, ***K.Huang***, Wiley Eastern Limited, New Delhi (**1975**)
9. Basic of Atmospheric Physics, A Chandrasekar, PHI Learning Private Limited (EEE)
10. Weather, climate and atmosphere by Siddartha.
11. Atmospheric Science by John M Wallace and Peter V Hobbs, Elsevier Publications (**2006**).
12. Introduction to Atmospheric Science by Turberick &Lutzens,Elsevier Publications
13. Nano materials, A K Bandopadhyay. New Age International Pvt Ltd Publishers (**2007**)
14. Nanocrystals, C. N. Rao, P. John Thomas.
15. Nanotubes and wires, C. N. Rao, A. Govindaraj.

PHYSICS – P502, PRACTICAL PHYSICS – V(A)

1. Applications of CRO in the (a) study of Lissajous figures (b) calculation of rms voltage (c) calculation of frequency of AC. **(Mandatory)**
2. Monte Carlo experiment & error analysis
3. Verification of Maxwell's distribution of velocity
4. Maxwellian distribution of velocities for electron using EZ81vacuum diode
5. Dice experiment – to study statistical nature of results
6. Study of statistical distribution on nuclear disintegration data (using GM counter as a black box)
7. Characteristics of a photo cell-determination of stopping potential.

8. Determination of Planck's constant.
9. Characteristics and spectral response (selenium photocell)
10. Determination of particle size using XRD Scherer's formula.
11. Temperature of atmospheric air - by using Thermograph (Bimetallic type)- Plotting the graph of temperature Vs time.
12. Relative humidity using hair hygrometer
13. Estimation of relative humidity using wet and dry bulb thermometer
14. Wind speed and direction by Hand held anemometer and wind wane
15. Estimation of height from the given pressure data
16. Regulated power supply (using zener diode).
17. Determination of transistor h-parameters.
18. Frequency response of a CE amplifier.
19. Transistor as a switch and active device.
20. Construction of RFO or AFO - using transistor
21. Emitter follower

Note: A minimum of EIGHT experiments must be performed.

References :

1. Worsnop and Flint , Advanced practical physics for students, Asia Pub.(**1979**)
2. Singh and Chauhan, Advanced practical physics, 2 vols., Pragati prakashan, (**1976**)
3. Misra and Misra, Physics Lab. Manual, South Asian publishers (**2000**)
4. Gupta and Kumar, Practical physics, Pragati prakashan, (**1976**)
5. Ramalingom & Raghuopalan : A Lab. Course in Electronics
6. Bharagav et al : Electronics, TTI tata MacGraw Hill 33rd Reprint (**2002**)

Syllabus for V Sem. B.Sc. (Physics) Paper VI – Phy T503:

ASTROPHYSICS, SOLID STATE PHYSICS AND SEMICONDUCTOR PHYSICS

UNIT-I : ASTROPHYSICS (15 hours)

Parallax and distance: Helio-centric parallax, Definition of parsec (pc), Astronomical unit (AU), light year (ly) and their relations.

Luminosity of stars: Apparent brightness, Apparent magnitude - scale of Hipparchus. Absolute magnitude - distance - modulus relationship. Distinction between visual and bolometric magnitudes, Radius of a star. **3 hours**

Stellar classification: Pickering classification and Yerke's luminosity classification. H-R diagram, Main sequence stars and their general characteristics.

Gravitational potential energy or self energy of a star based on the linear density model, Statement and explanation of Virial theorem.

Surface or effective temperature and color of a star : Wien's displacement law. Expressions for - average temperature, core temperature, hydrostatic equilibrium, core pressure of a star based on the linear density model of a star. Photon diffusion time (qualitative), Mass – Luminosity relationship and expression for lifetime of a star.

7 hours

Evolution of stars: Stages of star formation (GMC – Protostar- T-Tauri) and main sequence evolution, White dwarfs, Pulsars, Neutron stars and Black holes, Variable stars, Supernova explosion- its types, Chandrasekhar limit. Event Horizon,Singularity,Schwarzchildradius(qualitative)

5Hours

Unit-2: Solid State Physics (15 hours)

Crystal systems and X-rays: Crystal systems-Bravais lattice; Miller indices– Spacing between lattice planes of cubic crystals, Continuous and characteristic X-ray spectra; Moseley's law, Scattering of X-rays - Compton effect, Bragg's law. **6 hours**

Free electron theory of metals : Electrical conductivity- classical theory (Drude-Lorentz model); Thermal conductivity; Wiedemann - Franz's law; Density of states for free electrons (with derivation); Fermi-Dirac distribution function and Fermi energy; Expression for Fermi energy and Kinetic energy at absolute zero(derivation). Hall Effect in metals

6 Hours

Superconductivity : Introduction – Experimental facts – Zero resistivity – The critical field – The critical current density – Meissner effect, Type I and type II superconductors– BCS Theory (qualitative); Applications - SQUIDs. **3 hours**

Unit-3: Semiconductor Physics

Distinction between metals, semiconductors and insulators based on band theory. Intrinsic semiconductors - concept of holes – effective mass - expression for carrier concentration(derivation for both holes and electrons) and electrical conductivity – extrinsic semiconductors – mention of expressions for carrier concentrations and conductivity – impurity states in energy band diagram and the Fermi level.

Formation of P-N junction, depletion region, Biased P-N junction, variation of width of the depletion region, drift and diffusion current –expression for diode current.

6 hours

Special Diodes: Zener diode – characteristics and its use as a voltage regulator.

Photo diodes, Solar cells and LED (principle, working and applications). **4 hours**

Transistors: Transistor action, Characteristics (CE mode), DC Biasing , Load line analysis (Operating Point, Fixed Bias – Forward bias of Base – Emitter, collector – emitter loop, transistor saturation, Load line analysis ; Voltage divider bias – Transistor saturation, Load line analysis)

Transistor as an amplifier(CE mode); . H-parameters **5 hours**

References :

1. Astronomy : Fundamentals and Frontiers – **Jastrow & Thompson,** John Wileyand Sons 4th Revised ed (**1984**)
2. Chandrashekhar and his limit – **G. Venkataraman,** University press, reprint (**1997**)
3. An introduction to Astrophysics – **Baidyanath Basu,** PHI 2nd ed (**2010**)
4. Astrophysics Concepts, ***M. Herwit***: John Wiley, (**1990**).
5. Astrophysics. ***Krishnaswamy*** (ed)New Age Publishers,(**1996**)
6. Introduction to solid State Physics, ***Charles Kittel***, VII edition, (**1996**)
7. Solid State Physics- **A J Dekker**, MacMillan India Ltd, (**2000**)
8. Elementary Solid State Physic, **J P Srivastava**,PHI,(**2008**)
9. Essential of crystallography**, M A Wahab**, Narosa Publications (**2009)**
10. Solid State Physics-**F W Ashcroft and A D Mermin**-Saunders College (**1976**)
11. Solid State Physics-**S O Pillai**-New Age Int. Publishers (**2001**)

PHYSICS – 504, PRACTICAL PHYSICS – V(B)

1. Parallax Method – Distance of objects using trigonometric parallax.
2. HR Diagram & the physiMisra and Misra, Physics Lab. Manual, South Asian publishers (**2000**)
3. Gupta and Kumar, Practical physics, Pragati prakashan, (**1976**)
4. Ramalingom & Raghuopalan : A Lab. Course in Electronics
5. Bharagav et al : Electronics, TTI tata MacGraw Hill 33rd Reprint (**2002**)cal properties of stars.
6. Analysis of stellar spectra.
7. Determination of temperature of a star (artificial) using filters.
8. Analysis of sunspot photographs & solar rotation period.
9. Mass luminosity curve – Estimation of mass of a star.
10. Mass of binary stars.
11. Resistivity of a material by four probe method.
12. Determination of Lorentz Number
13. Semiconductor temperature sensor.
14. Temperature coefficient of resistance and energy gap of thermistor.
15. LED characteristics and spectral response.
16. LDR characteristics – dark resistance – saturation resistance.

17. Solar cell characteristics – Open circuit voltage – short circuit current – efficiency.
18. Study of Hall effect in a metal.
19. Characteristics of LASER diode.
20. Spectral response of a photodiode and its I – V characteristics.
21. Analysis of X-ray diffraction pattern obtained by powder method to determine properties of crystals.
22. Determination of Fermi energy of a metal.
23. Determination of thermal conductivity of a metal by Forbe's method.
24. Measurement of heat capacity of metals.

Note: A minimum of EIGHT experiments must be performed.

References :

1. IGNOU : Practical Physics Manual IGNOU publications
2. Saraf : Experiment in Physics Vikas publicatios
3. S.P. Singh : Advanced Practical Physics
4. Melissons : Experiments in Modern Physics.
5. Misra and Misra, Physics Lab. Manual, South Asian publishers (**2000**)
6. Gupta and Kumar, Practical physics, Pragati prakashan, (**1976**)
7. Ramalingom & Raghuopalan : A Lab. Course in Electronics
8. Bharagav et al : Electronics, TTI tata MacGraw Hill 33rd Reprint (**2002**)

Syllabus for VI Sem. B.Sc. (Physics) Paper VII – Phy T601:

ATOMIC, MOLECULAR AND NUCLEAR PHYSICS

UNIT I : ATOMIC AND MOLECULAR PHYSICS (15 HOURS)

Vector Model of the Atom

Review of Bohr's theory of hydrogen atom, Sommerfeld's modification of the Bohr atomic model (qualitative). Spatial quantization and spinning electron. Different quantum numbers associated with the vector atom model, Spectral terms and their notations, Selection rules, Coupling schemes(*l*-s and j-j coupling in multi electron systems), Pauli's Exclusion Principle, Expression for maximum number of electrons in an orbit. Spectra of alkali elements (sodium D-line), Larmor precession, Bohr magneton, Stern-Gerlach Experiment **.** Zeeman Effect- Experimental study, theory of normal and anomalous Zeeman effect based on quantum theory. **10 hours**

Molecular Physics: Pure rotational motion, Spectrum and selection rules; Vibrational motion, vibrational spectrum and selection rules; Rotation-Vibration spectrum; Scattering of light-Tyndall scattering, Rayleigh scattering and Raman scattering. Experimental study of Raman effect, Quantum theory of Raman effect - Applications . **5 hours**

UNIT II : RADIOACTIVE DECAY, DETECTORS AND ACCELERATORS (15 HOURS)

Alpha particle scattering : Rutherford's theory of alpha scattering (assuming the path to be hyperbolic) **2 hours**

Radioactive Decay : Laws of radioactive decay, half – life, mean life, decay constant; theory of successive disintegration (expression for number of atoms of n^{th} element in the chain – Bateman equations); radioactive equilibrium (secular and transient - cases of long lived parent, short lived parent, daughter and parent of nearly equal half – life).

3 hours

Alpha decay : Range and energy, Geiger- Nuttal law , Characteristics of alpha spectrum, Gamow's theory of alpha decay [Barrier height, tunneling effect, $\lambda=Pf$ f is the frequency of collision of nucleon with the potential barrier; P is the probability of transmission through the barrier); Barrier

penetrability factor (p)$e^{-\sqrt{\frac{2\mu}{\hbar^2}}\int_{r_0}^{r_i}\sqrt{V(r)-E}dr}$ (no derivation)]

Derivation of Q-value-of alpha decay; Exact energy of alpha particle emitted

3 hours

Beta decay : Types of beta decay (electron, positron decay and electron capture) Characteristics of beta spectrum and Pauli's neutrino hypothesis **2 hours**

Detectors : Variation of ionization current with applied voltage in a gas counter, Proportional counter, GM Counter (Construction, working, characteristics, efficiency and quenching)

3 hours

Particle accelerators : Linear accelerator, Cyclotron, Betatron **2 hours**

UNIT III : NUCLEAR REACTIONS AND PARTICLE PHYSICS

NUCLEAR REACTIONS : Types of reactions, Conservation laws in nuclear reactions with examples, derivation of Q – value for reactions using the energy – momentum conservation, exoergic and endoergic reactions, threshold energy , reaction rate, reaction cross – section, concept of direct and compound reactions, resonance reaction; Power reactors

8 hours

ELEMENTARY PARTICLES : Classification of elementary particles, Fundamental interactions (Gravitational, Electromagnetic, Weak, strong – range, relative strength, particle interactions for each);

Symmetries and Conservation Laws (momentum, energy, charge, parity, lepton number, baryon number, isospin, strangeness and charm); Concept of Quark Model, Color quantum number and gluons; **7 hours**

Reference Books:

1. Concepts of Modern Physics, Beiser 3rd edition, Student edition, New Delhi (1981).
2. Introduction to Atomic Physics – H.E. White
3. Introduction to Modern Physics – H.S. Mani, G.K. Mehta-West Press (1989).

4. Principles of Modern Physics, A.P. French, John Wiley, London (1958).
5. Modern Physics - S.N. Ghoshal, Part 1 and 2 S. Chand and Company (1996).
6. Physics of the Atom, Wehr et. al. McGraw Hill
7. Atomic and Nuclear Physics, S. N. Ghoshal: Vol. II. (2000).
8. Alpha, beta and gamma spectroscopy, K. Seighbahn: Vol. I and II, John Wiley (1967)
9. Introductory nuclear Physics by Kenneth S. Krane (Wiley India Pvt. Ltd., 2008).
10. Nuclear Physics, D C Tayal, Himalaya Publishing House, 5th Edition
11. Concepts of nuclear physics by Bernard L. Cohen. (Tata Mcgraw Hill, 1998).
12. Introduction to the physics of nuclei & particles, R.A. Dunlap. (Thomson Asia, 2004)
13. Introduction to Elementary Particles, D. Griffith, John Wiley & Sons 2nd revised ed (**2008**)
14. Quarks and Leptons, F. Halzen and A.D. Martin, Wiley India, New Delhi(**2008**)
15. Basic ideas and concepts in Nuclear Physics - An Introductory Approach by K. Heyde (IOP-Institute of Physics Publishing, (2004).
16. Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, (**2000**).
17. Theoretical Nuclear Physics, J.M. Blatt & V.F.Weisskopf (Dover Pub.Inc., (**1991**)

PHYSICS – 602, PRACTICAL PHYSICS – VI(A)

1. Study of hydrogen spectrum.
2. Sommerfeld's fine structure constant determination.
3. Determination of e/m by Thomson's method.
4. Characteristics of GM counter.
5. Determination of half-life of K^{40}.
6. Millikan's Oil drop experiment
7. Analysis of band spectrum of PN molecule.
8. Analysis of rotational spectrum of nitrogen.
9. Analysis of rotational vibrational spectrum of a diatomic molecule (HBr).
10. Absorption spectrum of $KMnO_4$.
11. B – H Curve using Oscilloscope
12. Verification of Curie – Weiss Law
13. To verify and design AND, OR, NOT and XOR gates using NAND gates
14. To convert a Boolean Expression into Logic Gate Circuit and assemble it using logic gate ICs.
15. Digital Half-adder & Full-adder circuits using logic gate ICs.

16. Half Subtractor & Full Subtractor, using logic gate ICs

Note : A minimum of EIGHT experiments must be performed.

References :

1. IGNOU : Practical Physics Manual
2. Saraf : Experiment in Physics Vikas Publications
3. S.P. Singh : Advanced Practical Physics
4. Melissons : Experiments in Modern Physics
5. Misra and Misra, Physics Lab. Manual, South Asian publishers, 2000
6. Gupta and Kumar, Practcal physics, Pragati prakashan, 1976

Syllabus for VI Sem. B.Sc. (Physics) Paper VIII – Phy T603:

ELECTRONICS, MAGNETIC MATERIALS, DIELECTRICS AND QUNTUM MECHANICS – II

UNIT I : OPAMPS

Operational amplifiers

Block Diagram of an OPAMP, Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Open loop configuration - Limitations, Gain Bandwidth Product, Frequency Response, CMRR, Slew Rate and concept of Virtual Ground **2 hours**

Feedback concepts, Advantages of feedback, types of feedback, Expression for Gain; OPAMP as a feedback amplifier – Non – Inverting and Inverting amplifier, Modification of input and output impedances with feedback ; Voltage follower; Differential amplifier with feedback;

2 hours

Linear Applications - frequency response of Low pass, high pass and band pass filters (first order), inverting summing amplifier, ideal Differentiator, Integrator;

2 hours

OPAMP Oscillators

Positive Feedback concept - oscillator operation –Barkhausen Criterion; Types of oscillator circuits (Qualitative); Phase shift oscillator and Wien bridge oscillator (using op amp).

2 hours

DIGITAL ELECTRONICS

Number Systems : binary, octal, hexadecimal (interconversions); Number codes : BCD, Gray Code (conversions to other systems); Signed Numbers; Arithmetic using Radix and Radix -1 complement.

2 hours

Logic gates and truth tables : OR gate, AND gate; Inverter (the NOT function); NAND and NOR; exclusive OR; exclusive NOR. **1 hour**

Boolean laws and theorems – simplification of SOP equations; Realization of AND, OR, NOT using universal gates NAND and NOR; **2 hours**

Combination logic: Adders (full and half adder) and Subtractors (half) **2 hours**

UNIT II – Magnetic Properties of Matter and Dielectrics

Magnetic Properties of Matter

Review of basic formulae : Magnetic intensity, magnetic induction, permeability, magnetic susceptibility, magnetization (M), Classification of Dia – , Para –, and ferro – magnetic materials;

3 hours

Classical Langevin Theory of dia – and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss, Hard and Soft magnetic materials

5 hours

Dielectrics : Static dielectric constant, polarizability (electronic, ionic and orientation), calculation of Lorentz field (derivation), Clausius-Mosotti equation (derivation), dielectric breakdown, electrostriction (qualitative), electrets. Piezo electric effect, cause, examples and applications.

7 hours

UNIT-III : Quantum mechanics-II

The concept of wave function, physical significance of wave function. Development of time dependent and time independent Schrodinger's wave equation. Max Born's interpretation of the wave function. Normalization and expectation values, Quantum mechanical operators, Eigen values and Eigen functions. Applications of Schrodinger's equation – free particle, particle in one dimensional box- derivation of Eigen values and Eigen function – extension to three dimensional box; Development of Schrodinger's equation for One dimensional Linear harmonic oscillator, Rigid rotator, Hydrogen atom – mention of Eigen function and Eigen value for ground state.

15 hours

References

1. OPAMPS and Linear Integrated Circuits, **Ramakant A Gayakwad**, PHI Learning Private Limited, 4th Edition
2. Operational Amplifiers with Linear Integrated Circuits, **William D Stanley**, Pearson, 4th Edition
3. Electronic Devices and Circuit Theory**, Robert Boylestead and Louis Nashelsky**, PHI Learning Private Limited, 10th Edition
4. Digital Principles and applications, **Leach and Malvino**, MC – Graw Hill, 5th Edition
5. Introduction to solid State Physics, ***Charles Kittel***, VII edition, (**1996**.)
6. Solid State Physics- **A J Dekker**, MacMillan India Ltd, (**2000**)
7. Elementary Solid State Physic, **J P Srivastava**,PHI,(**2008**)
8. Essential of crystallography**, M A Wahab**, Narosa Publications (**2009**)
9. Solid State Physics-**F W Ashcroft and A D Mermin**-Saunders College (**1976**)
10. Solid State Physics-**S O Pillai**-New Age Int. Publishers (**2001**)
11. Quantum Mechanics, ***B.H. Bransden and C.J. Joachain***, 2nd Edition, Pearson Education (**2004**)

12. Introduction to Quantum Mechanics, ***David J. Griffiths***, 2nd Edition, Pearson Education, (**2005**)
13. Modern Quantum Mechanics, ***J.J. Sakurai***, Pearson Education, (**2000**)
14. Principles of Quantum Mechanics, ***Ghatak and Lokanathan***, Macmillan, (**2004**)

2004PHYSICS – 604, PRACTICAL PHYSICS – VI(B)

1. Low pass filter using Op-amp
2. High pass filter using Op-amp
3. Band pass filter using Op-amp
4. Op-amp inverting and non – inverting amplifier – ac or dc
5. OPamp as a differential amplifier – COMMON MODE AND DIFFERENTIAL MODE
6. Op-amp-summing amplifier – ac and dc,
7. OPamp as integrator and differentiator.
8. Phase shift oscillator using op –amp
9. Wien-bridge Oscillator using op – amp
10. To design an Astable Multivibrator of given specifications using 555 Timer
11. Determination of dielectric constant.
12. Determination of dipole moment of organic liquid
13. Verification of inverse square law using GM counter (with a radioactive source).
14. Determination of mass absorption coefficient of gamma rays.

Note : A minimum of EIGHT experiments must be performed.

References :

1. IGNOU : Practical Physics Manual
2. Saraf : Experiment in Physics, Vikas Publications
3. S.P. Singh : Advanced Practical Physics
4. Melissons : Experiments in Modern Physics
5. Misra and Misra, Physics Lab. Manual, South Asian publishers, (**2000**)
6. Gupta and Kumar, Practical physics, Pragati prakashan, (**1976**)

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Bangalore University
Department of Chemistry

Jnanabharathi Campus

Bengaluru – 560 056

Syllabus for

I & II Semester Chemistry Courses

Under-Graduate (UG) Programme

Framed according to the National Education Policy (NEP 2020)

September 2021

FOREWORD

National Education policy 2020 has been one among the intensely debated policies in the recent times. Given the long reach of Education as a social and economic transformation tool - more so for a developing nation like ours- the traction it has garnered in public domain is no surprise.

Karnataka is the first state in the country to implement NEP in higher education. But playing the role of a pioneer is not child's play. Transforming the policy into a working framework and befitting a competent curriculum and syllabus is always a challenging task. The state has come up with the NEP framework for all the UG programmes starting from the academic year 2021.

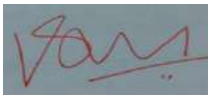
Undergraduate programmes were traditionally conceived as preparation for post graduation. Since decades its structure remained unchanged and was long due for an overhaul. The rigidity in choosing subjects through fixed combinations had to be reconsidered. The aspects of all-round development of the students, skill acquisition outside chosen subjects and research were undermined but NEP has changed all of these in one stroke.

The prominent features of the NEP framework are:

I. Flexibility in choosing subjects and even disciplines for the graduate programmes
II. Vertical and horizontal mobility across subjects throughout the programme
III. Multiple entry and exit points
IV. Main-streaming of skill based courses
V. Credit based evaluation system
VI. Integration of research into 4th year of the programme leading to Honors degree

Such radical modifications have put the learner at the center of the education system. The framework has nudged the academic faculty to work out syllabi aligned with national standards, if not global. The road map is in place. It is the implementation of NEP in its letter and spirit that would catalyze raising the bar for the quality in Higher Education.

I place on record my appreciation and regard to all those who were involved in the endeavor of the syllabus preparation for the undergraduate Chemistry programme of Bangalore University. The fact that all efforts have been made to align the syllabus with the NEP structure is further satisfying. I sincerely hope that periodical revisions will take place in coming years.



V. V. Sureshbabu, Ph.D.
CHAIRMAN
Department of Chemistry
Bangalore University
Bengaluru

Preamble

The syllabus for the B.Sc. Chemistry subject was long due for revision. It was incidental that timing of the revision overlapped with that of framing new syllabus in accordance to NEP framework to be implemented in higher educational institutions throughout the state.

Honorable Vice Chancellor of Bangalore University Dr. K. C. Venugopal provided the directions and vital inputs to undertake this uphill task of framing new syllabus for Chemistry subject of the B. Sc. programme. The model syllabus was to be provided by the state level expert committee, but this was to be modified and adopted according to our ingenious needs. The syllabus had to be compatible with the B.Sc. (Honors) programme which was to be newly introduced from the academic year 2021-22.

To accomplish the task, Department of Studies in Chemistry, Jnana Bharathi Campus, Bangalore University aligned with the Core Group of expert Teachers of the Affiliated colleges and University Department . The Core Group participated in virtual meetings on **13.09.2021, 17.09.2021, 19.09.2021 and 20.09.2021** and shaped a draft in accordance with the objectives of the NEP model curriculum. Several new elements like development of interdisciplinary skills, bridging the skill gap and knowledge-application to local problems were introduced.

Studying Chemistry subject in the B.Sc. and B,Sc.(Honors) is molded to Choice Based Credit System (CBCS) and the courses are spread over all semesters. The syllabus is intended to familiarize students with the sound basic understanding of the subject as well as expose them to advanced learning which would link to postgraduate and/or research programmes. Due importance is also given to the study of application oriented topics so as to build a foundation to acquiring skills.

The exercise of framing syllabus was a collective endeavor. Faculty of various branches of Chemistry namely Inorganic, Organic, Physical, Bio Chemistry, Analytical and Industrial had separate as well as joint brainstorm sessions and arrived at a draft syllabus for two semesters.

The Draft was brought to the attention of a wider group of teachers for further refinement and the final version incorporating the suggestions was placed before the Department Council on **22.09.2021** and then the Board of Studies in Chemistry (UG) on **23.09.2021** for approval.

V. V. Sureshbabu

Proceedings of the Syllabus Core Committee meeting held on 21-09-2021 at 10.30 am through cloud meeting platform

The Chairman welcomed the members of the Board to the meeting and placed the agendas for discussion.

The Chairman informed the members to frame syllabus for Chemistry subject of B.Sc. programme as per the directive from the Bangalore University and in accordance with the NEP- model programme structure. B.Sc. (Honors) Chemistryprogramme has been prepared with the help of the Faculty

members of the Core committee from Department of Chemistry, Bangalore University and from the affiliated Colleges of Bangalore University, Bengaluru. Proposed new syllabus is to be Introduced from 2021-22 after the approval from different bodies.

In this connection, Chairman directed the formation of four committees of expert teachers according to their specialization from various affiliated colleges of the University. Committees were instructed to hold virtual meetings too.

Chairman informed that,

- With the changing trends and voluminous development in the subject updating of the curriculum is a necessary exercise.
- The learners have to be equipped with sound subject know-how as well as skills required for their careers in teaching, industry and research.
- The rules governing the NEP - model (semester scheme) for UG programme are as per the university guidelines have to be adhered during syllabus framing.

Members of the core committee for the preparation of the Chemistry syllabus

Physical Chemistry Section

1**.** K. Ramakrishna Reddy, 2. Nagegowda P, 3. Nebula Murukesh

Analytical and Inorganic Chemistry Section

1. M. Shubha, 2. R. Nalini, 3. B. M. Savitha

Organic Chemistry Section

1. Renuka Manjunath , 2. Jisha S P, 3. Sumaiya Tabassum, 4. Meenaakshi Srinivasan

Bio Chemistry Section

1.Prasannakumar S G, 2. Kantharaju S

Proceedings of the meeting of the Board of studies in Chemistry-UG held on 23-09-2021 at 10.30 am in C_1 Lecture Hall, Department of Chemistry, Bangalore University

The Chairman welcomed the members of the Board and placed the agendas for discussion.

Agenda 1: The BOS unanimously resolved to co-opt Prasanna Kumar S G, M S Ramaiah College of Arts, Science and Commerce, Nebula Murukesh, St. Francis de Sales College and Sumaiya Tabassum, Surana College.

Agenda 2: Framing of syllabus (theory and practical) under NEP- model programme structure for the undergraduate programmes in universities and colleges scheme of examination.

Chairman informed that the tabled syllabus has been prepared as per the guidelines from the NEP.

- A core committee was formed to accomplish this task, which included the senior teachers from affiliated colleges and also the professors from the University department.
- Three meetings were held to finalize the theory and practical syllabus for I to II semester on 13.09.2021, 17.09.2021, 19.09.2021 and 20.09.2021.
- The teachers of the core committee have played a pivotal role in preparing the syllabus and their effort was duly appreciated.
- The draft syllabus was then finalized in a virtual meeting conducted on **20-09- 2021** in the presence of a wider group of teachers represented by affiliated colleges.

The draft syllabus was then placed before the Department Council for further recommendations and finally before the Board of Studies (UG) which approved the Syllabus after some modifications. The Chairman acknowledges with gratitude all the teachers involved in the preparation of this syllabus.

1. B. M. SREENIVASA
2. M. SHUBHA
3. NAGEGOWDA P. NOT PRESENT
4. JISHA S P
5. RENUKA MANJUNATH
6. MALLESH - RETIRED
7. B. VIJAYA BABU- RETIRED
8. K RAMAKRISHNA REDDY
9. K R MUDDUKRISHNA- NOT PRESENT
10. V V SURESHBABU

Co-opt members

1. Prasanna Kumar S G, M S Ramaiah College of Arts, Science and Commerce
2. Nebula Murukesh, St. Francis de Sales College
3. Sumaiya Tabassum, Surana College

Chemistry Syllabus for B.Sc. / B.Sc. (Honors) Programme

Discipline Core: Chemistry **Total Credits for the Programme: 186**

Year of implementation: 2021-22

Programme Outcomes:

By the end of the programme the students will:

1. Understand the basic principles of various branches of Chemistry
2. Demonstrate a range of practical skills to conduct and infer experiments independently and in groups
3. Apply the key concepts and standard methodologies to solve problems related to Chemistry
4. Apply methodologies to the solution of unfamiliar types of problems
5. Exhibit skills leading to employability in Chemistry and allied industries
6. Comprehend the fundamental aspects of research in Chemistry
7. Possess the level of proficiency in subject required for post graduation as well as for pursuing research in Chemistry and related interdisciplinary subjects
8. Design solutions stemming from the application of Chemistry to the local issues

Assessment: Weightage for assessments (in percentage)

Type of Course	Formative Assessment / IA	Summative Assessment/ESE
Theory	40	60
Practical	25	25
Projects	-	-
Experiential Learning (Internships etc.)	-	-

PROGRAMME STRUCTURE

Sem.	Discipline Core (DSC) (L+T+P)	Discipline Elective(DSE)/ Open Elective (OE)	Ability Enhancement Compulsory Courses (AECC), Languages (L+T+P)		Skill Enhancement Courses (SEC)		Total Credits
					Skill based (L+T+P)	Value based (L+T+P)	
I	DISCIPLINE A1 (4 + 2) DSC-1:Analytical and Organic Chemistry-I DSC lab-1:Analytical and	OE – 1 (3 CREDITS) Chemistry in	L1-1 (3), L2-1(3)		SEC-1: Digital Fluency (2) (1+0+2)	Physical education and Yoga(1) (0+0+2),	25

	Organic Practicals-I DISCIPLINE-B1(4+2)	Daily Life				Health and Hygiene(1)(0+0+2)	
II	DISCIPLINE A2(4 + 2) DSC-2:Inorganic and Physical Chemistry-I DSC Lab-2:Inorganic and Physical Practicals-I DISCIPLINE-B2(4+2)	OE – 2 (3 CREDITS) Molecules of Life	L1-2(3), L2-2 (3) (3+1+0 each)	Environmental Studies (2)		Health and Wellness/ Social & Emotional Learning (2)	25
Exit option with Certificate (50 credits)							
III	DISCIPLINE A3(4 + 2) DSC-3:Analytical and Organic Chemistry-II DSC Lab-3: Analytical and Organic Practicals-II DISCIPLINE-B3(4+2)	OE – 3 (3 CREDITS)	L1-3 (3), L2-3(3) (3+1+0 each)		SEC-2: Artificial Intelligence(2)(1+0+2)	Sports/NCC/ NSS etc(0+0+2)	25
IV	DISCIPLINE A4(4 + 2) DSC-4: Inorganic and Physical Chemistry-II DSC Lab-4: Inorganic and Physical Practicals-II DISCIPLINE-B4(4+2)	OE – 4 (3 CREDITS)	L1-4 (3), L2-4(3) (3+1+0 each)	Constitution of India (2)		Sports/NCC/ NSS etc (0+0+2)	25
Exit option with Diploma (100 credits)							
Choose any one Discipline as Major, the other as the Minor							
V	DISCIPLINE A5 (3 + 2) DSC-5: DSC Lab-5 DISCIPLINE A6 (3 + 2) DSC-6: DSC Lab-6: DISCIPLINE B5 (3 + 2)	Vocational 1 (3 CREDITS)			SEC-3: (2) SEC such as Cyber security(2) (1+0+2)	Physical Education(1) (0+0+2) NCC/NSS/R&R(S&G)/Cultural)(1) (0+0+2)	22
VI	DISCIPLINE A7 (3 + 2) DSC-7 DSC Lab-7 DISCIPLINE A8 (3 + 2) DSC-8 DSC Lab-8 DISCIPLINE B6 (3 + 2)	Vocational 2 (3 CREDITS) Internship (2 CREDITS)			SEC-4: Professional Communication(2)	Physical Education(1) (0+0+2) NCC/NSS/R&R(S&G)/Cultural)(1)(0+0+2)	24
Exit option with B. Sc. Basic Degree (146 credits)							
VII	DISCIPLINE A9 (3 + 2) DSC-9						

	DSC Lab-9 DISCIPLINE A10 (3) DSC-10 DISCIPLINE A11 (3) DSC-11	DSE A3 (3 CREDITS) DSE A4 (3 CREDITS RESEARCH METHODOLOGY (3 CREDITS)					20
VIII	DISCIPLINE A12 (3+2) DSC-12 DISCIPLINE A13 (3) DSC-13 DISCIPLINE A14 (3) DSC-14	DSE A4 (3 CREDITS) RESEARCH PROJECT (6 CREDITS)					20
Award of B.Sc. (Hons) degree (186 credits)							

***In lieu of the research Project, two additional elective papers/ Internship may be offered.**

COURSE PATTERN AND SCHEME OF EXAMINATION

Sl. No.	Semester	Title of the Paper	Teaching Hours	Hours / week		Examination Pattern Max. & Min. Marks /Paper						Duration of Exam (hours)		Total Marks / paper	Credits	
				Theory	Practical	ESE(Theory)		IA	ESE(Practical)			Theory	Practical		Theory	Practical
						Max.	Min.		Max.	Min.	IA					
1	I	**DSC-1: Analytical and Organic Chemistry-I**	**56**	**4**	**-**	**60**	**22**	**40**	**-**	**-**	**-**	**3**	**-**	**100**	**4**	**-**
		DSC LAB-1: Analytical and Organic Chemistry-I	**56**	**-**	**4**	**-**	**-**	**-**	**25**	**10**	**25**	**-**	**4**	**50**	**-**	**2**
		Chemistry-OE-1: Chemistryin Daily life	**42**	**3**	**-**	**60**	**22**	**40**	**-**	**-**	**-**	**3**	**-**	**100**	**3**	**-**

2	**II**	**DSC-2: Inorganic and Physical Chemistry-I**	**56**	**4**	**-**	**60**	**22**	**40**	**-**	**-**	**-**	**3**	**4**	**100**	**4**	**-**
		DSC LAB-2: Inorganic and Physical Chemistry-I	**56**	**-**	**4**	**-**	**-**	**-**	**25**	**10**	**25**	**-**	**4**	**50**	**-**	**2**
		Chemistry-OE-2:- Molecules of Life	**42**	**3**	**-**	**60**	**22**	**40**	**-**	**-**	**-**	**3**	**-**	**100**	**3**	**-**

Scheme of Internal Assessment Marks: Theory

Sl. No.	**Particulars**	IA Marks
1	Attendance	**05**
2	Internal Tests (Minimum of Two)	**25**
3	Assignments /Seminar	**10**
TOTAL Theory IA Marks		**40**

Scheme of Internal Assessment Marks: Practicals

Sl. No.	**Particulars**	IA Marks
1	Practical Test	**20**
2	Active participation in practical classes	**05**
TOTAL Practical IA Marks		**25**

Programme Articulation Matrix:

This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately

Semester	Title /Name Of the course	Programme outcomes that the course addresses	Pre-requisite course(s)	Pedagogy	Assessment
1	**DSC-1: Analytical and Organic Chemistry-I**	● The concepts of chemical analysis, accuracy, precision and statistical data treatment ● Understand the preparation of alkanes, alkenes and alkynes, their reactions, etc. ● Understand the mechanism of nucleophilic, electrophilic reactions	P.U.C with Chemistry	Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams
	DSC lab-1: Analytical and Organic Practicals-I	● The students will be able to learn how to handle the glassware, prepare and dilute solutions and perform the experiments with prepared reagents ● The students will be able to determine the analyte through volumetric and gravimetric analysis and understand the Chemistry involved in each method of analysis. ● The students will be able to deduce the conversion factor based on stoichiometry and in turn use this value for calculation	-	Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams
2	**DSC-2: Inorganic and Physical Chemistry-I**	● The Bohr's theory of atomic structure and how it was developed ● Quantum numbers and their necessity in explaining the atomic structure ● The concept of unit cell, symmetry elements, Nernst distribution law.	-	Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams
	DSC Lab -2: Inorganic and Physical Practicals-I	● Techniques like precipitation, filtration, drying and ignition ● Various titrimetric techniques and gravimetric methods		Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams

		To determine the physical constants of organic liquids and molecular weight of non-volatile solute.			
3	**DSC-3: Analytical and Organic Chemistry-II** **DSC Lab-3: Analytical and Organic Practicals-II**		DSC-1 and DSC-2	Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams
4	**DSC-4: Inorganic and Physical Chemistry-II** **DSC Lab-4: Inorganic and Physical Practicals-II**			Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams
5.	**DSC-5:** **DSC Lab-5:** **DSC-6:** **DSC Lab-6:**		DSC-3 and DSC-4	MOOC, Problem solving	Internal tests, Assignments, Quiz
6.	**DSC-7:** **DSC Lab-7:** **DSC-8:** **DSC Lab-8:**			MOOC, Problem solving	Internal tests, Assignments, Quiz
7.	**DSC-9 :** **DSC Lab-9:** **DSC-10:** **DSC Lab-10 :** **DSC-11:**		DSC-5, DSC-6, DSC-7 and DSC-8	MOOC, Problem solving	Internal tests, Assignments, Seminar, Debate, Quiz
8.	**DSC-12:** **DSC Lab-12** **DSC-13:** **DSC Lab-13** **DSC-14:**			Project work, Industrial Visit	Internal tests, Assignments, Seminar, Debate, Quiz

Semester 1

Course Title: DSC-1: Analytical and Organic Chemistry-I	
Total Contact Hours: 56	Course Credits: 4
Formative Assessment (IA) Marks: 40	Duration of Summative Assessment/ ESE: 3 hrs
Syllabus Authors: Chairman	Summative Assessment Marks: 60

Course Pre-requisite(s): *PUC with Chemistry*/ Any equivalent

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Learn the concepts of chemical analysis, accuracy, precision and statistical data treatment
2. Prepare the solutions after calculating the required quantity of salts in preparing the reagents/solutions and dilution of stock solution.
3. Know the concept of volumetric and gravimetric analysis and deducing the conversion factor for determination
4. Handle toxic chemicals, concentrated acids and organic solvents and practice safety procedures.
5. Understand the concepts of Organic reactions and techniques of writing the movement of electrons, bond breaking, bond forming
6. Learn the Concept of aromaticity, resonance, hyper conjugation, etc.
7. Understand the preparation of alkanes, alkenes and alkynes, their reactions, etc.
8. Understand the mechanism of nucleophilic, electrophilic reactions

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Programme Outcomes (POs 1-8)

Course Outcomes (COs) / Programme Outcomes (POs)	1	2	3	4	5	6	7	8
1. Learn the concepts of chemical analysis, accuracy, precision and statistical data treatment	X							
2 Prepare the solutions after calculating the required quantity of salts in preparing the reagents/solutions and dilution of stock solution		X						
3.Know the concept of volumetric and gravimetric analysis and deducing the conversion factor for determination		X	X					
4. Handle toxic chemicals, concentrated acids and organic solvents and practice safety procedures						X		
5 Understand the concepts of Organic reactions and techniques of writing the movement of electrons, bond breaking and bond forming			X	X				
6. Learn the Concepts of aromaticity, resonance and hyper conjugation	X					X	X	
7 Understand the preparation of alkanes, alkenes, alkynes and their reactions			X			X		
8 Understand the mechanism of nucleophilic and electrophilic reactions						X	X	X

Course Articulation Matrix relates course outcomes of course with the corresponding programme outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular programme outcome.

Title of the Course: DSC-1: Analytical and Organic Chemistry – I

Number of Theory Credits	Number of lecture hours/ semester
4	**56**

Content of Theory Course 1	56Hrs
Unit – 1	14 Hrs
Analytical Chemistry: Definitions of analysis, determination, measurement, techniques and methods. Classification of analytical techniques. Choice of an analytical method - accuracy, precision, sensitivity, selectivity, method validation. Figures of merit of analytical methods and limit of detection (LOD), Limit of quantification (LOQ), linear dynamic range (working range). Errors and treatment of analytical data:Limitations of analytical methods – Errors: Determinate and indeterminate errors, absolute error, relative error, minimization of errors. Statistical treatment of finite samples -mean, median, range, standard deviation and variance. External standard calibration - regression equation (least squares method), correlation coefficient (R^2). Acid-base titrimetry: Titration curves for strong acid vs strong base, weak acid vs strong base and weak base vs strong acid titrations. Titration curves, Quantitative applications – selecting and standardizing a titrant, inorganic analysis - alkalinity, acidity. Complexometric titrimetry: Indicators for EDTA titrations - theory of metal ion indicators, titration methods employing EDTA - direct, back, displacement and indirect determinations, Application-determination of hardness of water. Redox titrimetry: Balancing redox equations, calculation of the equilibrium constant of redox reactions, titration curves, Theory of redox indicators, calculation of standard potentials using Nernst equation. Applications. Precipitation titrimetry: Titration curves, titrants and standards, indicators for precipitation titrations involving silver nitrate- Volhard's and Mohr's methods and their differences. Gravimetric Analysis: Requisites of precipitation, mechanism of precipitation, Factors influencing precipitation, Co-precipitation, post-precipitation, Advantages of organic reagents over inorganic reagents, reagents used in gravimetry (8-hydroxy quinoline (oxine) and dimethyl glyoxime (DMG). Numerical problems on all the above aspects.	
Unit - 2	14 Hrs
Classification and nomenclature of organic compounds, hybridization-types, shapes of organic molecules, influence of hybridization on bond properties. **Nature of bonding in Organic molecules** Types of chemical bonding, formation of covalent bond, notations used to represent electron movements and directions of reaction- curly arrows, formal charges. Types of bond breaking- homolytic and heterolytic. Types of reagents-Electrophiles, nucleophiles, nucleophilicity and basicity. Homolytic and heterolytic fission of bonds. Carbocations, carbanions, free radicals, carbenes, nitrenes and benzyne.**Electronic displacement effects**: Inductive effects, Electromeric effect, Resonance effect, Hyperconjugation and steric effects, explanation with examples. **Types of Organic Reactions:** Substitution, addition, elimination, rearrangement and pericyclic reactions, explanation with examples. **Aliphatic Hydrocarbons:Alkanes**: Nomenclature of branched chain alkanes; *Preparation:* Corey-House synthesis, Wurtz reaction and Wurtz-Fittig reaction. Physical and chemical properties (Free radical substitution, halogenation- relative reactivity and selectivity) and commercial importance. Difference between conformation and configuration. Conformations of ethane, propane and n-butane, explanation of stability based on energy profile diagrams. Nomenclature of n-butane conformations using Klyne-Prelog terminology. Conformation and stability of 1,2-	

dichloroethane, ethylene glycol and acetaldehyde. **Cycloalkanes:** Nomenclature, method of formation. Explanation for stability based on heat of hydrogenation data. Baeyer's strain theory and stability of cyclopropane. Conformations of cyclohexane (chair, twist boat, boat, half-chair and envelop forms and their stability). Geometrical isomerism with examples, *cis* and *trans* isomerism in 1,2-dimethylcyclopropane and 1,2-dimethylcyclohexane.	
Unit - 3	14 Hrs
Carbon-carbon pi bonds **Alkenes**: Preparation by Wittig reaction-stereoselectivity, from but-2-yne to cis-alkenes – (partial catalytic hydrogenation) and trans-alkenes – (Birch reduction). Formation of alkenes by elimination reaction. Mechanism of E_1, E_2, E_1cB reaction. Saytzeff and Hofmann eliminations. Reactions: Addition of halogens to alkenes-carbocation and halonium ion mechanism. Stereospecificity of halogen addition. Addition of hydrogen halides to alkenes (Free radical addition of HBr to propene), mechanism, regioselectivity and relative rates of addition. Ozonolysis mechanism - ozonolysis of propene. Hydrogenation, hydration, hydroxylation and epoxidation of alkenes, explanation with examples. Diels-Alder reaction, allylic and benzylic bromination and mechanism in propene, 1-butene, 1-toluene and ethylbenzene. Conformation and stability of propene. Steric effect- Relative stability of trans and cis-2-butene. **Dienes:** Classification- isolated, conjugated and cumulated- one example. Structure of allene and butadiene. **Reactions:** 1, 2 addition and 1, 4 addition reactions. Diels Alder reaction: 1, 3-butadiene with maleic anhydride. **Alkynes**: Preparation*:* Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides. Reactions: alkylation of terminal alkynes and conversion to higher alkynes, ozonolysis and oxidation with hot alk. $KMnO_4$.	
Unit - 4	14 Hrs
Nucleophilic substitution:. Mechanism of S_N^1 and S_N^2 reactions with suitable examples. Energy profile diagrams, Stereochemistry and factors effecting S_N^1 and S_N^2 reactions **Arenes:** Nomenclature: mono, di and tri substituted benzenes, aromaticity: Huckel's rule - application to benzenoid (benzene, naphthalene, anthracene and phenanthrene) and non-benzenoid (cyclopropenyl cation, cyclopentadienyl anion, tropylium cation) compounds, anti-aromaticity, homoaromaticity. Benzene: molecular orbital picture and resonance energy. Preparation-from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Aromatic Electrophilic substitution reactions, mechanisms, σ and π complexes, Halogenation, Nitration, Sulphonation, Friedel Crafts alkylation and acylation with their mechanism. Activating and deactivating groups. Orientation influence, Ortho-para ratio. Aromatic nucleophilic substitution reaction: S_N^{Ar} and Benzyne mechanism with suitable examples, Birch reduction, side chain oxidation of toluene to benzaldehyde and benzoic acid. Polynuclear hydrocarbons: naphthalene, anthracene and phenanthrene- Preparations, resonance structures, oxidation of naphthalene, anthracene and phenanthrene. Electrophilic and nucleophilic substitution reactions of naphthalene and anthracene. Diels-Alder reaction of anthracene with 1,2-dichloroethene. Alkenyl benzenes: Styrene, *cis*- and *trans*-stilbenes and their preparations. Biphenyl: Preparation-Ullmann reaction.	

Text Books

1. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt.Ltd.(2007).
2. Analytical Chemistry, G.D. Christian, 6th edition, Wiley-India (2007).
3. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)

4. Organic Reaction mechanism by V. K. AhIuwalia and K. Parashar (Narosa Publishers).
5. Organic Chemistry by S. M. Mukherji, S. P. Singh and R. K. Kapoor. (Narosa Publishers)

References

1.Finar, I. L. *Organic Chemistry (Volume I),* Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)

2.McMurry, J. E. *Fundamentals of Organic Chemistry,* 7th Ed. Cengage Learning India Edition, 2013

Pedagogy :

Chalk and Talk, ICT Tools and Models

Assessment	
Assessment Occasion/ type	**Weightage in Marks**
Formative Assessment/ IA	40
Summative Assessment/ESE	60
Total	100

DCE-Lab-1 Analytical and Organic Practicals-1

Course Outcome:

After studying the course the student will be able to

1. Understand the safety practices in the Chemistry Laboratory
2. Develop awareness regarding toxicity of chemicals
3. Know the importance of calibration of glassware, pipette, burette and volumetric flask
4. Prepare standard/working solutions, standardization of solutions and determination of the respective analytes
5. Select suitablesolvent for purification of organic compounds
6. Gain an insight to the mechanism behind the reaction and the significance of catalysts
7. Learn the importance of green methods over conventional methods and proficiently handle the byproducts and disposal of waste
8. Enthuse students to conduct experiments by arousing the curiosity which would help them in learning basics and advanced concepts through simulation-based labs

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Programme Outcomes (POs 1-8)

Course Outcomes (COs) / Programme Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1.Understand the safety practices in the Chemistry Laboratory	X	X						
2.Develop awareness regarding toxicity of chemicals	X					X		
3.Know the importance of calibration of glassware, pipette, burette and volumetric flask	X	X						
4.Prepare standard/working solutions, standardization of solutions and determination of the respective analytes	X	X	X					
5.Select suitable solvent for purification of organic compounds		X	X				X	
6.Gain an insight to the mechanism behind the reaction and the significance of catalysts						X		X
7.Learn the importance of green methods over conventional methods and proficiently handle the byproducts and disposal of waste				X			X	X
8.Enthuse students to conduct experiments by arousing the curiosity which would help them in learning basics and advanced concepts through simulation-based labs				X		X		X

Course Articulation Matrix relates course outcomes of course with the corresponding programme outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular programme outcome.

Number of practical Credits	Number of practical hours/ semesters
2	**56**

Tutorials
Calibration of instruments, glasswares etc. to be performed in the beginning of the experiments
Specific arrangements to be made for proper disposal of chemicals, broken glasswares and solutions after the experiments
Green Principles to be adopted in the laboratories
Preparation of Standard solution along with calculations to be taught
Handling and dilution of mineral acids to be emphasized
Use of suitable indicators to be explained

List of Experiments to be conducted

PART-A Analytical Chemistry

1. Safety Practices in the Chemistry Laboratory, knowledge about common toxic chemicals and safety measures in their handling, cleaning and drying of glass wares.
2. Calibration of glassware, pipette, burette and volumetric flask.
3. Determination of sodium carbonate and sodium bicarbonate in a mixture.
4. Determination of alkali present in soaps/detergents
5. Determination of iron(II) using potassium dichromate
6. Determination of oxalic acid using potassium permanganate solution
7. Determination of Fe^{2+} as Fe_2O_3

   Virtual Experiments
8. Standardization of EDTA solution and determination of hardness of water
9. Gravimetric estimation of Barium
10. Gravimetric estimation of Nickel

PART-B Organic Chemistry

1. Selection of suitable solvents for Purification/Crystallization of organic compounds.
2. Preparation of acetanilide from aniline using Zn/acetic acid (Green method).
3. Synthesis of p-nitro acetanilide from acetanilide using nitrating mixture.
4. Hydrolysis of methyl m-nitrobenzoate to m-nitrobenzoic acid (Conventional method)
5. Synthesis of diazoaminobenzene from aniline (conventional method).
6. Preparation of dibenzalacetone (Green method).

7. Diels Alder reaction between furan and maleic acid (Green method).

Virtual Experiments

8. Simple Distillation
9. Separation of Compounds by Column Chromatography
10. Detection of Functional Groups

Note:

1. Questions from both sections should be given in each batch.
2. In the first 20 minutes the Teacher should discuss in detail the theory, principle, procedure and calculations
3. Instructions to be given for operating instruments, weighing chemicals and precautions while handling chemicals
4. The last 20 minutes the teacher is expected to solve related problems based on the experiments.

Title of the Course: OE-1: CHEMISTRY IN DAILY LIFE

Course Outcome:

After studying the course the student will be able to

1. Analyse the fat content and minerals in milk, butter and other dairy products
2. Know about various food preservatives, adulterants, additives and their analysis
3. Know about the Sources, role and deficiency symptoms of Vitamins
4. Learn the importance of renewable energy sources
5. Be aware of the applications of polymers as plastics in various fields and strategies for development of environment friendly polymers

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Programme Outcomes (POs 1-8)

Course Outcomes (COs) / Programme Outcomes (POs)	1	2	3	4	5	6	7	8
1.Analyse the fat content and minerals in milk, butter and other dairy products	X		X		X			
2.Know about various food preservatives, adulterants, additives and their analysis				X	X			X
3.Know about the Sources, role and deficiency symptoms of Vitamins	X					X	X	
4.Learn the importance of renewable energy sources	X	X						
5.Be aware of the applications of polymers as plastics in various fields and strategies for development of environment friendly polymers.			X			X		X

Course Articulation Matrix relates course outcomes of course with the corresponding programme outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular programme outcome.

Number of Theory Credits	Number of lecture hours/ semester
3	**42**

Content of Theory Course 1	42 Hrs
Unit – 1	14 Hrs
Dairy Products: Composition of milk and milk products. Analysis of fat content, minerals in milk and butter. Estimation of added water in milk. Beverages: Analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, determination of methyl alcohol in alcoholic beverages. **Food additives, adulterants, and contaminants**- Food preservatives like benzoates, propionates, sorbates, disulphites. Artificial sweeteners: Aspartame, saccharin, dulcin, sucralose, and sodium cyclamate. Flavors: Vanillin, alkyl esters (fruit flavors), and monosodium glutamate. **Artificial food colorants:** Coal tar dyes and non-permitted colors and metallic salts. Analysis of pesticide residues in food.	
Unit - 2	14 Hrs
Vitamins: Classification and Nomenclature. Sources, deficiency diseases, and structures of Vitamin A1, Vitamin B1, Vitamin C, Vitamin D, Vitamin E & Vitamin K1.	

Oils and fats: Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like argemone oil and mineral oils. Halphen test. **Soaps & Detergents**: Definition, classification, manufacturing of soaps and detergents, composition and uses	
Unit - 3	14 Hrs
Chemical and Renewable Energy Sources:	
Principles and applications of primary & secondary batteries and fuel cells. Basics of solar energy, future energy storer.	
Polymers: Basic concept of polymers, classification and characteristics of polymers. Applications of polymers as plastics in electronics, automobile components, medical fields and aerospace materials. Problems of plastic waste management. Strategies for the development of environment-friendly polymers.	

Text Books

1. B. K. Sharma: Introduction to Industrial Chemistry, Goel Publishing, Meerut (1998)
2. Medicinal Chemistry- Ashtoush Kar.
3. Analysis of Foods – H.E. Cox: 13
4. Fred Billmeyer: Textbook of polymer science; Willey 3rd addition.

References

1.Foods: Facts and Principles. N. Shakuntala Many and S. Swamy, 4thed. New Age International (1998)

2.Handbook on Fertilizer Technology by Swaminathan and Goswamy, 6th ed. 2001, FAI.

Pedagogy :

Demonstration activities using live examples

Assessment	
Assessment Occasion/ type	**Weightage in Marks**
Formative Assessment/ IA	40
Summative Assessment/ESE	60
Total	100

Semester 2

Course Outcome:

After studying the course the student will be able to

1. Learn scientific theory of atoms, concept of wave functions, the fundamentals of quantum mechanics and concept of operators
2. Understand the physical and chemical characteristics of elements
3. Identify the given element, relative size, charges of proton, neutron and electron and their assembly to form different atoms
4. Learn the theory of dilute solutions, distribution law and its applications
5. Properties of liquid as solvent for various household and commercial use
6. Explain the laws governing the behaviour of ideal gases and real gases including their comparison
7. Understand the laws of crystallography, X-ray diffraction techniques, Bragg's law and its applications
8. Solve the problems related to quantum mechanics, different molecular velocities, critical constants and molar mass of non-volatile solutes

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Programme Outcomes (POs 1-8)

Course Outcomes (COs) / Programme Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1.Learn scientific theory of atoms, concept of wave functions, the fundamentals of quantum mechanics and concept of operators	X					X		X
2.Understand the physical and chemical characteristics of elements			X	X				
3.Identify the given element, relative size, charges of proton, neutron and electron and their assembly to form different atoms	X		X	X				
4.Learn the theory of dilute solutions, distribution law and its applications							X	X
5.Properties of liquid as solvent for various household and commercial use					X			X
6.Explain the laws governing the behaviour of ideal gases and real gases including their comparison	X	X	X					
7.Understand the laws of crystallography, X-ray diffraction techniques, Bragg's law and its applications			X		X			
8.Solve the problems related to quantum mechanics, different molecular velocities, critical constants and molar mass of non-volatile solutes				X	X	X	X	

Course Articulation Matrix relates course outcomes of course with the corresponding programme outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular programme outcome.

Title of the Course: DSC – 2: INORGANIC AND PHYSICAL CHEMISTRY– I

Number of Theory Credits	Number of lecture hours per semester
4	**56**

Content of Theory Course 2	56Hrs
Unit – 1	14 Hrs
Atomic structure Review of Bohr's theory and its limitations and atomic spectrum of hydrogen atom. Need of a new approach to atomic structure. Wave mechanics: de Broglie equation, Problems on calculation of wavelength of an electron Heisenberg's Uncertainty Principle and its significance What is Quantum Mechanics? Sinusoidal wave equation (Explain sinusoidal wave, Classical wave mechanics). Schrodinger's wave equation – derivation. Applications of Schrodinger's equation to the hydrogen atom. significance of ψ and $\psi 2$ Postulates of quantum mechanics. Hamiltonian operator. Eigen values and function. Concept of orbitals, Radial and angular parts of the hydrogenic wave function (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (graphical representation only). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals. Quantum numbers: Significance of quantum numbers. The four types of quantum numbers, shapes, s, p and d atomic orbitals, discovery of spin, spin quantum numbers (s) and magnetic spin quantum number (ms). Electronic configuration of elements. Principles (Aufbau, Pauli's exclusion principle and Hund's rule). Stability of half-filled and completely filled orbitals. Relative energies of atomic orbitals, Anomalous electronic configurations.	
Unit - 2	14 Hrs

Periodic Table & Periodic Properties The long form of periodic table. Classification of elements in to s, p, d and f-block elements. Periodic properties & trends in the periodic properties with reference to s and p-block elements: (a) Atomic radii (van der Waals) (b) Ionic and crystal radii. (c) Covalent radii (d) Ionization enthalpy, successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy. (e) Electron gain enthalpy, trends of electron gain enthalpy. (f) Electronegativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-Jaffé's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity. Trends in the periodic properties. Applications in predicting and explaining chemical behaviour. Trends in the Chemistry of the compounds of groups 13 to 17 (hydrides, carbides, oxides and halides).	
Unit - 3	14 Hrs
Gaseous State Elementary aspects of kinetic theory of gases, Ideal and real gases. Boyle temperature (derivation not required), Molecular velocity, collision frequency, collision diameter, Collision cross section, collision number and mean free path and coefficient of viscosity, calculation of σ and η, variation of viscosity with temperature and pressure. Maxwell's Boltzmann distribution law of molecular velocities (Most probable, average and root mean square velocities). Relation between RMS, average and most probable velocity and average kinetic energies. (Mathematical derivation not required), law of equipartition of energy. Behaviour of real gases: Deviation from ideal gas behaviour. Compressibility factor (Z) and its variation with pressure for different gases. Causes of deviation from ideal behaviour, vander Waals equation of state (no derivation) and application in explaining real gas behaviour. Critical phenomena - Andrews isotherms of CO_2, critical constants and their calculation from van der Waals equation, Continuity of states, Law of corresponding states. Numerical problems. **Liquid State** **Surface Tension**: Definition and its determination using stalagmometer, effect of temperature and solute on surface tension **Viscosity**: Definition, Coefficient of viscosity. Determination of viscosity of a liquid using Oswald viscometer. Effect of temperature, size, weight, shape of molecules and intermolecular forces. **Refraction**: Specific and molar refraction- definition and advantages. Determination of refractive index by Abbes Refractometer. Additive and constitutive properties. **Parachor:** Definition, Atomic and structure parachor, Elucidation of structure of benzene and benzoquinone. Viscosity and molecular structure. Molar refraction and chemical constitution. Numerical Problems.	

Unit - 4	14 Hrs
Dilute solutions- Review of colligative properties and concentration terms Determination of molecular mass of a solute by: (i) Berkeley-Hartley's method ; (ii) Beckmann's method (ΔT^f) and (iii) Landsberger's method. Numerical problems **Distribution Law** Nernst Distribution Law – Statement. Distribution constant, factors affecting distribution constant, validity of Distribution Law, Modification of distribution law when molecules undergo a) Association b) Dissociation. Application of Distribution Law in Solvent extraction, numerical Problems **Solids** **Forms of solids:** Unit cell and space lattice, anisotropy of crystals, size and shape of crystals. Laws of Crystallography: Law of constancy of interfacial angles, Law of rational indices, Law of symmetry (Symmetry elements), Crystal systems, Bravais lattice types and identification of lattice planes. Miller indices and its calculation, X–Ray diffraction by crystals: Bragg's law and derivation of Bragg's equation, Single crystal and powder diffraction methods. Defects in crystals, glasses and liquid crystals. Numerical problems.	

Text Books

1. Concise Inorganic Chemistry: J D Lee, 4th Edn, Wiley, (2021)
2. Atkins Physical Chemistry.8th Edition. Peter Atkins & Julio De Paula Oxford University Press.
3. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co.
4. Advanced Physical Chemistry, Gurdeep Raj, Goel Publishing House (2018)

References

1. Basic Inorganic Chemistry, F A Cotton, G Wilkinson and P. L. Gaus, 3rd Edition. Wiley. India
2. Physical Chemistry by Samuel Glasstone, ELBS (1982).
3. A Text Book of Physical Chemistry P.L.Soni , O.P. Dharmarhaand and U.N.Dash, Sultan Chand and Sons.

Pedagogy :

Chalk and Talk, ICT Tools and Models

Assessment	
Assessment Occasion/ type	**Weightage in Marks**
Formative Assessment/ IA	40
Summative Assessment/ESE	60
Total	100

DSC LAB-2 Inorganic and Physical Practicals

Course Outcome:

After studying the course the student will be able to

1. Inculcate the significance of physical constants organic liquids
2. Weigh accurately compounds up to fourth decimal
3. Know the importance of calibration of instruments, pipette, burette and volumetric flask
4. Understand the concept of distribution coefficient, Nernst Distribution law, and how it takes different form when solute undergo association or dissociation in one of the layer
5. Prepare standard/working solutions, standardization of solutions and determination of the respective analytes
6. Handle proficiently byproducts and disposal of waste
7. Learn the importance of green methods over conventional methods.
8. Enthuse students to conduct experiments by arousing the curiosity which would help them in learning basics and advanced concepts through simulation-based labs

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Programme Outcomes (POs 1-8)

Course Outcomes (COs) / Programme Outcomes (POs)	1	2	3	4	5	6	7	8
1.Inculcate the significance of physical constants organic liquids	X	X						
2,Weigh accurately compounds up to fourth decimal		X						X
3,Know the importance of calibration of instruments, pipette, burette and volumetric flask		X		X				
4.Understand the concept of distribution coefficient, Nernst Distribution law, and how it takes different form when solute undergo association or dissociation in one of the layer		X			X			X
5.Prepare standard/working solutions, standardization of solutions and determination of the respective analytes		X			X			
6.Handle proficiently byproducts and disposal of waste						X	X	
7.Learn the importance of green methods over conventional methods.						X	X	X
8.Enthuse students to conduct experiments by arousing the curiosity which would help them in learning basics and advanced concepts through simulation-based labs		X			X		X	

Course Articulation Matrix relates course outcomes of course with the corresponding programme outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular programme outcome.

Number of practical Credits	Number of practical hours per semester
2	**56**

Tutorials
Green Principles to be adopted in the laboratories
Specific arrangements to be made for disposal of chemicals and solutions after the experiments
Calibration of instruments, glasswares etc to be performed in the beginning of the experiments
Preparation of Standard solution along with calculations to be taught
Handling and dilution of mineral acids to be emphasized
Selection and usage of Indicators to be explained

List of Experiments to be conducted

PART-A Inorganic Chemistry

TITRIMETRY

1. Determination of carbonate and hydroxide present in a mixture.
2. Determination of oxalic acid and sodium oxalate in a given mixture using standard $KMnO_4$/NaOH solution
3. Standardization of potassium permanganate solution and determination of nitrite in a water sample
4. Determination of alkali content in antacids
5. Determination of chlorine in bleaching powder using iodometric method.

Virtual Experiments

6. Determination of concentration of Potassium Permanganate solution using Ferrous Ammonium sulphate
7. Standardization of silver nitrate and determination of chloride in a water sample
8. Soil Analysis-Determination of pH of soil.

PART-B Physical Chemistry

1. Determination of density using specific gravity bottle and viscosity of liquids using Ostwald's viscometer (ethyl acetate, toluene, chlorobenzene or any other non-hazardous liquids)
2. Study of the variation of viscosity of sucrose solution with the concentration of a solute
3. Determination of the density using specific gravity bottle and surface tension of liquids using Stalagmometer (ethyl acetate, toluene, chlorobenzene or any other non-hazardous liquids)
4. Study of variation of surface tension of detergent solution with concentration.
5. Determination of molar mass of non-electrolyte by Walker-Lumsden method
6. Determination of partition/distribution coefficient of Benzoic acid in water and toluene
7. Determination of compositionof liquid mixtures by refractometry. (toluene and alcohol, water and sucrose)
8. Determination of specific and molar refraction by Abbes refractometer (ethyl acetate, methyl acetate, ethylene dichloride)

Virtual Experiments

9. Determination of molar mass of a non-volatile solute by cryoscopic method
10. Determination of viscosity by average molecular weight of a polymer
11. Determination of partition co-efficient of Iodine between water and carbon tetrachloride

Note:

1. Questions from both sections should be given in each batch.
2. In the first 20 minutes the Teacher should discuss in detail the theory, principle, procedure and calculations
3. Instructions to be given for operating instruments, weighing chemicals and precautions while handling chemicals
4. The last 20 minutes the teacher is expected to solve related problems based on the experiments.

Title of the Course: OE – 2: Molecules of Life

Course Outcome:

After studying the course the student will be able to

1. Know about the biological importance of biomolecules
2. Learn about the structure of amino acids and proteins.
3. Understand the correlation of enzyme function with drug action
4. Learn the classification and clinical significance of lipids
5. Know about the concepts of bioenergetics

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Programme Outcomes (POs 1-8)

Course Outcomes (COs) / Programme Outcomes (POs)	1	2	3	4	5	6	7	8
1.Know about the biological importance of biomolecules	X					X		
2.Learn about the structure of amino acids and proteins	X							
3.Understand the correlation of enzyme function with drug action			X				X	
4.Learn the classification and clinical significance of lipids	X			X				X
5.Know about the concepts of bioenergetics			X			X		

Course Articulation Matrix relates course outcomes of course with the corresponding programme outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular programme outcome.

Number of Theory Credits	Number of lecture hours per semester
3	**42**

Content of Theory Course 2	42 Hrs
Unit – 1	14 Hrs
Carbohydrates Classification of carbohydrates, reducing and non-reducing sugars, General properties of glucose and fructose, their open chain structures. Epimers, mutarotation and anomers. Linkage between monosaccharides, structure of disaccharides (sucrose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation. Carbohydrates as a source of energy **Amino Acids, Peptides and Proteins** Classification ofamino acids, Zwitterions structure and Isoelectric point. Peptides: structure and conformation, example and function of biologically important Peptides. Proteins: Classification based on composition, shape and function with examples. Overview of Primary, Secondary, Tertiary and Quaternary structure of proteins. Importance of primary structure by taking sickle cell anemia as example. Determination of primary structure of peptides. Denaturation of proteins:, Renaturation of proteins.	
Unit - 2	14 Hrs

Enzymes and correlation with drug action Brief introduction, Nomenclature (E.C. No. upto 2nd digit) and classification of enzymes, Effect of pH and temperature. Enzyme specificity and theories-Lock and key model, induced fit theory. Active site and its characteristics, Mechanism of enzyme action, factors affecting enzyme action, Co-enzymes and cofactors and their role in biological reactions, Specificity of enzyme action (including stereo specificity), Enzyme inhibitors and their importance, phenomenon of inhibition (Competitive and Noncompetitive inhibition including allosteric inhibition). **Drug action**-receptor theory. Structure–activity relationships of drug molecules, binding role of –OH group, -NH_2 group, double bond and aromatic ring. **Lipids** Introduction to lipids, classification. Biological importance of triglycerides, phospholipids, glycolipids, and steroids (cholesterol).Oils and fats: Common fatty acids present in oils and fats, Omega fatty acids, Trans fats,Hydrogenation, Rancidity of oils. Triglycerides:: Biological importance of triglycerides. Saponification, saponification value and its significance, Unsaturation in acyl glycerols- iodine number and iodine number of different oils.Prostaglandins: definition and example, biological role of prostaglandins in general, Waxes: definition, types, biological importance. Lipoproteins: Types and functions, clinical significance.	
Unit - 3	14Hrs
Nucleic Acids Components of nucleic acids: Adenine, guanine, thymine and cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides **(nomenclature)**, Structure of polynucleotides; Structure of DNA (Watson-Crick model) and RNA (**types of RNA**), Genetic Code, -(general features and about Central dogma of Molecular biology) Biological roles of DNA and RNA: Replication, Transcription and Translation. Physico- chemical properties of nucleic acids - effect of alkali, acid and heat (denaturation and renaturation), Mutation Mutagens- chemical and physical, Molecular basis of mutation: spontaneous and induced mutations. Types of mutation, **Concept of Energy in Bio systems** Calorific value of food. Standard caloric content of carbohydrates, proteins and fats. Oxidation of foodstuff (organic molecules) as a source of energy for cells. Introduction to Metabolism (catabolism, anabolism), ATP: the universal currency of cellular energy, ATP hydrolysis and free energy change. Conversion of food into energy. Outline of catabolic pathways of Carbohydrate- Glycolysis, Fermentation, and Krebs Cycle. Overview of catabolic pathways of Fats and Proteins. Interrelationships in the metabolic pathways of Proteins, Fats and Carbohydrates. Introduction to bioenergetics, stages of energy transformation- Photosynthesis respiration and utilization of energy. Exergonic and endergonic reactions. standard free energy change.	

Text Books

1.Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

2.A Text Book ofBioChemistry, V. S. S. Rama Rao, UBSPD,1998.

References

1.Concise Text Book ofBioChemistry,T. N. Pattabhiraman, All India Publishers, 2000.
2.W. H. Freeman. Berg, J.M., Tymoczko, J.L. & Stryer, L. *BioChemistry*, , 2002.

Pedagogy :

Chalk and Talk, ICT Tools and Models

Assessment	
Assessment Occasion/ type	**Weightage in Marks**
Formative Assessment/ IA	40
Summative Assessment/ESE	60
Total	100

BANGALORE UNIVERSITY

III & IV Semester Chemistry Syllabus

for

B.Sc. / B.Sc. Honors Courses

Framed According to the National Educational Policy (NEP 2020)

(To be implemented from the academic year 2022-23)

DEPARTMENT OF CHEMISTRY
Bangalore University
Jnanabharathi
Bangalore-560056

AUGUST-2022

Preamble

The Board of studies in UG Chemistry headed by Prof G Krishnamurthy, the Chairman, Department of Studies in Chemistry, Jnanabharathi Campus, Bangalore University had the thorough discussions on the syllabus of III and IV semester Chemistry for BSc/ BSc Honors courses using the syllabus provided by the NEP Chemistry syllabus drafting Committee. This syllabus has to be accepted for the academic year 2022-23.

The Core committee consisting of the faculty members of different branches of Chemistry namely Analytical, Physical, Inorganic and Organic Chemistry which comprising the BOS and also additional faculty members from different UG Colleges of Bangalore University have made effective joint brain storming discussions and arrived at a Syllabus in Chemistry for **III and IV** semesters on **23.08.2022** and **24.08.2022**.

The final syllabus incorporating all the suggestions was finally approved by the members of the Board of Studies in Chemistry (UG) on **24.08.2022**. The following Faculty Members of the Core Committee were involved in the preparation of the Chemistry Syllabus.

Physical Chemistry Section

1. G. Krishnamurthy
2. K. Ramakrishna Reddy
3. P Nagegowda

Analytical and Inorganic Chemistry Section

1. M. Shubha
2. R. Nalini
3. B. M. Savitha
4. B M Sreenivas

Organic Chemistry Section

1. Renuka Manjunath
2. Vasudeva Reddy
3. Sumaiya Tabassum
4. Meenaakshi Srinivasan

Sd/-

PROF. G. KRISHNAMURTHY
CHAIRMAN
BOS in Chemistry (UG)
Bangalore University
Bangalore -560056

Proceedings of the meeting of the Board of Studies in Chemistry- UG held on 23rd & 24th August 2022 from 10.30 am to 6.30 pm in the Department of Chemistry, Bangalore University, Jnana Bharathi, Bengaluru-560 056

A meeting of the Board of Studies (UG) in Chemistry was held on 23rd & 24th August 2022 from 10.30 am to 6.30 pm in the Department of Chemistry, Bangalore University, Jnana Bharathi, Bangalore-56. The Chairman welcomed the members and placed before them the following agenda for deliberations.

Approval of B.Sc Chemistry Syllabus-NEP 2021-2022 batch: The syllabus of B.Sc Chemistry III and IV semesters for 2022-2023 was considered, discussed in detail, all suggestions incorporated and unanimously approved by the members.

Revision of B.Sc Chemistry syllabus (NEP-2020) I and II Semesters of 2022-2023 batch: The I and II semester syllabus was done without taking care of equal distribution of different branches of Chemistry such as Analytical, Organic, Inorganic and Physical Chemistry. It was very unfair for Chemistry learning students at I year (I/II semesters) level. So, all the board members unanimously decided to revise the syllabus. The syllabus was thus revised by thoroughly discussing in detail and the same has been unanimously approved by all the members.

The meeting ended with vote of thanks by the Chairman, Department of Chemistry, Bangalore University, Jnana Bharathi, Bangalore- 560 056.

MEMBERS OF THE BOS (UG)		**Signature**
1. Prof. G. Krishnamurthy	**Chairman**	
2. Prof. B. M. Sreenivasa	Member	B. M. Sreenivasa
3. Prof. M. Shubha	Member	
4. Dr. Nagegowda P	Member	
5. Dr. Renuka Manjunath	Member	
6. Dr. K. Ramakrishna Reddy	Member	
7. Dr. K. R. Muddukrishna	Member	Absent
8. Dr. Prasannakumar S G	Member (Coopted)	Absent
9. Dr. Sumaiya Tabassum	Member (Coopted)	Sumaiya-2

Retired/Transferred to other University

1. Dr. Jisha S. P.
2. Dr. B. Vijaya Babu
3. Dr. Mallesh

24/8/2022

Prof. G. KRISHNAMURTHY
Chairman
Department of Chemistry
Bangalore University
Jnanabharathi Campus
Bangalore - 560 056.

PROGRAMME STRUCTURE

Sem.	Discipline Core (DSC) (L+T+P)	Discipline Elective(DSE)/ Open Elective (OE)	Ability Enhancement Compulsory Courses (AECC), Languages (L+T+P)		Skill Enhancement Courses (SEC)		Total Credits
					Skill based (L+T+P)	Value based (L+T+P)	
I	DISCIPLINE A1 (4 + 2) DSC-1:Analytical and Organic Chemistry-I DSC lab-1:Analytical and Organic Practicals-I DISCIPLINE-B1(4+2)	OE – 1 (3 CREDITS) Chemistry in Daily Life	L1-1 (3), L2-1(3)		SEC-1: Digital Fluency (2)		23
II	DISCIPLINE A2(4 + 2) DSC-2:Inorganic and Physical Chemistry-I DSC Lab -2:Inorganic and Physical Practicals-I DISCIPLINE-B2(4+2)	OE – 2 (3 CREDITS) Molecules of Life	L1-2(3), L2-2 (3) (3+1+0 each)	Environmental Studies (2)		Health and Wellness/ Social & Emotional Learning (2)	25
Exit option with Certificate (48 credits)							
III	DISCIPLINE A3(4 + 2) DSC-3:Analytical and Organic Chemistry-II DSC Lab-3: Analytical and Organic Practicals-II DISCIPLINE-B3(4+2)	OE – 3 (3 CREDITS)	L1-3 (3), L2-3(3) (3+1+0 each)		SEC-2: (2)		23
IV	DISCIPLINE A4(4 + 2) DSC-4: Inorganic and Physical Chemistry-II DSC Lab-4:Inorganic and Physical Practicals=II DISCIPLINE-B4(4+2)	OE – 4 (3 CREDITS)	L1-4 (3), L2-4(3) (3+1+0 each)	Constitution of India (2)		Sports/NCC/NSS etc	25
Exit option with Diploma (96 credits)							
Choose any one Discipline as Major, the other as the Minor							
V	DISCIPLINE A5 (3 + 2) DSC-5: DSC Lab-5 DISCIPLINE A6 (3 + 2) DSC-6: DSC Lab-6: DISCIPLINE B5 (3 + 2)	DSE A1 (3 CREDITS)			SEC-3: (2)	Ethics & Self Awareness (2) (1+0+2)	20
VI	DISCIPLINE A7 (3 + 2) DSC-7 DSC Lab-7 DISCIPLINE A8 (3 + 2) DSC-8 DSC Lab-8 DISCIPLINE B6 (3 + 2)	DSE A2 (3 CREDITS)			SEC-4: (2)		20
Exit option with B. Sc. Basic Degree (136 credits)							
VII	DISCIPLINE A9 (3 + 2) DSC-9 DSC Lab-9 DISCIPLINE A10 (3 + 2) DSC-10 DSC Lab-10: DISCIPLINE A11 (4) DSC-11	DSE A3 (3 CREDITS) RESEARCH METHODOLOGY (3 CREDITS)					20

VIII	**DISCIPLINE A12 (4)** **DSC-12** **DISCIPLINE A13 (4)** **DSC-13** **DISCIPLINE A14 (3)** **DSC-14**	**DSE A4** **(3 CREDITS)** **RESEARCH PROJECT** **(6 CREDITS)**					**20**
Award of B.Sc. CHEMISTRY (Hons) degree (176 credits)							

***In lieu of the research Project, two additional elective papers/ Internship may be offered.**

Sl. No.	**Semester**	**Title of the Paper**	**Teaching Hours**	**Hours / week**		**Examination Pattern Max. & Min. Marks /Paper**						**Duration of Exam (hours)**		**Total Marks / paper**	**Credits**	
				Theory	**Practical**	**ESE**		**IA**	**Practical**			**Theory**	**Practical**		**Theory**	**Practical**
						Max.	**Min.**		**Max.**	**Min.**	**IA**					
1	**I**	**DSC-3: Analytical and Organic Chemistry-II**	**56**	**4**	**-**	**60**	**22**	**40**	**-**	**-**	**-**	**3**	**-**	**150**	**4**	**-**
		DSC LAB-3: Analytical and Organic Chemistry-II	**56**	**-**	**4**	**-**	**-**	**-**	**25**	**9**	**25**	**-**	**4**	**50**	**-**	**2**
		Chemistry-OE-3: Chemistry in Daily life	**42**	**3**	**-**	**60**	**22**	**40**	**-**	**-**	**-**	**3**	**-**	**100**	**3**	**-**
2	**II**	**DSC-4: Inorganic and Physical Chemistry-II**	**56**	**4**	**-**	**60**	**22**	**40**	**-**	**-**	**-**	**3**	**4**	**150**	**4**	**-**
		DSC LAB-2: Inorganic and Physical Chemistry-II	**56**	**-**	**4**	**-**	**-**	**-**	**25**	**9**	**25**	**-**	**4**	**50**	**-**	**2**
		Chemistry-OE-4:- Industrial Applications in Chemistry	**42**	**3**	**-**	**60**	**22**	**40**	**-**	**-**	**-**	**3**	**-**	**100**	**3**	**-**

ASSESSMENT: WEIGHTAGE FOR ASSESSMENT
Common for both III and IV semesters

TYPE OF ASSESSMENT	SUMMATIVE (MARKS)	FORMATIVE (MARKS)
THEORY	**60**	**40**
PRACTICAL	**25**	**25**

SCHEME OF INTERNAL ASSESSMENT MARKS:
THEORY PAPERS
Common for both III and IV semesters

Sl N	PARTICULARS	MARKS
1	**Attendance**	**10**
2	**Assignments/ Seminars**	**10**
3	**Internal Tests (Average of two tests)**	**20**
TOTAL		**40**

PRACTICALS
Common for both III and IV semesters

SL NO	PARTICULARS	MARKS
1	**Attendance**	**05**
2	**Record writing**	**05**
3	**Internal Tests (Average of two tests)**	**15**
TOTAL		**25**

Program Articulation Matrix:
This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately

Semester	Title /Name Of the course	Program outcomes that the course addresses	Pre-requisite course(s)	Pedagogy	Assessment
1	**DSC-1: Analytical and Organic Chemistry-I**	● The concepts of chemical analysis, accuracy, precision and statistical data treatment ● Understand the preparation of alkanes, alkenes and alkynes, their	P.U.C with Chemistry	Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams

		reactions, etc. ● Understand the mechanism of nucleophilic, electrophilic reactions			
	DSC lab-1: Analytical and Organic Practicals-I	● The students will be able to learn how to handle the glassware, prepare and dilute solutions and perform the experiments with prepared reagents ● The students will be able to determine the analyte through volumetric and gravimetric analysis and understand the chemistry involved in each method of analysis. ● The students will be able to deduce the conversion factor based on stoichiometry and in turn use this value for calculation	-	Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams
2	**DSC-2: Inorganic and Physical Chemistry-I**	● The Bohr's theory of atomic structure and how it was developed ● Quantum numbers and their necessity in explaining the atomic structure ● The concept of unit cell, symmetry elements, Nernst distribution law.	-	Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams
	DSC Lab -2: Inorganic and Physical Practicals-I	● Techniques like precipitation, filtration, drying and ignition ● Various titrimetric		Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams

		techniques and gravimetric methods ● To determine the physical constants of organic liquids and molecular weight of non-volatile solute.			
3	**DSC-3: Analytical and Organic Chemistry-II**	● The concepts of chemical analysis, accuracy, precision and statistical data treatment ● Understand the preparation of alkanes, alkenes and alkynes, their reactions, etc. ● Understand the mechanism of nucleophilic, electrophilic reactions	DSC-1 and DSC-2	Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams
	DSC Lab-3: Analytical and Organic Practicals-II	● The students will be able to learn how to handle the glassware, prepare and dilute solutions and perform the experiments with prepared reagents ● The students will be able to determine the analyte through volumetric and gravimetric analysis and understand the chemistry involved in each method of analysis. ● The students will be able to deduce the conversion factor based on stoichiometry and in turn use this value for			

		calculation			
4	**DSC-4: Inorganic and Physical Chemistry-II**	● The Bohr's theory of atomic structure and how it was developed ● Quantum numbers and their necessity in explaining the atomic structure ● The concept of unit cell, symmetry elements, Nernst distribution law.		Assignment Desk work	Internal Exams, Continuous Evaluation, Sem Exams
	DSC Lab-4: Inorganic and Physical Practicals-II	● Techniques like precipitation, filtration, drying and ignition ● Various titrimetric techniques and gravimetric methods ● To determine the physical constants of organic liquids and molecular weight of non-volatile solute.			
5.	**DSC-5:** **DSC Lab-5:** **DSC-6:** **DSC Lab-6:**		DSC-3 and DSC-4	MOOC, Problem solving	Internal tests, Assignments, Quiz
6.	**DSC-7:** **DSC Lab-7:** **DSC-8:** **DSC Lab-8:**			MOOC, Problem solving	Internal tests, Assignments, Quiz
7.	**DSC-9 :** **DSC Lab-9:** **DSC-10:** **DSC Lab-10 :** **DSC-11:**		DSC-5, DSC-6, DSC-7 and DSC-8	MOOC, Problem solving	Internal tests, Assignments, Seminar, Debate, Quiz
8.	**DSC-12:** **DSC Lab-12** **DSC-13:** **DSC Lab-13** **DSC-14:**			Project work, Industrial Visit	Internal tests, Assignments, Seminar, Debate, Quiz

CHEMISTRY

DSC-3: Analytical and Organic Chemistry-II

Contact Hours: 56 **Work load: 4 Hours/Week.**

Credit Points :4

Evaluation: Continuous Internal Assesment-40 Marks

Semester End Examination -60 Marks

Course Objectives:

1) Interrelationship among frequency, wavelength and wave number and importance of validation parameters of an instrumental method will be taught
2) Principle, instrumentation and applications of spectrophotometry, nephelometry and turbidometry will be taught
3) Fundamentals of separation methods and principles of paper, thin layer and column chromatography will be taught
4) Principle, types and applications of solvent extraction will be taught
5) Principle and mechanism of ion-exchange, types of resins and domestic andindustrial applications of ion-exchange chromatography will be taught
6) The concept of mechanism and its importance will be taught to the student
7) Concept and importance of intermediates in organic chemistry will be taught taking proper examples
8) The various techniques for identification of reaction mechanism will be taught to the student taking proper examples
9) Concept of stereochemistry and its importance will be taught.
10) The various projection formulae and the techniques of designating the moleculesinto R, S, D, L will be taught taking proper examples
11) The theory and concept of Cis-, Trans- isomerism and its importance and thetechniques to differentiate between them will be taught taking examples

Course Specific Outcomes

After the completion of this course, the student would be able to

1) Understand the importance of fundamental law and validation parameters in chemical analysis
2) Know how different analytes in different matrices (water and real samples) can be determined by spectrophotometric, nephelometric and turbidometric methods.
3) Understand the requirement for chemical analysis by paper, thin layer and column chromatography.
4) Apply solvent extraction method for quantitative determination of metal ions in different samples
5) Utilize the ion-exchange chromatography for domestic and industrial applications
6) Explain mechanism for a given reaction.
7) Predict the probable mechanism for a reaction. Explain the importance of reaction intermediates, its role and techniques of generating such intermediates

8) Explain the importance of Stereochemistry in predicting the structure and property of organic molecules.
9) Predict the configuration of an organic molecule and able to designate it.
10) Identify the chiral molecules and predict its actual configuration.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	X							
2	X							
3	X							
4	X							
5	X							
6	X							
7	X							
8	X							

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

DSC-3: Analytical and Organic Chemistry-II

Contact Hours: 56 **Work load: 4 Hours/Week.**

Unit-I

Quantitative Analysis-Instrumental methods

Electromagnetic spectrum, absorption of electromagnetic radiation, Definition and unitsof frequency, wavelength, wave number, Beer's law, Beer-Lambert law derivation,deviations from Beer's law, limitations, construction of calibration graph (Plot of absorbance versus concentration), Evaluation Procedures- standard addition, Internal standard addition, validation parameters-detection limits, sensitivity, dynamic/linearity range, Instrumentation, single beam and double beam spectrophotometers, quantitativeapplications of colorimetry (determination of Fe, Mo, Cu, Ti and $PO4^{3-}$) and numericalproblems on application of Beer's law. **10 hrs**

Nephelometry and Turbidimetry: Introduction, principle, instrumentations of nephelometry and turbidimetry; effects of concentration, particle size and wavelength on scattering; choice between nephelometry, applications of nephelometry and turbidimetry (determination of $S04^{2-}$ and $PO4^{3-}$). **4 hrs**

Unit-II

Separation methods

Solvent Extraction: Definition of solvent extraction, Types- batch, continuous, efficiency, selectivity, Nernst distribution law, derivation, distribution coefficient, factors affecting the partition, relationship between % extraction and volume fraction, Numerical problems on solvent extraction. Solvent extraction of iron and copper. **4hrs**

Fundamentals of chromatography: General description, definition, terms and parameters used in chromatography, classification of chromatographic methods, criteria for selection of stationary and mobile phase and nature of adsorbents. Principles of paper, thin layer, column chromatography. Column efficiency, factors affecting the column efficiency, van Deemter's equation and its modern version. **3hrs**

Paper chromatography: Theory and applications.

Thin layer chromatography (TLC): Mechanism, Rf value, efficiency of TLC plates, methodology–selection of stationary and mobile phases, development, spray reagents, identification and detection, qualitative applications. **4 hrs**

Ion exchange chromatography: resins, types with examples- cation exchange and anion exchange resins, mechanism of cation and anion exchange process and applications of ion-exchange chromatography (softening of hard water, separation of lanthanides, industrial applications). **3hrs**

Unit-III

Reaction Intermediates: Generation, Stability and Reactions of,

i) Carbocations: Dienone-phenol; and Pinacol-Pinacolone Rearrangement.
ii) Carbanions : Perkin Reaction, Aldol condensation, Claisen-Schmith condensation.
iii) Free Radicals: Sandmeyer Reaction

iv) Carbenes and Nitrenes: Singlet and Triplet states, their relative stability andreactions

v) Arynes: Formation and detection **8 hrs**

Methods for identifying reaction mechanism:

Product analysis, Isolation and Identification of Intermediates, Stereochemical Evidences, Effect of Catalyst, crossover Experiments, Isotopic studies, Kinetic Studies.

6 hrs

Unit-IV

Stereochemistry of Organic Compounds:

Fischer projection, Newmann and Sawhorse projection formulae and their interconversions. Geometrical isomerism: Cis-trans and syn-anti isomerism, E/Z notations with C.I.P rules. Optical Isomerism: Optical activity, Specific rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral centres, Diasteroisomers, meso structures, Racemic mixtures and Resolution, Relative and absolute configuration, D/L and R/S designations

14 hrs

References:

1) Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, Saunders College Publishing, New York (2005).
2) Analytical Chemistry, G.D. Christian, 6th edition, Wiley-India (2007).
3) Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, PHI Learning PvtLtd. New Delhi (2009).
4) Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M. J. K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt Ltd. (2007).
5) Organic Reaction Mechanism, V. K. Ahluwalia and R. K. Parashar, Narosa Publishers, (2007).
6) Organic Chemistry, S. M Mukherji, S. P Singh and R. K Kapoor (Volume II), International Pvt Ltd. Narosa Publishers, (2003).
7) Organic Chemistry, R.N Morrison and R.N Boyd, DarlingKindersley (India) Pvt. Ltd. Pearson Education, (2016).
8) Organic Chemistry: Stereochemistry and the Chemistry of Natural Products, I. L Finar (Volume I), I. L Finar, (Volume II), Dorling Kindersley India Pvt Ltd. Pearson Education, (2002).
9) Stereochemistry, Conformation and Mechanism, P.S Kalsi, New age International, (2005).
10) Stereochemistry of Organic Compounds, Wiley, E.L Eliel and S.H Wilen, (London), (2020).

PRACTICALS

Credit Points: 2 **Teaching Hours:4 hrs**

Evaluation: Continuous Internal Assessment-20 marks

Semester End Examination :30 marks

Course Objectives

1) To impart skills related to preparation of stock and working solutions and handling of instrumental methods
2) To know the principle of colorimetric analysis and construction of calibration plot
3) To understand the chemistry involved in colorimetric determination of metal ions andanions
4) To determine Rf values of different metal ions present in a mixture
5) To impart knowledge on the importance of functional groups in organic compounds.
6) Techniques to identify the functional groups in a compound by performing physical and chemical tests
7) To record its melting point/boiling point.
8) To prepare suitable derivative for that compound and to characterize it.

Course Specific outcomes

After the completion of this course, the student would be able to

1) Understand the importance of instrumental methods for quantitative applications
2) Apply colorimetric methods for accurate determination of metal ions and anions in water or real samples
3) Understand how functional groups in a compound is responsible for its characteristic property
4) Learn the importance of qualitative tests in identifying functional groups.
5) Learn how to prepare a derivative for particular functional groups and how to purify it.

PART-A (Analytical Chemistry)

1) Colorimetric determination of copper using ammonia solution
2) Colorimetric determination of iron using thiocyanate solution
3) Colorimetric determination of nickel using DMG solution
4) Colorimetric determination of titanium using hydrogen peroxide
5) Colorimetric determination of nitrite in a water sample (diazo coupling Reaction/Griess reagent
6) Colorimetric determination of phosphate as ammonium phosphomolybdate
7) Determination of Rf values of two or three component systems by TLC
8) Separation of different metal ions by paper chromatography/ Solvent extraction of ironusing oxine solution **(demonstration)**

PART-B(Organic Chemistry)

Qualitative analysis of bifunctional Organic compounds such as:

1)Salycilic acid , p-Nitro benzoic acid, Antranilicacid, p-Chloro benzoic acid

2) o-Cresol, p-Cresol, Resorcinol,o- Nitrophenol, p-nitophenol

3)o-Nitro aniline, p-Nitroaniline, p-Toluidine, p-Chloroaniline, p- Bromoaniline,

4)Ethyl Salicylate, Salicylaldehyde, Actophenone, p-Dichlorobenzene, p-Nitro toluene,,Benzamide etc.(Atleast 6-8 compounds to be analysed in a semester)

References

1)Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt Ltd (2007).

2) Vogels Text Book of Qualitative Chemical Analysis, ELBS (1989).

OE1: For Science students

Title of the Course: Open Elective-3: ATOMIC STRUCTURE, BONDING AND CONCEPTS IN ORGANIC CHEMISTRY

Contact Hours: 42 **Workload: 3 hours per week**

Credit Points: 3

Evaluation: Continuous Internal Assessment - 40 marks

Semester End Examination - 60 marks

Course Objectives:

1) To develop an understanding of principles of Atomic structure
2) To know the importance of quantum numbers, writing of electronic configurations and represention of orbitals
3) To develop an understanding of the periodic trends
4) To understand the nature of bonding and to predict the shapes of molecules
5) To construct MO energy level diagrams and predict the properties of molecules
6) To understand the formation of sigma and pi bonds and the bond strength.
7) To study the classification of organic reactions
8) To learn nomenclature preparation and reactions of alkanes, alkenes, alkynes and stability of alicyclic compounds

COURSE CONTENT

Unit I: Atomic Structure and Periodic Properties

History of an atom. Idea of de Broglie matter waves. Heisenberg uncertainty principle. Schrödinger wave equation, significance of wave functions, Bohr's model of hydrogen atom and its limitations. Quantum numbers and their importance, atomic orbitals and shapes of s, p, d orbitals, Multi-electron atoms, Aufbau and Pauli exclusion principle and Hund's multiplicity rule- Electronic configurations of the elements (atomic no. up to 30), effective nuclear charge and shielding. **8 hrs**

Periodic Properties

Atomic radius, Covalent, ionic and van der Waal radii-explanation with examples. Definition and periodicity of the following properties - ionic radii, ionisation potential, electron affinity and electronegativity, methods of determination of electronegativity. Factors affecting the values of ionisation energy. **6 hrs**

Unit II: Chemical Bonding

Ionic Solids– Ionic structures (NaCl, CsCl, TiO_2, ZnS), radius ratio rule and coordination number, limitation of radius ratio rule, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule and their consequences. **4 hrs**

Covalent Bond – Valence bond theory and its limitations, directional characteristics of covalent

bond, various types of hybridization with examples and shapes of simple inorganic molecules and ions. Shapes of NH_3, I_3^+, I_3^-, SF_4, CIF_3, IF_5, ICl_2^- and H_2O using valence shell electron pair repulsion (VSEPR) theory, linear combination of atomic orbitals (LCAO), bonding, nonbonding and antibonding molecular orbitals, physical picture of bonding and antibonding wave functions. Applications of MO theory to explain the stability of homo dinuclear (He_2, N_2, O_2, F_2, C_2) and hetero dinuclear (NO and CO) molecules. Comparison of M.O. and V.B. Models.

7 hrs

Metallic bond-free electron, Band theory-electrical properties of metals, semiconductors and insulators.

Weak interactions – Hydrogen bonding and its consequences, van der Waals forces. **3 hrs**

Unit III: Bonding and molecular structure and hydrocarbons

Bonding and molecular structure: Introduction to organic chemistry, atomic orbitals, sigma and pi bond formation-molecular orbital [MO] method, sp, $sp^2$and sp^3 hybridization, bond length, bond dissociation energies and bond angles (open chain and cyclic compounds). Electronegativity and polarity of the bonds. Classification and reactions of organic compounds (with examples). **7 hrs**

Alkanes, Alkenes and Alkynes

Definition, Nomenclature, preparations (any two methods)

Reactions: Electrophilic, nucleophilic and free radical addition reactions

Alicyclic compounds:

Nomenclature, preparation and stability of cyclopropane, cyclobutane, cyclopentane and cyclohexane. **7 hrs**

Reference Books:

1. Concise Inorganic Chemistry, J. D. Lee, ELBS. (1996)
2. Fundamental Concepts of Inorganic Chemistry, A. K. Das, 3rd edition, Vol 1. (2020)
3. Inorganic Chemistry: Principles of Structure and Reactivity, J. E Huheey, E. A Keiter, R. L Keiter & O. K Medhi, Pearson Education India, (2006)
4. Inorganic Chemistry, D.F Shriver & P. W Atkins, Oxford University Press. (2009)
5. Schaum's Outline Series Theory and Problems of Organic Chemistry. SI (metric) edition Herbert Meislich, Howard Nechamkin and Jacob Sharefkin. (2013)
6. Organic chemistry. Robert T. Morrison and Robert N. Boyd, 6th Edition. (1992)
7. Organic Chemistry, I. L.Finar (Volume I). (2002)

COURSE OUTCOME:

On completion of the course the student will learn and be able to understand/explain

1) the concept of atomic structure, significance of quantum numbers, filling of electrons of atoms/ions in various orbitals as per rules
2) the trends in periodic properties
3) the structures of ionic solids, applications of B-H cycle, solubility of compounds and consequences of polarization of ions
4) the shapes of molecules/ions based on VSEPR theory

5) the construction of MO energy level diagrams and prediction of properties of molecules/ions like bond order, bond energies, bond lengths and magnetic properties.
6) the formation of sigma and pi bonds and the bond strength
7) the classification of organic reactions
8) nomenclature preparation, and reactions of alkanes, alkenes, alkynes and stability of alicyclic compounds.

OE 2 : For Other than Science Students

CHEMISTRY

DSC-4: Inorganic and Physical Chemistry-II

Contact Hours: 56 **Work load: 4 Hours/Week.**

Credit Points :4

Evaluation: Continuous Internal Assesment-40 MarksSemester End Examination -60 Marks

Course Objectives:

Students learn about

1) Different types of bonding in molecules/compounds/ions
2) The structures of molecules/compounds/ions based on different models/theories
3) Properties of compounds based on bonding and structure
4) The fundamentals of thermodynamics including the laws, the concept of entropy and free energy functions and their applications.
5) The concepts of surface chemistry, catalysis and their applications.
6) The theoretical and experimental aspects of chemical kinetics including basic theories of reaction rates and methods of determining order.
7) Electrochemistry dealing with electrolytes in solution. Conductance measurements and applications. Concept of ionic mobility and their determination.

Course outcomes:

After the completion of this course, the student would be able to

1) Predict the nature of the bond formed between different elements
2) Identify the possible type of arrangements of ions in ionic compounds
3) Write Born - Haber cycle for different ionic compounds
4) Relate different energy parameters like, lattice energy, entropy, enthalpy and solvation energy in the dissolution of ionic solids
5) Explain covalent nature in ionic compounds
6) Write the M.O. energy diagrams for simple molecules
7) Differentiate bonding in metals from their compounds
8) Learn important laws of thermodynamics and their applications to various thermodynamic systems
9) Understand adsorption processes and their mechanisms and the function and purpose of a catalyst
10) Apply adsorption as a versatile method for waste water purification.
11) Understand the concept of rate of a chemical reaction, integrated rate equations, energy of activation and determination of order of a reaction based on experimental data
12) Know different types of electrolytes, usefulness of conductance and ionic mobility measurements
13) Determine the transport numbers

DSC-4: Inorganic and Physical Chemistry-II

Contact Hours: 56 **Work load: 4 Hours/Week.**

Unit - I

Structure and Bonding -I

The ionic bond: Structures of ionic solids

Radius ratio rules, Calculation of some limiting radius ratio values, Coordinationnumber 3

(planar triangle), Coordination number 4 (tetrahedral and square planar), Coordination number 6 (octahedral), Close packing. **3hrs**

Classification of ionic structures:

Ionic compounds of the type AX (ZnS, NaCl, CsCI)

Ionic compounds of the type AX_2 (Calcium fluoride (fluorite) and Rutile structure Layer structures CdI_2 , Cadmium iodide structure

Limitations of radius ratio concept **2 hrs**

Lattice energy and Born-Haber cycle, Derivation of Born-Lande equation and its drawbacks, Kapustinskii equation, solvation energy and solubility of ionic solids, polarizing power and polarizability, Fajan's rules with applications.

Numerical problems **5 hrs**

Covalent bond: Valence bond theory, The Lewis theory, The octet rule, Exceptions to the octet rule, Sidgwick- Powell theory. Valence shell electron pair repulsion (VSEPR) theory, Effect of lone pairs, electronegativity, isoelectronic principle, Examples using VSEPR theory: BF_3 and BF_4^-, NH_3 and NH_4^+, H_2O, PCl_5, CIF_3, SF_4, I_3^- and I_3^+, SF_6, and IF_7.

Limitations of VSEPR. **4 hrs**

Unit - II

Structure and Bonding -II

Concept of resonance, resonance energy, hybridisation, types of hybridization, sp, sp^2, sp^3 dsp^2 dsp^3, d^2sp^3, sp^3d^2 with one example each, and energetics of hybridization. Bent's rule, Limitations of Valence Bond Theory. **3 hrs**

Molecular Orbital theory:

LCAO concept: s-s, s-p, p-p, p-d and d-d combinations of orbitals, bonding, nonbonding and antibonding molecular orbitals, non-bonding combinations of orbitals, Rules for linear combination of atomic orbitals

Examples of molecular orbital treatment for homonuclear diatomic molecules, H_2 molecule, H^+ He_2 molecule, He^{+2} molecule ion, Li_2 molecule, Be_2 molecule, B_2 molecule, C_2 molecule, N_2 molecule, N_2^+, O_2 molecule, O^- and O_2^{2-} M.O. energy diagrams of heteronuclear diatomic molecules with examples (NO, NO^+, CO and HCl). Calculation of bond order, relationship between bond order, bond energy and bond length, magnetic properties based on MOT. **7 hrs**

Metallic Bonding:

General properties of metals: Conductivity, Lustre, Malleability and cohesive force Crystal structures of metals and Bond lengths

Theories of bonding in metals:

Free electron theory, Valence bond theory, Molecular orbital or band theory of solids Prediction of conducting properties of conductors. insulators and semiconductors, extrinsic and intrinsic semiconductors using M.O. theory. **4 hrs**

UNIT III

First Law of Thermodynamics

Thermodynamic Processes, Reversible and Irreversible Processes, Nature of Heat and Work,Internal Energy, First Law of Thermodynamics, Enthalpy of a System,Work done in isothermal and adiabatic expansion of an ideal gas, Numerical problems, Joule -Thomson Expansion, Relation between Joule-Thomson coefficient and other thermodynamic parameters.

Second law of Thermodynamics

Concept of entropy, thermodynamic scale of temperature, Statements of the Second Law of Thermodynamics, molecular and statistical interpretation of entropy, Calculation of entropy change for reversible and irreversible processes, Free Energy Functions: Gibbs and Helmholtz energy, Variation of S, G, A with T, V and P, Numerical problems, Free energy change and spontaneity, Gibbs-Helmholtz equation.

Third Law of Thermodynamics

Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules. **9 Hrs**

Surface Chemistry

Adsorption: Types of adsorption isotherms. Freundlich adsorption isotherm (only equation), its limitations. Langmuir adsorption isotherm (derivation to be done) and BET equation (derivation not included).

Catalysis: Types of Catalysis and theories with examples (intermediate compound theory and adsorption theory), Theory of acid base catalysis, Michaelis-Menten mechanism. Heterogeneous catalysis: surface reactions, unimolecular, bimolecular surface reactions. Autocatalysis with examples. Applications: Design process to removal of toxic compounds from industrial wastewater and treatment of portable water requirements. **5 Hrs**

UNIT IV

Chemical Kinetics

Differential and integrated form of rate expressions up to second order reactions, Derivation of expression of rate constant of second order reaction (a=b and a ≠ b), Problems on rate constant (a=b), Methods of determination of order of a reaction, temperature dependence of reaction rates; Arrhenius equation, activation energy, Numerical problems on Arrhenius equation in calculating energy of activation and rate constants. Collision theory of reaction rates, Lindemann's mechanism, qualitative treatment of the theory of absolute reaction rates. Experimental determination of kinetics of (i) inversion of cane sugar by polarimetric method (ii) spectrophotometric method for the reaction between potassium persulphate and potassium iodide. **7 Hrs**

Electrochemistry – I

Arrhenius theory of electrolytic dissociation. Merits and Demerits, Conductance, Specific conductance, equivalent and molar conductivity and their variation with dilution. Molar conductivity at infinite dilution. Numerical problems.

Kohlrausch's law of independent migration of ions and its applications, Debye-Hückel-Onsager equation. Ionic mobilities and their determinations, transference numbers and their relation to ionic mobility's, determination of transference numbers using Hittorf and Moving Boundary methods.

Applications of conductance measurement: (i) degree of dissociation of weak electrolytes (ii) ionic product of water (iii) solubility and solubility product of sparingly soluble salts (iv) conductometric titrations (acid base titrations only) and (v) Hydrolysis constants of salts. Numerical problems. **7 Hrs**

Reference Books

1. Physical Chemistry, Peter Atkins & Julio De Paula, 9th Edition, Oxford University Press, (2010)
2. Physical Chemistry, G. W Castellan, 4th Edition, Narosa publishers, (2004)
3. Physical Chemistry, R. G Mortimer, 3rd Edition, Elsevier: Noida, UP (2009)
4. Principal of Physical Chemistry, B. R Puri, L. R Sharma and M. S Pathania, Vishal Publishing Co. (2008)
5. Essentials of Physical chemistry, B. S Bahl, G. D Tuli and Arun Bahl, S Chand & Company Ltd. (1994)
6. A textbook of Physical Chemistry, A. S Negi and S. C Anand, New Age International Publishers, (2022)
7. Advanced Physical chemistry, B. N Bajpai, S Chand and Company Ltd, (2012)
8. Chemistry for Degree Students, R. L Madan, Semester I, II, III and IV, S. Chand and Company Ltd.
9. Textbook of Physical Chemistry, P. L Soni, O. P Dharmarha and U N Dash, Sultan Chand and Sons (2021)

PRACTICALS

Credit Points: 2 **Teaching Hours:4Hrs**

Evaluation: Continuous Internal Assessment-20 marks

Semester End Examination: 30 marks

Course objective:

To attain practical knowledge about:

1) Analytical skills in detecting the constituents present in unknown samples bysystematically carrying out thequalitative analysis.
2) The methods of determining rates of chemical reactions.
3) Designing electrochemical cells and making measurements related to it.
4) Determination of physical characteristics of electrolytes using conductivitymeasurements in solution.
5) Adsorption phenomenon, mechanism and basic models to explain adsorption.
6) Simple techniques like conductometry to obtain physicochemical parameters ofelectrolytes.

Course outcomes: At the end of the course student would be able to

1) Understand the chemical reactions involved in the detection of cations and anions.
2) Explain basic principles involved in classification of ions into groups in semi-micro qualitative analysis of salt mixture
3) Carryout the separation of cations into groups and understand the concept of commonion effect.
4) Understand the choice of group reagents used in the analysis.
5) Analyse a simple inorganic salt mixture containing two anions and cations
6) Use instruments like a conductivity meter to obtain various physicochemical parameters.
7) Apply the theory about chemical kinetics and determine the velocity constants ofvarious reactions.
8) Learn about the reaction mechanisms.
9) Interpret the behavior of interfaces, the phenomena of physisorption andchemisorption and their applications in chemical and industrial processes.
10) Learn to fit experimental data with theoretical models and interpret the data

Part A- Inorganic Chemistry Practicals

Qualitative semi-micro analysis of mixtures containing 2 anions and 2 cations.Emphasis should be given to the understanding of different reactions.

The following cations and anions are suggested.

Cations: $NH4^{+}$, Pb^{2+}, Bi^{3+}, Cu^{2+}, Al^{3+}, Fe^{3+}, Co^{2+}, Cr^{3+}, Ni^{2+}, Zn^{2+}, Mn^{2+}, Ba^{2+}, Ca^{2+}, Sr^{2+}, Mg^{2+}, Na^{+}, K^{+} and Li^{+}.

Anions: CO_3^{2-}, CH_3COO^{-}, Cl^{-}, Br^{-}, I^{-}, NO_3^{-}, BO_3^{3-}, SO_4^{2-}, $C_2O_4^{2-}$ and PO_4^{3-}

Spot tests and flame tests to be carried out wherever possible.

Part B- Physical Chemistry Practicals

1. Determination of the enthalpy of neutralization of a strong acid with strong base.
2. The study of kinetics of potassium persulphate and potassium iodide volumetrically.

3. Determination of velocity constant for acid catalyzed hydrolysis of methyl acetate.
4. Determination of equivalent conductivity of strong electrolyte and verification ofDHO equation.
5. Determination of dissociation constant of weak acid by conductivity method.
6. Conductometric titration of strong acid and strong base.
7. Conductometric titration of weak acid and strong base.
8. Determination of solubility product of sparingly soluble salt conductometrically.

References

1. Vogel's Qualitative analysis, Revised by G. Svehla, Pearson education, (2002)
2. Advanced Physical Chemistry, J. B Yadav, Krishna Prakashan Media (P) Ltd,Meerut (2014)
3. Senior Practical Physical Chemistry, B. D Khosla, V. C Garg, & A. R Gulati, Chand & Co. New Delhi (2011)
4. Experiments in Physical Chemistry,C. W Garland, J. W Nibler & D. P Shoemaker, 8th Edition McGraw-Hill: New York (2003)
5. Experimental Physical Chemistry, A. M Halpern & G. C McBane, W.H Freeman & Co, New York (2003)

Semester 4

B Sc / B Sc (Honors)

Title of the Course: Open Elective: Applications of Chemistry in Industries

Number of Theory Credits	Number of lecture hours/semester
3	42

Evaluation Scheme for Theory:

Continuous Internal Assessment (CIA): 40 MarksSemester End Examination (SEE): 60 marks

This course provides a broad introduction to the fundamental principles of Electrochemistry, Corrosion and Metallurgy. The student will gain an understanding of basic and practical applications in various fields of Electrochemistry, Corrosion and Metals and Alloy behaviour andmanufacturing processes. This course is a valuable prerequisite for taking more technically challenging courses that will be required for career development.

Course Objectives

This course will deal with

1) Types of conductance, concept of electrolytes, electrolysis, redox reactions and EMF
2) Concept of different types of electrochemical cells, Types of electrodes and electrode potential. Application of electrochemical series.
3) Basic principles and applications of conductometric, potentiometric and pH titrations.
4) Different types of Batteries their principle construction and working - lead-acid storage

and lithium ion battery. Study of Fuels cells.

5) Concept of corrosion, types of corrosion and its prevention by different methods.Introduction to electroplating.
6) Introduction to ores and minerals, extraction of metals from their ores, and purification. Eg., Manganese, Titanium and Uranium.
7) Study of alloys, classification, production and uses of alloys.

Expected Course Outcomes

Upon completion of the course students will be able to

1) Understand the concept of conductance in electrolytic solutions, electrolysis and redox reactions involved in electrode reactions.

2) Learn the different types of electrochemical cells, their symbolical representation and application of electrochemical series.
3) Apply conductometric, potentiometric and pH titrations
4) Know the principle, construction and working of batteries
5) Understand different types of corrosion and its prevention by different methods
6) Learn the methods of extraction of metals from their ores and purification

UNIT I

Electrochemical Energy Sources

Batteries:Definition of a Cell and a Battery, Examples to each, Daniel cell, dry Cells - electrolytic and Galvanic cell, Representation of a cell. Standard electrode potential, Nernst equation (No derivation) and its application to chemical cell,

Oxidation -reduction reactions, electrode potential, EMF of an electrochemical cell, Electrochemical series and its importance.

Primary and Secondary batteries, Battery components and their role. Working of thefollowing Batteries- Lead acid, Lithium Storage, Batteries, Fuel cells. **12 hrs**

Types of Electrodes- Hydrogen, Calomel and Glass electrodes. Determination of pH using glass electrode. **2 hrs**

UNIT II

Corrosion: Introduction, definition, damages of corrosion, reasons for corrosion to occur, Types of Corrosion, Corrosion rate, Factors affecting corrosion rate, Metallic factor-purity, electrode potential of metal, hydrogen over voltage,nature of corrosion product. Environmental Factors-Temperature, pH of the medium, humidity, presence of impurities, electrical conductivity of the medium, velocity of the medium, concentration of the medium.

5hrs

Prevention of Corrosion: Material selection - Metals and alloys, metal purification, non-metallic, Alteration of environment - Changing media, inhibitors, Design-wall thickness, design rules, Coating-Metallic and other inorganic coatings, organic coating. **5 hrs**

Electroplating: Introduction, Electroplating of chromium (hard and decorative). Electro less

plating: Introduction, distinction between electroplating and electroless plating processes. Electroless plating of copper. **4 hrs**

UNIT III

Metallurgy

Introduction: Ore, minerals, important ores of some common elements in India, General Principles of pyrometallurgy, roasting, Calcination, Gangue, Smelting, Flux, Gravity separation, Froth flotation process, leaching. Techniques employed for Purification of metal (Distillation process, Bessemerization, Electro-refining, Van Arkel and De Boer's Filament. **6 hrs**

Extraction of metals: Extraction of Manganese (Pyrolusite), Titanium (Ilmanite) and Uranium. **4 hrs**

Alloys: Introduction, Classification of alloys, commercially important alloys, gold karats, Production of Ferro alloys; Ferrochrome, Ferro Manganese, Uses of alloys. **4 hrs**

Reference Books

1) Physical Chemistry, Barrow. G.M, Tata McGraw-Hill, (2007)
2) An introduction to Electrochemistry, Samuel Glasstone, East-West edition New Delhi, (1942)
3) Text book of Physical chemistry, Samuel Glasstone, 2nd Edition, Mac Millan India Ltd, (1991)
4) Principles and applications of Electrochemistry, D. R. Crow, 3rd edition, Chapmanhall London, (1988)
5) Fundamentals of Electrochemical deposition, Milan Paunovic and Mordechay Schlesinger, Wiley Interscience Publications, New York, (1998)
6) Engineering Chemistry, V R Kulkarni and K Ramakrishna Reddy, New Age International, (2015)
7) Electrochemistry and Corrosion Science, Nestor Perez, Springer (India) Pvt. Ltd, (2004)
8) Principles and Prevention of Corrosion, D. A. Jones, Macmillan Publ. Co, (1996)
9) Essential of Materials Science and Engineering, Donald R. Askeland, Thomson Learning, 5th Edition, (2006)
10) Introduction to Engineering Materials, B. K. Agarwal, Tata McGraw Hill, 1st Edition (1988)
11) Material Science and Engineering, V. Raghavan, PHI Learning, 5th Edition (2009)
12) Engineering Materials and Metallurgy, R. K. Rajput, S. Chand - 1st Edition, (2011)

BANGALORE UNIVERSITY

B. Sc., Chemistry Syllabus

I to VI Semesters
(w. e. f. 2014)

Department of Chemistry
Central College Campus
Bangalore - 560 001

FOREWORD

As per the directive from the Bangalore University, the Chemistry syllabus for the B. Sc., degree course (CBCS) had to be prepared. Guidelines for this were provided by the University.

In the Department of Studies in Chemistry, Central College, with the help of the Chemistry Teachers' Forum, a Core Group involving the Teachers of the University Department and affiliated colleges was constituted. This Core Group participated in work-shops held on 22.04.2014, 30.04.2014 and 19.05.2014, keeping in view the aims of the UGC Model Curriculum in developing interdisciplinary skills in students linking general studies with professional courses and allowing both vertical and horizontal mobility and also catering to local needs the syllabus was prepared.

Teachers of different branches of Chemistry, namely Inorganic, Organic, Physical and Biochemistry had separate and joint brainstorming sessions and arrived at a Draft Syllabus in Chemistry for SIX semesters. The Chemistry Teachers' Forum played a pivotal role during the drafting of the syllabus. The Draft Syllabus in chemistry was brought to the attention of a wider group of Teachers for further refinement on 23th May 2014. The final draft incorporating the suggestions was placed before the Department Council on 02. 6. 2014 and then the Board of Studies in Chemistry (UG) on 07. 6. 2014 for approval.

CHAIRMAN
Department of Studies in Chemistry
Central College Campus
Bangalore University
Bangalore-560 001

Members of the Committee for the Preparation of the Chemistry Syllabus for the B. Sc., Degree Course (Semester Scheme)

Chemistry Teachers' Forum: Bangalore University, Bangalore

Physical Chemistry Section

Dr. Girija C R	SSMRV College, Bangalore
Mr. Sripathi	Vivekananada College, Bangalore
Dr. Vasundara D E	BMS College, Bangalore
Ms. Malathi M	Rural College , Kanakapura
Mr. S. Uday Kumar	Rural College, Kanakapura

Inorganic Chemistry Section

Mr. H B Mallesh	GFGC, Channapatna
Mr. Vijaya Babu B.	GFGC, Vijayanagar
Mr. Ramanna	Kongadiappa College, Doddaballapura
Dr. Muddu Krishna K R.	Govt. First Grade College, Varthur, Bangalore
Ms. Hamsini S	GFGC Chickaballapur.
Ms. Vanitha G K	GFGC, Doddaballapur
Mr. G R Rangappa	GFGC, Kolar
C Sanjeevarayappa	GFGC, Yelahanka

Organic Chemistry Section

Dr. Shylaja S	GFGC, K R Puram, Bangalore
Dr. Rekha S	VVS First Grade College, Bangalore
Dr. Shashikala Devi K	Maharani Science College, Bangalore
Dr. Prathima Rao	Vivekananda College, Bangalore
Ms. Shamsiya Rizwana	M E S College, Bangalore
Mr. Sridhar B T	Maharani Science College, Bangalore

Biochemistry Section

Dr. Nanda N	BMS College for Women, Bangalore
Ms. Radhika R	GFGC, Channapatna
Ms. Kathyayini	National College, Gowribidanur.

Proceedings of the Meeting of Board of Studies in Chemistry (UG) held on 7th June 2014 at 10.30 am in the Department of Chemistry, Central College Campus, Bangalore-560 001.

The Chairman welcomed the members of the Board to the meeting and placed the agenda before them for discussion.

Agenda: 1. *Scrutiny and approval of the Syllabus for the B. Sc., Degree, Chemistry Course (Semester Scheme)*.

2. *Preparation of the BOE (UG) and Professional Courses for the Academic Year 2014-15.*

The Chairman informed the members that, as per the directive from the Bangalore University, the Chemistry syllabus for the B. Sc., degree has been prepared with the help of the Chemistry Teachers' Forum which constituted a Core Group form affiliated Colleges, is proposed to be introduced from 2014 onwards. In this connection, the Core Group participated in workshops held on three days: 22. 04. 2014, 30. 04. 2014 and 19. 05. 2014 and prepared a Draft syllabus. The syllabus was then finalized in a workshop conducted on 23th May 2014 in the presence of a wider group of Teachers represented by most of the colleges offering Chemistry at UG level. The draft syllabus was then placed before the Department Council on 2. 6. 2014 for approval, the approved syllabus is now placed before the Board for Scrutiny and approval.

The Board of Studies (UG) approved the Syllabus after some modifications.

The Board also prepared the BOE (UG) Chemistry and BOE Professional Course (BE., Chemistry).

The meeting ended with the vote of thanks by the Chairman.

The following members were present.

1. Dr. Shaheen Taj
2. Sri. R. Vinay Kumar
3. Sri. S. Vijay Kumar
4. Sri. H. B. Mallesh
5. Sri. G. Siddalingaiah
6. Smt. M. Malathi
7. Dr. Venkatesha, B. M (External Member)
8. Dr. Nanjundaswamy, N (External Member)
9. Dr. M. A. Pasha Chairman, (BOS, UG)

SCHEME OF EXAMINATION

Title of the paper	Contact hours/Week	Exam. hours	IA	Marks	Total Marks	Credits
First Semester						
Chemistry-I	4	3	30	70	100	2
Chemistry Practical-I	3	3	15	35	50	1
Second Semester						
Chemistry-II	4	3	30	70	100	2
Chemistry Practical-II	3	3	15	35	50	1
Third Semester						
Chemistry-III	4	3	30	70	100	2
Chemistry Practical-III	3	3	15	35	50	1
Fourth Semester						
Chemistry-IV	4	3	30	70	100	2
Chemistry Practical-IV	3	3	15	35	50	1
Fifth Semester						
Chemistry-V	3	3	30	70	100	2
Chemistry- VI	3	3	30	70	100	2
Chemistry Practical-V	3	3	15	35	50	1
Chemistry Practical-VI	3	3	15	35	50	1
Sixth Semester						
Chemistry-VII	3	3	30	70	100	2
Chemistry VIII	3	3	30	70	100	2
Chemistry Practical-VII	3	3	15	35	50	1
Chemistry Practical-VIII	3	3	15	35	50	1

B. Sc., – I Semester
Paper- I

UNIT-I

Mathematical Concepts for Chemistry **4 hours**

Logarithmic relations: Definition, some important relations like log*(m+n)*, $\log\left(m/n\right)$, *log* m^n, change of base ($\log_e 2 \rightarrow \log_e x$). Application in the calculation of pH.

Curve sketching: How a cure is sketched with a set of points: linear and non-linear (asymptotic) with a set of points, sketching both linear and non-linear curves. Calculation of slope in the case of linear curve.Extrapolation of linear curve and arriving at a limiting value.

Parabolic curve- maximum and minimum. *Differentiation*: Meaning and derivative of functions like e^x, log *x, sin x, cos x,* $1/x$, x^2, $x^x$and $\sqrt{n}$, $\frac{dy}{dx} = 0$ at maximum and minimum.

2^{nd} *order differentiation*: for maximum and minimum (derivation from first principles not required). Rules of differentiation for $y = u + v$, $y = uv$, $y = \frac{u}{v}$ and $y = ku$, where *k* is constant.

Partial differentiation: Explanation, applications using the equation, H = U + PV and G = H − TS.

Integration: Meaning and integrals of functions like, *x, dx,*x^2, $1/x$, $1/x^2$, $1/x^3$, x^n, e^x, *sin x* and *cos x*. simple problems from I and II order kinetics.

Exact and inexact differentials: Examples from internal energy and enthalpy. *Definite integrals*.

Probability: some definitions, examples from atomic orbitals, wave functions and entropy.

Gaseous state **9 hours**

***Introduction*:** Need for Maxwell-Boltzmann distribution law, mathematical expression for both mole and molecule-explanation of the terms only. Explanation of velocity distribution curves based on this law (no derivation). Mean free path, collision frequency and collision number. Definition and expressions using SI units (no derivations). Derivation of expression for most probable speed from Maxwell-Boltzmann equation Definitions and expressions for rms velocity and average velocity, relationships between them. Problems.

Andrew's isotherm on carbon dioxide and explanation of the curves (no experimental details). Derivation of critical constants T_c, P_c and V_c from van der Waal's equation and their experimental determination by Cagniard de La Tour method for T_c and P_c. Amagat's mean density method for V_c. Problems on the calculation of T_c, P_c and V_c, *a* and *b*.

Law of corresponding states-statements, reduced equation of state and explanation, Joule-Thomson effect-explanation. Joule-Thomson co-efficient, inversion temperature-definition (no derivation).The application of Joule-Thomson effect to the liquefaction of air and hydrogen by Linde's process.

UNIT-II

Photochemistry **4 hours**

Laws of photochemistry. Grotthus-Draper law, Stark-Einstein law, differences between photophysical and photochemical processes with examples. Comparison of photochemical and thermal reactions. Quantum yield of photochemical combination of (i) H_2 and Cl_2 (ii) H_2 and Br_2 (iii) dissociation of HI (iv) dimerisation of anthracene. Photosensitization, photostationary

equilibrium. Singlet and triplet states. Fluorescence, phosphorescence, luminescence, bioluminescence and chemical sensors.

Beer-Lambert's law and its applications. Numerical problems on absorption coefficient and molar extinction coefficient.

Liquids and Solutions **9 hours**

Properties of liquids-Viscosity, Surface tension and Parachor-Definition, mathematical expression, numerical problems and factors affecting them.

Viscosity- Definition, mathematical expression, Coefficient of viscosity, effect of temperature, size, weight, shape of molecules and intermolecular forces on it.

Surface Tension-Definition, mathematical expression, effect of temperature and solute on it

Parachor-Definition, Sugen equation, calculation and applications. Numerical problems.

Liquid Mixture: Review of Raoult's law, ideal and non-ideal solutions.

Completely miscible liquids-Fractional distillation Tc curves for all the three types, azeotropic mixtures -examples.

Completely miscible liquids-Critical solution temperature (Three types), examples. Effect of addition of salt on CST of phenol-water system.

Immiscible liquids-Steam distillation and its applications.

Distribution law-Statement, partition coefficient and condition for validity of distribution of distribution law. Application-solvent extraction

Dilute solutions- Review of colligative properties and concentration terms

Determination of molecular mass of a solute by: (i) Berkeley-Hartley's method (π); (ii) Beckmann's method (ΔT_f) and (iii) Landsberger's method. Numerical problems.

UNIT-III

Periodic Table and Periodic properties **9 hours**

Review of the modern periodic table (with respect to classification of elements based on outer electronic configuration)

Periodic properties: Atomic and ionic radii, ionisation energy, electron affinity and electronegativity. Trends in the periodic properties. Applications in predicting and explaining chemical behaviour. Factors affecting the values of ionisation energy. Determination of electronegativity by Pauling's method. Diagonal relationship between beryllium and aluminium. Comparitive study of elements of alkali and alkalline earth metals, chalcogens and halogens with respect to electronic configuration, atomic and ionic radii, ionisation energy, and elecronegativity. Halides, oxides and carbonates of alkali and alkalline earth metals. Hydrides of chalcogens and halogens.

Analytical Chemistry **4 hours**

Errors: Classification, minimization of determinate errors, accuracy and precision. Significant figures and their computations.

Equivalent weights of acids, bases, salts, oxidising and reducing agents. Methods of expressing concentration of solutions in terms of Normality and Molarity. Numerical problems.

UNIT-IV

Basic concepts in organic chemistry **4 hours**

Bond cleavage – homolytic and heterolytic. Types of reagents – electrophilic and nucleophilic reagents. Reactive intermediates - generation and relative stabilities of carbocation, carbanion, carbon free radicals and carbenes – explanation for stability and reactivity based on inductive, resonance and hyperconjugation effects.

Types of reactions - addition, substitution and elimination. Concept of isomerism - structural isomerism, stereo isomerism - geometrical and optical isomerism, chiral center – definition and examples. Tautomerism (keto – enol).

Aliphatic Hydrocarbons **9 hours**

Alkanes: Sources, Nomenclature of branched chain alkanes, preparation of symmetrical and unsymmetrical alkanes- Corey- House reaction and Wurtz reaction - their merits and demerits.

Conformational analysis of n-butane - Sawhorse and Newman projection formulae to be used - Energy profile diagram.

Cycloalkanes: Nomenclature. Method of formation. Explanation for stability based on heat of hydrogenation data, Baeyer's strain theory and its limitation, Sachse - Mohr theory of strain-less rings; cyclopropane ring - banana bonds.

Alkenes: Preparation of alkenes by Wittig reaction-stereoselectivity. Addition of HX to unsymmetrical alkene - Markownikov's rule and Antimarkownikov's rule with mechanism. Reactions: Hydroboration- oxidation, reduction, oxymercuration - demercuration, epoxidation. Mechanism of oxidation with $KMnO_4$ and OsO_4.Ozonolysis- mechanism and importance.

Dienes: Classification- isolated, conjugated, cumulated. Structure of allene and butadiene.1,2 addition and 1,4 addition reactions. Diels Alder reaction-1,3-butadiene with maleic anhydride.

Alkynes: Methods of preparation - Dehydrohalogenation of vicinal and geminal dihalides; and higher alkynes from terminal alkynes. Reactions - metal ammonia reduction – significance. Oxidation with $KMnO_4$, acidic nature of terminal alkynes.

B. Sc., – II Semester
Paper- II

UNIT-I

Quantum Mechanics and Atomic Structure **13 hours**

Review of Bohr's atomic model:
Derivation of expressions of for radius, energy and ionisation energies of hydrogen like atoms. Numerical Problems.
Limitations of classical mechanics. Wave particle duality, Uncertainty principle.
New quantum mechanics-Sinusoidal wave (Explain sinusoidal wave.) equation (classical wave mechanics); Schrodinger wave equation- derivation. Postulates of quantum mechanics.
Significance of terms- (i) Hamiltonian operator; (ii) eigen function Ψ (significance of ψ and ψ^2); (iii) eigen values.
Application of Schrodinger equation: (i) to particle in one dimensional box (derivation required); (ii) to the hydrogen atom (detailed solution not required)
Expressing the solution as a product of $\psi_{n,\,l.\,m}\,(r, \theta, \phi) = \psi_{n,\,l.\,(r)}\psi_{\,l.\,m(\theta,\,\phi)}$
Explanation of quantum numbers (only qualitative). Radial probability distribution and angular probability distribution. Orbitals

UNIT-II

Chemical bonding **13hours**

Ionic bond: Lattice energy, Born-Haber cycle, Born-Lande equation (derivation not required, problems on Born-Lande expression to be worked out). Calculation of lattice energies of NaCl and MgO,effect of lattice energy on solubility of ionic compounds.
Covalent bond: Valence bond approach: hybridization and directional characteristics of sp, sp^2, sp^3, sp^2d, sp^3d^2. Shapes of $BeCl_2$, BF_3, $SiCl_4$, PCl_5, SF_6.VSEPR theory: shapes of CH_4, NH_3, NH_4^+, H_2O, BrF_3, ICl^{2-}.Molecular orbital theory: H_2, He^{2+}, Be_2, N_2, O_2, O^{2-}, O_2^{2-}, O^{2+} and CO (bond order, stability and magnetic properties to be discussed). Polarization concept, Fazan's rule, bond length, bond angle and bond energy, polar and non-polar molecules, dipole moment.
Weak interactions: i). Hydrogen bond: Intra molecular and Intermolecular types, anomalous properties of HF, H_2O, NH_3, alcohols, carboxylic acids, nitro phenols and bio molecules.
ii) van der Waal's forces: Noble gases and molecular crystals (dry ice, Iodine and solid SO_2)
Metallic bond: Band theory, electrical properties of metals, semiconductors and insulators.

UNIT-III

Silicates **2hours**

Structure of SiO_4^{4-}, Classification of silicates based on the structure. Zeolites: their structure and applications.

Noble gases **3hours**

Introduction, isolation of Helium from Natural gas, applications of Noble gases. Preparation properties and structures of fluorides and oxides of Xenon (XeF_2, XeF_4, XeF_6, XeO_3, XeO_4).

General study of d and f block elements. **8hours**

Transition elements: electronic configuration, atomic and ionic radii, ionisation energy, oxidation states, redox potentials, spectral and magnetic properties, catalytic activity, interstitial compound formation.

Lanthanides and Actinides: Electronic configuration, atomic and ionic sizes, lanthanide contraction and its consequences. Oxidation states, spectral and magnetic properties, comparison of oxidation states, complex formation and magnetic properties of d and f block elements. Ion exchange method for separation of Lanthanides.

UNIT-IV

Aromatic hydrocarbons **9 hours**

Nomenclature. Structure of benzene - using molecular orbital theory. Criteria for aromaticity-Huckel's rule (Examples: cyclopentadienyl anion, cycloheptatrieneylcation, benzene, naphthalene, anthracene and phenanthrene). Antiaromaticity.

General mechanism of aromatic electrophilic substitution. Mechanism of nitration of benzene including evidence for the formation of nitronium ion, energy profile diagram and isotopic effect. Orienting influence of substituents in toluene, chlorobenzene, nitrobenzene and phenol.

Aromatic nucleophilic substitution *via* benzyne intermediate, mechanism with evidences for the formation of benzyne by trapping with anthracene, Birch reduction.Side chain oxidation of toluene to benzaldehyde and benzoic acid. Oxidation of naphthalene, anthracene and phenanthrene. Diels-Alder reaction of anthracene with 1,2-dichloroethene.

Alkenyl benzenes: Styrene, *cis*- and *trans*-stilbenes and their preparations.
Biphenyl: Preparation-Ullmann reaction.

Organic halogen compounds **4 hours**

Alkyl halides: Nomenclature. Nucleophilic substitution reactions - S_N1 andS_N2 mechanisms with energy profile diagrams. Effect of (i) nature of alkyl groups,(ii) nature of leaving groups, (iii) nucleophiles and (iv) solvents on S_N1 and S_N2 mechanisms. Elimination reactions - E1 and E2 mechanisms; Hofmann and Saytzeff eliminations with mechanism.

Aryl halides: Preparation by halogenation. Relative reactivity of alkyl, allyl, vinyl, aryl and aralkyl halides towards nucleophilic substitution.

B. Sc., –III Semester
Paper III

UNIT-I

Chemical Kinetics **7 hours**

Review of terms –Rate, Order and Molecularity.

Derivation of expression for the rate constant of a second order reaction with $a = b$ and $a \neq b$. Expression for half-life of a second order reaction. Mean life for first order reaction to be mentioned. Problems on rate constant, half-life period, mean life period and order of reaction.

Determination of order of reaction: differential method, method of integration, method of half-life period and isolation method.

Theories of reaction rates: Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Problems.

Simple collisions theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects. Steady state approximation and Lindemann's hypothesis.

Experimental determination of kinetics of: (i) inversion of cane sugar by polarimetric method, (ii) spectrophotometric method for the reaction between potassium persulphate and potassium iodide.

Thermodynamics I **6 hours**

Exact and inexact differentials. Review of terms, I law of Thermodynamics.

Work done (derivation with problems) in isothermal and adiabatic expansion and compression of an ideal gas (IUPAC sign conventions to be used).

Heat capacity of a gas at constant pressure and constant volume: relation between P, V and T in an adiabatic process to be derived. Derivation of Kirchoff's equation. Numerical problems.

Spontaneous and non-spontaneous processes.

Second law of thermodynamics: Limitations of I law of thermodynamics with illustrations. Need for II law of thermodynamics, different ways of stating II law with respect to heat and spontaneity. Other forms of II law of thermodynamics. Concept of entropy and its physical significance-illustrations with order, disorder, physical and chemical processes and probability.

Heat engine-Carnot's cycle and derivation of the expression for its efficiency. Problems based on efficiency equation. II law in terms of efficiency (η). Change in entropy in reversible and irreversible processes (derivations required) . Calculation of entropy changes in reversible isothermal and reversible adiabatic processes. Phase transitions in terms of Entropy (Fusion, vaporization, sublimation and polymorphic changes) in terms of entropy. Limitations of the entropy concept of spontaneity. Problem on Phase transitions

UNIT-II

Thermodynamics II **4 hours**

Gibb's free energy: Work function, chemical potential. Definition and relationship between free energy and work function. Criteria for equilibrium and spontaneous processes. Gibb's-Helmholtz equation-Derivation. Change of free energy with respect to temperature and pressure. Mention of temperature coefficient, van't Hoff isotherm (derivations included), $\Delta G^\circ = -RT\, ln K_p$ Problems.

Derivation of van't Hoff reaction isochore and Clausius-Clapeyron equation. Its applications to ΔT_b and ΔT_f determination (thermodynamic derivation not required).

Qualitative treatment of Nernst heat theorem and III law of thermodynamics-statement only. Elementary concept of residual entropy.

Surface chemistry **4hours**

Review of surface phenomena.

Theories of adsorption . Adsorption isotherms and BET equation (derivation included), Adsorption indicators. Surface film on liquids.

Catalysis –Types and theories ((intermediate compound theory and adsorption theory).

Heterogeneous catalysis: surface reactions, unimolecular, bi-molecular surface reactions. pH dependence of rate constant of catalysed reactions. Autocatalysis.

Organic and Inorganic Polymers **3hours**

Differences between inorganic and organic polymers.

Polymerisation: types: addition and condensation polymerisation

Molecular weight of Polymers: Expression for Weight average and Number average (experimental determination is not required)

Preparation and applications of the following types of polymers

1. Plastics: i)thermosetting plastics(Phenol-formaldehyde)
   ii) thermo softening plastics(PVC)
2. Fibers: Acrylic, polyamide, polyester types: one example for each
3. Rubber: Neoprene,
4. Fluoro Carbons: Teflon
5. Silicones.

Compounds of some Nonmetals. **2hours**

i) Boron and its compounds: Synthesis, structure and applications of Diborane, Borazole and Boron trifluride.

ii) Halogens and its Compounds: Bleaching powder: manufacture and its applications.

UNIT-III

Metallurgy **5 hours**

Ellingham's diagrams: Salient features. Selection of reducing agents using Ellingham's diagrams.Extraction of the following metals.

i) Nickel from sulphide ore
ii) Thorium from Monazite sand
iii) Uranium from Pitch blende
iv) Plutonium from Nuclear waste.

Alcohols and Thiols **8 hours**

Alcohols: Introduction and classification. Methods of preparation - (i) From carbonyl compounds - reduction of aldehydes and ketones (by Meerwein-Pondorff-Verley reaction);
(ii) from acids and esters (by reduction with $LiAlH_4$); (iii) From alkenes (by hydroboration-oxidation with alkaline peroxide); (iv) hydration of alkenes. Reactions of alcohols: Acidic nature, esterification, oxidation of alcohols with $KMnO_4$. Comparison of the reactivity of 1°, 2° and 3° alcohols- Lucas test, oxidation with $K_2Cr_2O_7$.

Glycols: Preparation from alkenes using OsO_4, $KMnO_4$ and from epoxides. Oxidation of glycols by periodic acid and lead tetraacetate with mechanisms. Pinacol-pinacolone rearrangement.

Glycerol: Preparation from propene and from oils/fats. Uses. Reactions of glycerol: (i) nitration, (ii) action of concentrated H_2SO_4 and (iii) oxidation by periodic acid.

Thiols: Nomenclature. Methods of formation and chemical reactions (with sodium, NaOH, metal oxides, formation of thioesters and oxidation with mild and strong oxidizing agents).
Uses of dithianes. Introduction of umpolung character (reversal of polarity) in carbonyl compounds.

UNIT-IV

Phenols **3 hours**

Classification. Acidic nature - Comparison of acidic strength of phenol with alcohols and monocarboxylic acids. Effect of electron withdrawing $-NO_2$ group and electron donating $-CH_3$ group on acidity of phenols at *o-*,*m-*,*p-* positions. Pechmann reaction, Mechanisms of Reimer-Tiemann and Kolbe-Schmidt reactions.
Industrial applications of phenols: Conversion of phenol to (i) aspirin, (ii) methyl salicylate, (iii) salol, (iv) salicyl salicylic acid.

Ethers and Epoxides **4 hours**

Ethers: Methods of preparation – (i) dehydration of alcohols, (ii) Williamson's ether synthesis. Reactions – Ethers as Lewis bases (complexation with metal ions), cleavage and auto-oxidation. Ziesel's method.

Epoxides: Preparation using per acids, Darzen's reaction. Reactions of mono and 1,2-disubstituted epoxides with (i) carbon nucleophiles, (ii) nitrogen nucleophiles, (iii) reduction with $LiAlH_4$.

Fertilizers **4hours**

Introduction(need of fertilizers), functions of essential plant nutrients(N,P,K),
Classification of fertilizers with examples. Nitrogeneous, Phosphatic and mixed fertilizers with suitable examples. Manufacture of urea and Super phosphate of lime, and their uses.
Fertilizer industries in India.

Organometallic compounds **2 hours**

Preparation and synthetic applications of Grignard reagents, Organolithium compounds and lithium dialkylcuprates.

B.Sc., IV -Semester
Paper –IV

UNIT-I

Phase Equilibria 7 hours

Statement and explanation of the terms with examples for phase (P), component (C) and degree of freedom (F), Definition and significance of phase rule. Derivation of phase rule. Application of phase rule to one component systems-water and sulphur, -modified form of phase rule to two component systems. Water–potassium iodide and lead-silver systems. Eutectic mixtures and their applications (examples: freezing mixtures, desilverisation of lead by Patterson's method).

Solid state 6 hours

Crystalline state, Laws of crystallography. Symmetry elements in crystals, crystal systems.Weiss and Miller indices. X-ray diffraction of crystals-derivation of Bragg's equation, . Problems
Liquid crycstals-Types with examples. Applications
Superconducting solids-High temperature superconductors. Applications.

UNIT-II

Water Technology 3hours

Types of impurities present in water. Causes for the hardness of water. Permissible levels of ions present in water. Treatment of water for domestic and Industrial purposes by the following methods.
i) Demineralisation of water by Ion exchange method.
ii) by reverse Osmosis method.

Nuclear and Radiochemistry. 8hours

Nucleus: Structure and stability, binding energy calculations. Instability of the nuclei, radioactive decay law, half life: numerical problems. Radioactive equilibrium, radioactive series. Artificial radioactivity: Nuclear reactions induced by γ-radiation,α,n,p,and d particles. Nuclear fission and fusion. Nuclear reactors, Breeder reactors, atomic energy programme in India. Isotopes- use of radio isotopes in tracer technique, agriculture, medicine, food preservation and Carbon dating-Numerical problems.

Powder metallurgy 2hours

Advantages of powder metallurgy and its applications. Methods of production of metal powders. production of Tungsten powder from Wulframite.

UNIT-III

Steel 5hours

Iron-Carbon Phase diagram, Austenite, Ferrite, Cementite and Pearlite phases.
Alloy steels: Influence of Si, Mn, Cr, Ni, Ti and W on the properties of Steel.
Ferro alloys: Production of ferro chrome, ferro manganese, and ferro silicon and their applications.
Carbon steel: classification. Heat treatment: hardening, case hardening, carbiding, nitriding, tempering and annealing.

Aldehydes and Ketones 8hours

Nomenclature. Preparation of aldehydes: from acid chlorides (Rosenmund reaction), Gattermann-Koch aldehyde synthesis. Preparation of Ketones: From nitriles, from carboxylic acids with alkyl lithium, from acid chlorides with metal alkyls.
Mechanisms of: Aldol condensation, Perkin condensation, Knoevenagel condensation, Benzoin condensation and Acetal formation. General mechanism of condensation with ammonia and its derivatives (NH_2-R; R = $-NH_2$, $-OH$, $-NH-CO-NH_2$).
Reduction: Reduction by $LiAlH_4$ and $NaBH_4$. Mannich reaction. Mechanisms of Clemmensen and Wolff-Kishner reductions.

UNIT-IV

Carboxylic acids and their derivatives. 5 hours

Nomenclature. Preparation: Acid hydrolysis of nitriles with mechanism.

Acidic strength (pK_a values) - Effect of substituents on the strength of aliphatic and aromatic carboxylic acids. (comparison of acidic strength of formic and acetic acids; acetic acid and monochloro, dichloro, trichloro acetic acids ; benzoic and p-nitrobenzoic acid; benzoic acid and p-aminobenzoic acid)

Reactions: Formation of esters, acid chlorides, amides and anhydrides. Hell-Vollhardt-Zelinski reaction, Decarboxylation and reduction (using $LiAlH_4$). (already included under preparation of alcohols from acid)

Di and tri carboxylic acids: Action of heat on dicarboxylic acids (Oxalic to Adipic acids)

Reactions of tartaric acid and citric acid. (action of heat, reduction with HI).

Reactions of acid chlorides (hydrolysis, reaction with alcohol, ammonia and lithium dialkylcuprates) .Acid anhydrides (hydrolysis, reaction with alcohol, ammonia).Esters (alkaline hydrolysis, ammonolysis and alcoholysis).Amides (hydrolysis, reduction, Hoffmann rearrangement). Mechanism of ester hydrolysis - acid and base catalysed (acyl O-cleavage: $B_{AC}2$, $A_{AC}2$; alkyl O-cleavage: $A_{AL}1$ mechanisms).

Tautomerism and Enolates 4 hours

Tautomerism in carbonyl compounds – Keto-Enol tautomerism. Acidity of α-hydrogen atoms in aldehydes, ketones and active methylene compounds (example diethyl malonate, ethyl acetoacetate and acetyl acetone). Preparation of (from acetic acid) and synthetic applications of diethyl malonate (preparation of monocarboxylic acids - butanoic acid, dicarboxylic acid - Adipic acid, unsaturated acids - cinnamic acid, ketones - butanone, cyclic compounds - barbituric acid)

Preparation of ethyl acetoacetate (from ethyl acetate). Synthetic applications of ethyl acetoacetate (preparation of monocarboxylic acids - butanoic acid, dicarboxylic acid –succinic acid, unsaturated acids - crotonic acid, ketones - butanone).

Environmental Chemistry 4hours

Depletion of ozone in the stratosphere. causes and remedial measures. The green-house effect and its consequences. Acid rain, photochemical smog. Treatment of sewage and industrial effluents. Disposal of radioactive wastes.

B.Sc., - V Semester
Paper V

UNIT-I

Stereochemistry **8hours**

Elements of symmetry in chiral and achiral molecules, chirality, stereogenic centre. Fischer projection formulae.

Enantiomers: Optical activity; use of +/–, *d/l* and D/L notations. Properties of enantiomers, chiral and achiral molecules with two stereogenic centers. Meso compounds. Cahn-Ingold-Prelog sequence rules: R, S system of nomenclature.

Diastereomers: Threo and Erythro isomers.

Racemisation and resolution. Relative and absolute configuration.

Optical isomerism due to restricted rotation about single bonds- diphenyl systems.

Geometric isomerism: Determination of configuration of geometric isomers. Cis & trans, E, Z system of nomenclature. Geometric isomerism in oximes.

Alicyclic compounds: Conformations of four to eight membered cycloalkanes and disubstituted cyclohexanes.

Bicylic systems: Nomenclature and conformations of decalins and norbornane.

UNIT-II

Amines **5hours**

Classification. Preparation of alkyl and aryl amines-reductive amination of carbonyl compounds, Gabriel phthalimde synthesis. Basicity of amines in aqueous solution: Inductive, resonance, steric and solvation effects on the basicity of amines. Reaction of amines as nucleophiles – Methylation, quarternary salts, Hoffmann elimination with mechanism. Distinguishing reactions of 1°, 2° and 3° amines.

Diazotization and synthetic applications of diazonium salts.Sandmeyer's reaction. (conversion to chlorobenzene, bromobenzene and benzonitrile), hydrolysis, reduction (to phenyl hydrazine and aniline), coupling reactions to give azo dyes (*p*-hydroxyazobenzene and 1-phenylazo-2-naphthol).

Heterocyclic compounds **4hours**

Introduction, classification, structures, resonance and aromatic character of furan, pyrrole, thiophene and pyridine. Methods of preparation and reactions of pyrrole, furan, thiophene, pyridine. Mechanism of electrophilic substitution reactions. Comparison of basicity of pyrrole, pyridine and piperidine. Preparation and reactions of indole, quinoline and isoquinoline.

UNIT-III

Chemistry of Natural Products **10hours**

Carbohydrates: Introduction and classification.

Monosaccharides: Aldoses, structures of all the D-aldohexoses. Elucidation of open chain structure of D-glucose.Mechanism of mutarotation and anomeric effect.Elucidation of ring structure of D-glucose in detail.

Ketoses: Fructose, interconversion of glucose and fructose.

Disaccharides: Glycosidic bond. Structures of maltose, lactose and sucrose-Haworth and conformational structures.

Terpenes and terpenoids: Occurrence, classification and isoprene rule. Elucidation of structure and synthesis of citral and zingiberene.Structures of limonene, menthol, α-terpineol, camphor, β-carotene, Vitamins-A and their uses.

Alkaloids: Introduction, classification and general characteristics. Structural elucidation and synthesis of nicotine.Structures and uses of ephedrine, caffeine, cocaine, atropine, quinine and morphine.

UNIT-IV

Spectroscopy of Organic compounds **8 hours**

UV-Visible spectroscopy: Introduction. Chromophores and auxochormes; blue shift and red shift. Graphical representation of spectra of 1,3-butadiene, benzene and lycopene. Influence of conjugation on UV absorption-Comparison of UV spectra of acetone and methyl vinyl ketone.

IR spectroscopy: Introduction. Stretching frequencies of −OH (free and H-bonded), alkyl −C−H, C≡C, C=C, C−C, C=O and C−O groups (by taking suitable examples). Graphical representation of IR spectra of benzoic acid and methyl benzoate.

NMR spectroscopy: Basic principles of proton magnetic resonance: Nuclear magnetic spin quantum number I, influence of the magnetic field on the spin of nuclei, spin population, saturation using radio frequency. Nuclear magnetic resonance.chemical shift (δ values), uses of TMS as reference. Nuclear shielding and deshielding effects.Equivalent and non-equivalent protons.Effect of electronegativity of adjacent atoms on chemical shift values.Spin-spin splitting and spin-spin coupling (qualitative treatment only).

Applications of NMR spectroscopy including identification of simple organic molecules. E*xamples*: Shielding and deshielding effects for (i) methane (ii) CH_3−Cl (iii) CH_2Cl_2 (iv) $CHCl_3$. Spin-spin coupling in (i) Cl_2CHCHO (ii) 1,1,2-trichloroethane (iii) CH_3CH_2Cl.

Industrial Organic chemistry **5 hours**

Synthetic dyes: Introduction and classification. Colour and constitution. Synthesis of congo red, malachite green, alizarin and indigo.

Drugs: Chemotherapy, classification of drugs. Synthesis and uses of paracetamol, diclofenac, ranitidine, sulphanilamide and chloramphenicol.

Introduction to Green Chemistry: Principles of Green chemistry and its application to the synthesis of paracetamol.

B. Sc., - V Semester
Paper VI

UNIT-I

Electrochemistry I **10 hours**

Review of electrolytes and Conductance related terms

Methods of determination of molar conductance. Conductometric titrations (only acid-base type). Transport numbers: definition – determination by moving boundary method. Causes of abnormal transport numbers observed in certain systems. Ionic mobility. Problems on transport numbers. Conductivity of water.

Kohlrausch's law and its applications: (i) evaluation of Λ_∞ from Λ_+ and Λ_-(ii) evaluation of degree of dissociation of a weak electrolyte (iii) evaluation of $\Lambda_\infty$of a weak electrolyte (iv) determination of solubility from conductance of saturated solutions of sparingly soluble salts (AgCl and $BaSO_4$). Problems based on these.

Limitations of Arrhenius theory: qualitative account of Debye-Huckel theory, Debye-Huckel-Onsagar equation for aqueous solutions of 1:1 electrolytes. Verification of DHO equation.

Galavanic cell: conventions of representing galvanic cells-reversible and irreversible cells, derivation of Nernst equation for single electrode potential (free energy concept).

UNIT-II

Electrochemistry II **5 hours**

Weston-cadmium cell:Determination of emf of a cell by compensation method. Determination of E° of Zn/Zn^{2+} and Cu/Cu^{2+}electrodes.Liquid junction potentials, elimination of liquid junction potential.

Types of electrodes: Metal and gas electrodes (chlorine), metal/metal insoluble salt electrodes, redox electrodes. Reference electrodes-standard hydrogen electrode, calomel electrode, quinhydrone electrode and glass electrode. Determination of pH using these electrodes. Numerical problems.

Concentration cells: (i) emf of concentration cells (ii) determination of solubility of sparingly soluble salts and numerical problems. Redox electrodes, emf of redox electrodes. Potentiometric titration involving only redox systems.

Ionic equilibria **3 hours**

Hydrolysis of salts of weak acids and weak bases.Ionic product of water. Relationship between K_h, K_w, K_a and K_b. Degree of hydrolysis and its relationship with K_h. Effect of temperature and dilution on degree of hydrolysis. pH of salt solutions. Problems.

Common-ion effect, buffers, buffer action and buffer capacity. pH of buffers. Henderson's equation and its derivation. Solubility product and ionic product in precipitation and in qualitative analysis.

Analytical and biological applications of buffers.

Theories of indicators.

UNIT-III

Physical properties and Molecular structures **5 hours**

Polarization and orientation of dipoles in an electric field. Dipole moment. Induced dipole moment (experimental determination of dipole moment not included). Clausius-Mossotti equation (only statement).Dipole moment and structure of molecules (planar and non-planar).

Magnetic properties-paramagnetic, diamagnetic and ferromagnetic systems. Electrical properties of solids: types of solids-metals, insulators and semiconductors. Pyroelectricity, piezoelectricity, ferroelectricity, inverse piezoelectricity. Thomson effect, Seebeck effect and Peltier effect-definition with examples.

Chemical Spectroscopy I **5 hours**

The interaction of radiation with matter. Regions of electromagnetic spectrum and associated spectroscopic techniques.

Origin of molecular spectra: Born-Oppenheimer approximation.

Rotational spectra of diatomic molecules: Relationship between internuclear distance and moment of inertia. Expression for rotational energy. Numerical problems. Criterion for absorption of radiation-selection rule.

UNIT-IV

Chemical Spectroscopy II **4 hours**

Vibrational spectroscopy*:* Hooke's law- Expression for the frequency of SHO-force constant and its significance. Expression for vibrational energy levels of SHO. Zero point energy., numerical problems. Degree of freedom of polyatomic molecules– modes of vibration for CO_2 and H_2O molecules.

Raman spectroscopy: **3 hours**

Concept of polarisability. Pure rotation, vibration, qualitative study. Stokes and anti-Stoke's lines-selection rules.

Advantages of Raman spectroscopy over IR spectroscopy.

Electronic spectroscopy: Potential energy curves for bonding and antibonding molecular orbitals. Electronic transitions –qualitative description of non-bonding orbitals and transitions between them. Selection rules and Franck-Condon principle.

Electroanalytical Methods **5 hours**

Voltammetry at a dropping mercury electrodes (DME)-Types of current obtained at DME. Ilkovic equation and its applications. Current –potential relation for a cathodic process – half wave potential.

Cyclic Voltammetry-Principles-Experimental set up-Quantitative analysis, determination of diffusion coefficients.

B.Sc., - VI Semester
Paper VII

UNIT-I

Coordination and Organometallic compounds I **10 hours**

Coordination compounds, ligands and their classification (mono, bi, tri, tetra, penta and hexa dentate ligands) and ambidentate ligands, coordination number, nomenclature of coordination compounds in detail. Theories of structure and bonding (Explanation for the formation of complexes by Werner's Theory in detail and its limitations). EAN rule, Valence bond theory-postulates, low spin and high spin complexes with examples, limitations of VBT. Crystal field theory (octahedral, tetrahedral and square planar complexes). Crystal field splitting and crystal field stabilization energies, limitations of CFT. Magnetic properties of $[CoF_6]^{3-}$, $[Co(NH_3)_6]^{3+}$, $[Fe(CN)_6]^{4-}$, $[Fe(CN)_6]^{3-}$. Spectral properties of $[Ti(H_2O)_6]^{3+}$, $[Co(H_2O)_6]^{3+}$, $[CoCl_4]^{2-}$. Isomerism-Structural: ionization, linkage, hydrate and coordination isomerism with examples. Stereoisomerism-geometrical and optical isomerism with examples.
Organometallic compounds – ligands, classification (hapticity). Synthesis and structure of $K[PtCl_3(\eta^2\text{-}C_2H_4)]$ and $[Fe(\eta^5\text{ - }C_5H_5)_2]$,

UNIT-II

Coordination and Organometallic compounds II **4 hours**

Metal carbonyls – $Cr(CO)_6$, $Co_2(CO)_8$, $Mn_2(CO)_{10}$; eighteen electron rule and its deviations with examples.
Applications of coordination/organometallic compounds: *cis*-platin in cancer therapy, Na_2Ca EDTA in the treatment of heavy metals (Pb, Hg) poisoning, Wilkinson's Catalyst in alkene hydrogenation, Monsanto acetic acid process.

Industrial Materials I **6 hours**
Refractories: Properties, classification, determination of PCE values.
Abrasives – definition and classification with examples, applications, hardness, manufacture and importance of carborundum and tungsten carbide.
Glass: Properties, types, manufacture of soda glass. Composition and applications of borosilicate, metallic glass, optical glasses and polycarbonate glass, safety glass, fire and bullet proof glasses.
Ceramics: Raw materials and their roles, varieties of clay, production of ceramic ware, glazing, ceramic insulators.
Cement: Raw materials grades, manufacture of Portland cement (by wet process), setting of cement.

UNIT-III

Industrial Materials II **7 hours**
Paints and Varnishes: Constituents of oil and emulsion paints and their role, constituents of varnishes.

Fuels: Characteristics, Calorific value and its determination using bomb calorimeter, Coal-Varieties, Gaseous fuels-advantages, constituents and their significance, production of Coal gas and composition of LPG. Octane number.
Explosives: Classification, preparation of dynamite and TNT.
Propellants: Characteristics, classification and their applications.

Bioinorganic Chemistry **3 hours**
Essential and trace elements in biological systems with reference to Na^{+}, $K^{+,}$ Ca^{2+}, Fe^{2+}, P, Cu, V and Ni. Metallo-porphyrins with special reference to haemoglobin, myoglobin and chlorophyll. Role of cobalamin (vitamin-B_{12}coenzyme) in living systems.

UNIT-IV

Chemistry of Newer materials **10hours**
Conducting polymers: Introduction, definition and examples-polyaniline, polyacetylene. Mechanism of conduction. Qualitative treatment of doping,Properties: elasticity with high electrical conductivities, Engineering and biological applications.
Super conductors: Introduction, definition, type1, type 2 and atypical. Preparation of high temperature super conductor-$\mathbf{Y_1Ba_2Cu_3O_{x\pm\delta}}$, BCS theory (qualitative treatment only) and general applications of high temperature super conductors.
Fullerenes: Introduction, definition, preparation and isolation of C_{60}. Structure and Chemical reactions (redox reactions, electrophilic aromatic substitution and bromination) of $C_{60.}$Commercial uses of $C_{60.}$Carbon nanotubes-Introduction, definition, examples and structure.
Nanomaterials: Introduction, definition and electronic structure. Different methods of production: Sol gel synthesis, inert gas condensation, mechanical alloying (ball milling), plasma synthesis, electrodeposition, and general applications.

B.Sc., - VI SEMESTER
Paper – VIII

UNIT-I

INTRODUCTION TO BIOCHEMSITRY **2hours**

Contributions of Lavosier, Wohler, Emil Fischer, Louis Pasteur, Embden, Meyerhof, Parnas. Hans Kreb, Michaelis and Menton, Watson and Crick, Chargaff, H.G. Khorana, Knoop, Pauling, Hopkins and Miescher. Elemental and biochemical composition of living organisms. Role of water in biochemical systems (mention the properties of water which makes water a solvent of life).

CARBOHYDRATES **4hours**

Structure and biological importance of derivatives of monosaccharides.

Amino sugars : β-D-glucosamine, galactosamine and their N-acetylated forms: N-acetylmuramic acid (NAMA); N-acetylneuraminic acid (NANA)

Sugar acids–structure and biological importance of D-gluconic acid, D-glucuronic acid and D-glucaric acid.

Sugar phosphates–structure and biological importance of Glucose-6-P, Fructose-6-P, Fructose-1,6-di-P, β-D-ribose-5-P and β-D-deoxyribose-5-P.

Structure and biological importance of oligosaccharides – isomaltose, cellobiose, trehalose.

Polysaccharides - source, comparative account of partial structure and biological function of starch, glycogen, cellulose, chitin and insulin.

LIPIDS **4hours**

Introduction, Classification.

Fatty acids–definition, classification as saturated and unsaturated with examples and structure (lauric, myristic, palmitic, stearic, oleic, linoleic, linolenic and arachidonic acids). Essential fatty acids – definition with examples

Triglycerides–Structure of simple and mixed glycerides, properties of triglycerides- acid and alkali hydrolysis, saponification number and its significance, iodine number and its significance, rancidity (oxidative and hydrolytic), biological importance of triglycerides.

Phosphoglycerides – general structure of 3-Sn–phosphatidic acid, lipid bilayer (as in cell membrane), micelles, liposomes and its applications, structure and biological importance of lecithin, cephalin, phosphatidylserine, phosphatidylinositol.

Cholesterol – definition, types (HDL, LDL and VLDL)

Sphingolipids–structure and biological significance of ceramide.

UNIT-II

PROTEINS **5hours**

***α*-amino acids**: Introduction, structure, classification on the basis of polarity of R-groups, essential and non essential amino acids, ionic properties and reactions of amino acids with alcohol, nitrous acid and Ninhydrin.

Levels of organizations of Protein: Primary structure, Secondary structure (α-helix, triple helix eg., Collagen and β-pleated sheet), tertiary structure and forces stabilizing it, quaternary structure.
Denaturation and renaturation: Thermal renaturation-Aufinsen's experiment with ribonuclease.
Classification of proteins based on structure, composition and biological function (enzymes, hormones, transport agents, antibodies, structural materials with examples).

NUCLEIC ACIDS **3hours**
Types–Components of nucleic acids, bases, nucleosides and nucleotides with structures. Partial structure of polynucleotide.
Structure of DNA (Watson-Crick model) and RNA. Biological roles of DNA and RNAs.
Protein-nucleic acid interaction- chromatin and viral nuclear capsid.

HORMONES **2hours**
Definition.
Classification - a) amino acid derivatives (epinephrine and thyroxine); b) peptide (oxytocin and vasopressin) and polypeptide hormones (insulin and glucagon); c) Steroid hormones (progesterone, testosterone) with functions.
Role of insulin and glucagon in glucose homeostasis.
Mediators of hormone action – Ca^{2+}, cyclic AMP.

UNIT-III

ENZYMES **4hours**
Introduction, Holo enzyme (apo enzyme and co enzyme).Active site, specificity.
Classification of enzymes (EC code number not required).
Enzyme substrate interaction- Fischer and Koshland models.
Enzyme kinetics–factors affecting rate of enzymatic reactions – enzyme concentration, substrate concentration, pH and temperature (mention M. M. equation).
Allosteric enzymes–definition and example
Enzyme inhibitions-Competitive, noncompetitive and uncompetitive inhibition with one example for each.

BIOLOGICAL OXIDATION **4hours**
Bioenergetics- Introduction-stages of energy transformation. Exergonic and endergonic reactions. Relationship between $\triangle G$ and Keq.
High energy phosphates–definition, examples, structural features of ATP that makes ATP a high energy phosphate (electro static repulsion, opposing resonance, solvation of ATP).
Examples of high energy phosphates other than ATP. Energy coupling in biological reactions (explain the concept with suitable examples).
Biological oxidation – comparison of oxidation with combustion using glucose as an example. Redox potentials of some biological important half reactions. Calculation of energy yield from biological redox reaction (oxidation of NADH by oxygen, reduction of acetaldehyde by NADH). Mitochondrial electrotransport chain, oxidative phosphorylation. Substrate level phosphorylation.

BIOCHEMICAL TECHNIQUES **2hours**

Principle and applications of:

- Paper chromatography and TLC.
- Electrophoresis–cellulose acetate membrane electrophoresis and PAGE.

UNIT-IV

METABOLISM **6hours**

Catabolism and anabolism (explanation with an example) – Carbohydrate metabolism, glycolysis, fate of pyruvate. TCA cycle, energetic.

Gluconeogenesis–definition, synthesis of glucose from lactate.

Fatty acid metabolism–activation of fatty acids, role of carnitine, β-oxidation pathway, energetics.

Protein metabolism–general aspects of amino acid degradation – transamination, deamination and decarboxylation. Urea cycle.

MOLECULAR BIOLOGY **4hours**

Central dogma of molecular biology–semi conservative replication and mechanism of DNA replication, transcription, translation.

DNA finger printing – Definition and its applications.

SUGGESTED BOOKS

Inorganic Chemistry

1. Advanced Inorganic Chemistry, 6th Edition
   F. A. Cotton, G. Wilkinson, C. A. Murillo and M. Bochmann-John Wiley & Sons, 1999.
2. Concise Inorganic Chemistry, 5th Edition
   J. D. Lee, Blackwell Science, 2001.
3. Inorganic Chemistry, 4th Edition
   J. E. Huhee, E. A. Keiter and R. I. Keiter, Pearson Education Asia, 2000
4. Inorganic Chemistry, ELBS 2nd Edition
   D. F. Shriver, P. W. Atkins and C. H. Langford, Oxford Univ. Press 2002.
5. Environmental Chemistry
   A. K. De, Wiley Eastern Ltd., 1999.
6. Nuclear and Radiation Chemistry
   Sharma B. K, Goel Publishing House, 1987.
7. Modern Inorganic Chemistry
   W. L. Jolly, McGraw Hill Co.
8. Principles of Inorganic Chemistry
   B. R. Puri and L. R. Sharma, Jauhar S. P-S. N. Chand & Co., 1998
9. Inorganic Chemistry, 3rd Edition (ISE)
   A G Sharpe, Addison Wesley, 1989.
10. Basic Inorganic Chemistry, 3rd Edition
    F. A. Cotton, G. Wilkinson, P. L. Gaus-John Wiley & Sons, 1995.
11. Essential Chemistry, International Edition
    R. Chang, McGraw Hill Co, 1996.
12. University Chemistry, 4th Edition (ISE)
    B. H. Mahan & R. J. Myers, Addison Wesley, 1989.
13. Essential Trends in Inorganic Chemistry
    C. M. P. Mingos, Oxford Univ Press, 1998
14. Chemistry, 3rd Edition
    P. Atkins &L.Jones, W. H. Freeman & Company, 1997.
15. Modern Chemistry, 4th Edition
    D. W. Oxicby, H. P. Gills & N. H. Nachtrieb, Saunders College Publishing, 1998.
16. Fundamental Concepts of applied Chemistry,
Jayashree Ghosh, S Chand Publications.
17. Industrial Chemistry,
    B. K. Sharma, Goel Publishing House

Organic Chemistry

1. Organic Chemistry, Paula YurkanisBruice, Prentice Hall, 2005.
2. Advanced Organic Chemistry
   F. A. Carey and R. J. Sundberg, Plenum, 1990.

3. Organic Chemistry, Vol I & II
I. L. Finar, ELBS, 1986, 1991, 2005
4. Organic Chemistry
R. T. Morrison and R. N. Boyd, Prentice Hall, 1991
5. Organic Chemistry, Maitland Jones, Jr., W. W. Norton & Company
6. Advanced Organic Chemistry
O. S. Bahl and A. Bahl., S. Chand & Co. 1995
7. Advanced Organic Chemistry
J. March, John Wiley & Sons, 2008.
8. Understanding Organic Reaction Mechanisms
A. Jacobs, CambridgeUniv Press, 1998.
9. Organic Chemistry
M. K. Jain, Nagin& Co., 1987
10. A Guide to Mechanism in Organic Chemistry
P. Sykes, Orient Longman, 2005.
11. Organic Spectroscopy
V. R. Dani, Tata McGraw Hill, 1998.
12. Organic Spectroscopy
W. Kemp, ELBS IV Edition, 1998.
13. Synthetic Drugs
G. R. Chatwaal, Himalaya Publications, 2000.
14. Steriochemistry of Organic Compounds ,
Ernest L. Eliel, Samuel H. Wilen, Wiley India Edition,1994

Physical Chemistry

1. Physical Chemistry, 7th Edition
P. W. Atkins and Julio de Paula, Oxford Univ. Press, 2002.
2. The Elements of Physical Chemistry, 3rd Edition
Peter Atkins, OxfordUniv. Press, 2000.
3. Physcial Chemistry – A molecular Approach
Donal A. Mcquarrie and John D. Simon, Viva Low-priced Student Edition, 2001.
4. Introduction to Physical Chemistry, 3rd Edition
Mark Ladd, Cambridge Low-Priced Edition, 1999.
5. Text Book of Physical Chemistry
S. Glasstone, MacMillan India Ltd., 1998.
6. Principles of Physical Chemistry, 4th Edition
B. R. Puri and L. R. Sharma and M. S. Pathania, S. L. N. Chand & Co., 1987
7. Text Book of Physical Chemistry
P. L. Soni., S. Chand & Co., 1993.
8. Physcial Chemistry
Alberty R. A. and Silbey R. J. John Wiley & Sons, 1992.
9. Physical Chemistry
G. M. Barrow, McGraw Hill, 1986.
10. Physical Chemistry, 3rd Edition
Gibert W. Castellan, Narora Publishing House, 1985.

11. Text Book of Polymer Science
Billmeyer, Dr. F. W. John Wiley & Sons, 1984.
12. Basic Physical Chemistry
Walter J. Moore, Prentice Hall, 1972.

Biochemistry

1. Concise Text Book of Biochemistry
T. N. Pattabhiraman, All India Publishers, 2000.
2. Biochemistry
A. L. Lehningeret. al., CBS, 2000.
3. A Text Book of Biochemistry
A. V. S. S. Rama Rao, UBSPD, 1998.
4. Biochemistry
P. C. Champe and R. A. Harvey, J. B. Lipincott& Co, 1982.
5. Fundamentals of Biochemistry
J. L. Jain, S. Chand & Co., 1983.
6. Biochemistry
COSIP-ULP, Bangalore University, 1981.
7. Outlines of Biochemistry
Conn E. E and Stumpf P. K., John Wiley & Sons, 1978.
8. General Biochemistry
Weil J. H., Wiley Eastern
9. BiochemistryCampbell M. K., Harcourt Brace & Co.

Chemistry Practicals for B. Sc., Course

I Semester: Practical 1 (General Chemistry) 3 hours per week

1. Calibration of glass wares: (i) Pipette (ii) Burette (iii) Volumetric flask
2. Estimation of potassium permanganate using standard sodium oxalate solution.
3. Estimation of ferrous ammonium sulphate using standard potassium dichromate solution with potassium ferricyanide as an external indicator.
4. Estimation of ferrous ammonium sulphate using standard potassium dichromate solution with diphenyl amine as an internal indicator. (Change to ferroin indicator?)
5. Estimation of sodium thiosulphate using standard potassium dichromate solution.
6. Estimation of iodine using sodium thiosulphate and standard potassium dichromate solution.
7. Determination of the percentage of available chlorine in the given sample of bleaching powder.
8. Determination of percentage of manganese dioxide from pyrolusite ore.
9. Estimation of chloride by Mohr's method (using potassium chromate as an adsorption indicator).
10. Estimation of chloride by Volhard's method.
11. Estimation of ferrous and ferric iron in a given mixture using standard potassium dichromate solution.
12. Estimation of nitrogen in an ammonium salt using sodium hydroxide solution and standard oxalic acid.
13. Estimation of carbonate and bicarbonate in a given mixture.

Note: ***Standard solutions to be prepared for experiments 2 to 6***.

II Semester: Practical II (Physical Chemistry) 3 hours per week

1. Determination of the density using specific gravity bottle and viscosity of a liquid using Ostwald's viscometer.
2. Determination of percentage composition of a binary liquid mixture by viscosity method.
3. Determination of molar mass of polymer by viscosity method.
4. Determination of the density using specific gravity bottle and surface tension of a liquid using Stalagmometer.
5. Determination of molar mass of a non-electrolyte by Walker-Lumsden method.
6. Determination of degree of dissociation of an electrolyte by ebullioscopic method.
7. Determination of transition temperature of a salt hydrate by thermometric method.
8. Determination of distribution coefficient of acetic acid between water and butanol.
9. Determination of distribution coefficient of benzoic acid between water and toluene.
10. Effect of surfactants on the surface tension of water (Stock solution to be given).

III Semester: Practical III (Organic Chemistry) 3 hours per week

Preparation and purification of organic compounds

1. Recrystallisation and determination of melting point of solids (mixed melting point determination and its importance may be mentioned).
2. Simple distillation and determination of boiling point of liquids.
3. Purification of solids by sublimation.

One stage preparation

(Preparation, recrystallization and melting point determination of the recrystallised sample)

4. Preparation of aspirin from salicylic acid.
   (*Note: Acetic anhydride is to be prepared freshly by distilling acetyl chloride and sodium acetate mixture*).
5. Preparation of paracetamol from *p*-aminophenol.
6. Preparation of dibenzalacetone from benzaldehyde (using acetone-alcoholic sodium hydroxide).
7. Preparation of *p*-aminobenzoic acid from *p*-nitrobenzoic acid.
8. Preparation of *m*-dintrobenzene from nitrobenzene.
9. Preparation of benzoic acid from benzaldehyde.

Two stage preparations

10. Preparation of *p*-bromoaniline from acetanilide.
11. Preparation of *p*-nitroaniline from acetanilide.
12. Preparation of *m*-nitrobenzoic acid from methyl benzoate.
13. Preparation of methyl orange/methyl red by diazotization and coupling.

Chromatography

14. **Paper chromatography**: Extraction of spinach (using 1 : 1 alcohol and Whatmann filter paper)
15. **Thin layer chromatography**: Separation of green leaf pigments/separation of a mixture of two organic compounds.
16. **Column chromatography**: Separation of a mixture of two organic compounds

IV Semester: Practical IV (Inorganic Chemistry) 3 hours per week

1. Systematic semi-micro qualitative analysis of a mixture of two simple salts (with no interfering radicals).
2. Separation of metal ions (Cu^{2+}, Co^{2+}, Ni^{2+}, Fe^{2+})using paper chromatography and calculation of R_f values (To be performed by the students)
3. Separation of Mg(II) and Fe(II) by solvent extraction technique.
4. Effluent analysis.

V Semester: Practical V (Organic Chemistry) 3 hours per week

1. Organic qualitative analysis of mono functional organic compounds through functional group analysis. Determination of physical constant. Preparation and characterization of a suitable derivative.
2. Isolation of lycopene from tomatoes.
3. Isolation of caffeine from tea leaves.

V Semester: Practical VI (Physical Chemistry) 3 hours per week

1. Determination of velocity constant for acid catalysed hydrolysis of methyl acetate and determination of energy of activation.
2. Determination of velocity constant for the saponification of ethyl acetate ($a = b$).
3. The study of kinetics of potassium persulphate and potassium iodide colorimetrically.
4. Determination of equivalent conductivity of 0.1 N sodium chloride and verification of DHO equation.
5. Determination of dissociation constant of monochloroacetic acid by conductivity method.
6. Conductometric titration of hydrochloric acid with sodium hydroxide.
7. Potentiometric titration of potassium dichromate with ferrous ammonium sulphate.
8. Determination of Critical Micellar Concentration (CMC) by conductivity method.
9. Determination of pK_a of a weak acid by pH metric method.
10. To construct the phase diagram of two component system (Ex. diphenylamine-benzophenone) by cooling curve method.
11. Determination of percentage of sodium chloride by miscibility temperature method.
12. Estimation of Cu^{2+} colorimetrically and verification of Beer-Lambert's law.
13. Determination of Oxidation and Reduction potential of $K_4Fe(CN)_6/K_3Fe(CN)_6$ system by cyclic voltammetry.

VI Semester: Practical VII (Inorganic Chemistry) 3 hours per week

1. Estimation of percentage of iron in haematite using bariumdiphenylamine sulphonateas an internal indicator.
2. Estimation of calcium in lime stone.
3. Estimation of copper in brass.
4. Estimation of zinc using EDTA.
5. Estimation of total hardness of water using EDTA.
6. Gravimetric estimation of barium as barium sulphate.
7. Gravimetric estimation of nickel as nickel dimethyl glyoximate.
8. Preparation of cuprammoniumsulphate and determination of λ_{max} and hence CFSE.
9. Preparation of sodium trioxalatoferrate (III) and estimation of iron.
10. Estimation of nickel using EDTA and standard zinc sulphate.
11. Preparation of ferrous oxalate and its analysis (both iron and oxalate).

VI Semester: Practical VIII (Biochemistry) 3 hours per week

1. Preparation of buffers and determination of their pH values using pH meter.
2. Estimation of reducing sugars by Hegdorn-Jensen method.
3. Estimation of lactose in milk by Nelson-Somyogi's method.
4. Estimation of creatinine by Jaffe's method.
5. Estimation of inorganic phosphate by Fiske-Subbarow method.
6. Estimation of total reducing sugars by DNS (dinitrosalicylic acid) method.
7. Isolation of lactose and casein from milk and estimation of lactose by colorimetric method.
8. Estimation of α-amino acids using ninhydrin by colorimetric method.
9. Determination of blood group.
10. Separation of α-amino acids by paper chromatography.
11. Isolation of DNA from onions.
12. Estimation of cholesterol by colorimetric method.

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BANGALORE UNIVERSITY

Department of Mathematics
Jnanabharathi Campus
Bengaluru – 560 056

Syllabus for
Mathematics
Under-Graduate (UG) Programmme
I & II Semester

Framed according to the
National Education Policy (NEP 2020)

September 20, 2021

Proceedings of the BOS meeting in UG-Mathematics-Regular, held on 20th September 2021 in the Department of Mathematics, JB Campus, Bangalore University, Bangalore-560 056 at 2.00 pm

The following members attended the meeting to frame the NEP new syllabus for undergraduate degree program B.A./B.Sc with mathematics as Major Subject & B.A./B.Sc.(Hons) Mathematics.

1.	Prof. Harina P. Waghmore	Chairperson
2.	Prof. Jayadeva. M	Member
3.	Prof. T.R. Marulasiddappa	Member
4.	Sri. Mahesh H.S	Member
5.	Smt. Veena M.G	Member
6.	Smt. Shobha. V	Member
7.	Dr. Maheshwari P.G	Member
8.	Dr. S. Sigarakanti	Member
9.	Dr. R. Sumithra	Member

20/09/2021

The Chairperson thanked the members for their cooperation.

[Dr. HARINA P. WAGHAMORE]
CHAIRPERSON
ಮುಖ್ಯಸ್ಥರು
ಗಣಿತಶಾಸ್ತ್ರ ವಿಭಾಗ
ಜ್ಞಾನಭಾರತಿ ಆವರಣ
ಬೆಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾಲಯ
ಬೆಂಗಳೂರು - 560 056.

Preamble

The subject wise expert committee to draft model curriculum contents in Mathematics constituted by the Department of Higher Education, Government of Karnataka, Bangalore vide GO No. ED 260 UNE 2019 (PART-1) DATED 13.08.2021 is pleased to submit its partial report on the syllabus for the First Year (First & Second Semesters) B.Sc.(Basic/Honors) Mathematics and detailed Course Structure for B.Sc.(Honors) Mathematics and M.Sc. (One Year) Mathematics.

The committee discussed various models suggested by the Karnataka State Higher Education Council in its joint meetings with the Chairpersons of Board of Studies of all state universities in Karnataka and resolved to adopt Model IIA (Model Program Structure for the Bachelor of Science (Basic/Hons.) for the subjects with practical's with Mathematics as Major/Minor.

To achieve the core objectives of the National Education Policy 2020 it is unanimously resolved to introduce computer based practical's for the Discipline Core (DSC) courses by using Free and Open Source Software's (FOSS) tools for implementation of theory based on DSC courses as it is also suggested by the LOCF committee that the papers may be taught using various Computer Algebra System (CAS) software's such as Mathematica, MATLAB, Maxima and R to strengthen the conceptual understanding and widen up the horizon of students' self-experience. In view of these observations the subject expert committee suggested the software's Python/ Maxima/ Scilab/ Maple/ MatLab/ Mathematica for hands on experience of implementation of mathematical concepts in computer based lab.

The expert committee suggests the implementation this curriculum structure in all the Departments of Mathematics in Universities/Colleges in Karnataka.

The subject expert committee designed the Course Learning Outcome (CO) to help the learners to understand the main objectives of studying the courses by keeping in mind of the Programme outcomes (PO) of the graduate degree with honors in Mathematics or a graduate degree with Mathematics as a major subject.

As the Mathematics subject is a vast with several branches of specializations, it is difficult for every student to learn each branch of Mathematics, even though each paper has its own importance. Hence the subject expert committee suggests number of elective papers (for both Discipline electives and Open

Electives) along with Discipline Core Courses. The BoS in Mathematics of universities may include additional electives based on the expertise of their staff and needs of the students'.

A student can select elective paper as per her/his needs and interest. The subject expert committee in Mathematics suggests that the concerned Department/Autonomous Colleges/Universities to encourage their faculty members to include necessary topics in addition to courses suggested by the expert committee.

B.Sc. Mathematics (Honors)

Programme Outcomes (PO): By the end of the program the students will be able to:

PO 1	**Disciplinary Knowledge:** Bachelor degree in Mathematics is the culmination of in-depth knowledge of Algebra, Calculus, Geometry, differential equations and several other branches of pure and applied mathematics. This also leads to study the related areas such as computer science and other allied subjects.
PO 2	**Communication Skills**: Ability to communicate various mathematical concepts effectively using examples and their geometrical visualization. The skills and knowledge gained in this program will lead to the proficiency in analytical reasoning which can be used for modeling and solving of real life problems.
PO 3	**Critical thinking and analytical reasoning:** The students undergoing this programme acquire ability of critical thinking and logical reasoning and capability of recognizing and distinguishing the various aspects of real life problems.
PO 4	**Problem Solving** : The Mathematical knowledge gained by the students through this programme develop an ability to analyze the problems, identify and define appropriate computing requirements for its solutions. This programme enhances students overall development and also equip them with mathematical modeling ability, problem solving skills.
PO 5	**Research related skills:** The completing this programme develop the capability of inquiring about appropriate questions relating to the Mathematical concepts in different areas of Mathematics.

PO 6	**Information/digital Literacy**: The completion of this programme will enable the learner to use appropriate softwares to solve system of algebraic equation and differential equations.
PO 7	**Self –directed learning**: The student completing this program will develop an ability of working independently and to make an in depth study of various notions of Mathematics.
PO 8	**Moral and ethical awareness/reasoning:** : The student completing this program will develop an ability to identify unethical behavior such as fabrication, falsification or misinterpretation of data and adopting objectives, unbiased and truthful actions in all aspects of life in general and mathematical studies in particular.
PO 9	**Lifelong learning**: This programme provides self-directed learning and lifelong learning skills. This programme helps the learner to think independently and develop algorithms and computational skills for solving real word problems.
PO 10	Ability to peruse advanced studies and research in pure and applied Mathematical sciences.

Assessment

Weightage for the Assessments (in percentage)

Type of Course	Formative Assessment/ I.A.	Summative Assessment (S.A.)
Theory	40%	60 %
Practical	50%	50 %
Projects	40 %	60 %
Experiential Learning (Internship etc.)	--	--

Contents of Courses for B.Sc. with Mathematics as Major Subject & B.Sc.(Hons) Mathematics

Model IIA

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
I	MATDSCT1.1	Theory	4	Algebra - I and Calculus - I	60	40
	MATDSCP1.1	Practical	2	Theory based Practical's on Algebra - I and Calculus - I	25	25
	MATOET1.1	Theory	3	(A) Mathematics –I (B) Business Mathematics –I	60	40
II	MATDSCT2.1	Theory	4	Algebra - II and Calculus - II	60	40
	MATDSCP2.1	Practical	2	Theory based Practical's on Algebra - II and Calculus - II	25	25
	MATOET2.1	Theory	3	(A) Mathematics –II (B) Business Mathematics-II	60	40
Exit Option with Certificate						
III	MATDSCT3.1	Theory	4	Ordinary Differential Equations and Real Analysis-I	60	40
	MATDSCP3.1	Practical	2	Theory based Practical's on Ordinary Differential Equations and Real Analysis-I	25	25
	MATOET3.1	Theory	3	(A) Ordinary Differential Equations (B) Quantitative Mathematics	60	40
IV	MATDSCT4.1	Theory	4	Partial Differential Equations and Integral Transforms	60	40
	MATDSCP4.1	Practical	2	Theory based Practical's on Partial Differential Equations and Integral Transforms	25	25
	MATOET4.1	Theory	3	(A) Partial Differential Equations (B) Mathematical Finance	60	40
Exit Option with Diploma						
V	MATDSCT5.1	Theory	3	Real Analysis and Complex Analysis	60	40
	MATDSCP5.1	Practical	2	Theory based Practical's on Real Analysis and Complex Analysis	25	25
	MATDSCT5.2	Theory	3	Ring Theory	60	40
	MATDSCP5.2	Practical	2	Theory based Practical's on Ring Theory	25	25
	MATDSET5.1	Theory	3	(A) Vector Calculus (B) Mechanics (C) Mathematical Logic	60	40
VI	MATDSCT6.1	Theory	3	Linear Algebra	60	40
	MATDSCP6.1	Practical	2	Theory based Practical's on Linear Algebra	25	25

	MATDSCT6.2	Theory	3	Numerical Analysis	60	40
	MATDSCP6.2	Practical	2	Theory based Practical's on Numerical Analysis	25	25
	MATDSET6.1	Theory	3	(A) Analytical Geometry in3D (B) Number Theory (C) Special Functions (D) History of Bhârtîya Gaṇita	60	40
Exit Option with Bachelor of Arts, B.A./ Bachelor of Science, B.Sc. Degree						
VII	MATDSCT7.1	Theory	3	Discrete Mathematics	60	40
	MATDSCP7.1	Practical	2	Theory based Practical's on Discrete Mathematics	25	25
	MATDSCT7.2	Theory	3	Advanced Ordinary Differential Equations	60	40
	MATDSCP7.2	Practical	2	Theory based Practical's on Advanced Ordinary Differential Equations	25	25
	MATDSCT7.3	Theory	4	Advanced Analysis	60	40
	MATDSET 7.1	Theory	3	(A) Graph Theory (B) Entire and Meromorphic Functions (C) General Topology (D) Bhâratîya Trikoṇmiti Śâstra	60	40
	MATDSET 7.2	Theory	3	Research Methodology in Mathematics	60	40
VIII	MATDSCT8.1	Theory	4	Advanced Complex Analysis	60	40
	MATDSCT8.2	Theory	4	Advanced Partial Differential Equations	60	40
	MATDSCT8.3	Theory	3	Fuzzy Sets and Fuzzy Systems	60	40
	MATDSET 8.1	Theory	3	(A) Operations Research (B) Lattice theory and Boolean Algebra (C) Mathematical Modeling (D) *Aṅkapâśa* (Combinatorics)	60	40
	MATDSET 8.2	Research Project	6 (3 + 3)	Research Project* OR Any Two of the following electives (A) Finite Element Methods (B) Cryptography (C) Information Theory and Coding (D) Graph Theory and Networking	120 OR 60 60	80 OR 40 40
Award of Bachelor of Science Honours, B.Sc.(Hons) Degree in Mathematics						

One Year M.Sc. degree in Mathematics (Two Semesters)

Semester	Course Number	Theory/ Practic al	Credits	Title of the Course	S.A.	I.A.
I	PGMATDSCT1.1	Theory	3	C++ Programming for Mathematics	60	40
	PGMATDSCP1.1	Practical	2	Computer Practical's on C++ Programming for Mathematics	25	25
	PGMATDSCT1.2	Theory	3	Computational Numerical Methods	60	40
	PGMATDSCP1.2	Practical	2	Computer Practical's on CNM	25	25
	PGMATDSCT1.3	Theory	4	Functional Analysis	60	40
	PGMATDSET1.1	Theory	3	(A) Fluid Mechanics –I (B) Computational Fluid Mechanics (C) Contact Geometry (D) Fuzzy Topology (E) Ramanujan Theta Function and Continued Fractions	60	40
	PGMATDSET1.2	Theory	3	(A) Advanced Graph Theory (B) Partition Theory (C) Algebraic Number Theory (D) Riemannian Geometry	60	40
II	PGMATDSCT2.1	Theory	4	Measure Theory	60	40
	PGMATDSCT2.2	Theory	4	Differential Geometry	**60**	**40**
	PGMATDSCT2.3	Theory	3	Mathematical Methods	60	40
	PGMATDSET2.1	Theory	3	(A) Fluid Mechanics –II (B) Magneto hydrodynamics (C) Finsler Geometry and Relativity (D) Mathematical Modeling	60	40
	PGMATDSET2.2	Project	6	Research Project	120	80

- In lieu of the research Project, two additional elective papers/Internship may be offered

Abbreviation for MATDSCT1.1 /MATDSCP1.1

MAT – Mathematics ; DSC – Discipline Core; T – Theory/ P – Practical; 1 – First Semester; .1 – Course 1

PGMATDSCT1.1 : PG- Post Graduate ; MAT- Mathematics; DSC- Discipline Core; T- Theory 1 –First Semester; .1 – Course 1

CURRICULUM STRUCTURE FOR UNDERGRADUATE DEGREE PROGRAM

Name of the Degree Program : B.Sc. (Honors)
Discipline/Subject : Mathematics Starting
Year of Implementation :2021-22

PROGRAM ARTICULATION MATRIX

Semester	Course No.	Programme Outcomes that the Course Addresses	Pre-Requisite Course(s)	Pedagogy*	Assessment**
I	MATDSCT1.1	PO 1, PO 2, PO 3	-	MOOC	CLASS TESTS
II	MATDSCT2.1	PO 1, PO 2, PO 3, PO 8	MATDSCT1.1	PROBLEM SOLVING	
III	MATDSCT3.1	PO 1, PO 4, PO7, PO 8	-----	SEMINAR	SEMINAR
IV	MATDSCT4.1	PO 1, PO 4, PO7, PO 8	MATDSCT3.1	PROJECT BASED LEARNING	QUIZ
V	MATDSCT5.1	PO 1, PO 2, PO 3, PO 5	----		ASSIGNMENT
V	MATDSCT5.2	PO 3, PO 4, PO 7, PO10	MATDSCT2.1	ASSIGNMENTS	
VI	MATDSCT6.1	PO 6, PO 7, PO 10.	MATDSCT5.2	GROUP DISCUSSION	
VI	MATDSCT6.2	PO 3, PO 4, PO 5, PO 8, PO 9, PO 10.	MATDSCT1.1 & MATDSCT2.1		
VII	MATDSCT7.1	PO 3, PO 4, PO5, PO 7, PO 9.	MATDSCT1.1 & MATDSCT2.1		TERM END EXAM
VII	MATDSCT7.2	PO 2, PO 4, PO 5, PO 10	MATDSCT3.1		
VII	MATDSCT7.3	PO 2, PO 4, PO 5, PO 10	MATDSCT3.1		
VIII	MATDSCT8.1	PO 2, PO 4, PO 5, PO 10	MATDSCT5.1		
VIII	MATDSCT8.2	PO 2, PO 4, PO 5, PO 10	MATDSCT4.1		VIVA-VOCE
VIII	MATDSCT8.3	PO 2, PO 4, PO 5, PO 10	MATDSCT7.3		

** Pedagogy for student engagement is predominantly Lecture. However, other pedagogies enhancing better student engagement to be recommended for each course. This list includes active learning/ course projects / Problem based or Project based Learning / Case Studies / Self Study like Seminar, Term Paper or MOOC.

*** Every Course needs to include assessment for higher order thinking skills (Applying/ / Evaluating / Creating). However, this column may contain alternate assessment methods that help formative assessment (i.e. assessment for Learning).

B.Sc. with Mathematics as a Minor in the 3rd Year

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks	
					S.A.	I.A.
V	MATDSCMT5.1	Theory	3	Complex Analysis	60	40
	MATDSCMP5.1	Practical	2	Theory based Practical's on Complex Analysis	25	25
VI	MATDSCMT6.1	Theory	3	Numerical Analysis	60	40
	MATDSCMP6.1	Practical	2	Theory based Practical's on Numerical Analysis	25	25

Abbreviation for MATDSCMT5.1 / MATDSCMP5.1

MAT – Mathematics; **DSC** – Discipline Core; **M** – Minor; **T** – Theory /**P** – Practical;

5 – Fifth Semester; **.1** – Course 1

Credit Distribution for B.Sc.(Honors) with Mathematics as Major in the 3rd Year
(For Model IIA)

Subject	Semester	Major/ Minor in the 3rd Year	Credits					
			Discipline Specific Core (DSC)	Open Elective (OE)	Discipline Specific Elective (DSE)	AECC &Languages	Skill Enhancement Courses (SEC)	Total Credits
Mathematics	I – IV	Major	4 Courses (4+2)x 4=24	4Courses 3 x 4 =12	---	(4+4=8) Courses 8x(3+1)= 32	2 Courses 2x(1+1)= 4	72
Other Subject		Minor	24	--	--	--	--	24
								96
Mathematics	V & VI	Major	4 Courses4x(3+2) =20	-----	2Courses 2 x 3 =06	---	2Courses 2 x 2 =4	30
Other Subject		Minor	10	--	--	--	--	10
			(96+40)**=136**					
Mathematics	VII & VIII	Major	2 Courses 2x(3+2)=10 3 Courses 3 x 4 = 12 1Course 1 x 3 =3 Total=25	-----	2Courses 2 x 3 =6 Res.Meth1 x 3 = 3 2 Courses 2 x 3 =6 Total=15	----	-----	40
Total No. of Courses			14	04	07	08	04	
								136+40=**176**

Syllabus for B.Sc. with Mathematics as Major Subject & B.Sc. (Hons) Mathematics

SEMESTER – I

MATDSCT 1.1: Algebra - I and Calculus – I	
Teaching Hours : 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 56 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- Learn to solve system of linear equations.
- Solve the system of homogeneous and non homogeneous linear of m equations in n variables by using concept of rank of matrix, finding eigen values and eigenvectors.
- Sketch curves in Cartesian, polar and pedal equations.
- Students will be familiar with the techniques of integration and differentiation of function with real variables.
- Identify and apply the intermediate value theorems and L'Hospital rule.

Unit-I: Matrix: Recapitulation of Symmetric and Skew Symmetric matrices, Algebra of Matrices; Row and column reduction to Echelon form. Rank of a matrix; Inverse of a matrix by elementary operations; Solution of system of linear equations; Criteria for existence of non- trivial solutions of homogeneous system of linear equations. Solution of non-homogeneous system of linear equations. Eigen values and Eigen vectors of square matrices, Cayley-Hamilton theorem, inverse of matrices by Cayley-Hamilton theorem (Without Proof), real symmetric matrices and their properties, reduction of such matrices to diagonal form.

14 Hours

Unit-II: Polar Co-ordinates: Polar coordinates, angle between the radius vector and tangent. Angle of intersection of two curves (polar forms), length of perpendicular from pole to the tangent, pedal equations. Derivative of an arc in Cartesian, parametric and polar forms, curvature of plane curve-radius of curvature formula in Cartesian, parametric and polar and pedal forms- center of curvature, asymptotes, evolutes and envelops.

14 Hours

Unit-III: Differential Calculus-I: Limits, Continuity, Differentiability and properties. Properties of continuous functions. Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and evaluation of limits usingL'Hospitalrule.

14 Hours

Unit-IV: Successive Differentiation: n^{th} Derivatives of Standard functions $e^{ax+b}, (ax+b)^n$, $\log(ax+b), \sin(ax+b), \cos(ax+b)$, $e^{ax}\sin(bx+c), e^{ax}\cos(bx+c)$, Leibnitz theorem and its applications. Tracing of curves (standard curves).

14 Hours

Reference Books:

1. University Algebra - N.S. Gopala Krishnan, New Age International (P)Limited, 2015.
2. Theory of Matrices - B S Vatsa, New Age International Publishers, 2010.
3. Matrices - A R Vasista, Krishna Prakashana Mandir, 2014.
4. Differential Calculus - Shanti Narayan, S. Chand & Company, NewDelhi, 1998.
5. Applications of Calculus, Debasish Sengupta, Books and Allied (P) Ltd.,2019.
6. Calculus – Lipman Bers, Holt, Rinehart &Winston, 1969.
7. Calculus - S Narayanan & T. K. Manicavachogam Pillay, S. Viswanathan Pvt.Ltd., vol. I &II, 2009.
8. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc.Graw, 2008.

MATDSCP 1.1: Practical's on Algebra - I and Calculus – I	
Practical Hours : 4 Hours/Week	**Credits: 2**
Total Practical Hours: 56 Hours	**Max. Marks: 50** **(S.A.-25 + I.A. – 25)**

Course Learning Outcomes: This course will enable the students to

- Learn Free and Open Source Software (FOSS) tools for computer programming
- Solve problem on algebra and calculus theory studied in MATDSCT 1.1 by using FOSS software's.
- Acquire knowledge of applications of algebra and calculus through FOSS.

Practical/Lab Work to be performed in Computer Lab (FOSS)

Suggested Software's: Maxima/Python.

1. Introduction to Python/Maxima.
2. Basic commands in Python/Maxima.
3. Simple examples using Python/Maxima.
4. Matrices –Algebra of matrices.
5. Computation of rank of matrix.
6. Solving the system of homogeneous and non-homogeneous linear algebraic equations.
7. Computation of inverse of matrix using Cayley-Hamilton theorems.
8. Finding the angle between the radius vector and tangent and angle between two curves.
9. Finding the radius of curvature of the given curve.
10. Verification of mean value theorems.
11. Find the Taylor's and Maclaurin's expansion of the given function.
12. Indeterminate forms and evaluation of limits using L-Hospital Rule.
13. Finding the n^{th} derivative.
14. Tracing of standard curves.

Open Elective Course

(For students of Science stream who have not chosen Mathematics as one of Core subjects)

MATOET 1.1: Mathematics – I	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Total Teaching Hours: 42 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- Learn to solve system of linear equations.
- Solve the system of homogeneous and non homogeneous m linear equations by using the concept of rank of matrix, finding eigen values and eigenvectors.
- Students will be familiar with the techniques of differentiation of function with real variables.
- Identify and apply the intermediate value theorems and L'Hospital rule.
- Learn to trace some standard curves.

Unit-I: Matrices: Recapitulation of Symmetric and Skew Symmetric matrices, Algebra of Matrices; Row and column reduction, Echelon form. Rank of a matrix; Inverse of a matrix by elementary operations; Solution of system of linear equations; Criteria for existence of non- trivial solutions of homogeneous system of linear equations. Solution of non-homogeneous system of linear equations. Eigen values and Eigen vectors of square matrices, Cayley-Hamilton theorem, inverse of matrices by Cayley-Hamilton theorem (Without Proof). Real symmetric matrices and their properties, reduction of such matrices to diagonal form.

14 Hours

Unit-II: Differential Calculus: Limits, Continuity, Differentiability and properties. Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and examples.

Unit-III: Successive Differentiation: n^{th} Derivatives of Standard functions $e^{ax+b}, (ax+b)^n$, $\log(ax+b), \sin(ax+b), \cos(ax+b)$, $e^{ax}\sin(bx+c), e^{ax}\cos(bx+c)$, Leibnitz theorem and its applications.

14 Hours

Reference Books:

1. University Algebra - N.S. Gopala Krishnan, New Age International (P)Limited, 2015
2. Theory of Matrices - B S Vatsa, New Age International Publishers, 2010.
3. Matrices - A R Vasista, Krishna Prakashana Mandir, 2014.
4. Differential Calculus - Shanti Narayan, S. Chand & Company, NewDelhi, 1998.
5. Applications of Calculus, Debasish Sengupta, Books and Allied (P) Ltd.,2019.
6. Calculus – Lipman Bers, Holt, Rinehart &Winston, 1969.
7. Calculus - S Narayanan & T. K. Manicavachogam Pillay, S. Viswanathan Pvt. Ltd., vol. I &II, 2009.
8. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc.Graw, 2008.

Open Elective
(For Students of other than Science Stream)

MATOE 1.1(B): Business Mathematics-I	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Totat Teaching Hours: 42 Hours	**Max. Marks: 100** **(S.A.- 60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to:

- Translate the real word problems through appropriate mathematical modeling.
- Explain the concepts and use equations, formulae and mathematical expression and relationship in a variety of context.
- Finding the extreme values of functions.
- Analyze and demonstrate the mathematical skill require in mathematically intensive areas in economics and business.

Unit-I: Algebra – Set theory and simple applications of Venn Diagram, relations, functions, indices, logarithms, permutations and combinations. Examples on commercial mathematics.

14 Hours

Unit - II: Matrices – Definition of a matrix; types of matrices; algebra of matrices. Properties of determinants; calculations of values of determinants upto third order; Adjoint of a matrix, elementary row and column operations; solution of a system of linear equations having unique solution and involving not more than three variables. Examples on commercial mathematics.

14 Hours

Unit - III: Percentage, Ratios and Proportions – Percentages: Definition, Calculation of percentage, Ratios- Types of Ratios, Duplicate, Triplicate and Sub-Duplicate of ratio, Proportions - Definitions and properties- cross product property and Reciprocal property, United proportions – Continued proportions – Compound proportions, Examples on commercial mathematics.

14 Hours

Reference Books:

1. Basic Mathematics, Allen R.G.D, Macmillan, NewDelhi, 1962.
2. Mathematics for Economics, Dowling,E.T., Schaum's Series,McGrawHill,London, 2020.
3. Quantitative Techniques in Management, Vohra, N.D., Tata McGraw Hill, NewDelhi, 2006.
4. Business Mathematics, Soni R.S., Pitamber Publishing House,Delhi, 1996.

SEMESTER – II

MATDSCT 2.1: Algebra - II and Calculus – II	
Teaching Hours : 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 56 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- Recognize the mathematical objects called Groups.
- Link the fundamental concepts of groups and symmetries of geometrical objects.
- Explain the significance of the notions of Cosets, normal subgroups and factor groups.
- Understand the concept of differentiation and fundamental theorems in differentiation and various rules.
- Find the extreme values of functions of two variables.

Unit-I: Groups-I: Definition of a group with examples and properties, congruence, problems. Subgroups, center of groups, order of an element of a group and its related theorems, cyclic groups, Coset decomposition, Lagrange's theorem and its consequences. Fermat's theorem and Euler's ϕ function.

14 hours

Unit-II: Groups-II: Normal subgroups-Examples and problems, Quotient group, Homomorphism and isomorphism of groups, Kernel and Image of a homomorphism, Normality of the kernel, Fundamental theorem of homomorphism, Properties related to isomorphism, Permutation group, Cayley's theorem.

14 hours

Unit-III: Partial Derivatives: Functions of two or more variables-explicit and implicit functions, partial derivatives. Homogeneous functions- Euler's theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and illustrative examples. Taylor's and Maclaurin's series for functions of two variables, Maxima- Minima of functions of two variables.

14 hours

Unit-IV: Integral Calculus: Recapitulation of definite integrals and its properties. Line integral: Definition of line integral and basic properties, examples on evaluation of line integrals. Double integral: Definition of Double integrals and its conversion to iterated integrals. Evaluation of double integrals by changing the order of integration and change of variables. Computation of plane surface areas, volume underneath a surface of revolution using double integral. Triple integral: Definition of triple integrals and evaluation-change of variables, volume as triple integral.

14 hours

Reference Books:

1. Topics in Algebra, I N Herstein, Wiley Eastern Ltd., NewDelhi, 2006.
2. Higher algebra, Bernard & Child, Arihant, 2016.
3. Modern Algebra, Sharma and Vasista, Krishna Prakashan Mandir, Meerut,U.P,1960.
4. Differential Calculus, Shanti Narayan, S. Chand & Company, NewDelhi, 1998.
5. Integral Calculus, Shanti Narayan and P K Mittal, S. Chand and Co. Pvt.Ltd., 2015.
6. Schaum's Outline Series, Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc. Graw Hill.,2008.
7. Mathematical Analysis, S C Malik, WileyEastern, 1992.
8. A Course in Abstract Algebra, Vijay K Khanna and S K Bhambri, Vikas Publications, 2018.
9. Text Book of B.Sc. Mathematics, G K Ranganath, S Chand &Company, 2011.

PRACTICAL

MATDSCP 2.1: On Algebra -II and Calculus – II	
Practical Hours : 4 Hours/Week	**Credits: 2**
Total Practical Hours: 56 Hours	**Max. Marks: 50** **(S.A.-25 + I.A. –25)**

Course Learning Outcomes: This course will enable the students to

- Learn Free and Open Source Software (FOSS) tools for computer programming.
- Solve problem on algebra and calculus by using FOSS software's.
- Acquire knowledge of applications of algebra and calculus through FOSS.

Practical/Lab Work to be performed in Computer Lab

Suggested Software's: Maxima/Python.

1. Program to construct Cayley's table and test abelian for given finite set.
2. Program to find all possible cosets of the given finite group.
3. Program to find generators and corresponding possible subgroups of a cyclic group.
4. Programs to verification of Lagrange's theorem with suitable examples.
5. Program to verify the Euler's ϕ function for a given finite group.
6. Program to verify the given function is Homomorphism and Isomorphism.
7. Program to verify the Euler's theorem and its extension.
8. Program to find Jacobian.
9. Programs to construct series using Maclaurin's expansion for functions of two variables.
10. Program to evaluate the line integrals with constant and variable limits.
11. Program to evaluate the Double integrals with constant and variable limits.
12. Program to evaluate the Triple integrals with constant and variable limits.

Open Elective

(For students of Science stream who have not chosen Mathematics as one of the Core subjects)

MATOET 2.1(A): Mathematics – II	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Total Teaching Hours: 42 Hours	**Max. Marks: 100** **(S.A.- 60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- Recognize the mathematical objects called Groups.
- Link the fundamental concepts of groups and symmetries of geometrical objects.
- Explain the significance of the notions of Cosets, normal subgroups and factor groups.
- Understand the concept of differentiation and fundamental theorems in differentiation and various rules.
- Find the extreme values of functions of two variables.
- To understand the concepts of multiple integrals and their applications.

Unit-I: Groups: Definition of a group with examples and properties, congruence, problems. Subgroups, center of groups, order of an element of a group and its related theorems, cyclic groups, Coset decomposition, Factor groups, Lagrange's theorem and its consequences. Fermat's theorem and Euler's ϕ function.

14 hours

Unit-II: Partial Derivatives: Functions of two or more variables-explicit and implicit functions, partial derivatives. Homogeneous functions- Euler's theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and illustrative examples. Taylor's and Maclaurin's series for functions of two variables, Maxima- Minima of functions of twovariables.

14 hours

Unit-III: Integral Calculus: Recapitulation of definite integrals and its properties. Line integral: Definition of line integral and basic properties, examples on evaluation of line integrals. Double integral: Definition of Double integrals and its conversion to iterated integrals.

14 hours

Reference Books:

1. Topics in Algebra, I N Herstein, 2nd Edition, Wiley Eastern Ltd., NewDelhi, 2006.
2. Higher algebra, Bernard & Child, Arihant Pub, 2016.
3. Modern Algebra, Sharma and Vasishta, Krishna Prakashan Mandir, Meerut,U.P, 1960.
4. A Course in Abstract Algebra, Vijay K Khanna and S K Bhambri, VikasPublications, 2018.
5. Differential Calculus, Shanti Narayan, S. Chand & Company, NewDelhi, 1998.
6. Integral Calculus, Shanti Narayan and P K Mittal, S. Chand and Co. Pvt.Ltd., 2015.
7. Schaum's Outline Series, Frank Ayres and Elliott Mendelson, 5th ed. USA:McGraw Hill.,2008.
8. Mathematical Analysis, S.C. Malik, WileyEastern, 1992.
9. Text Book of B.Sc. Mathematics, G.K. Ranganath, S.Chand & Company, 2011.

Open Elective
(For Students of other than science stream)

MATOET 2.1(B): Business Mathematics-II	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Total Teaching Hours: 42 Hours	**Max. Marks: 100** **(S.A.- 60 + I.A. −40)**

Course Learning Outcomes: This course will enable the students to

- Integrate concept in international business concept with functioning of global trade.
- Evaluate the legal, social and economic environment of business.
- Apply decision-support tools to business decision making.
- Will be able to apply knowledge of business concepts and functions in an integrated manner.

Unit - I: Mathematical logic: Propositions, Truth values, Logical connectives, Truth table, Tautology and Contradiction, Logical equivalence, Negations, Converse, Inverse and Contrapositive of condition proposition and examples on commercial mathematics.

14 hours

Unit - II: Commercial Arithmetic: Interest: Concept of Present value and Future value, Simple interest, Compound interest, Nominal and Effective rate of interest, Examples and Problems Annuity: Ordinary Annuity, Sinking Fund, Annuity due, Present Value and Future Value of Annuity, Equated Monthly Installments (EMI) by Interest of Reducing Balance and Flat Interest methods, Examples and Problems.

14 Hours

Unit - III: Measures of central Tendency and Dispersion: Frequency distribution: Raw data, attributes and variables, Classification of data, frequency distribution, cumulative frequency distribution, Histogram and give curves. Requisites of ideal measures of central tendency, Arithmetic Mean, Median and Mode for ungrouped and grouped data. Combined mean, Merits and demerits of measures of central tendency, Geometric mean: definition, merits and demerits, Harmonic mean: definition, merits and demerits, Choice of A.M., G.M. and H.M. Concept of dispersion, Measures of dispersion: Range, Variance, Standard deviation (SD) for grouped and ungrouped data, combined SD, Measures of relative dispersion: Coefficient of range, coefficient of variation. Examples and problems.

14 Hours

Reference Books:

1. Practical Business Mathematics, S. A. Bari New Literature Publishing Company New Delhi, 1971.
2. Mathematics for Commerce, K. Selvakumar Notion Press Chennai, 2014.
3. Business Mathematics with Applications, Dinesh Khattar& S. R. Arora S. Chand Publishing New Delhi, 2001.
4. Business Mathematics and Statistics, N.G. Das &Dr. J.K. Das McGraw Hill New Delhi, 2017.
5. Fundamentals of Business Mathematics, M. K. Bhowal, Asian Books Pvt. Ltd New Delhi, 2007.
6. Mathematics for Economics and Finance: Methods and Modeling, Martin Anthony and Norman, Biggs Cambridge University Press Cambridge, 2009.

7. Financial Mathematics and its Applications, Ahmed Nazri Wahidudin Ventus Publishing APS Denmark, 2011.
8. Fundamentals of Mathematical Statistics, Gupta S.C. and Kapoor V.K, Sultan Chand and Sons, New Delhi, 2002.
9. Statistical Methods , Gupta S.P.: Sultan Chand and Sons, New Delhi, 2021.
10. Applied Statistics, Mukhopadhya Parimal New Central Book Agency Pvt. Ltd. Calcutta, 2018.
11. Fundamentals of Statistics, Goon A.M., Gupta M.K. and Dasgupta, B. World Press Calcutta, 2008.
12. Fundamentals of Applied Statistics, , Gupta S.C. and Kapoor V.K, Sultan Chand and Sons, New Delhi, 2014.

Proposed Syllabus for B.Sc. Mathematics paper for 6 semesters under Revised Choice Based Credit Scheme (CBCS)

Effective from the academic year 2020 - 21

Department of Mathematics
Bangalore University

Structure of B.Sc. Mathematics papers

Subjects	Paper	Instruction hrs/week	Duration of Exam(hrs)	Marks			Credits
				IA	Exam	Total	
I Semester							
Mathematics paper with practicals of 3credits	Theory Practical	4 3	3 3	30 15	70 35	100 50	2 1
II Semester							
Mathematics paper with practicals of 3credits	Theory Practical	4 3	3 3	30 15	70 35	100 50	2 1
III Semester							
Mathematics paper with practicals of 3credits	Theory Practical	4 3	3 3	30 15	70 35	100 50	2 1
IV Semester							
Mathematics paper with practicals of 3credits	Theory Practical	4 3	3 3	30 15	70 35	100 50	2 1
V Semester							
Two Mathematics papers with practicals of 3 credits each	Theory Practical	3 3	3 3	30 15	70 35	100 50	2 1
	Theory Practical	3 3	3 3	30 15	70 35	100 50	2 1
VI Semester							
Two Mathematics papers with practicals of 3 credits each	Theory Practical	3 3	3 3	30 15	70 35	100 50	2 1
	Theory Practical	3 3	3 3	30 15	70 35	100 50	2 1

Note: The structure of the syllabus of mathematics paper of B. Sc. is included in the structure of M.Sc. (Mathematics) syllabus.

MISSION AND VISION OF THE NEW SYLLABUS IN MATHEMATICS

Mission

- Improve retention of mathematical concepts in the student.
- To develop a spirit of inquiry in the student.
- To improve the perspective of students on mathematics as per modern requirement.
- To initiate students to enjoy mathematics, pose and solve meaningful problems, to use abstraction to perceive relationships and structure and to understand the basic structure of mathematics.
- To enable the teacher to demonstrate, explain and reinforce abstract mathematical ideas by using concrete objects, models, charts, graphs, pictures, posters with the help of FOSS tools on a computer.
- To make the learning process student-friendly by having a shift in focus in mathematical teaching, especially in the mathematical learning environment.
- Exploit techno-savvy nature in the student to overcome math-phobia.
- Propagate FOSS (Free and open source software) tools amongst students and teachers as per vision document of National Mission for Education.
- To set up a mathematics laboratory in every college in order to help students in the exploration of mathematical concepts through activities and experimentation.
- To orient students towards relating Mathematics to applications.

Vision

- To remedy Math phobia through authentic learning based on hands-on experience with computers.
- To foster experimental, problem-oriented and discovery learning of mathematics.
- To show that ICT can be a panacea for quality and efficient education when properly integratedand accepted.
- To prove that the activity-centered mathematics laboratory places the student in a problem solving situation and then through self exploration and discovery habituates the student into providing a solution to the problem based on his or her experience, needs, and interests.
- To provide greater scope for individual participation in the process of learning and becoming autonomous learners.
- To provide scope for greater involvement of both the mind and the hand which facilitates cognition?
- To ultimately see that the learning of mathematics becomes more alive, vibrant, relevant and meaningful; a program that paves the way to seek and understand the world around them. A possible by-product of such an exercise is that math-phobia can be gradually reduced amongst students.
- To help the student build interest and confidence in learning the subject.

Support system for Students and Teachers in understanding and learning FOSS TOOLS:

As a national level initiative towards learning FOSS tools, IIT Bombay for MHRD, Government of India is giving free training to teachers interested in learning open source soft wares like scilab, maxima, python, octave, geogebraand others.

(website: http://spoken-tutorial.org ; email: contact@spoken-tutorial.org ; info@spokentutorial.org)

REVISED SYLLABUS
FIRST SEMESTER
MATHEMATICS – I

(4 lecture hours per week+3 hours of practical /week per batch of not more than 15 students)

(56 HOURS)

THEORY

1. ALGEBRA - I

Matrices

Elementary row and column transformations (operations), equivalent matrices, theorems on it. Row- reduced echelon form, Normal form of a matrix, Rank of a matrix, Problems.

Homogeneous and Non – Homogeneous systems of *m* linear equations in *n* unknowns consistency criterion – criterion for uniqueness of solutions.

Eigenvalues and Eigenvectors of a square matrix of order 2 and 3, standard properties, Matrix polynomial, Cayley-Hamilton theorem (with proof). Finding A^{-1}, A^{-2} and A^2, A^3, A^4. Application Problems. **(14 lecture hours)**

2. CALCULUS – I

a) Differential Calculus

Successive Differentiation - n^{th} derivatives of the functions: e^{ax+b} , $(ax + b)^n$, $\log(ax + b)$, $\sin(ax + b)$, $\cos(ax + b)$, $e^{ax}\sin(bx+ c)$, $e^{ax}\cos(bx + c)$ – Problems. Leibnitz theorem (with proof) and its applications.

Partial differentiation –Function of two and three variables - First and higher order derivatives - Homogeneous functions – derivatives- Euler's theorem and its extension (with proof) - Total derivative and differential - Differentiation of implicit functions and composite functions – Problems - Jacobians – Properties of Jacobians problems. Application Problems

b) Integral Calculus

Reduction formulae for $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \cot^n x\,dx$, $\int \sec^n x\,dx$, $\int \operatorname{cosec}^n x\,dx$, $\int \sin^m x \cos^n x\,dx$, with definite limit - problems. Differentiation under integral sign by Leibnitz rule- problems. **(28 lecture hours)**

3. GEOMETRY

Analytical Geometry of Three Dimensions

Recapitulation of elements of three dimensional geometry- Equation of the sphere in general and standard forms - equation of a sphere with given ends of a diameter. Tangent plane to a sphere, orthogonality of spheres.

Standard equations of right circular cone and right circular cylinder and problems.

(14 lecture hours)

Note: All the derivations (book works) must be through vector methods with reduction to corresponding Cartesian equivalents.

Suggested distribution of lecture hours

1. Matrices: 1 hour perweek
2. Differential Calculus and Integral Calculus: 2 hours perweek
3. Analytic Geometry of three dimensions: 1 hour perweek.

Text Books

1. Shanti Narayan and P K Mittal, Text book of *Matrices*, 5th ed., New Delhi, S. Chand and Co. Pvt. Ltd., 2013.
2. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: S. Chand and Co. Pvt. Ltd., 2014.
3. Shanthi Narayan and P K Mittal, *Integral Calculus*, Reprint. New Delhi: S. Chand and Co. Pvt. Ltd., 2013.
4. Shanthi Narayan and P K Mittal, *Analytical Solid Geometry*. New Delhi: S. Chand and Co. Pvt. Ltd., 2014.
5. Philip N. Klein, *Coding the Matrix: Linear Algebra through Computer Science Applications*, Newtonian Press, 2013.
6. Brian Heinold, *A Practical Introduction to Python Programming*, Department of Mathematics and Computer Science, Mount St. Mary's University, 2019.

Reference Books

1. B S Vatssa, *Theory of Matrices*, New Delhi: New Age International Publishers, 2005.
2. A R Vashista, *Matrices,* Krishna Prakashana Mandir, 2003.
3. G B Thomasand and R L Finney, *Calculus and analytical geometry,* Addison Wesley, *1995.*
4. J Edwards, *An elementary treatise on the differential calculus: withapplications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
5. N P Bali, *Differential Calculus*, India: Laxmi Publications (P) Ltd.., 2010.
6. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., Vol. I & II, 1996.
7. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
8. SPMahajan & Ajay Aggarwal, *Comprehensive Solid Geometry*, 1st ed.: Anmol Publications , 2000.
9. H. Anton, I Birens and S. Davis, Calculus, John Wiley and Sons, Inc, 2002.

Useful web links:

1. http://www.cs.columbia.edu/~zeph/3203s04/lectures.html
2. http://home.scarlet.be/math/matr.htm
3. http://www.themathpage.com/
4. http://www.abstractmath.org/
5. http://ocw.mit.edu/courses/mathematics/

6. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
7. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
8. http://mathworld.wolfram.com/Calculus.html
9. http://ocw.mit.edu/courses/mathematics/
10. http://www.univie.ac.at/future.media/moe/galerie.html
11. http://mathworld.wolfram.com/AnalyticGeometry.html
12. http://www.nptelvideos.in/2012/11/mathematics.html
13. https://www.my-mooc.com/en/categorie/mathematics
14. www.python.org
15. www.rosettacode.org
16. http://faculty.msmary.edu/heinold/python.html
17. https://kitchingroup.cheme.cmu.edu/pycse/pycse.html

PRACTICALS – I

Mathematics practical with Free *and* **O***pen* **S***ource* **S***oftware* **(FOSS) tool for computer programs (3 hours/ week per batch of not more than 15 students)**

LIST OF PROBLEMS

1. Introduction to Python: Basic syntax, variable types, basic operators, numbers, strings, lists, tuples, functions and input/output statements.
2. Some simple programs to understand the relational, conditional and logical operators.
   i) Compare two numbers (less than, greater than) using *if* statement
   ii) Sum of natural numbers using *while* loop
   iii) Finding the factors of a number using *for* loop.
   iv) To check the given number is prime or not (use *if... else* statement).
   v) Find the factorial of a number (use *if...if...else*).
   vi) Simple programs to illustrate *logical operators (and, or, not*)

   Note: Give the structure of a while...do loop to the students and illustrate with an example.
3. Python commands to reduce given matrix to echelon form and normal form with examples.
4. Python program/command to establish the consistency or otherwise and solving system of linear equations.
5. Python command to find the n^{th} derivatives.
6. Python program to find n^{th} derivative with and without Leibnitz rule.
7. Obtaining partial derivative of some standard functions
8. Verification of Euler's theorem, its extension and Jacobean.
9. Python program for reduction formula with or without limits.
10. Python program to findequation and plot sphere, cone, cylinder.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

SECOND SEMESTER
MATHEMATICS – II

(4 lecture hours per week+ 3 hours of practicals /week per batch of not more than 15 students)

(56 HOURS)

THEORY

1. ALGEBRA - II

Group Theory

Binary operation, algebraic structure-problems on finding identity and inverse. Definitions of semigroup and group, abelian group – problems on finite and infinite groups. Properties of group with proof – standard problems on groups – A finite semi group with both the cancellation laws is a group – Any group of order less than five is abelian – permutation groups.

Subgroups- theorems on subgroups (with proof)- problems. **(14 lecture hours)**

2. CALCULUS - II

a) Differential Calculus

Polar coordinates - Angle between the radius vector and the tangent - Angle of intersection of curves (polar form) polar sub-tangent and polar subnormal- perpendicular from pole on the tangent - Pedal equations. Derivative of an arc in Cartesian, parametric and polar forms (with derivations).

Curvature of plane curves - formula for radius of curvature in Cartesian, parametric, polar and pedal forms - centre of curvature - evolutes. Singular points – Asymptotes – Envelopes. Application Problems

b) Integral Calculus

Applications of Integral Calculus: computation of length of arc, plane area and surface area and volume of solids of revolutions for standard curves in Cartesian and Polar forms. Application Problems.

(28 lecture hours)

3. DIFFERENTIAL EQUATIONS – I

Recapitulation of Solutions of ordinary differential equations of first order and first degree.

Solutions of:

(i) Linear equations, Bernoulli's equation.

(ii) Exact equations(excluding reducible to Exact)

Equations of first order and higher degree – nonlinear first order, higher degree – solvable for p - solvable for y - solvable for x - Clairaut's equation - singular solution - Geometric meaning. Orthogonal trajectories in Cartesian and polar forms. Application Problems.

(14 lecture hours)

Suggested distribution of lecture hours

1. Algebra-II (Group theory) : 1 hour / week
2. Calculus-II (Differential calculus & Integral Calculus): 2 hours / week.
3. Differential Equations-I: 1 hour / week.

Text Books

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: SChand and Co. Pvt. Ltd., 2014.
3. Shanthi Narayan and P K Mittal, *Integral Calculus*, Reprint. New Delhi: S. Chand and Co. Pvt. Ltd., 2013.
4. M D Raisinghania, Ordinary and Partial Differential Equations, S Chand and Co. Pvt. Ltd., 2014.
5. Eric Ayars, *Computational Physics with Python*, California State University, Chico.
6. Hans Petter Langtangen and Anders Logg, *Solving PDEs in Python*, Springer, 2017.

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*
6. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
7. N P Bali, *Differential Calculus*, New ed. New Delhi, India: Laxmi Publications (P) Ltd.., 2010.
8. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., vol. I & II, 1996.
9. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
10. E Spiegel, *Schaum's Outline of Advanced Calculus*, 5th ed. USA: Mc. Graw Hill., 2009.
11. M D Raisinghania, *Advanced Differential Equations*, S Chand and Co. Pvt. Ltd., 2013.
12. FAyres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 2010.
13. S Narayanan and T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Pvt. Ltd., 1981.
14. G F Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.
15. Hans Petter Langtangen, *A primer on Scientific programming with Python*, Springer, 2016.

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1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://ocw.mit.edu/courses/mathematics/
4. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
5. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
6. http://mathworld.wolfram.com/Calculus.html
7. http://ocw.mit.edu/courses/mathematics/
8. http://www.univie.ac.at/future.media/moe/galerie.html
9. http://tutorial.math.lamar.edu/classes/de/de.aspx
10. http://www.sosmath.com/diffeq/diffeq.html
11. http://www.analyzemath.com/calculus/Differential_Equations/applications.html
12. http://www.nptelvideos.in/2012/11/mathematics.html
13. https://www.my-mooc.com/en/categorie/mathematics
14. www.python.org
15. www.rosettacode.org
16. http://faculty.msmary.edu/heinold/python.html
17. https://kitchingroup.cheme.cmu.edu/pycse/pycse.html

PRACTICALS –II

Mathematics practicals with F*ree and* O*pen* S*ource* S*oftware* (FOSS) tool for computer programs (3 hours/ week per batch of not more than 15 students)

LIST OF PROGRAMMES

1. i). Verifying whether given operator is binary or not
   ii). To find identity and inverse element of a group
2. Plotting of standard Cartesian curves(Part-1)
3. Plotting of standard Cartesian curves (Part-2)
4. Plotting of standard polar curves
5. Plotting of standard parametric curves
6. Surface area and Volume of curves
7. Solution of differential equation and plotting(Part-1)
8. Solution of differential equation and plotting(Part-2)
9. Solution of differential equation and plotting(Part-3)
10. Solution of differential equation and plotting the solution(Part-4)

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

THIRD SEMESTER

MATHEMATICS-III

(4 lecture hours per week+ 3 hours of practicals /week per batch of not more than 15 students)

(56 HOURS)

THEORY

1. ALGEBRA - III

Groups

Order of an element of a group – properties related to order of an element- subgroup generated by an element of a group – Equivalence Class and partition of a set, coset decomposition of a group, Cyclic groups- properties- modulo relation- index of a group –Lagrange's theorem- consequences.

(14 lecture hours)

2. ANALYSIS – I

a) Sequences of Real Numbers

Definition of a sequences-Bounded sequences- limit of a sequences- convergent, divergent and oscillatory sequences- Monotonic sequences and their properties- Cauchy's criterion. Application Problems.

b) Series of Real Numbers

Definition of convergence, divergence and oscillation of series -properties of Convergence series - properties of series of positive terms – Geometric series Tests for convergence of series -p- series - comparison of series Cauchy's root Test -D Alembert's test. Raabe'stest ,- Absolute and conditional convergence-D' Alembert test for absolute convergence - Alternating series - Leibnitz test.

Summation of binomial, exponential and logarithmic series. Application Problems.

(28 lecture hours)

3. MATHEMATICAL METHODS -I

Definition and basic properties Laplace transform of some common functions and Standard results –Laplace transform of periodic functions- Laplace transforms ,of derivatives And the integral of function- Laplace transforms, Heaviside function convolution theorem (statement only) Inverse Laplace transforms. Application Problems. **(14 lecture hours)**

Suggested distribution of lecture hours

1. Algebra – III (Groups): 1 hour / week.
2. Analysis-I (sequences of real numbers and series of real numbers):2 hours /week
3. Mathematical Methods - I (1 hour / week.)

Text Books

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Pub. House Pvt. Ltd, 1991.
2. Boumslag and Chandler, *Schaum's outline series on groups*, 2010.

3. S.C.Malik and Savita Arora, *Mathematical Analysis*, 2nd ed. New Delhi, India: New Age international (P) Ltd., 1992.
4. John Kerl, Concrete abstract algebra in Python, Notes.
5. Titus Adrian Beu, Introduction to Numerical programming, CRC Press, Taylor and Fransis.
6. Eric Ayars, *Computational Physics with Python*, California State University, Chico.

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. Richard R Goldberg, *Methods of Real Analysis*, Indian ed. New Delhi, India: Oxford and IBH Publishing Co., 1970.
6. Raisinghania M.D., *Laplace and Fourier Transforms*. New Delhi, India: S. Chand and Co. Ltd. , 1995.

Usefulweb links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://ocw.mit.edu/courses/mathematics/
4. http://www.math.unl.edu/~webnotes/contents/chapters.htm
5. http://www-groups.mcs.st-andrews.ac.uk/~john/analysis/index.html
6. http://web01.shu.edu/projects/reals/index.html
7. http://www.mathcs.org/analysis/reals/index.html
8. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
9. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
10. http://mathworld.wolfram.com/Calculus.html
11. http://ocw.mit.edu/courses/mathematics/
12. http://www.nptelvideos.in/2012/11/mathematics.html
13. https://www.my-mooc.com/en/categorie/mathematics
14. www.python.org
15. http://doc.sagemath.org/html/en/thematic_tutorials/group_theory.html
16. http://doc.sagemath.org/html/en/reference/groups/sage/groups/abelian_gps/abelian_group_morphism.html
17. https://kitchingroup.cheme.cmu.edu/pycse/pycse.html

PRACTICALS –III

Mathematics practicals with Free *and* O*pen* S*ource* S*oftware* (FOSS) tool for computer programs(3 hours/ week per batch of not more than 15 students)

LIST OF PROBLEMS

1. Examples for finding right and left coset and the index of a group.
2. Examples to verify Lagrange's theorem.
3. Illustration of convergent, divergent and oscillatory sequence.
4. Illustration of convergent, divergent and oscillatory series.
5. Using Cauchy's criterion to determine the convergence of a sequence.
6. To find the sum of the series.
7. Finding the Laplace transform.
8. Finding the inverse Laplace transform.
9. Laplace transform method of solving first order ordinary differential equations with constant coefficients.
10. Laplace transform method of solving second order ordinary differential equations with constant coefficients

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

FOURTH SEMESTER
MATHEMATICS – IV

(4 lecture hours per week+ 3 hours of practicals /week per batch of not more than 15 students)

(56 HOURS)

THEORY

1. ALGEBRA –IV

Groups

Normal subgroups-examples and problems – Quotient group-Homomorphism and Isomorphism of groups-Kernel and image of a homomorphism-Normality of the Kernel-Fundamental theorem of homomorphism- properties related to isomorphism-Permutation group-Cayley's theorem. **(10 lecture hours)**

2. ANALYSIS -II

Fourier Series

Trigonometric Fourier series of functions with period 2π and period 2L - Half range Cosine and sine series. Application problems. **(10 lecture hours)**

3. CALCULUS - III

Differential Calculus

Definition of the limit of a function in ε-δ form – continuity- types of discontinuities. Properties of continuous function on a closed interval (boundedness, attainment of bounds and taking every value between bounds). Differentiability - Theorem : Differentiability implies Continuity - Converse not true. Rolle's Theorem- Lagrange's and

Cauchy's First Mean Value Theorem (Lagrange's form) - Maclaurin's expansion. Evaluation of limits by L' Hospital's rule

Continuity and differentiability of a function of two and three variables – Taylor's Theorem and expansion of functions of two variables- Maxima and Minima of functions of two variables. Method of Lagrange multipliers**.** **(22 lecture hours)**

4. DIFFERENTIAL EQUATIONS –II

Second and higher order ordinary linear differential equations with constant Coefficients- complementary function- particular integrals (standard types) Cauchy-Euler differential equation. Simultaneous linear differential equations (two variables) with constant coefficients. Solutions of second order ordinary linear differential equations with variables coefficients by the following methods.

(i) When a part of complementary function is given
(ii) Changing the independent variable
(iii) Changing the dependent variable
(iv) Variation of parameters
(v) Conditions for exactness and the solution when the equation is exact.

(14 lecture hours)

Suggested distribution of lecture hours

1. Algebra – IV, Analysis – II, Calculus - III: 3 hours / week.
2. Differential Equations II: 1 hour / week.

Text Books

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Boumslag and Chandler, *Schaum's outline series on groups*, 2010.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, 8th ed. New Delhi, India: Wiley India Pvt. Ltd., 2010.
4. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: SChand and Co. Pvt. Ltd., 2014.
5. M D Raisinghania, *Ordinary and Partial Differential Equations*,S Chand and Co. Pvt. Ltd., 2014.
6. John Kerl, Concrete abstract algebra in Python, Notes.

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. G B Thomas and R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*

6. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
7. N P Bali, *Differential Calculus*, Laxmi Publications (P) Ltd., 2010.
8. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., Vol. I & II, 1996.
9. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed.USA: Mc. Graw Hill., 2008.
10. E Spiegel, *Schaum's Outline of Advanced Calculus*, 5th ed. USA: Mc. Graw Hill., 2009.
11. M D Raisinghania, *Advanced Differential Equations*,S Chand and Co. Pvt. Ltd., 2013.
12. FAyres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 2010.
13. S Narayanan and T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Private Ltd., 1981.
14. G F Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.
15. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons,1984.

Useful web links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://www.fourier-series.com/
4. http://mathworld.wolfram.com/
5. http://www.princeton.edu/~rvdb
6. http://www.zweigmedia.com/RealWorld/Summary4.html
7. http://ocw.mit.edu/courses/mathematics/
8. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
9. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
10. http://mathworld.wolfram.com/Calculus.html
11. http://ocw.mit.edu/courses/mathematics/
12. http://www.univie.ac.at/future.media/moe/galerie.html
13. http://tutorial.math.lamar.edu/classes/de/de.aspx
14. http://www.sosmath.com/diffeq/diffeq.html
15. http://www.analyzemath.com/calculus/Differential_Equations/applications.html
16. http://www.nptelvideos.in/2012/11/mathematics.html
17. https://www.my-mooc.com/en/categorie/mathematics
18. www.python.org
19. http://www.auraauro.com/uncategorized/demonstration-of-fourier-series-using-python-code/
20. https://kitchingroup.cheme.cmu.edu/pycse/pycse.html

PRACTICALS –IV

Mathematics practicals with F*ree and* O*pen* S*ource* S*oftware* (FOSS) tool for computer programs(3 hours/ week per batch of not more than 15 students)

LIST OF PROBLEMS

1. Verification of normality of a given subgroup
2. Illustrating homomorphism and isomorphism of groups
3. To find full range trigonometric Fourier series of some simple functions with period 2π and 2L
4. Finding the half-range sine and cosine series of simple functions and plotting them.
5. Program to illustrate continuity of a function
6. Program to illustrate differentiability of a function
7. Program to verify Rolle's theorem
8. Program to verify and Lagrange's theorem
9. Evaluation of limits by L'Hospital's rule
10. Solution of second and higher order ordinary differential equations with constant coefficients
11. Solution of second order ordinary differential equations with variable coefficients
    i) Method of variation of parameters
    ii) When the equation is exact

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

FIFTH SEMESTER
MATHEMATICS - V

(3 lecture hours per week+ 3 hours of practicals /week per batch of not more than 15 students)

(42 HOURS)

THEORY

1. ALGEBRA - IV

Rings, Integral Domains, Fields

Rings, Types of Rings properties of rings – Rings of integers modulo n – Subrings – Ideals, Principal, Prime and Maximal ideals in a commutative ring - examples and standard properties following the definition - Homomorphism, Isomorphism - Properties - Quotient rings - Integral Domain- Fields - properties following the definition - Fundamental Theorem of Homomorphism of Rings - Every field is an integral domain - Every finite integral domain is a field - Problems.

(14 lecture hours)

2. MATHEMATICAL METHODS - II

Calculus of Variation

Variation of a function $f = f(x, y, y')$ – variation of the corresponding functional – extremal of a functional – variational problem – Euler's equation and its particular forms – Examples – standard problems like geodesics, minimal surface of revolution, hanging chain, Brachistochrone problem –Isoperimetric problems. Application Problems.

(14 Lecture hours)

3. NUMERICAL METHODS - I

Finite differences – Definition and properties of $\Delta, \nabla, \delta, \mu$ and E, the relation between them – The nth differences of a polynomial, Factorial notations, separation of symbols, divided differences and related theorems.

Newton – Gregory forward and backward interpolation formulae – Lagrange's and Newton's interpolation formulae for unequal intervals - Inverse interpolation

Numerical Integration: Quadrature formula – Trapezoidal rule -Simpon's 1/3 and 3/8 rule, Weddle's rule - problems. Application Problems.

(14 lecture hours)

Suggested distribution of lecture hours.

1. Algebra IV: 1 hour /week.
2. Calculus of Variation: 1 hours/week
3. Numerical Methods I : 1 hours/week

Text Books

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: SChand and Co. Pvt. Ltd., 2014.
3. M D Raisinghania, *Vector calculus*,S Chand Co. Pvt. Ltd., 2013.
4. M K Jain, S R K Iyengar, and R K Jain, *Numerical Methods for Scientific and Engineering Computation*, 4th ed. New Delhi, India: New Age International, 2012.
5. JaanKiusalaas, *Numerical methods in engineering with python 3*, Cambridge University press, 2013.
6. Philip N. Klein, *Coding the Matrix: Linear Algebra through Computer Science Applications*, Newtonian Press, 2013.

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. G B Thomas and R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*

6. B Spain, *Vector Analysis*, ELBS, 1994.
7. D E Bournes and, P C Kendall, *Vector Analysis*, ELBS, 1996.
8. S S Sastry, *Introductory methods of Numerical Analysis*, Prentice Hall of India, 2012.
9. Brian Heinold, *A Practical Introduction to Python Programming*, Department of Mathematics and Computer Science, Mount St. Mary's University, 2019.
10. Titus Adrian Beu, Introdution to numerical programming, CRC press, Taylor and Fransis.
11. J. C. Bautista, *Mathematics and Python programmings*, lulu.com, 2014.

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1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://ocw.mit.edu/courses/mathematics/
4. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
5. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
6. http://mathworld.wolfram.com/Calculus.html
7. http://www.univie.ac.at/future.media/moe/galerie.html
8. http://www.math.gatech.edu/~harrell/calc/
9. http://www.amtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/index.htm
10. http://math.fullerton.edu/mathews/numerical.html
11. http://www.onesmartclick.com/engineering/numerical-methods.html
12. http://www.nptelvideos.in/2012/11/mathematics.html
13. https://www.my-mooc.com/en/categorie/mathematics
14. www.python.org
15. https://docs.sympy.org/latest/modules/series/fourier.html
16. https://docs.sympy.org/latest/modules/series/fourier.html

PRACTICALS –V

Mathematics practicals with F*ree and* O*pen* S*ource* S*oftware* (FOSS) tools for computer programs (3 hours/ week per batch of not more than 15 students)

LIST OF PROBLEMS

2. Examples on different types of rings.
3. Examples on integral domains and fields.
4. Examples on subrings, ideals and subrings which are not ideals.
5. Homomorphism and isomorphism of rings- illustrative examples.
6. Example on Euler's equation in full form.
7. Example on particular forms of Euler's equation.
8. Examples on minimum surface of revolution and Brachistochrone problem.
9. Examples on Isoperimetric problems.
10. Programs on Interpolations with equal intervals.
11. Programs on Interpolations with unequal intervals.

12. Programs to evaluate integrals using Simpson's $\frac{1}{3}^{rd}$ and $\frac{3}{8}^{th}$ rule.

13. Programs to evaluate integrals using Weddle's rule.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

FIFTH SEMESTER

ELECTIVE - I
MATHEMATICS – VI(A)

(3 lecture hours per week+ 3 hours of practicals/week per batch of not more than 15 students)

(42 HOURS)

THEORY

1. CALCULUS - IV

Differential Calculus of Scalar and Vector Fields

Scalar field – gradient of a scalar field, geometrical meaning – directional derivative – Maximum directional derivative – Angle between two surfaces - vector field – divergence and curl of a vector field – solenoidal and irrotational fields – scalar and vector potentials – Laplacian of a scalar field – vector identities. Standard properties, Harmonic functions, Problems. Orthogonal curvilinear co-ordinates (only conversions)

(14 lecture hours)

2. CALCULUS – V

a) Line And Multiple Integrals

Definition of line integral and basic properties examples evaluation of line integrals.
Definition of double integral – its conversion to iterated integrals .Evaluation of double integrals by change of order of integration and by change of variables – computation of plane and surface areas, volume underneath a surface and volume of revolution using double integrals.
Definition of triple integral and evaluation – change of variables – volume as a triple integral .

(18 lecture hours)

b) Integral Theorems

Green's theorem (with proof) - Direct consequences of the theorem. The Divergence theorem (with proof) - Direct consequences of the theorem. The Stokes' theorem (with proof) - Direct consequences of the theorem.

(10 lecture hours)

Suggested distribution of lecture hours

1. Differential Calculus Of Scalar And Vector Fields: 1 hour /week.
2. Calculus VI (Line and Multiple Integrals and Integral theorems): 2 hours/week

Text Books

1. R Weinstock, *Calculus of Variation*, Dover Pub. Ltd., 1970.
2. M. D. Raisinghania, *Vector Calculus*, S Chand Co. Pvt. Ltd., 2013.
3. Philip N. Klein, *Coding the Matrix: Linear Algebra through Computer Science Applications*, Newtonian Press, 2013.
4. Hans Petter Langtangen, *A primer on Scientific programming with Python*, Springer, 2009.

Reference Books:

1. F B Hildebrand, *Methods in Applied Mathematics*,
2. B Spain,*Vector Analysis*, ELBS, 1994.
3. D E Bournesand and P C Kendall, *Vector Analysis*, ELBS, 1996.

Useful web links:

1. http://ocw.mit.edu/courses/mathematics/
2. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
3. http://mathworld.wolfram.com/Calculus.html
4. http://www.univie.ac.at/future.media/moe/galerie.html
5. http://www.math.gatech.edu/~harrell/calc/
6. http://www.nptelvideos.in/2012/11/mathematics.html
7. https://www.my-mooc.com/en/categorie/mathematics
8. www.python.org
9. http://kitchingroup.cheme.cmu.edu/blog/2013/02/02/Integrating-functions-in-python/
10. https://kitchingroup.cheme.cmu.edu/pycse/pycse.html

PRACTICALS – VI(A)

Mathematics practicals with F*ree and* O*pen* S*ource* S*oftware* (FOSS) tools for computer programs (3 hours/ week per batch of not more than 15 students)

LIST OF PROBLEMS

1. To demonstrate the physical interpretation of gradient, divergence curl and laplacian.
2. Using cyclic notations to derive some more vector identities
3. Evaluation of the line integral with constant limits.
4. Evaluation of the double integral with constant limits.
5. Evaluation of the triple integral with constant limits.
6. Evaluation of the line integral with variable limits.
7. Evaluation of the double integral with variable limits.
8. Evaluation of the triple integral with variable limits.
9. Green's theorem.
10. Gauss divergence theorem.
11. Stokes' theorem

FIFTH SEMESTER

ELECTIVE - II

MATHEMATICS – VI(B)

(3 lecture hours per week+ 3 hours of practicals/week per batch of not more than 15 students)

(42 HOURS)

THEORY

1. Number Theory

Introduction to number theory - Divisibility– Prime and composite numbers - Euclidean algorithm – fundamental theorem of Arithmetic – The greatest common divisor and least common multiple – congruences – Linear congruences –Simultaneous congruences – Wilson's, Euler's and Fermat's Theorems and their applications.

(14 lecture hours)

2. Graph Theory

Konigsberg bridge problem, graph, subgraph, adjacency, incidency, degree of a vertex, finite and infinite graphs, order and size of a graph, multiple edges, loops, simple graph,multigraph,general graph,underlying graph, r - regular graph, complete graph,walk,trail, path, closed walk,circuit cycle, directed graph, connected and disconnected graphs, component of a graph,trees, pendant vertices in a tree, distance and centers in a tree, rooted and binary trees, spanning Trees - with fundamental theorems and examples. **(14 lecture hours)**

3. Fourier Transforms

The Fourier integral, Different forms of Fourier integral, Problems complex Fourier Transform, Self reciprocals, slit functions Basic properties of Fourier transforms, Linear, Change of scale, Shifting, Modulation. Derivation of a Function Extension.

Fourier sine and cosine Transform and Inverses properties, self reciprocal. The derivatives – theorems and problems.

(14 lecture hours)

Suggested distribution of lecture hours:

1. Number Theory: 1 hour / week.
2. Graph Theory: 1 hour / week
3. Fourier Transforms: 1 hour / week

Text Books

1. David M. Burton, *Elementary Number Theory*, 6th ed., Tata McGraw-Hill Edition, Indian reprint, 2007.
2. Frank Harary, *Graph Theory*, Addison-Wesley Publishing Company, 1969.
3. Douglas B. West, *Introduction to Graph Theory*, 2nd edition, Pearson, 2015.
4. F. B. Hildebrand, *Method of Applied Mathematics*, Dover Publications.
5. Mohammed Zuhair Al-Taie and Seifedine Kadry, *Python for Graph and Network Analysis*, Springer, 2017.

Reference Books

1. Neville Robinns, *Beginning Number Theory*, 2nd ed., Narosa Publishing House Pvt. Ltd., Delhi, 2007.
2. Narsingh Deo, *Graph Theory*, Prentice-Hall of India Pvt. Ltd., 2000
3. B Spain, *Vector Analysis*, ELBS, 1994.
4. Lokenath Debnath and D Bhatta, Integral *Transforms and their Applications*, Taylor and Fransis, 2002.

Useful web links:

1. http://ocw.mit.edu/courses/mathematics/
2. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
3. http://mathworld.wolfram.com/Calculus.html
4. http://www.univie.ac.at/future.media/moe/galerie.html
5. http://www.math.gatech.edu/~harrell/calc/
6. http://www.nptelvideos.in/2012/11/mathematics.html
7. https://www.my-mooc.com/en/categorie/mathematics
8. www.python.org
9. http://kitchingroup.cheme.cmu.edu/blog/2013/02/02/Integrating-functions-in-python/
10. https://www.geeksforgeeks.org/
11. https://www.python-course.eu/graphs_python.php
12. https://medium.com/apprentice-journal/the-graph-theory-an-introduction-in-python-5906d5be0e4b
13. https://pypi.org/project/graph-theory/

PRACTICALS –VI (B)

Mathematics practical with F*ree and* O*pen* S*ource* S*oftware* (FOSS) tools for computer programs(3 hours/ week per batch of not more than 15 students)

LIST OF PROBLEMS

1. Check whether given number is prime or not.
2. Program to find the GCD and LCM
3. Program to compute elements of the sequences
4. Create a graph using adjacency matrix and then show all the edges that exist in the graph.
5. Find the adjacency matrix from the given digraph.
6. Find the degree of all vertices in a graph.
7. Program to find the connected components of a undirected graph.
8. Check whether given degrees of vertices represent a graph or tree.
9. To return a list of all paths (without cycles).
10. Find if there is a path between two vertices in a graph.
11. Detect cycle in a directed graph.
12. To find the Fourier integrals for the given function
13. To find the Fourier sine and cosine Transform

SIXTH SEMESTER

MATHEMATICS – VII

(3 lecture hours per week + 3 hours of practicals/week per batch of not more than 15 students)

(42 HOURS)

THEORY

1. ALGEBRA –V

Linear Algebra

Vector space – Examples – Properties – Subspaces – criterion for a subset to be a subspace –linear span of a set - linear combination – linear independent and dependent subsets – Basis and dimensions– Standard properties – Examples illustrating concepts and results.

Linear transformations – properties – matrix of a linear transformation – change of basis – range and kernel – rank and nullity – Rank – Nullity theorem –Eigen values and eigen vectors of linear transformation - Application Problems

(14 lecture hours)

2. DIFFERENTIAL EQUATIONS III

a) Orthogonal Curvilinear Coordinates

Definition of orthogonal curvilinear coordinates. Fundamental vectors or base vectors, Scale factors or material factors - quadratic differential form. Spherical, Cartesian, cylindrical co-ordinate systems-Theorem: The Spherical and cylindrical coordinate systems are orthogonal curvilinear coordinate system (excluding problems on conversion of one system to another).

b) Partial Differential Equations

Total differential equations-Necessary condition for the equation $Pdx + Qdy + Rdz = 0$ to be integrable - Simultaneous equations of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

Formation of partial differential equation - Equations of First Order Lagrange's linear equation – Charpit's method, Standard types of first order non-linear partial differential equation (By known substitution).

Solution of second order linear partial differential equations in two variables with constant coefficients by finding complementary function and particular integral

Solution of one – dimensional heat equations, Solution of one – dimensional wave equations using Fourier series- Application Problems.

(28 lecture hours)

Suggested distribution of lecture hours:

1. Algebra-V (Linear Algebra) : 1 hours / week.
2. Differential Equations III: 2 hours / week

Text Books

1. Krishnamoorty V K and Mainra V P and Arora J L, *An Introduction to Linear Algebra*, Reprint. New Delhi, India: Affiliated East West Press Pvt. Ltd., 2003.
2. M. D. Raisinghania, *Vector Calculus,* S Chand Co. Pvt. Ltd., 2013.
3. M D Raisinghania, *Ordinary and Partial Differential Equations*,S Chand and Co. Pvt. Ltd., 2014.
4. Hans Petter Langtangen, *A primer on Scientific programming with Python*, Springer, 2009.

Reference Books

1. G Strang, Linear Algebra and its Applications, Thomson, 2007
2. B Spain, *Vector Analysis*, ELBS, 1994.
3. D E Bournes and, P C Kendall, *Vector Analysis*, ELBS, 1996.
4. Frank Ayres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 1972.
5. GF Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.
6. S Narayanan & T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Private Ltd., 1981.
7. I N Sneddon, *Elements of Partial Differential Equations*, 3rd ed.: Mc. Graw Hill., 1980.

Useful web links:

1. http://ocw.mit.edu/courses/mathematics/
2. http://mathworld.wolfram.com/Calculus.html
3. http://www.math.gatech.edu/~harrell/calc/
4. http://tutorial.math.lamar.edu/classes/de/de.aspx
5. http://www.sosmath.com/diffeq/diffeq.html
6. http://www.analyzemath.com/calculus/Differential_Equations/applications.html
7. http://www.nptelvideos.in/2012/11/mathematics.html
8. https://www.my-mooc.com/en/categorie/mathematics
9. www.python.org
10. https://docs.sympy.org/0.7.6/modules/mpmath/calculus/differentiation.html
11. https://apmonitor.com/pdc/index.php/Main/SolveDifferentialEquations
12. https://kitchingroup.cheme.cmu.edu/pycse/pycse.html

PRACTICALS –VII

Mathematics practicals with F*ree and* O*pen* S*ource* S*oftware* (FOSS) tools for computer programs(3 hours/ week per batch of not more than 15 students)

LIST OF PROBLEMS

1. i) Vector space, subspace – illustrative examples.
   ii) Expressing a vector as a linear combination of given set of vectors.
   iii) Examples on linear dependence and independence of vectors.

2. i) Basis and Dimension – illustrative examples.
   ii) Verifying whether a given transformation is linear.
3. i) Finding matrix of a linear transformation.
   ii) Problems on rank and nullity.
4. Solutions to the problems on total and simultaneous differential equations.
5. Solutions to the problems on different types of Partial differential equations.
6. Solving second order linear partial differential equations in two variables with constant coefficient.
7. Solving some more second order linear partial differential equations in two variables with constant coefficient.
8. Solution of one dimensional heat equation using Fourier series with Dirichlet condition.
9. Solution of one dimensional heat equation using Fourier series with Neumann condition.
10. Solution of one dimensional wave equation using Fourier series with Dirichlet condition.
11. Solution of one dimensional wave equation using Fourier series with Neumann condition.

SIXTH SEMESTER
ELECTIVE - I

MATHEMATICS – VIII(A)

(3 lecture hours per week+ 3 hours of practicals /week per batch of not more than 15 students)

(42 HOURS)

THEORY

1. ANALYSIS - III

Complex Analysis

Complex numbers-Cartesian and polar form-geometrical representation-complex-Plane-Euler's formula- $e^{i\theta} = \cos\theta + i\sin\theta$. Functions of a complex variable-limit, continuity and differentiability of a complex function. Analytic function Cauchy-Riemann equations in Cartesian and Polar forms-Sufficiency conditions for analyticity(Cartesian form only)-Harmonic function-standard properties of analytic functions-construction of analytic function when real or imaginary part is given-Milne Thomson method.

Complex integration-the complex integration–properties, problems.Cauchy's Integral theorem-proof using Green's theorem- direct consequences.Cauchy's Integral formula with proof-Cauchy's generalized formula for the derivatives with proof and applications for evaluation of simple line integrals - Cauchy's inequality with proof – Liouville's theorem with proof. Fundamental theorem of algebra with proof.

Transformations – conformal transformation – some elementary transformations namely Translation,rotation,magnification and inversion - examples.

The bilinear transformation (B.T.)-cross ratio-invariant points of a B.T.-properties-

(i) B.T. sets up a one to one correspondence between the extended z-plane and the extended w-plane.

(ii) Preservation of cross ratio under a B.T.

(iii) A B.T. transforms circles onto circles or straight lines.

Problems on finding a B.T., and finding images under a B.T.and invariant points of a B.T. Discussion of transformations w = z^2 , w = sin z , w = cosh z and w = e^z.

(28 lecture hours)

2. NUMERICAL METHODS – II

Numerical solutions of algebraic and transcendental equations – method of successive bisection - method of false position – Newton-Raphson method. Numerical solutions of non-Homogeneous system of linear algebraic equations in three variables by Jacobi's method and Gauss-Seidel method. Computation of largest Eigen value of a square matrix by power method.

Solutions of initial value problems for ordinary linear first order differential equations by Taylor's series, Euler's and Euler's modified method and Runge-Kutta 4^{th} ordered method.

(14 lecture hours)

Suggested distribution of lecture hours:

1. Analysis-III (Complex Analysis): 2 hours / week.
2. Numerical Methods-II: 1 hour / week

Text Books

1. S Shanthinarayan, *Complex Analysis*, S Chand Co. Pvt. Ltd., 2012.
2. M K Jain, S R K Iyengar, and R K Jain, *Numerical Methods for Scientific and Engineering Computation*, 4th ed. New Delhi, India: New Age International, 2012.
3. B. Bradie, *A Friendly Introduction to Numerical Analysis*, Pearson Education, India, 2007.
4. Brian Heinold, *A Practical Introduction to Python Programming*, Department of Mathematics and Computer Science, Mount St. Mary's University, 2019.
5. Titus Adrian Beu, *Introduction to Numerical programming*, CRC press, Taylor and Francis.

Reference Books

1. R V Churchil & J W Brown, *Complex Variables and Applications*, 5th ed.: McGraw Hill Companies., 1989.
2. L V Ahlfors, *Complex Analysis*, 3rd ed.: Mc Graw Hill. , 1979.
3. A R Vashista, *Complex Analysis*, Krishna Prakashana Mandir, 2012.
4. S S Sastry, *Introductory methods of Numerical Analysis*, Prentice Hall of India, 2012.

Useful web links:

1. http://www.mathcs.org/analysis/reals/index.html
2. http://www.amtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/index.htm
3. http://math.fullerton.edu/mathews/numerical.html
4. http://www.onesmartclick.com/engineering/numerical-methods.html
5. http://www.nptelvideos.in/2012/11/mathematics.html
6. https://www.my-mooc.com/en/categorie/mathematics

7. www.python.org
8. https://docs.sympy.org/latest/modules/series/fourier.html
9. https://kitchingroup.cheme.cmu.edu/pycse/pycse.html

PRACTICALS –VIII (A)

Mathematics practicals with F*ree and* O*pen* S*ource* S*oftware* (FOSS) tools for computer programs(3 hours/ week per batch of not more than 15 students)

LIST OF PROBLEMS

1. Some problems on Cauchy-Riemann equations (polar form).
2. Implementation of Milne-Thomson method of constructing analytic functions(simple examples).
3. Illustrating orthogonality of the surfaces obtained from the real and imaginary parts of an analytic function.
4. Verifying real and imaginary parts of an analytic function being harmonic (in polar coordinates).
5. Illustrating the angle preserving property in a transformation.
6. Illustrating that circles are transformed to circles by a bilinear transformation.
7. Examples connected with Cauchy's integral theorem.
8. Solving algebraic equation (Bisection method).
9. Solving algebraic equation (Regula-Falsi and Newton-Raphson methods
10. Solving system of equations (Jacobi and Gauss-Seidel methods).
11. Solving for largest eigenvalue by Power method.
12. Solving ordinary differential equation by modified Euler's method.
13. Solving ordinary differential equation by Runge-Kutta method of 4^{th} order.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

MATHEMATICS – VIII (B)
ELECTIVE - II

(3 lecture hours per week+ 3 hours of practical /week per batch of not more than 15 students)

(42 HOURS)

THEORY

1. Linear Programming

Linear inequalities and their graphs. Statement of the linear programming problem in standard form-classification of solutions-solution of linear programming problems by graphical method.

Illustrative examples on the solution of linear programming problems in two and three variables by the simplex method. (Maximization and minimization)

Transportation problem:- North West rule, Vogel's method, Row minima method, Column minima method. **(14 lecture hours)**

2. Particle Dynamics

Newton's laws of motion – Conservative forces and potential energy - Definitions of work, kinetic energy and power.

Motion of a particle in a uniform force field – simple harmonic motion – Two dimensional motion of projectiles, Inclined plane.

(14 lecture hours)

3. Improper Integrals

Gamma and Beta functions-results following definitions-Relations connecting the two functions-duplication formula-Applications to evaluation of integrals.

(14 lecture hours)

Text book:

1. Robert J. Vanderbei, *Linear Programming*, Springer, 1996.
2. A. R. Vasishtha and D. C. Agarwal, *Dynamics of a Particle*, Krishna Prakashana Media Pvt. Ltd., 2003.
3. Murrey R. Spiegel, *Theory and Problems of Advanced Calculas*, Schaum's Outline series.
4. Hans Petter Langtangen, *A primer on scientific programming with Python*, Springer, 2016.
5. Surg Kruk, *Practical Python A1 projects: Mathematical models of optimization problems*, A press, 2018.
6. J. C. Bautista, *Mathematics and Python programming*, lulu.com, 2014.

Reference Book:

1. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, *Linear programming and Network flows*, 2nd Ed., John Wiley and Sons, India, 2004.
2. Hamdy A. Taha, *Operations Research*: *An introduction*, 8th Ed., Tata McGraw Hill, Singapore, 2004.
3. A. P. Roberts, *Statics and Dynamics with Background in Mathematics*, Cambridge University press, 2003.
4. Lokenath Debnath and D. Bhatta, *Integral Transforms and their Applications*, Taylor and Fransis Group, 2002.
5. Dimitris Bertsimas and J. N. Tsitsiklis, *Introduction to linear Optimization*, Athena Scientific, 1997.

Useful web links:

1. http://www.mathcs.org/analysis/reals/index.html
2. http://www.amtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/index.htm
3. http://math.fullerton.edu/mathews/numerical.html
4. http://www.onesmartclick.com/engineering/numerical-methods.html
5. http://www.nptelvideos.in/2012/11/mathematics.html
6. https://www.my-mooc.com/en/categorie/mathematics.

7. www.python.org
8. http://coderview.stackexchange.com//
9. http://scibook.readthedocs.io/en/latest/intro.html
10. http://gist.github.com/mick001/f4864f36551e89ab7bc4.
11. http://www.analyticsvidhya.com/blog/2017/02/lintroductory-guide-on-linear-programming-explained-in-simple-english/
12. http://kitchingroup.cheme.cmu.edu/blog/2013/02/02/Integrating-functions-in-python/

PRACTICALS –VIII (B)

Mathematics practical with F*ree and* O*pen* S*ource* S*oftware* (FOSS) tools for computer programs(3 hours/ week per batch of not more than 10 students)

LIST OF PROBLEMS

1. Graphs with linear inequalities.
2. Solution of linear programming problem by graphical method.
3. Implementation of the simplex method.
4. Implementation of solution procedure for the transportation problem.
5. Application of Newton's law of motion-problems on conservative forces and potential energy.
6. Problems on work done, kinetic energy and power.
7. Problems on simple harmonic motion.
8. Problems on two-dimensional motion of projectiles.
9. Problems on gamma and beta functions.
10. Problems on duplication formula.
11. Problems on evaluation of improper integrals in applications.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

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Structure of B.Sc. Mathematics papers

Semester	Title of the paper		Teaching hrs/week	Duration of Exam (hrs)	IA MARKS	EXAM MARKS	TOTAL MARKS	Semester Total
1	B.Sc. I	Theory	4 hrs	3 hrs	30	70	100	150
		Practical	3 hrs	3 hrs	15	35	50	
2	B.Sc. II	Theory	4hrs	3 hrs	30	70	100	150
		Practical	3 hrs	3 hrs	15	35	50	
3	B.Sc. III	Theory	4 hrs	3 hrs	30	70	100	150
		Practical	3 hrs	3 hrs	15	35	50	
4	B.Sc. IV	Theory	4 hrs	3 hrs	30	70	100	150
		Practical	3 hrs	3 hrs	15	35	50	
5	B.Sc. V	Theory	3 hrs	3 hrs	30	70	100	150
		Practical	3hrs	3 hrs	15	35	50	
	B.Sc. VI(A) or VI(B)	Theory	3 hrs	3 hrs	30	70	100	150
		Practical	3 hrs	3 hrs	15	35	50	
6	B.Sc. VII	Theory	3 hrs	3 hrs	30	70	100	150
		Practical	3 hrs	3 hrs	15	35	50	
	B.Sc. VIII(A) or VIII(B)	Theory	3 hrs	3 hrs	30	70	100	150
		Practical	3 hrs	3 hrs	15	35	50	

Note: In the Practical component out of 35 marks: 25 for practical exam + 5 for vivo +5 for lab record.

PATTERN OF THE QUESTION PAPER

FROM 1st TO 4th SEMESTER

Time: 3 Hours **Max.Marks:70**

I	Answer any FIVE of the following (8 questions are given)	$5 \times 2 = 10$ Marks
II	Answer any THREE of the following (05 questions are given)	$3 \times 5 = 15$ Marks
III	Answer any THREE of the following (05 questions are given)	$3 \times 5 = 15$ Marks
IV	Answer any TWO of the following (03 questions are given)	2x 5 = 10 Marks
V	Answer any TWO of the following (03 questions are given)	2x 5 = 10 Marks
VI	Answer any TWO of the following (03 questions are given) Questions to be taken only from Application part	2x 5 = 10 Marks

PATTERN OF THE QUESTION PAPER

FOR 5th and 6th SEMESTER

I	Answer any FIVE of the following (8 questions are given)	$5 \times 2 = 10$ Marks
II	Answer any THREE of the following (05 questions are given)	$3 \times 5 = 15$ Marks
III	Answer any THREE of the following (05 questions are given)	$3 \times 5 = 15$ Marks
IV	Answer any THREE of the following (05 questions are given)	3x 5 = 15 Marks
V	Answer any THREE of the following (05 questions are given) Questions to be taken only from Application part	3x 5 = 15 Marks

SYLLABUS PERTAINING TO MBA DEGREE OF BANGALORE UNIVERSITY

Revised MBA (Day & Evening) Syllabus for the Academic Year 2021-2022

CANARA BANK SCHOOL OF MANAGEMENT STUDIES

BANGALORE UNIVERSITY

Dear all,

Dr Y Nagaraju, Professor, and I thank all the Director/Heads of affiliated MBA Institutions who supported us in this endeavour of upgrading the MBA Syllabus.

Our special thanks to:

Dr S R Sridharamurthy, President, NSB Academy and team,

Dr Kiran Reddy, CEO, AIMS,

Dr K M Nagendra, Director, BIMS,

Dr K Y Reddy, Director, PIMS,

Dr Geetha Rajaram, Director, GIMS,

Dr Venkatesh, ABBS,

Dr Binu Paul, Christ Academy,

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Dr Usha Prabhu, City College,

Dr Arijit Roy, St Claret College and

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Grateful thanks to all the members of the MBA Board of Studies.

Dr. Cynthia Menezes,

Director, Canara Bank School of Management Studies, Bangalore University,

Dean, Faculty of Commerce and Chairperson, Board of Studies of MBA

COURSE MATRIX

Course Matrix of I Semester MBA (DAY)

Paper Code	Subject	Credit	Contact Hours	I.A.	U.E.	Total Marks
1.1	Economics for Managers	4	60	30	70	100
1.2	Organizational Behaviour	4	60	30	70	100
1.3	Accounting for Managers	4	60	30	70	100
1.4	Statistics for Management	4	60	30	70	100
1.5	Marketing for Customer Value	4	60	30	70	100
1.6	Legal Aspects and Intellectual Property Rights	4	60	30	70	100
1.7	Managerial Skills-1	2	30	30	70	100
Total		26	390	210	490	700

Course Matrix of II Semester MBA (DAY)

Paper Code	Subject	Credit	Contact Hours	I.A	U.E	Total Marks
2.1	Technology for Management	4	60	30	70	100
2.2	Management Research Methods	4	60	30	70	100
2.3	Entrepreneurship & Ethics	4	60	30	70	100
2.4	Human CapitalManagement	4	60	30	70	100
2.5	Financial Management	4	60	30	70	100
2.6	Quantitative Techniques and Operation Research	4	60	30	70	100
2.7	Managerial Skills-2	2	30	30	70	100
Total		26	390	210	490	700

Course Matrix of I Semester MBA (Evening)

Paper Code	Subject	Credit	Contact Hours	I.A.	U.E.	Total Marks
1.1	Economics for Managers	4	60	30	70	100
1.2	Organizational Behaviour	4	60	30	70	100
1.3	Accounting for Managers	4	60	30	70	100
1.4	Statistics for Management	4	60	30	70	100
1.5	Marketing for Customer Value	4	60	30	70	100
1.6	Legal Aspects and Intellectual Property Rights	4	60	30	70	100
				180	420	600
1.7	Project Work- I	2	-	-	-	100
Total		26				700

Course Matrix of II Semester MBA (Evening)

Paper Code	Subject	Credit	Contact Hours	I.A	U.E	Total Marks
2.1	Technology for Management	4	60	30	70	100
2.2	Management Research Methods	4	60	30	70	100
2.3	Entrepreneurship & Ethics	4	60	30	70	100
2.4	Human CapitalManagement	4	60	30	70	100
2.5	Financial Management	4	60	30	70	100
2.6	Quantitative Techniques and Operation Research	4	60	30	70	100
				180	420	600
2.7	Project Work-11	2				100
Total		26				700

MBA COURSE MATRIX-YEAR 2

III SEMESTER	IV SEMESTER
CORE COURSES	
3.1. Strategic Management and Corporate Governance	4.1. International Business
3.2. Project and Operations Management	

III SEMESTER	IV SEMESTER
3.3 FINANCE	**4.2 FINANCE**
3.3.1 Business Valuation and Value Based Management	4.2.1 Financial Techniques for Strategic Decision-making
3.3.2 Indian Financial Systems	4.2.2 International Financial Management
3.3.3. Investment Analysis and Management	4.2.3 Risk Management and Derivatives
3.3.4. Business Analytics using Excel	4.2.4 Data Analysis and Visualization using Tableau
3.4 MARKETING	**4.3 MARKETING**
3.4.1 Retailing Management and Services	4.3.1 Strategic Brand Management
3.4.2 Consumer Behaviour	4.3.2 Marketing Research and Metrics
3.4.3 Rural and Agricultural Marketing	4.3.3 Digital Marketing
3.4.4. Business Analytics using Excel	4.3.4 Data Analysis and Visualization using Tableau
3.5 HUMAN RESOURCES	**4.4 HUMAN RESOURCES**
3.5.1 Learning And Development	4.4.1 Strategic HRM
3.5.2 Team Dynamics at work	4.4.2 International HRM
3.5.3 Performance Management Systems	4.4.3 Talent and Knowledge Management
3.5.4 Business Analytics using Excel	4.4.4 Data Analysis and Visualization using Tableau
3.6 HEALTHCARE MANAGEMENT	**4.5 HEALTHCARE MANAGEMENT**
3.6.1 Perspectives On Health Care Sector	4.5.1 Basic Management Aspects of Health Care
3.6.2 Management Of Public Health Systems	4.5.2 Strategic Management in Health Care Settings

3.6.3 Health Economics	4.5.3 Management of Hospital Services
3.6.4. Business Analytics using Excel	4.5.4 Data Analysis and Visualization using Tableau
3.7 BANKING FINANCE AND INSURANCE SERVICES MANAGEMENT (BFIS)	**4.6 BANKING FINANCE AND INSURANCE SERVICES MANAGEMENT (BFIS)**
3.7.1 Strategic Credit Management In Banks	4.6.1 Banking Technology and Management
3.7.2 Insurance Planning & Management	4.6.2 International Financial Management
3.7.3 Indian Financial System	4.6.3 Risk Management for Banks and Insurance Companies
3.7.4. Business Analytics using Excel	4.6.4 Data Analysis and Visualization using Tableau
3.8 STARTUPS AND SMES MANAGEMENT	**4.7 STARTUPS AND SMES MANAGEMENT**
3.8.1 Perspectives On Start-ups And SME	4.7.1 Technology and Innovation
3.8.2 Basic Management Aspects Of Small Business	4.7.2 Internationalization of SMEs
3.8.3 Establishment Of SMEs	4.7.3 Management of Start-ups
3.8.4. Business Analytics using Excel	4.7.4 Data Analysis and Visualization using Tableau
3.9 BUSINESS ANALYTICS	**4.8 BUSINESS ANALYTICS**
3.9.1 Data Science Using R And Python	4.8.1 Data Visualisation
3.9.2 Advanced Statistical Methods For Business Decision Making	4.8.2 Business Forecasting
3.9.3 Analytics For Decision Making	4.8.3 Data Warehousing and Data Mining
3.9.4. Business Analytics using Excel	4.8.4 Data Analysis and Visualization using Tableau
3.10 LOGISTICS AND SUPPLY CHAIN MANAGEMENT	**4.9 LOGISTICS AND SUPPLY CHAIN MANAGEMENT**
3.10.1 Inventory Management	4.9.1 Supply Chain Planning and Strategies
3.10.2 Supply Chain Management	4.9.2 Global Procurement and Sourcing
3.10.3 Logistics Management Systems and Practices	4.9.3 Vendor Management
3.10.4. Business Analytics using Excel	4.9.4 Data Analysis and Visualization using Tableau

Name of the Program: Master of Business Administration

Course Code:1.1

Name of the Course: Economics for Managers

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Learning Objectives:

1. To introduce the concepts of Scarcity and Efficiency.
2. To explain principles of micro-economics relevant to managing an organization.
3. To describe principles of macroeconomics to understand the economic environment of business.
4. To learn the basic Micro and Macroeconomic concepts.
5. To have an understanding of Demand, Production, Cost, Profit and Market competitions
   with reference to a firm and industry.

Course Outcomes: On successful completion of the course, the students will be able to;

1. Understand the application of Economic Principles in Management decision making.
2. Learn the micro economic concepts and apply them for effective functioning of a Firm and Industry.
3. Understand, assess and forecast Demand.
4. Apply the concepts of production and cost for optimization of production.
5. Design Competitive strategies like pricing, product differentiation etc. and marketing according to the market structure.

Module 1: Introduction 8 HOURS

Introduction to Managerial Economics, Economic Systems, Principles of managerial economics, Integration with other managerial decision-making process, Tools and analysis for optimization, Roleof Government and private sector, Competition Vs Cooperation. Relationship with other management subjects. Production Possibility Frontiers (PPF) – Productive efficiency Vs economic efficiency – economic growth & stability – Microeconomies and Macroeconomies – the role of markets and government – Positive Vs Negative externalities.

Module 2: Demand and Supply Analysis 10 HOURS

Definition of demand, Law of demand and its determinants and exceptions, elasticity of demandand supply, movement along the demand curve and shift in demand curve, Demand and supply relationship. Definition of supply, Law of supply, Movement along the supply curve and shift in supply curve. Relationship of Revenue and elasticity of demand, Methods of Demand forecastingand its use in demand. Interpretation of Quantitative and Qualitative demand techniques- model specification using regression and OLS.

Module 3: Consumer and Producer Behavior 12 HOURS

Introduction to Consumer behavior, Utility, Cardinal approach, Ordinal approach, Consumer's equilibrium using Indifference curve analysis and Consumer surplus, Application of Indifference curve analyses Market, Production – Short-run and long-run Production Function – Returns to scale – economies Vs diseconomies of scale, ISO-Quants & ISO-Cost line, – Analysis of cost – Short-run and long-run cost function – Relation between Production and cost function, Break Even Analysis – Meaning, Assumptions, Determination of BEA, Limitations, Uses of BEA in Managerial decisions (with simple Problems).

Module 4 Market Structure and Pricing Practices: 12 HOURS

Different Market structure, features, determination of price under perfect competition and equilibrium in the short run and the long run, Monopoly - features, equilibrium condition, Price discrimination. Monopolistic Competition: Features, Pricing Under monopolistic competition Oligopoly: Features, Kinked demand

Curve, Cartels, Price leadership., Game theory-types, static and dynamic games Pricing Approaches: Full cost pricing, Product line pricing, Pricing Strategies: Price Skimming,Penetration Pricing, Loss leader pricing, Peak Load pricing.

Module 5: Business Environment and Economy Performance 10 HOURS

Nature, Scope, Structure of Indian Business Environment – Internal and External Environment. Political and Legal Environment, Economic Environment, Socio – Cultural Environment, Global Environment, Macro-economic aggregates – circular flow of macroeconomic activity – National income determination– Aggregate demand and supply – Macroeconomic equilibrium – Components of aggregate demand and national income – multiplier effect.

Module 6: Industrial Policies 8 HOURS

Industrial Policies of India, New Industrial Policy 1991; Private Sector- Growth, Problems and Prospects, SMEs –Significance in Indian economy-problems and prospects. Fiscal policy and Monetary Policy. Foreign Trade: Trends in India's Foreign Trade, Impact of WTO on India's Foreign Trade.

Skill Development Activities:

1. Assessment of Demand Elasticity – Price, Income, Cross, Advertising.
2. Demand Forecasting: Application of qualitative and quantitative methods of demand forecasting to various sectors (Automobile, Service, Pharmaceutical, Information Technology, FMCG, Hospitality etc.) in India.
3. Preparing a Project proposal for a Business Venture.

SUGGESTED READINGS:

1. Paul A. Samuelson, William D. Nordhaus, Sudip Chaudhuri and Anindya Sen, (2019), Economics, 20th ed, Tata McGraw Hill, New Delhi.
2. Ritika Sinha : Managerial Economics, SBPD Publishing House
3. Richard Lipsey and Alec Charystal, (2015), Economics, 13th edition, Oxford, University Press, New Delhi.

4. Samuelson, W. F., Marks, S. G., & Zagorsky, J. L. (2021). Managerial economics.
John Wiley & Sons.

References:

1. H. Craig Petersen, W. Cris Lewis, Sudhir K. Jain, (2019), Managerial Economics, 8th Edition, Pearson Education
2. Dominick, S., Siddhartha K. Rastogi (2018) Managerial Economics, Eighth Edition,
Oxford University Press.

Name of the Program: Master of Business Administration

Course Code: 1.2

Name of the Course: Organizational Behaviour

Course Credits	No. of Hours per Week	Total No. Of Teaching Hours
4 Credits	4 Hrs.	60 Hrs

Course Learning Objectives:

1. To understand the nature of organization and interaction between individuals and the organization.
2. To acquire the knowledge, skills and behaviors to work in different teams and situation towork in global environment

Course Outcomes: On successful completion of the course, the students will be able to;

1. Demonstrate understanding and application of Concepts and principles of Organizational behavior, perception and personality.
2. Improving practical experience in the field of Management and Organization Behaviour
3. Develop skills and ability to work in groups to achieve organizational goals.
4. Develop a greater understanding about Behavioral aspects to analyze the conceptsrelated to individual behavior, attitude, and personality.
5. Design motivational techniques for job design, employee involvement, incentives,rewards & recognition.

Module 1: Nature and Principles of Management 8 HOURS

Evolution of management, Indian contributions to Management practices roles and skills of managers, Foundations of OB, OB models, reasons and benefits of studying OB, OB is an Inter-disciplinary subject, challenges and opportunities of OB.

Module 2: Personality 10 HOURS

Shaping of personality, types of personalities, determinants of personality, personality and workperception, process of perception and managing the perception process, perception influencing decision making and ethical issues in decision making from an individual and Organization perspective. Learning, explicit and implicit knowledge, principles of learning, learning process and theories of learning, Organizational reward system. Attitudes, changing and work-related attitudes, components and types of attitudes, values and Human dignity

Module 3: Motivation Theories 12 HOURS

Motivation across cultures, managerial issues and motivational challenges, Motivation in work settings, employee Involvement, Organizations are social system Stress management, work stress model, stress and performance Group and team dynamics, group development, group decision making, types of teams, team vs groups, team issues and effective teamwork. Leadership and management, Theories of leadership, leadership styles and their implications, power and politics,ethics of power and politics.

Module 4: Communication and Conflict 8 HOURS

Organization communication, methods and tools used in communication, informal communications, changing views of conflict, the process of conflict, conflict resolution, effects of conflicts in organization, Transactional analysis, Johari window.

Module 5: Organizational Structure and Types 12 HOURS

Organization structure, organizational design and organizations for future Organizational culture creating and sustaining a positive culture, effects of culture, types of culture in the organization
changing culture.

Module 6: Organizational Development 10 HOURS

Types of change, forces for change in organizations, resistance to change, Organizational development, human resource policies and methods of OD.

Skill Development Activities:

- Students will be divided into groups to identify, analyze, and develop a plan for resolvinga key problem that an organization is facing and to analyze and apply OB concepts in a real organization.
- Identifying any five job profiles and listing out the various types of abilities required forthose jobs and also the personality traits required for the jobs.
- Based on learning concept of perception, conduct a role play in an organization to findout the impact of perceptual errors on perceptual interpretation.
- Develop few questions, interact with people in the organization to observe their personality and reaction

Suggested Readings:

1. Fred Luthans, “Organizational Behaviour”, (2019)12th Edition, McGraw Hill International Edition

2. Stephen P. Robbins, “Organizational Behaviour, (2018) , 8th Edition, Prentice Hall
3. Buchanan, D. A., & Huczynski, A. A. (2019). Organizational behaviour. Pearson UK.

References

1. Aswathappa K, (2017), Organizational Behaviour (Text, Cases and Games). 12th Edition, Himalaya Publication House.

Name of the Program: Master of Business Administration

Course Code:1.3

Name of the Course: Accounting for Managers

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4Hrs	60 Hrs

Course Objectives:

1. To introduce students to Accounting Process, Accounting Standards and modern accounting softwareand IFRS.
2. To orient the students about Financial Statements, its analysis and interpretation for decision making.
3. To provide skills for eliciting information and making decisions.
4. To give knowledge on the latest trends and developments in the field of accounting.

Course Outcomes: By the end of this course, a student would be able to;

1. Demonstrate theoretical knowledge and its application in real time accounting.
2. Capable of preparing financial statement of companies.
3. Independently undertake financial statement analysis and take decisions.
4. Comprehend emerging trends in accounting and computerization of accounting systems.

Course Contents:

Module One: Conceptual Basis for Accounting 10 HOURS

Introduction, Meaning and definition, understanding forms of Business Organizations, Framework and process of Accounting (Journalizing business transactions, posting into ledger accounts and preparation of Trial Balance), objectives and purpose of accounting information, users of Accounting information, Branches of Accounting, Basic terminology, Fraud and Ethical Issues in accounting.

Module Two: Orientation to Financial Statement 10 HOURS

Financial Statements of Companies: Income statement, Balance sheet, Statement of Changes in Equity,Cash Flow Statement and Notes to accounts – Terms and Jargons

in financial statements, accounting concepts and conventions. Orientation to Indian Accounting Standards.

Module Three: Analyzing and Interpreting Financial Statements 12 HOURS

Objectives of financial statements analysis, sources of information, standards of comparison, Quality of earnings, window dressing, Beating window dressing, Presentation of Financial Statements for analysis and interpretation. Analyzing financial statements - Ratio Analysis, Du-Pont Model, Altman's Z score, Modified C Score, Piotroski's F Score; Trend Analysis, Comparative Statements, Common Size Statements; Reading Cash Flow Statement.

Module Four: Orientation to Cost Accounting 8 HOURS

Meaning of Costs, Classification of Costs on the basis on elements, functions and behaviour. Costascertainment – preparation of Cost Sheet.

Module Five: Managerial Decision-making 12 HOURS

Cost Management – Techniques for controlling and reducing cost – Marginal Costing and CVP Analysis,Decision areas – Make or Buy, Profitable Product Mix and Addition of a New product line Budgetary Control – Preparation of Flexible budgets and reporting of variances.

Module Six: Trends and Developments in Accounting 8 HOURS

Orientation to Accounting Packages. Cloud Accounting, Responsibility Accounting, ForensicAccounting, Human Resource Accounting, Corporate Social Reporting (Triple Bottom Line),Environmental Accounting.

Skill Development Activities:

- Preparation of Financial Statements using quarterly / yearly transactions of a small businessenterprise
- Listing the contents of Annual Reports of at least 10 companies
- Analyzing performance of a company based on its annual report, using DU PONT Model, Altman's ZScore and Piotroski's F Score.
- Eliciting information from annual report and presenting it for facilitating decision making Hands-on practice on any accounting software.

Suggested Readings:

1. Narayanaswamy R (2019), Financial Accounting – A Managerial Perspective, Eight Edition, PHI Learning Pvt. Ltd. Publication.
2. Jain and Khan (2020), Management Accounting- Text, Problems and Cases, Sixth Edition, Tata McGraw Hill Publication.
3. S.N Maheswari & S.K Maheswari, (2018), Corporate Accounting, Sixth Edition, Vikas Publishing House Pvt. Limited.

References:

1. Prasanna Chandra (2017), Finance Sense- Finance for Non- finance Executives, Sixth edition, Tata McGraw Hill Publication.
2. Anthony Robert and S Recce James (2019), Accounting Principle, Sixth Edition, A.I.T.B.S Publication.

Name of the Program: Master of Business Administration

Course Code:1.4

Name of the Course: Statistics for Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
Credits: 4	Hours: 4	60 Hrs

Course Learning Objectives:

1. To elevate students' awareness of data in everyday life and prepare them for a career intoday's age of information
2. To have a proper understanding of Statistical applications in Management.
3. To develop statistical literacy skills in students in order to comprehend and practice statistical ideas at many different levels
4. To learn some common and simple concepts of applied statistics which will be useful tothem while analyzing data sets obtained from different scientific experiments.
5. To promote the practice of the scientific method in our students: the ability to identify questions, collect evidence (data), discover and apply tools to interpret the data, and communicate and exchange results.
6. To provide students with the foundations of probabilistic and statistical analysis mostlyused in varied applications.

Course Outcomes: On successful completion of the course, the students will be able to:

1. Acquire knowledge of statistics and its scope and importance in various areas.
2. Achieve statistical literacy and will be able to find ways to move beyond the-what ofstatistics to the how and why of statistics.
3. Describe and discuss the key terminology, concepts tools and techniques used in businessstatistical analysis.
4. Critically evaluate the underlying assumptions of analysis tools.
5. Identify the type of statistical situation to which different distributions can be applied.
6. Demonstrate understanding of the concepts of time series and its applications in differentareas.

COURSE CONTENTS

MODULE 1- Introduction to Statistics 10 HOURS

Statistical Data: Primary and Secondary data – Sources of Data – Classification of data - Frequency Distribution – Diagrammatic and Graphic Representation of Data – Graphs – Advantages and Limitations of Diagrams and Graphs - Tabulation: Types of Tables- Construction of one way and two way tables. Measures of central tendency: Mean, Median and Mode and their implications, Measures of Dispersion: Range, Mean deviation, Standard deviation, Coefficient of Variation, Skewness, Kurtosis

MODULE 2: Correlation & Time Series 12 HOURS

Correlation Analysis: Positive and Negative Correlation, Karl Pearson's Coefficient of Correlation, Spearman's Rank Correlation, Concept of Multiple and Partial Correlation. Regression Analysis: Concept, Least Square fit of a Linear Regression, Two lines of Regression, and properties of Regression coefficients. Time series analysis: Concept, Additive and Multiplicative models, Components of time series. Trend analysis: Least Square method, Linear and Non- Linear equations, Exponential shooting method, Applications in business decision-making. Index Numbers: Meaning, Types of index numbers, Uses of index numbers,Construction of Price, Quantity and Volume indices, Fixed base and Chain base methods

MODULE 3 – Probability and Probability Distribution 10 HOURS

Probability: Concept of probability and its uses in business decision-making; Addition and multiplication theorems; Bayes' Theorem and its applications. Probability Theoretical Distributions: Concept and application of Binomial; Poisson and Normal distributions

MODULE 4 - Sampling Distribution and Estimation 8 HOURS

Introduction to sampling distributions, Sampling distribution of mean and proportion, Sampling techniques. Estimation: Point and Interval estimates for population parameters of large sample and small samples, determining the sample size.

MODULE 5 - Testing of Hypothesis 12 HOURS

Hypothesis testing: one sample and two sample tests for means and proportions of large samples (z-test), one sample and two sample tests for means of small samples (t-test), F- test for two sample standard deviations. ANOVA one and two way – Design of

experiments. Chi-square test for single sample standard deviation, Chi-square tests for independence ofattributes and goodness of fit, Rank sum test, Kolmogorov-Smirnov, Mann – Whitney U test and Kruskal Wallis test

MODULE 6 Decision Theory 8 HOURS

Decision Theory – Decision under certainty, Decision making under risk (EMV criteria) and Decision making under uncertainty. Decision Tree – Concept – Construction of Decision Tree and Analysis.

Skill Development Activities:

- Collect primary data by constructing a questionnaire
- Analyze the trend on sales of an automobile industry for past 10 years.
- Assess the degree of relationship between Income and savings of your parents for past 6months.
- Form a Hypothesis and test for its significance
- Case studies on Decision Tree.

SUGGESTED READINGS

1. P. N. Arora, S. A. (2018), Comphrehensive Statistical Methods, S. Chand Publishers, 7th Edition, New Delhi
2. Richard I. Levin, D. S. (2020), Statistics For Management (Seventh Edition ed.), Pearson Publi, 9th Edition, New Delhi
3. Sharma, J. (2014), Busiuness Statistics (4th Edition ed.), Vikas Publishing House Pvt Limited, New Delhi, India
4. T N Srivastava, S. R. (2018), Statistics For Management, Tata McGraw-Hill Publishing Company Limited, New Delhi, India

REFERENCES

1. SC Gupta, Fundamentals of Statistics, Himalaya Publications.2019, latest Edition
2. N.D. Vohra, Business Statistics, Tata McGraw Hill, 2018, latest Edition
3. Anderson D.R., Sweeney D.J. and Williams T.A., Statistics for business and economics,12th edition, Thomson (South – Western) Asia, Singapore, 2019.

Name of the Program: Master of Business Administration

Course Code:1.5

Name of the Course: Marketing for Customer Value

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4Hrs	60 Hrs

Course Learning Objectives:

1. Make students have an understanding of the fundamental concepts of marketing & the environment inwhich marketing system operates.
2. To analyze the motives influencing buying behavior & Describe major bases for segment marketing, targetmarketing, and market positioning.
3. Identify a Conceptual framework, covering basic elements of the marketing mix.
4. To understand fundamental premise underlying market driven strategies.
5. Giving them hands on practical approach to subject study.

Course Outcomes:

On successful completion of the course, the students will be able to;

1. Develop an ability to assess the impact of the environment on marketing function.
2. To formulate marketing strategies that incorporate psychological and sociological factors whichinfluence buying.
3. Understand concept of Branding, development of product and significance of market segmentation, targeting and positioning.
4. Identifying marketing channels and the concept of product distribution.
5. Identifying techniques of sales promotion, significance of marketing research.

COURSE CONTENT

MODULE 1: Introduction to marketing 12 HOURS

Introduction: Concept, nature, scope and importance of marketing; Marketing concept and its evolution; Marketing mix; Strategic marketing planning – an overview. Market Analysis and

Selection: Marketing environment – macro and micro components and their impact on marketing decisions. concept of market segmentation, Bases for market segmentation,

Types of market segmentation, Effective segmentation criteria, Evaluating & Selecting, Target Markets, Concept of Target Market, Positioning and differentiation strategies, Concept of positioning.

MODULE 2: Product Decisions: 8 HOURS

Concept of a product; Classification of products; Major product decisions; Product line and product mix; Branding; Packaging and labeling; Product life cycle – strategic implications; New product development and consumer adoption process. Pricing Decisions: Factors affecting price determination; Pricing policies and strategies; Discounts and rebates.

MODULE 3: Distribution Channels: 8 HOURS

Distribution Channels and Physical Distribution Decisions: Nature, functions, and types of distribution channels; Distribution channel intermediaries; Channel management decisions; Retailing and wholesaling.

MODULE 4: Promotion Decisions 12 HOURS

Communication Process; Promotion mix – advertising, personal selling, sales promotion, publicity and public relations; Determining advertising budget; Copy designing and testing; Media selection; Advertising effectiveness; Sales promotion – tools and techniques.

MODULE 5: Marketing Research 8 HOURS

Meaning and scope of marketing research; Marketing research process. Marketing Organization and Control: Organizing and controlling marketing operations

MODULE 6: Issues and Developments in Marketing 12 HOURS

Social, ethical and legal aspects of marketing; Marketing of services; International marketing; Green marketing; Cyber marketing; Relationship marketing and other developments of marketing.

Suggestive Readings:

1. Kotler, Gary, (2019). Principles of Marketing, (16th ed.), Pearson Publications, Noida.
2. Kotler, Kevin Lane, Keller. (2018). Marketing Management (15e ed.), Pearson, Noida:
3. V S Ramaswamy, N. Namakumari. (2018). Marketing Management. (Fifth, Ed.), McGraw Hill Education, New Delhi, India:
4. Michael J. Etzel, Bruce J. Walker, William J.Stanton, Ajay Pandit. (2018). Marketing, 14e ed, McGraw Hill Education, Chennai, India.

References

1. Prachi Gupta, Ashita Aggarwal, Hufrish Majra, Isaac Jacob, Varsha Jain, Ritu Narang. (2017), Marketing Management-Indian Cases, 1st Edition, Pearson, Chennai.
2. Rajan Saxena. (2017). Marketing Management. (Fifth.Ed.), McGraw Hill Education, New Delhi, India.

Name of the Program: Master of Business Administration

Course Code: 1.6

Name of the Course: **Legal Aspects and Intellectual Property Rights**

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
Credits:4	Hrs:4	60 Hrs

Course Learning Objectives:

1. To find out the key components of intellectual property and their use in business
2. To compare and contrast the different forms of intellectual property from the perspective ofnature and subject matter of legal protection.
3. To identify the real-life examples of application of different intellectual property in businesses
4. To analyze the legal disputes involving companies in relation to intellectual property
5. To explain the integration of intellectual property with businesses with examples
6. To develop an ability to apply for the acquisition of different types of intellectual property

Course Outcomes:

On successful completion of the course, the students will be able to:

1. Find out the key components of intellectual property and their use in business.
2. Compare and contrast the different forms of intellectual property from the perspective ofnature and subject matter of legal protection.
3. Identify the real-life examples of application of different intellectual property in businesses.
4. Analyze the legal disputes involving companies in relation to intellectual property
5. Explain the integration of intellectual property with businesses with examples
6. Develop an ability to apply for the acquisition of different types of intellectual property

COURSE CONTENT

Module 1: Introduction to Labour Codes, Code on Wages, Occupational Safety, Health and Working Conditions Code. 10 HOURS

Introduction to labor codes, Importance and Evolution of labor codes, comparison of new labor codes and old labor related acts. Code on Wages, 2019; Definitions, Minimum Wages, Payments of Wages, Payment of Bonus, Central and state Advisory board, payment of dues claims and audits, offenses, and penalties, miscellaneous.

Occupational Safety, Health and working Conditions Code, 2020- preliminary definitions, Registration of establishments, duties of employer and employees, occupational safety and health, health safety and working conditions, hours of work and annual leave with wages, maintenance of registers, records and returns, special provisions relating to employment of women, contract labor and interstate migrant workers, offenses and penalties, social security fund, miscellaneous.

Module 2: Social Security Code and Industrial Relations Code 10 HOURS

The Code on Social Security, 2020, preliminary definitions, social security organizations, employees provident fund, employee state insurance corporation, gratuity, maternity benefits, employees' compensation, social security and cess, social security for unorganized, gig and platform workers, offenses and penalties, employment information and monitoring, miscellaneous.

Industrial Relations Code, 2020, preliminary definitions, bipartite forums, trade unions, standing orders, notices of change, voluntary reference of disputes to arbitration, mechanism for resolution of industrial disputes, strikes and lockouts, layoff, retrenchment and closure-special provisions, unfair labor practices, offenses and penalties and miscellaneous

Module 3: Information Technology Act, 2000 8 HOURS

IT Act 2000, preliminary definitions, Amendments, digital signature, electronic governance, attribution, acknowledgement and dispatch of electronic records, secure electronic records and digital signature, regulations of certifying authority, duties of subscribers, penalties and adjudication, cyber regulations appellate (tribunal), offenses and miscellaneous.

Module 4: Introduction to IPR 8 HOURS

IPRs – Invention and Creativity, Intellectual Property, Importance and Protection of Intellectual Property Rights (IPRs), A brief summary of patents. Copyrights, Trademarks, Industrial designs, Integrated circuits, Geographical Indications, Establishment of WIPO, Applications and procedures of WIPO

Module 5: Law of Copyrights and Designs 10 HOURS

Introduction to Copyright Law, International Conventions relating to Copyright Law, Core Principles: Idea-Expression Dichotomy, Originality and Fixation Under Copyright Law, Original Literary, Dramatic, Musical and Artistic works, Sound Recording and Cinematograph Films, Authorship, Ownership, Transfer of Rights and Registration of Copyright, Rights of Copyright Owner under Copyright Law, Infringement of Copyright, Fair Use-Fair Dealing & Secondary Liability, limitations on the Right of the Copyright Owner Fair Use-Fair Dealing as a Defense under Copyright Law.

Module 6: Law of Patents and procedures 10 HOURS

Patent System: An Overview, Patentability, Patent/Prior Art Search, drafting a Patent Specification, Patent Procedure in India, Patent Cooperation Treaty, Patent Infringement, Freedom to Operate, Defenses For Infringement Action & Remedies; Prosecution History Estoppel- Defenses, Experiment, Research Or Education, Government Use, Patent Exhaustion, Patent Misuse, Inequitable Conduct, Remedies - Relevant Cases.

Skill Development Activities:

1. Conducting model Group Discussion
2. Download and fill form for Patent or Copyright
3. Group Discussion on cases relating to copyrights in Indian film industry

Suggestive Readings:

1. New Labour and Industrial Laws, (2020), October 2020th Edition, Taxmann Publication Pvt. Ltd.
2. Intellectual property law, Revised and updated, Eastern Law House; 3rd edition (1 December 2020).
3. Egazette.nic.in

References:

1. Fundamentals of Intellectual Property, Kalyan C. Kankanala, (2017), 3rd Edition, Asia Law House.
2. Subbaram N R, Handbook on Intellectual Property Law and Practice, S Vishwanathan, (1998), Printers and Publishing Private Limited.
3. Susan K Sell, Private Power, Public Law: The Globalization of Intellectual Property Rights, Cambridge University Press, 2003

Name of the Program: Master of Business Administration Course Code:1.7 **Name of the Course: Managerial Skills-1**		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
Credits:2	Hrs:2	30 Hrs

Course Learning Objectives:

1. To learn the basic skills of managing people, leading teams and improving work processes.
2. To enable the students to become aware of their communication skills and sensitize them about the importance and barriers to communication and to make themaware of gateways so as to enhance their potential to become successful managers.
3. To enable learners to draft reports, resumes, emails and business letters effectively.
4. To prepare students to develop the art of negotiation with emphasis on empatheticlistening and decision making.
5. To train students towards Inter-Personal Skills – working in teams and conflict managementskills.

Course Outcomes:

On successful completion of the course, the students will be able to:

1. Describe and understand the elements of managerial skills.
2. Communicate better across teams and clients.
3. Demonstrate empathy in negotiations with assertiveness.
4. Apply creative thinking to reach a beneficial outcome.
5. Know their strengths and build on the essential Managerial Skills.

Module 1: Introduction to Essential Skills for Managers 5 HOURS

Definition, Importance of Managerial Skills, Essential Skills - Problem solving, Critical thinking,Creativity, Leadership, Collaboration and Communication, Interpersonal Skills; Forward planning- Strategic thinking, Motivation; Empathy, Value and Culture.

Module 2: Communication Skills 6 HOURS

Fundamentals, Types - horizontal, vertical, oral, written, email etiquettes; Virtual meetings; Delegation, assigning tasks, Building Communication matrix, Report writing, Journaling, Feedback, Difficult conversations.

Module 3: Motivation Skills: 5 HOURS

Meaning, Hierarchy of Motivation; Power and Purpose, 8 skills of Motivation,Situational motivation, and stimulus control, Solving Behavioral problems; Motivating teams; keys to Intrinsic motivation, Motivation and Organizational Cycles.

Module 4: Team Formation Skills 4 HOURS

Teams- meaning, types; team structure, Stages of Team Development; Writing a Team Charter; Roles and Responsibilities on a Team; Leading Teams; Gain Consensus, Team facilitation.

Module 5: Listening Skills 5 HOURS

Importance and need, types of listening active and empathic listening, listening and judgment, developing skills, listening and understanding, Anatomy of poor Listening, features of a good Listener; Acknowledgment and use of Silence; Body Language, Feedback.

Module 6: Interpersonal Skills for Managers 5 HOURS

Forms - building trust, emotional intelligence, empathy, vulnerability, and listening skills; Negotiation skills - persuading or influencing others, Differing in ideas; Relationship Management; Receptiveness to Feedback, Self Confidence.

Skill Development Activities:

- Design a Self-Assessment Test for understanding essential skills.
- Role Play to initiate meaningful communication.
- Role play through any given situation to motivate Teams.
- Writing a Team Charter.
- Arrange a virtual meeting and test the negotiation skills.
- Case Study to observe the empathetic behavior skills.

Suggested Readings:

1. Stephen R Covey, (2018), The 7 Habits of Highly Effective People, 12th Edition, Simon & Schuster.
2. Nierenberg, Calero and Grayson, (2018), The New Art of Negotiating, Rupa Publishers.
3. Nierenberg Bovee, Till and Schatzman, (2003), Business Communication today, 7th Edition, Pearson.
4. Zenger, Hougaard, Carter, Bregman, (2019), Mindful Listening, HBR Emotional Intelligence Series.

REFERENCES

1. Scot Ober, (2007), Contemporary Business Communication, 7th Edition, Houghton Mifflin.
2. Richard Banks, (2021), The Art of Active Listening, Nxt Level International
3. Chaturvedi P. D, &Mukesh Chaturvedi, (2011) Business Communication: Concepts, Cases AndApplications —2/e, Pearson Education

Master of Business Administration

Course Code: 2.1

Name of the Course: Technology for Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Learning Objectives:

1. To evaluate the role of technology in achieving competitive business advantage through strategic decision making
2. To help students in developing the ability to develop, deploy and manage technology interms of creating firm's value creation
3. To elevate student's consciousness about the ethical responsibilities while dealing with the information and technology

Course Outcomes: On successful completion of the course, the students will be able to:

1. Analyze the role of technology in gaining a strategic perspective on business decisionmaking
2. Gain the skills required in deploying, developing and managing the applicable firm'stechnological importance
3. Understand and behave ethically while dealing with information and technology

Course Content

Module 1: Introduction to Information Systems 12 HOURS

Information System: Concept of Data and Information, Meaning and Role of Information Systems, Elements and types of a System, Conversion/Installation modes of Information System, Strategic Information System. Classification of Information Systems: Management Information System (MIS), Transaction Processing Systems (TPS), Decision Support System(DSS), Knowledge Management System (KMS),

Operations Support System (OSS), Management Support System(MSS), Process Control System(PCS), Enterprise Collaboration System(ECS), Artificial Intelligence (AI), Applications of Artificial Intelligence: Neural Networks, Fuzzy Logical Control Systems, Virtual Reality, Expert Systems (ES), Executive Information Systems (EIS)

Module 2: Management Information System 10 HOURS

Management Information System (MIS): Definition and characteristics of MIS, Components of MIS, Function and Role of MIS, Process of MIS Implementation, Applications of MIS, System view of Business, Development of MIS within the organization, System approach in Planning, Organizing and Controlling MIS, Reasons for the failure of MIS.

Database Management Systems (DBMS): Overview; Components, Objectives of DBMS, Functions performed by DBMS, Recent trends in DBMS, The Concept of RDBMS;

Module 3: Information Systems Analysis and Design 12 HOURS

Applications of Information System: Information System for Strategic Advantage, Strategic role for information system, Breaking business barriers and Improving business qualities, Business process reengineering. Information system analysis and design: Information SDLC, Stages in System Analysis – Structured SAD and tools like DFD (Data Flow Diagram), Context Diagram Decision Table, System Development models: Water Flow, Prototype, Spiral; Hardware and Software acquisition, system testing, documentation and its tools, conversion methods. Emerging Concepts and Issues in Information Systems: Supply Chain Management, Customer Relationship Management, ERP, Introduction to Data Warehousing, Data Mining and its Applications

Module 4: E-commerce and its Applications 10 HOURS

Technology Adoption, Diffusion, and Absorption: New Technologies, Automation decisions, Technology Adoption, Perspectives of innovation diffusion process, Technology absorption – Role, benefits; Issues Involved in the Management of Technology and Government Initiatives E-commerce: Introduction, Comparison

between Traditional commerce and E-commerce, Advantages & disadvantages of E-commerce, Buying & Selling on Internet, Challenges in Implementing Electronic Commerce, Electronic Payment System, Electronic Commerce and banking, E-Security in cyberspace payment

Module 5: Ethics in IT 4 HOURS

Security and Ethical challenges of IT: Ethical Responsibility- Business Ethics, Technology Ethics; Ethical responsibilities of Business Professionals, environmental impact analysis, CyberCrime and Privacy Issues – Hacking, cyber theft, unauthorized use at work, Software and Intellectual property, Issues on internet privacy.

Ethical issues pertaining to Technology: Cloud and mobile computing, Internet of Things, M-Commerce, IT influence on the changing business environment, Health and Social Issues, Ergonomics and Cyber terrorism

Module 6: Introduction to Application Software 12 HOURS

Basics of MS-Word, MS-Excel and MS-Power point; Application of these software's for documentation and making reports; Preparation of questionnaires, Presentations, Tables and reports (Practical). Basic ways of connecting to the internet, Internet Protocol, IP Address, Working with GoogleServices: Docs, Spreadsheet, presenter, sites etc;

Introduction to Oracle or MySQL, MS Access: Overview of MS-Access. Creating tables, queries,forms and reports in MS-Access

Skill Development Activities:

1. Students should study the adoption of technology by various business entities
2. Students should simulate a business environment, access its technological needs and create
3. Hypothetical technological framework for its strategic building

Suggested Readings:

1. Rohtagi P K, Rohtagi K and Bowonder B, (2018), Introduction to Technological Forecasting, Tata McGraw Hill,New Delhi, Single Edition.
2. Ramesh, B. (2018), Computer Fundamentals and Information Technology. New Delhi:Laxmi Publication Pvt. Ltd, Single Edition.
3. David Cyganski, John A. Orr , Richard F. Vaz (2000) Information Technology: Inside and outside. New Delhi: Prentice Hall, Single Edition.

References:

1. Leon, A. (2019). Fundamentals of Information Technology. New Delhi: Vikas Publishing, Second Edition.
2. Goel, R & Kakkar, D.N. Computer Applications in Management. New Delhi:New Age International, Third Edition.
3. Laudon, K. & Laudon J. (2014). MIS: Managing the Digital Firm. New Delhi: Pearson Education. Sixteen Edition.
4. James, O. B. (2015). Introduction to Information Systems. New Delhi: Tata McGraw Hill, Thirteen Edition.

Name of the Program: Master of Business Administration Course Code: 2.2 **Name of the Course: Management Research Methods**		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
Credits: 4	Hrs: 4	60 Hrs

Course Learning Objectives:

1. To understand the concepts, tools and terminologies used in research world.
2. To identify the methods best suited for investigating different types of problems and questions.
3. To construct research questions that are based on and build upon a critical appraisal ofexisting research.
4. To develop a research design and analysis the results to provide suggestions based onresearch findings.
5. To apply Data visualization for exploratory analysis and communicate effectively to diverseaudience.

Course Outcomes: On successful completion of the course, the students will be able to

1. Demonstrate ability to understand different research terminologies.
2. Identify research problems and questions
3. Develop methodology for research problems
4. Analyse data required for business decision-making.
5. Propose suggestions based on the findings from the research
6. Apply Data visualization for exploratory analysis and communicate effectively to diverseaudience

Course Content

Module 1: Business Research 8 HOURS

Meaning, Objectives, purpose, types, scope and significance of research in business and industry. Criteria for Good research, Ethics in research. Research Process - Steps in research, identification and formulation of research problem, extensive literature review, Research gap, statement of the problem, need for the study, Variables- meaning and types. Theoretical framework, research questions. Deductive and inductive logic.

Module 2: Formulation of Research Problem and Hypotheses 10 HOURS

Identifying and formulating research problem, Diagnosis of symptoms and problem. Setting research objectives. Doing review of literature – purpose, methods. Hypothesis – Meaning, Purpose, Sources, characteristics of hypotheses, types of hypotheses, Formulation of hypothesis.

Module 3 Measurement and Data Collection concepts 12 HOURS

Sample design, steps in sampling process, sampling methods – probability Sampling and non- probability sampling, sampling error, Criteria for good sample, determining sample size (infinite and finite). Measurement – Types of Scales, Scaling techniques.

Meaning of Primary and Secondary data, Primary data collection methods - observations, survey, interview and Questionnaire, Qualitative Techniques of data collection, Questionnaire design – Meaning - process of designing questionnaire. Secondary data -Sources – advantages and disadvantages.

Measurement and Scaling Techniques: Basic measurement scales-Nominal scale, Ordinal scale, Interval scale, Ratio scale. Attitude measurement scale - Likert's Scale, Semantic Differential Scale, Thurstone scale, Multi-Dimensional Scaling. Case Study as per the chapter needs.

Module 4 Data Analysis 12 HOURS

Data processing – Editing, coding, tabulation, normality and stationary test, pictorial and graphical presentation of Data, Parametric and non-parametric hypothesis testing,

hypothesis testing using statistical tools such as descriptive statistics, Chi–square, t-test, ANOVA, Correlation and Regression.

Module 5 Report Writing and Presentation of Results 8 HOURS

Classification and tabulation, Research presentation, Types of report - Research proposal, research report. Format of a report- Layout, Precautions. Citation and referencing.

Module 6 Introduction and Application to Business Analytics 10 HOURS

Data – Information – Intelligence – Knowledge Approach, Types of Analytics, Types of Digital Data, Sources of Data, Importance of Data Quality, Looking at Data from many perspectives, Evolutionof Business Analytics, Business Analytics Process, Business Analytics Architecture and Framework. Analytics in Business Support Functions, Analytics in Industries – Sports Analytics, Social Media Analytics, Social Networking Analytics, Recommendation Systems.

Skill Development Activities:

1. To identify research problem and collect relevant literatures for data analysis.
2. To write the research design by using exploratory and descriptive research methods.
3. To conduct Market survey and to investigate consumer perception towards any FMCG and to conduct the data analysis and submit a small report.
4. To demonstrate Report writing and Presentation method skills.
5. To demonstrate the data using analytical tools

Suggested Readings:

1. William G. Zikmund, Barry J. Babin, Jon C.Carr, Atanu Adhikari, Mitch Griffin. (2019). Business Research Methods., Delhi: Cengage Learning India Pvt. Ltd, Eight Edition
2. Kothari, C. R. (2019). Research Methodology Methods & Techniques. New Delhi: Vishwa Prakashan, Fourth Edition
3. Naresh K. Malhotra and Satyabhusan Das (2019). Marketing Research : An Applied

Orientation | Seventh Edition | By Pearson Publication

4. R N Prasad and Seema Acharya (2018), “Fundamentals of Business Analytics”, SecondEdition, Wiley India Pvt. Ltd

References:

1. Bryman, Alan and Bell, Emma (2018), Business Research Methods, Oxford UniversityPress. Third Edition
2. Chawla, D. & Sondhi, N. (2017). Research Methodology: Concepts and cases. New Delhi:Vikas Publishing House, Second Edition.
3. Gupta, S. L and Gupta, Hitesh (2017), Business Research Methods, McGraw Hill Education(India) Private Limited, New Delhi, 1st Edition
4. Krishnaswami, O., & Ranganatham, M. (2013). Methodology of Research in Social Sciences. Mumbai: Himalaya Publishing House, Second Edition

Name of the Program: **Master of Business Administration**

Course Code: 2.3

Name of the Course: Entrepreneurship and Ethics

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4Hrs	60 Hrs

Course Learning Objectives:

1. The objective of the course is to understand the students with the entrepreneurship concepts, develop entrepreneurial talents and generate innovative business ideas in emerging industrial scenario and to understand the ways of starting a company of their own and also to create a conscious effort to treat people and companies with respect andestablish a positive working environment.

2. To motivate the students on entrepreneurial opportunities and to run a business efficiently by various sources of financial supporting institutions for young entrepreneurs.

Course Outcomes: On successful completion of the course, the students will be able to

1. Understand of starting a company by the various financial institutions support
2. Develop new innovative business ideas.
3. Understand the marketing demand in various forms of business
4. Aware of alternative to jobs and employment which will make themjob providers in an ethical manner

Course Content

Module 1: Introduction to Entrepreneurship 8 HOURS

Concepts of entrepreneur and entrepreneurship, Importance and Characteristics of entrepreneurs, Types of entrepreneurs, Benefits and potential risks of entrepreneurship, Myths of Entrepreneurship, Factors affecting growth of

Entrepreneurship in India, Role of Entrepreneurship in Economic Development, Competency requirement for entrepreneurs - Awareness of self-competency and its development.

Module 2: Opportunity Assessment and Entrepreneurial Finance 10 HOURS

Opportunity Identification and Selection, Environmental dynamics and changes, Business Opportunities in emerging environment, challenges of new venture start-ups, Pit falls in selecting new ventures, Critical factors for new venture development, why new ventures fail, Sources of Finance for New Venture. Institutional support for Enterprises-Central & State Government Policy regarding Small and Medium Scale Enterprises in India.

Module 3: Feasibility Analysis and Business plan 12 HOURS

Feasibility analysis of Industry, Market, Product or service and Finance; Business plan Meaning, Significance, contents, formulation and presentation of Business Plan, preparing a model project report for starting a new venture, Final project report with feasibility studyCommon errors in Business Plan formulation.

Module 4: Legal forms of Entrepreneurial Organizations 10 HOURS

Identifying legal structures, Selection of an appropriate legal structure, Sole Proprietorship's, Partnerships, Companies, Companies under section 25, Franchising, Legal environment – patents, copyrights, trademarks.

Module 5: Social Entrepreneurship 8 HOURS

Introduction, Meaning, Perspective of social entrepreneurship, Social entrepreneurship in practice, Boundaries of Social entrepreneurship, growth of entrepreneur communities, Fewexperiments.

Module 6: Corporate Ethics 12 HOURS

Meaning and Need for business ethics, Arguments for and against Business ethics, Business Ethics in an Evolving Environment, Entrepreneurship and Start-Up Culture, ethical issues in start –up, Ethics and laws, Establishing strategy for ethical responsibility, Approaches to managerial ethics, Ethics and Business decisions,

Frame work for ethical decision making, WhyEthics Still Matter, Becoming an Ethical Professional , Making a Difference in the Business World, CSR, Environmental awareness, Ethical leadership by entrepreneurs, Corporate citizenship.

Skill Development Activities:

1. Understand types of entrepreneurs and what motivated them to start their career as entrepreneurs- Make Presentations
2. Students to identify their own innovative business ideas
3. Prepare a business plan and how to give a presentation of business plan for financialinstitutions and banks
4. Discuss with bankers / financial institutions to find out what they look for in a business plan - modify accordingly and present it in the class.
5. Identify the legal forms for organization and intellectual property rights for their business ideas
6. Submit business plan report at the end of the course in groups
7. Identify the social problems and business ideas to solve the problems faced by society and to know the impact of social entrepreneurs on society.
8. Create an awareness for entrepreneurs about ethics and CSR
9. Identify the organizations which are engaged in CSR and impact of that towards society.

Suggested Readings:

1. Kanaka SS- Entrepreneurial development, S Chand -Fourth edition.
2. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, & Sabyasachi Sinha (2020), 'Entrepreneurship '. McGraw – Hill, Eleventh Edition
3. Laura Hartman & Abha Chatterjee (2017), Perspectives in Business Ethics, McGraw Hill, Third Edition
4. Vasant Desai , The Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House. Single Edition

References:

1. Ashwathappa K “Essentials of Business Environment”, Himalaya Publishing House, Fifteen Edition
2. Jeffry .A. Timmons & Stephen spinelli, New Venture Creation, Entrepreneurship for the 21st Century, Tata McGraw Hill, Seventh Edition
3. John R Boatright, "Ethics and the Conduct of Business". Pearson Education, Sixth Edition.
4. Prof. P S Baja] and Raj Agrawal. "Business Ethics — An Indian Perspective". Biztantra. New Delhi. 2004, Single Edition

Name of the Program: **Master of Business Administration**

Course Code: 2.4

Name of the Course: Human Capital Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Learning Objectives:

1. To clarify the character of the special capital – humanresource as capital.
2. To develop the basic set of methods and techniques neededfor managing human capital
3. To learn about basic administrative processes related to human capital management.
4. To inculcate in the students an awareness of legal framework within which the businessfunction

Course Outcomes:

On successful completion of the course, the students will be able to:

1. Know new trends in human capital management.
2. Understand the work, competencies tasks and organization of Human Resource Specialist
3. Know basic processes related to Human Capital Management Skills:
4. Assess the human capital potential assessment and planning
5. Recruiting and keeping proper candidates.

Course Content

MODULE 1: Introduction to HRM 8 HOURS

Human Resource Philosophy – Changing environments of HRM – Using HRM to attain competitive advantage – Trends in HRM – Organization of HR departments – Line and stafffunctions – Role of HR Managers-Contemporary issues and practices in HRM, Changing concept of HRM in India and in the globe.

MODULE 2: Human Capital Planning and Employee Hiring 12 HOURS

Nature of job Analysis, job design, Job evaluation, Human resource planning, Demand forecasting, HR supply forecasting, Need for and factors influencing HRP, Career planning, Promotion, transfer, demotion and separation; Employee hiring- Nature of Recruitment, Sources of recruitment-internal and external, Employee selection, process of employee selection.

MODULE 3: HR Development 10 HOURS

Orientation & Training: Orienting the employees, Nature and importance of Training, Methods of training, TNA, Nature of HRD program, Methods of management development and Executive development programs, Development beyond training, Contemporary HRD practices

MODULE 4: Performance Appraisal 10 HOURS

Methods - Problem and solutions - The appraisal interviews - Performance appraisal in practice. Managing careers: Career planning and development - Managing promotions, demotion, transfers and separation.

MODULE 5: Industry Relations 12 HOURS

Employer, Employee, Rights of an Employee at Work Place. HR Policy- Meaning and ItsImportance. Legal Issues Related to HR in the Organization. Compensation Act, 1923-TheWorkmen's Compensation Act,1923- Introduction, Main Features of the Act, Definitions, Provisions Under the Act

MODULE 6: Strategic HRM 8 HOURS

Introduction, characteristics and scope of SHRM, SHRM Vs HRM, Barriers tstrategic HRM, Linking HR strategy with business strategy, SHRM and business performance.

Skill Development Activities:

1. Conducting model role play
2. A write up on HRM at an organization- Split the class into teams with two members. Each team must choose one organization in any industry. They must write a report onthe HR department at the organization and the HR practices there.

Suggested Readings:

1. Gary Dessler & Biju Varkkey (2018). Human Resource Management, Pearson Education India, Fifteen Edition.
2. Robbins & DeCenzo (2017). Personnel/Human Resource Management, Prentice Hall. Latest Edition, Third Edition
3. V.S.P. Rao and C.B. Mamoria (2012), “Personal Management (Text and Cases)”, Himalaya Publications, Thirtieth Edition.

References

1. Snell and Bohlander, Human Resource Management, South-Western Cengeage Learning. Indian Edition, (2019) Latest edition.
2. Uday Kumar Haldar and Juthika Sankar, Human Resource Management. Oxford HigherEducation, 2013, Single Edition
3. K. Aswathappa, Human Resource Management, McGraw Hill Education Seventh Edition.
4. K. R. Bulchandani, Business Laws for management, Latest Edition, Himalaya PublishingHouse, Bombay, (2020), Eight Edition.

Name of the Program: **Master of Business Administration**

Course Code: 2.5

Name of the Course: Financial Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
Credits: 4	4 Hrs.	60 Hrs

Course Learning Objectives

1. To provide the concepts and foundations of managing finance in business enterprises.
2. To equip students with tools and techniques for managing financial resources.
3. To orient the students regarding financial management practices in Indian companies and Global enterprises.

Course Outcomes: By the end of this course, a student would learn:

1. Identification of financial challenges faced by a business enterprise,
2. Tools and techniques for making financial decisions,
3. Financial management practices in corporate sector.

Course Content

Module 1: Introduction to Financial Management 6 HOURS

Concept of Financial management - Meaning and definitions, Scope of Financial Management, finance functions, Financial Goals of a firm, Agency problem, Emerging role of finance manager in India.

Module 2: Time Value of Money 6 HOURS

Compounding, Continuous Compounding, Effective Rate of Interest, Discounting – Single Cash Flows & Series of Cash Flows, Annuity – Future Value and Present Value, Present Value of Growing Annuity, Perpetuity – Present Value, Present Value of Growing Perpetuity, Equated Annual Installments.

Module 3: Long-term Financing Decisions

(Capital Structure Decisions) 14 HOURS

Sources of Funds: Short term sources, Long term sources, Venture Capital: features, stages and types of venture capital. Factors influencing capital structure, Benefit to Owners – EBIT –EPS Analysis, Point of Indifference, Financial Break-even Point, Cost of Capital- Methods of computing cost of capital: Cost of Equity Capital, Cost of Preferred Capital, Cost of Debt Capital,Cost of internally generated funds, Weighted Average Cost of Capital (Theory and Problems), Leverages-Types and Measurement

Module 4: Capital Budgeting Decisions 14 HOURS

Meaning of Capital Budgeting, significance, principles, capital budgeting proposals, methods of appraising Proposals. Payback period, ARR, IRR, MIRR, NPV, Profitability Index, APV Method,Capital Rationing.

Module 5: Working Capital Management 14 HOURS

Concept of working capital, factors determining working capital, Sources of working capital, estimating working capital needs, Managing cash, marketable securities, debtors and inventory

Module 6: Dividend Decisions 6 HOURS

Meaning, Theory of relevance on Theory of Irrelevance. Walter's Model, Gordon's Model (Theoryand Problems) Types of dividends, Bonus Shares, Stock Splits

Skill Development Activities:

1. Draw an organization chart showing the steps used in financial planning of a company
2. Capital structure analysis of companies in different industries.
3. Take a company as example and show how firm borrows money and uses financial leverage.
4. Bring out the structure of dividend policy and the factors included in any 5 companies

Suggested Readings:

1. Corporate Finance – A Focused Approach (2017)-Brigham and Ehrhardt, Edition, Cengage Learning, Sixth Edition
2. Corporate Finance (2015)- Jeffrey Jaffe, Prof Stephen A. Ross, Randolph W Westerfield, Bradford D Jordan, Tata McGraw Hill Publication, Eleventh Edition
3. Financial Management: Theory & Practices (2015): Prasanna Chandra, Ninth Edition, Tata McGraw Hill Publication, Tenth Edition.

References;

1. Study material of the Institute of Chartered Accountants of India (ICAI), The Institute of Cost and Management Accountants of India (ICMAI), and The Institute of Company Secretaries of India (ICSI) – [Freely downloadable from the websites of respective institutions].
2. Anand, Manoj (2002), “Corporate Financial Practices in India: A Survey”, Vikalpa, Volume27, Number 4.
3. Jain and Yadav (2002), “Financial Management Practices in India, Singapore and Thailand”,“Management and Accounting Research”, Volume 3, No. 4, April-June, pp 84-102.
4. Ryan and Ryan (2002), “Capital Budgeting Practices of Fortune 1000: How have thingschanged”, Journal of Business and Management, Volume 8, Number 4.
5. Block, Stanley (2005), “Are there differences in capital budgeting procedures betweenindustries? – An Empirical Study”, The Engineering Economist, pp 55-67

Name of the Program: **Master of Business Administration** Course Code:2.6 **Name of the Course: Quantitative Techniques and Operation Research**		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
Credits: 4	4 Hrs.	56 Hrs.

Course Learning Objectives:

1. Ability to understand and analyze managerial problems in industry so that they are able touse resources (capitals, materials, staffing, and machines) more effectively. 2.
2. Knowledge of formulating mathematical models for quantitative analysis of managerialproblems in industry.
3. Skills in the use of Operations Research approaches and computer tools in solving realproblems in industry.
4. Mathematical models for analysis of real problems in Operations Research
5. To build capabilities in the students for analyzing different situations in the industrial/ business scenario involving limited resources and finding the optimal solution within constraints.
6. Develop mathematical skills to analyze and solve integer programming and network modelsarising from a wide range of applications.

Course Outcomes:

On successful completion of the course, the students will be able to:

1. Understand the application of Operation Research and frame a Linear Programming Problemwith solution – graphical and through solver add in excel (software).
2. Analyze any real-life system with limited constraints and depict it in a model form.
3. Build and solve Transportation and Assignment problems using appropriate method.
4. Design and solve simple models of CPM and queuing to improve decision making anddevelop critical thinking and objective analysis of decision problems.
5. Solve simple problems of replacement and implement practical cases of decision makingunder different business environments.
6. Take best course of action out of several alternative courses for the purpose of achievingobjectives by applying game theory and sequencing models.
7. Understand different queuing situations and find the optimal solutions using models fordifferent situations.
8. Develop a report that describes the model and the solving technique, analyse the results andpropose recommendations in language understandable to the decision-making processes in Management

Course Content

MODULE 1 - Introduction to Operations Research 10 HOURS

Introduction, Historical Background, Scope of Operations Research, Features of Operations Research, Phases of Operations Research, Types of Operations Research Models, Operations Research Methodology, Operations Research Techniques and Tools, Structure of the Mathematical Model, Limitations of Operations Research

Linear programming problem, Mathematical Formulation of LPP, Graphical method, Simplex method (standard maximization) problems, Formulation of duality.

MODULE 2 – Minimization Techniques 12 HOURS

Transportation: Importance, terminologies used, methods for finding Initial basic feasible solution; NWCM, LCM and VAM, unbalanced, degeneracy in transportation, test for optimality (MODI method only), maximization problems.

Assignment: Introduction, Mathematical Formulation of the Problem, Hungarian Method Algorithm, Routing Problem, Travelling Salesman Problem.

MODULE 3 - Sequence and Replacement 10 HOURS

Sequencing: terminologies and notations, types of sequencing problems; processing 'n' jobs through 2 machines, processing 'n' jobs through 'm' machines.

Replacement Models: Failure mechanism of items, assumptions of replacement theory, types of replacement problems, replacement of items which deteriorates with time, group replacement

MODULE 4 - Network analysis 10 HOURS

Networking Concepts; Rules for drawing network diagram; CPM Computations: CPM Terminology, finding critical path - Different Floats; PERT Computations: Computation of earliest and latest allowable times, Probability of meeting the scheduled dates; difference between PERT and CPM, Concept of Project Crashing

MODULE 5 – Game Theory 10 HOURS

Introduction, Types, pure and mixed strategies with two people zero sum game, Maximin – Minimax Principle, Saddle point, principle of dominance. Graphical method of solving a game.

Queuing Theory (waiting line): Single server/single queue, essential features of queuing system, single queue, operating characteristics of queuing system, probability distribution in queuing system, multi-server, description of other queuing models (only description).

MODULE 6 - Simulation 8 HOURS

Basic concepts, procedures and application, Monte Carlo simulation using Random numbers, Application of simulation in Inventory Management, Marketing Management, Financial Management

Skill Development Activities:

1. Construct linear integer programming models and discuss the solution techniques.
2. Set up decision models and use some solution methods for nonlinear optimization problems
3. Use computer software's to solve decision models
4. Understand the usage of game theory and Simulation for Solving Business Problems.
5. Formulate and solve problems as networks and graphs.

Decide an optimal replacement period/policy for a given item/equipment/machine.

Suggested Readings:

1. Cynthia Menezes Prabhu, Operations Research Techniques (2021), First Edition, Better Yourself Books Publishing.
2. K.K. Chawla and Vijay Guptha, Operation research, quantitative techniques for management, Kalyani publishers, Seventh Edition
3. N.D. Vohra (2012), "Quantitative techniques in management", Tata McGraw-Hill Publications, 4th Edition.

References

1. David M. Lenine (2012), quantitative techniques for management. Pearson publication.
2. Fedric S Hiller and Gerald J Lieberman (2012), introduction to operation

research. 8th Edition.

3. Er. Prem Kumar Guptha and Dr. D.S. Hira (2014), Operation research. S. Chand publications, Third Edition

Name of the Program: **Master of Business Administration**

Course Code:2.7

Name of the Course: Managerial Skills-2

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
Credits:2	2 Hrs.	30 Hrs

Course Learning Objectives:

1. To assess the students' understanding of self-development.
2. To enable the students to have a clarity about required employee's skills and work process.
3. To appraise the students on the importance of goal setting for the organization.
4. To understand the Problem Solving and Conflict management techniques.
5. To identify and apply facilitating skills and leadership competencies.
6. To create awareness of professional ethics, Work life balance and Time Management.

Course Outcomes: On successful completion of the course, the students will be able to:

1. Demonstrate an understanding of managerial skills and apply some ofthem for self-development.
2. Demonstrate an understanding of work process and employability skills
3. Manage Teams and Set Goals for the teams effectively.
4. Undertake Root Cause Analysis for problem solving.
5. Learn and apply Design thinking Skills for problem solving.
6. Exhibit an awareness and importance of professional ethics and manage timeand stress effectively.

Course Content

Module 1: Skills for Self-Development: 4 HOURS

Need for Self-Development, Self-awareness by taking the help of JOHARI Window-SWOT Analysis; Showing initiative, Self-confidence, Problem-solving, Communication, Adaptability.

Module 2: Developing Employee Skills 6 HOURS

Employee Skills: Need for development; Define the Skill, Steps required for Employee Skill development, Prepare and Practice; Create a Skill Development Plan, Review the Plan; Action andControl of the plan.

Module 3 Skills for Improving Work Process 6 HOURS

Processes and Capabilities – Know your customer (exercise), Define the process of work,eliminate the waste from the work process, Reduce Variances, Improve process; Mapping value stream; Work Process and Relationship Maps; Work System Architecture.

Module 4 Goal Setting 4 HOURS

Goal Setting – Need & Importance, life cycle of goals; Develop Team Scorecard; Balanced ScoreCard; Target, Goals and Objectives; MBO & Self Control;

Module 5 Problem Solving Skills and Conflict Management 6 HOURS

Importance, Attitudes of Problem Solving, Root-Cause Analysis; Plan-Do-Check- Act (PDCA) model; the 5 Whys, Fish Bone Model, Cause-Effect analysis; Pareto Analysis; Affinity Diagram; Design Thinking for Problem Solving. Conflict Management skills: Types and sources of conflicts; the influence of various cultures on the solving of conflicts.

Module 6 Facilitation Skills 4 HOURS

People Skills, Networking Skills, Critical thinking: Emotional Intelligence or Emotional Quotient-Spiritual Quotient, Resilience; Professional ethics and code of conduct- Work life balance, Time management: importance of time management: various steps for better time management process.

Skill Development Activities:

1. Conducting model Group Discussion
2. Conducting model Personal Interview
3. Use of Psychometric instruments to assess the student's managerial competencies.

Suggested Readings:

1. M.Ganesh Sai and M. RamakrishnaSayee, (2011), Skills for your career success: Touch your tipping point, Shroff publishers & Distributors Pvt. Ltd, Single Edition
2. Pavan Soni, (2020), Design Your Thinking: The Mindsets, Toolsets and Skill Sets for CreativeProblem-solving, First Edition
3. Susan Raines, Conflict Management for Managers: Resolving Workplace, Client, and PolicyDisputes (2019), Second Edition.
4. Developing management skills -David. A. Whetten, & Kim S. Cameron, PHI, Eighth Edition

References:

1. Enhancing employability at soft skills -Shalini Varma, Pearson, First Edition.
2. Skills Development for Business and Management Students -Kevin Gallagher, OxfordUniversity Press, Third Edition.
3. Personality Development and Soft skills, Oxford University Press by Barun K. Mitra, Second Edition.

Soft skills for everyone Butterfield Cengage, Second Edition.

MBA COURSE MATRIX-YEAR 2

III SEMESTER	IV SEMESTER
CORE COURSES	
3.1. Strategic Management and Corporate Governance	4.1. International Business
3.2. Project and Operations Management	

III SEMESTER	IV SEMESTER
3.3 FINANCE	**4.2 FINANCE**
3.3.1 Business Valuation and Value Based Management	4.2.1 Financial Techniques for Strategic Decision-making
3.3.2 Indian Financial Systems	4.2.2 International Financial Management
3.3.3. Investment Analysis and Management	4.2.3 Risk Management and Derivatives
3.3.4. Business Analytics using Excel	4.2.4 Data Analysis and Visualization using Tableau
3.4 MARKETING	**4.3 MARKETING**
3.4.1 Retailing Management and Services	4.3.1 Strategic Brand Management
3.4.2 Consumer Behaviour	4.3.2 Marketing Research and Metrics
3.4.3 Rural and Agricultural Marketing	4.3.3 Digital Marketing
3.4.4. Business Analytics using Excel	4.3.4 Data Analysis and Visualization using Tableau
3.5 HUMAN RESOURCES	**4.4 HUMAN RESOURCES**
3.5.1 Learning And Development	4.4.1 Strategic HRM
3.5.2 Team Dynamics at work	4.4.2 International HRM
3.5.3 Performance Management Systems	4.4.3 Talent and Knowledge Management
3.5.4 Business Analytics using Excel	4.4.4 Data Analysis and Visualization using Tableau
3.6 HEALTHCARE MANAGEMENT	**4.5 HEALTHCARE MANAGEMENT**
3.6.1 Perspectives On Health Care Sector	4.5.1 Basic Management Aspects of Health Care
3.6.2 Management Of Public Health Systems	4.5.2 Strategic Management in Health Care Settings

3.6.3 Health Economics	4.5.3 Management of Hospital Services
3.6.4. Business Analytics using Excel	4.5.4 Data Analysis and Visualization using Tableau
3.7 BANKING FINANCE AND INSURANCE SERVICES MANAGEMENT (BFIS)	**4.6 BANKING FINANCE AND INSURANCE SERVICES MANAGEMENT (BFIS)**
3.7.1 Strategic Credit Management In Banks	4.6.1 Banking Technology and Management
3.7.2 Insurance Planning & Management	4.6.2 International Financial Management
3.7.3 Indian Financial System	4.6.3 Risk Management for Banks and Insurance Companies
3.7.4. Business Analytics using Excel	4.6.4 Data Analysis and Visualization using Tableau
3.8 STARTUPS AND SMES MANAGEMENT	**4.7 STARTUPS AND SMES MANAGEMENT**
3.8.1 Perspectives On Start-ups And SME	4.7.1 Technology and Innovation
3.8.2 Basic Management Aspects Of Small Business	4.7.2 Internationalization of SMEs
3.8.3 Establishment Of SMEs	4.7.3 Management of Start-ups
3.8.4. Business Analytics using Excel	4.7.4 Data Analysis and Visualization using Tableau
3.9 BUSINESS ANALYTICS	**4.8 BUSINESS ANALYTICS**
3.9.1 Data Science Using R And Python	4.8.1 Data Visualisation
3.9.2 Advanced Statistical Methods For Business Decision Making	4.8.2 Business Forecasting
3.9.3 Analytics For Decision Making	4.8.3 Data Warehousing and Data Mining
3.9.4. Business Analytics using Excel	4.8.4 Data Analysis and Visualization using Tableau
3.10 LOGISTICS AND SUPPLY CHAIN MANAGEMENT	**4.9 LOGISTICS AND SUPPLY CHAIN MANAGEMENT**
3.10.1 Inventory Management	4.9.1 Supply Chain Planning and Strategies
3.10.2 Supply Chain Management	4.9.2 Global Procurement and Sourcing
3.10.3 Logistics Management Systems and Practices	4.9.3 Vendor Management
3.10.4. Business Analytics using Excel	4.9.4 Data Analysis and Visualization using Tableau

III Semester

Core Courses

Name of the Program: Master of Business Administration Course Code:3.1 Name of the Course: Strategic Management and Corporate Governance		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Course Objectives:

1. To enlighten the students with the concepts and practical applications of Strategic Management and Corporate Governance.
2. To instill a comprehensive and step-wise understanding of the principles of strategy formulation and competitive analysis

Course outcomes:

1. This course will equip the students with required skills of managerial decisions and actions.
2. This will enable students to transfer conceptual learning to strategic application in their professional lives.

Module 1: Strategy and Process **4 Hours**

Historical perspective of Strategic management, Conceptual framework for strategic management, the Concept of Strategy and Strategy Formation Process – Stakeholders in business –Vision, Mission and Purpose – Business definition, Objectives and Goals. The SM model

Module 2: Competitive Advantage **12 Hours**

External Environment – PESTEL Analysis, SWOT Analysis, Porter's Five Forces Model, The Competitive Profile Matrix (CPM), Globalization and Industry Structure – Resources, Capabilities and competencies – Value Chain Analysis – Core competencies, generic building blocks of Competitive Advantage- Distinctive Competencies - Avoiding failures and sustaining competitive advantage.

Module 3: The Strategic Alternatives **12 Hours**

Corporate Level Strategies – Stability, Expansion, Retrenchment and Combination

strategies - Business level strategy: Cost, Differentiation, and Focus Strategies- Strategy in the Global Environment - Corporate Strategy - Vertical Integration - Diversification and Strategic Alliances- Building and Restructuring the corporation- Strategic analysis and choice – Environmental Threat and Opportunity Profile (ETOP) – Organizational Capability Profile - Strategic Advantage Profile - Corporate Portfolio Analysis – GAP Analysis - Mc Kinsey's 7s Framework - GE 9 Cell Model – BCG Matrix - Balance Score Card, Internal Factor Evaluation (IFV) Matrix

Module 4: Strategy Implementation & Evaluation **8 Hours**

The implementation process, Resource allocation, designing organizational structure, Designing Strategic Control Systems - Matching structure and control to strategy - Implementing Strategic change, Politics-Power and Conflict-Techniques of strategic evaluation & control.

Module 5: Current Strategic Issues **10 Hours**

Managing Technology and Innovation- Blue Ocean Strategy, managing in an economic crisis, new directions in strategic thinking, Strategic issues for Non Profit organizations, Small Scale Industries, New Business Models and strategies for Internet Economy.

Module 6: Corporate Governance **10 Hours**

Defining Corporate Governance, Exploring Corporate Governance and the Relationships between Internal and External Stakeholders, The organization's Responsibility and Accountability to Its shareholders, The Organization's Accountability to Its Board of Directors, Role and Responsibilities of the Board, Integrity and Ethical Behavior: Disclosure and Transparency. Development and critical appraisal of corporate governance in India.

Suggested Readings:

1. David,F. R., & David,F. R., (2016) Strategic Management: A Competitive Advantage Approach, Concepts and Cases, 16 e , Pearson.
2. Charles W.L. Hill, Melissa A. Schilling & Gareth R. Jones (2016) Strategic Management: Theory: An Integrated Approach, South Western Educational Publishing
3. Thomas L. Wheelen, (2017) Strategic Management and Business policy, 15 ed. Pearson Education.

References:

1. Gregory Dess, G.T., Lumpkin, Alan Eisner & Gerry McNamara (2013), Strategic Management: Text and Cases,7 ed McGraw-Hill Education

Name of the Program: Master of Business Administration

Course Code: 3.2

Name of the Course: Projects and Operations Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Course Objectives:

1. To impart the concepts, tools and techniques of project management
2. To gain clear understanding of Operations Management
3. To gain a perspective on quality improvement and cost reduction

Course outcomes:

1. At the end of the courses, the students must have better insight in to project and operations management.

Module 1 **4 Hours**

Definition of Project, Five phases of project management- Project Initiation, Project Planning, Project Execution, Project Monitoring and Controlling, Project Closing.

Module 2 **10 Hours**

Project management knowledge areas: Project integration management. Project scope management. Project time management. Project cost management. Project quality management. Project resource management. Project communications management. Project risk management.

Module 3 **10 Hours**

Nature and Scope of Production and operations Management, its relationship with other Systems in Organizations, Functions of Production and material management, Types of

production Systems.

Forecasting as a planning tool, Forecasting types and methods. Problems.

Facility Planning: Facilities location decisions, factors affecting facility location decisions and their relative importance for different types of facilities. Problems.

Module 4 **10 Hours**

Facility layout planning: Layout and its objectives for manufacturing operations, principles, types of plant layouts – product layout, process layout, fixed position layout, cellular manufacturing layouts, hybrid layouts, Factors influencing layout changes. Problems.

Time and Motion Study, Work Study in Management Science

Maintenance: Reactive (run-to-failure), Predetermined maintenance, Preventive maintenance, Corrective maintenance, Condition-based maintenance, Predictive maintenance.

Introduction to Lean operations and elimination of 7 wastes

5S of housekeeping.

Module 5 **10Hours**

Quality management: Introduction; Quality characteristics of goods and services; Tools and techniques for quality improvement: check sheets, histogram, scatter diagram, cause and effect diagram, Pareto chart, process diagram, statistical process control charts;

Quality assurance; Total quality management (TQM) model; Service quality, Concept of Six Sigma and its application.

Juran's quality trilogy, Deming's 14 principles, PDCA cycle, Quality circles, Quality improvement and cost reduction – QC tools, Introduction to the current ISO for Production Management.

Contribution of Quality Gurus.

Module 6 **8Hours**

Meaning of Productivity and different types of productivity

Materials Management: Role of Materials Management – materials and profitability, Purchase functions, Procurement procedures

Vendor selection and development, Vendor rating, ethics in purchasing.

Inventory Management: Concepts of inventory, types, Classification, selective inventory

management, ABC, VED and FSN analysis. Inventory costs, Inventory models – EOQ, safety stocks, Reorder point, Quantity discounts.

Suggested Readings:

1. Mahadevan B., (2015)., Operations Management: Theory and Practice Pearson, Concepts and Cases, 16 e , Pearson.
2. Saxena J.P., (2012)., Production and Operations Management, Tata Mcgraw-Hill Education Pvt Ltd
3. Ajay K.Garg., (2011)., Production and Operations Management", Tata McGraw-Hill Education Pvt Ltd

References:

1. Martand T. Telsang, (2005)., Production Management, 1ed., S Chand & Company Pvt Ltd
2. Chase, Shankar & Jacob., Operations & Supply Chain Management, 14th Edition, McGraw Hill (2014): Indian Reprint: McGraw Hill, New Delhi

Common Elective

Name of the Program: Master of Business Administration

Course Code:3.4.4, 3.5.4, 3.6.4, 3.7.4, 3.8.4, 3.9.4 & 3.10.4

Name of the Course: Business Analytics using Excel

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Objectives:

1. Gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
2. Gain an understanding of different mathematical and statistical models available for modeling of various business scenarios including customer value assessment, customer segmentation, discrimination, choice, preference models and decision analysis methods.
3. To develop and use advanced predictive analytics methods
4. To develop expertise in the use of popular tools and software for predictive analytics
5. To learn how to develop predictive analytics questions, identify and select the most appropriate predictive analytics methods and tools, apply these methods to answer the respective questions and presenting data-driven solutions.

Course outcomes:

Competency 1: Predictive Analytics Methods

1. Ability to apply specific statistical and regression analysis methods applicable to predictive analytics to identify new trends and patterns, uncover relationships, create forecasts, predict likelihoods, and test predictive hypotheses.
2. Ability to develop and use various quantitative and Predictive models based on various regression models

Competency 2: Predictive Analytics Tools

1. Develop familiarity with popular tools and software used in industry for predictive analytics, especially R, R Studio and R Markdown.

Competency 3: The Predictive Analytics Cycle

1. Understanding of how to formulate predictive analytics questions.
2. Learn how to select the appropriate method for predictive analysis, and how to

build effective predictive models.

3. Learn how to search, identify, gather and pre-process data for the analysis.
4. Learn how to evaluate the soundness, appropriateness and validity of their models and how to interpret and report on results for a management audience.

Module 1: Introduction to Business Analytics **4 Hours**

Introduction to Business Analytics (BA)*. Evolution and Scope of Business Analytics. Data for Business Analytics. Decision Models – Descriptive, Predictive and Prescriptive Models. Problem Solving and Decision making process.

Analytics on Spread sheets

Basic Excel skills. Using Excel functions and developing Spread Sheet Models. Art of developing Spread sheet models – Guidelines to develop an adequate spread sheet model. Debugging a spread sheet model.

Module 2: Storytelling in a Digital Era **10 Hours**

A Visual Revolution, From Visualization to Visual Data Storytelling: An Evolution, From Visual to Story: Bridging the Gap - Power of Visual Data Stories: The Science of Storytelling. The Brain on Stories, The Human on Stories, The Power of Stories, The Classic Visualization Example, Using Small Personal Data for Big Stories, The Two-or-Four Season Debate, Napoleon's March, Stories Outside of the Box

Module 3: Getting Started with Tableau **10 Hours**

Using Tableau, Why Tableau, The Tableau Product Portfolio, Tableau Server, Tableau Desktop, Tableau Online, Tableau Public, Getting Started, connecting to Data, connecting to Tables, Live Versus Extract, connecting to Multiple Tables with Joins, Basic Data Prep with Data Interpreter, Navigating the Tableau Interface, Menus and Toolbar, Data Window, Shelves and Cards, Legends, Understanding Dimensions and Measures: Dimensions, Measures, Continuous and Discrete

Module 4: Descriptive Analytics **6 Hours**

Visualizing and Exploring Data. Descriptive measures to summarize the data. Application of Excel Descriptive statistics tool. Probability distributions and Data modelling. Sampling and Inferential statistical methods. Using Excel Data Analysis add in for estimation and hypothesis testing

Module 5: Predictive Analytics **15 Hours**

Introduction, Statistical Model, Inference about regression coefficient, Multicollinearity, Include/Exclude Decisions, Stepwise Regressions, The Partial F test, Outliers, Violation of Regression Assumptions, Prediction, Multiple Regression: Interpretation of regression coefficients, Interpretation of Standard error of estimate and R Square, Modelling Possibilities, Validation of Fit. Binomial Logistic Regression, Multinomial Logistic Regression.

Module 6 : **Time Series Analysis** **15 Hours**

Introduction – Time Series, Time Series Vs Regression, Components – Predictable, Unpredictable, Local Global, Trend, Seasonality, Additive & Multiplicative models, Cyclicity, Seasonality, Stationary, Noise, Single and Double Exponential Smoothing (Holt's Method), Autocorrelation function, AR Model, MA Model, ARMA Model, ARIMA, GARCH Model.

SKILL DEVELOPMENT

i. Bring out the application of predictive analytics in Marketing, Insurance, Supply chain management, and Education with suitable examples.

ii. Identify the profile of customers for a Digital fitness band that different brands offer. Investigate differences across the usage patterns and product lines concerning customer characteristics such as age, gender, annual income, and the number of miles walks every week. Use the appropriate measure of central tendency and dispersion.

iii. Build a visualization by using tableau based on publicly available Covid Data. The attributes may be a seven-day average of cases and death, Positive rate and number of tests, etc.

iv. Build a regression model by identifying dependent and independent variables. Test model fit and Multicollinearity and Interpret R-Square. Find whether the predictor variables are statistically significant and interpret the regression coefficients.

v. Using Binary logistic regression, identify characteristics that indicate people who are likely to default on loans and use those characteristics to identify good and bad credit risks.

vi. Estimate the stock market return and volatility on selected Thematic Indices. Apply the appropriate Time-series Model for the study.

Suggested Readings:

1. Evans J. R (2013). Business Analytics Methods, Models and Decisions. Pearson,

Upper Saddle River, New Jersey.

Reference Books:

1. Albright C. S., Winston Wayne L. and Zappe C. J (2009). Decision Making Using Microsoft Excel (India Edition). Cengage Learning.
2. Forte, R. M., (2015)., Mastering Predictive Analytics with R., Packt Publishng Limited.
3. Rees, M. (Jully 2015). Business Risk and Simulation Modelling in Practice: Using Excel, VBA and @RISK. John Wiley & Sons.
4. Richard, M., McCarthy, M., Ceccucci, W., & Halawi, L. (2019). Applying Predictive Analytics: Finding Value in Data. Springer.

3.3 Finance Specialization

Name of the Program: Master of Business Administration
Course Code:3.3.1
Name of the Course: Business Valuation and Value Based Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Course Objectives:

1. To provide knowledge on valuation of business enterprises.
2. To make students understand the various models of value-based management.
3. To give insight on various forms of corporate restructuring.

Course outcomes:

1. The basic concepts required for corporate valuation.
2. The various methods of valuation.
3. Valuation in special cases.
4. Models of value-based management.
5. Strategies for 'value maximization' – corporate restructuring, with special focus on mergers and acquisitions.
6. Financial modelling skills for valuation of business enterprises.

Module 1: Introduction to Fundamental tools of Finance **8 Hours**

Meaning of Financial Management – Goals of Financial Management - Analysis of Financial Statements – DU PONT ANALYSIS; Time Value of Money – Compounding, Discounting, Annuity and Perpetuity; Weighted AverageCost of Capital – CAPM based calculation. Beta – Un-levering and Re-levering

Module 2: Corporate Valuation **16 Hours**

Valuation of Firm and Valuation of Equity – Net Assets Method, Earnings Capitalisation Method, Relative Valuation, Chop Shop Method. Valuation of Firm and Valuation of Equity – Discounted Cash Flow (DCF) Method, Adjusted Present Value (APV) Method, Economic Value Added (EVA) Method. **Indian Valuation Standards issued by ICAI.**

Module 3: Advanced issues in Valuation **10 Hours**

Valuation of High Growth Companies, valuation of Cyclical Companies, Valuation of Banks, valuation of InsuranceCompanies. Cross-border Valuation, Valuation in Emerging Markets, Valuation of Private Companies. Valuation of Intangible Assets. Human Resource Valuation. Brand Valuation.

Module 4: Value Based Management and Corporate Restructuring **8 Hours**

Marakon Approach, Alcar Approach, Mc Kinsey Approach, Stern-Stewart Approach and BCG Approach.Performance Measurement and Analysis. Balanced Scorecard.

Module 5- Corporate Restructuring **8 Hours**

Corporate Restructuring – Ownership Restructuring, Business Restructuring, Asset Restructuring, Organisational Restructuring. Financial Restructuring - designing or redesigning capital structure, financial restructuring in the event of change in legal requirements, financial restructuring in the event of continuous losses, Buy-back of Shares, Rights Issue,Convertible Instruments, Callable Bonds.

Module 6: Mergers and Acquisition **10 Hours**

Valuation for Merger / Acquisitions, financing a merger, Determining Exchange Ratio – Range and Terms.Feasibility of Mergers and Acquisitions

PRACTICALS / SKILL ENHANCEMENT ACTIVITIES

1. Perform Du Pont Analysis for any listed company and identify the areas of concern.
2. Calculate Beta for a listed company using spreadsheet and ascertain its cost of equity.
3. Find value of any company using DCF method, making necessary assumptions.
4. From the latest media reports, identify and list corporate restructuring strategies of at least 5 Indian companies.
5. Make a list of domestic and international mergers and acquisitions over the last 5 years in any industry.
6. Design Excel Templates for Corporate Valuation

Suggested Readings

- Strategic Financial Management - Managing for value creation | Second Edition. (2020). (n.p.): McGraw-Hill Education.
- Strategic Financial Management. (2018). (n.p.): Kojo Press.
- Pettit, J. (2011). Strategic Corporate Finance: Applications in Valuation and Capital Structure. Germany: Wiley.
- Jarrell, S. L., Morin, R. A. (2000). Driving Shareholder Value: Value-Building Techniques for Creating Shareholder Wealth. United States: McGraw-Hill Education.
- Chandra, P. (2011). Corporate valuation and value creation. Tata McGraw-Hill Education.

Name of the Program: Master of Business Administration

Course Code:3.3.2

Name of the Course: Indian Financial System

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Course Objectives:

1. To provide an insight into the functioning of Indian financial system.
2. To make students understand the various components of the financial system, the inter-relationship among different components and the impact on business enterprise

Course outcomes:

The student will have improved ability to

1. The framework of Indian Financial System.
2. The various financial institutions that have impact and influence on business organizations and their functioning.
3. The financial markets and their mechanism, with special emphasis on Stock Exchanges.
4. Various financial services available for a business enterprise

Module 1: Overview of Financial system **6 Hours**

Indian Financial System – Features, Constituents of Financial System – Financial Institutions, Financial Services, Financial Markets and Financial Instruments. Overview of Global Financial System

Module 2: Financial Institutions **12 Hours**

Meaning of Financial Institutions, Special Characteristics, Broad Categories – Money Market Institutions and Capital Market Institutions. Industrial Finance Corporation of India, Industrial Development Bank of India, State Financial Corporations, Industrial Credit and Investment Corporation of India, EXIM Bank of India, , National Small Industrial Development Corporation, National Industrial Development Corporation, Life Insurance Corporation of India, Unit Trust of India

Module 3: Non-Banking Financial Institutions **8 Hours**

Meaning, Registration, Principal Business of NBFCs, Structure, Supervision, RBI Measures for NBFCs, Other Measures.

Module 4: Financial services **12 Hours**

Concept, Objectives / Functions, Characteristics, Financial Services – Concept, Classification, Regulatory Framework. Merchant Banking, Mutual Funds, Leasing, Credit Rating.

Module 5: Financial Markets **12 Hours**

Meaning and definition, Role and Functions of financial markets, constituents of Financial Markets, Money Market and instruments, Capital Markets and Instruments.

Module 6: Stock Exchange **6 Hours**

Meaning and definition, Role and Functions, Regulatory Framework of Stock Exchange, Profile of Indian Stock Exchanges, Listing, Trading

PRACTICALS / SKILL ENHANCEMENT ACTIVITIES

1. Identifying the organisation structure, functions and who's who of select 3 financial institutions.
2. Writing a commentary on the latest measures and policies of the Reserve Bank of India
3. Preparing a list of money-market and capital market instruments and identifying the pros and cons of each of them
4. Identifying the financial services offered by 1 bank and 1 financial institution and listing the features of all the services.
5. Writing a report on the trading activities and modus operandi of BSE / NSE.

Suggestive Readings

1. Guruswamy, S, "Indian Financial System", McGraw Hill Companies
2. L.M. Bhole,"Financial Institutions & Markets, Tata McGraw Hill, New Delhi.
3. Khan, M.Y, "Indian Financial System", TheMcGraw Hill Companies.
4. Sharma, Meera, "Management of Financial Institutions", Eastern Economy Edition.
5. Bhole and Mahakud, "Financial Institutions and Markets – Structure, Growth and

Innovations", TheMcGraw Hill Companies
6. Guruswamy, S, "Financial Services and System", McGraw Hill Companies
7. Edminister. R.O, Financial Institutions, Markets & Management, McGraw Hill, New York, 1986.
8. Karkal G.C,Unorganised money markets in India, Lalwani, Bombay.
9. Khan. M.Y, Indian Financial System, Vikas
10. H.R Machiraju, Indian Financial System, Vikas Pub. House.
11. E.Gorden& K. Nataraj, Financial Markets and Services, Himalaya Publishing house

References

1. ICWA, Financial Services, ICAI, Publication.
2. G.S. Patel, Capital Market, Functioning and Trends, ICFAI Publication.
3. J.N. Dhonkar, A Treatise an Merchant Banking, Skylark Pub. Delhi.
4. Vindo Kothari, Leasing, Hirepurchase and Consumer Credit, Wadhwa and Company.
5. SEBI Guidelines issued from time to time.
6. K. Sriram, Handbook of Leasing, Hire Purchasing and Factor, ICFAI Publications.
7. Gledstone, Venture Capital Investing, NY, Prentice Hall.
8. Smith P.F., Money and Financial Intermediation, The Theory and Structure of Financial Systems, Prentice Hall, New Jersey.

Name of the Program: Master of Business Administration

Course Code:3.3.3

Name of the Course: Investment Analysis and Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

Investing surplus funds for generating some returns is common among individuals and organizations. When a business enterprise has idle funds for a certain period of time, it is prudent on the part of the enterprise to invest it wisely and generate decent returns, the onus of which lies on finance manager. Hence, it is essential for finance professional to have knowledge on the process of making and managing investments. This course entitled "Investment Analysis and Management" is introduced to orient a finance professional regarding the process of making and managing investments.

Course Objectives:

- To provide knowledge and skill in identifying various investment alternatives and choosing the suitable alternatives.
- To orient on the procedures and formalities involved in investing.
- To train the learners on portfolio construction and management

Course outcomes:

This course will equip the students with required skills of Investment decisions and actions.

- Identifying investment alternatives
- Choosing the best / suitable alternatives.
- How to construct a portfolio
- Portfolio management

MODULE 1: BASICS OF INVESTMENTS 6 HOURS

Investments – Meaning. Differences between Investment, Trading and Speculation. Process of making andManaging Investments. Investment Goals and Constraints.

MODULE 2: INVESTMENT ALTERNATIVES 6 HOURS

Non-marketable Financial Assets, Money Market Instruments, Fixed Income Securities, Equity Shares, MutualFunds, Derivatives, Life Insurance Policies, Real Estate, Precious and Valuable items.

MODULE 3: STOCK SELECTION AND PORTFOLIO CONSTRUCTION 10 HOURS

Stock Selection: Fundamental Analysis – Economy Analysis, Industry Analysis, Company Analysis and StockValuation. Technical Analysis. Efficient Market Hypothesis. Portfolio Construction: Calculation of Return and Risk, Decomposition of Risk. Portfolio Construction Theories –Markowitz Theory, Sharpe's Single Index Model, Capital Asset Pricing Model, Arbitrage Pricing Theory.

MODULE 4: BONDS 12 HOURS

Pricing of Bonds, Returns on Bonds, Risks associated with Bonds, Duration and Modified Duration. Bond PortfolioConstruction – Immunization Strategy

MODULE 5: MUTUAL FUNDS 8 HOURS

Mutual Funds – Net Asset Value. Mutual Fund Returns. Selection Criteria – Sharpe's Measure, Treynor's Measure,Jensen's Measure.

MODULE 6: PORTFOLIO EVALUATION AND REVISION 6 HOURS

Selection criteria: Performance Evaluation- Sharpe's Performance Index, Treynor's Performance Index and Jensen's Measure to identify the predictive ability, Evaluation of Mutual Fund. -NAV method, Portfolio Revision Methods- Investment Timing, Formula Plans Constant Dollar Value Plan, Constant Ratio Plan, Variable Ratio Plan

PRACTICALS / SKILL ENHANCEMENT ACTIVITIES

1. Administering 'Risk Measurement Tools' and identifying the type of risk takers of at least 5 individuals.
2. Perform Fundamental Analysis and identify at least 5 stocks suitable for long-term investment
3. Perform Technical Analysis and identify at least 5 stocks for short-term investment
4. Construct Portfolio of selected stocks using Sharpe's Model or CAPM
5. Identify and suggest at least 5 Mutual Funds suitable Mutual Funds, on the basis of different parameters

Suggestive Readings:

- Charles P. Jones (2007); “Investments Analysis and Management”, Wiley, 9th Edition
- Punithavathy Pandian, (2007); *“Security Analysis and Portfolio Management*”, Vikas Publishing House Private Limited, Fifth Reprint Edition.
- Reily and Brown (2007); *“Investment Analysis and Portfolio Management*”, Thomson South Western, 8th Edition, First Indian Reprint.
- Fischer, E Donald and Jordan, J Ronald (2005); “*Security Analysis and Portfolio Management”*, Prentice Hall of India Private Ltd., 6th Edition.

Additional Readings:

- Haugen Robert (2003); “Modern Investment Theory”, Pearson Education, 5th Edition.
- Bhalla, V.K. (2006); “Investment Management”, S. Chand; 12th Edition.
- Hirschey and Nofsinger (2008); “Investments – Analysis and Behaviour”, Tata McGraw Hill Publishing Company Limited, Special Indian Edition.
- Avadhani V.A (2006), “Securities Analysis and Portfolio Management”, Himalaya Publishing House, Eighth Revised Edition.
- Sharpe, Alexander and Bailey (1996); “Investments”, Prentice Hall of India Private Limited, 5th Edition.
- Kevin (2008); “Security Analysis and Portfolio Management”, Prentice Hall of India Private Limited, First Reprint Edition.

1.4 MARKETING SPECIALIZATION

Name of the Program: Master of Business Administration

Course Code: 3.4.1

Name of the Course: Retailing Management and Services

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Course Objectives:

1 To understand the services domain from a marketing perspective.

2 To understand retailing as a business and have a comprehensive view of the marketing and store management functions in a retailing organization.

Course Outcomes:

1. At the end of the course, student must be able to understand the essential components of a service business and manage retailing.

COURSE CONTENT

MODULE 1: INTRODUTION TO SERVICES MARKETING 8 HOURS

Foundations of services marketing - The services concept- Service Industry –Nature of Services, Distinctive Characteristics of Services, Classification of Services – Importance of Services Marketing - The Growth in Services – Global & Indian Scenarios, Extended Services Marketing Mix: 7 Ps of Services Marketing.

MODULE 2: SEERVICE QUALITY 10 HOURS

The GAP model, Customer expectations of services, Customer perceptions of Service and Measurement of quality in services, Servqual model and measurement methods, Employees role in service delivery, Creating a culture of service, the services marketing triangle, Customers role in service delivery, Services -Market Segmentation –Positioning and Differentiation of Services, Strategies for managing closing the five gaps.

MODULE 3:SERVICE BLUE PRINT 10 HOURS

Managing the Service Process – new service development, Service Blueprints,

Customer defined service standards, Physical Evidence and Cape Services. Service encounter, Service failure and recovery, Service pricing, Customer relationship management and Loyalty in services, Role of social media in customer services.

MODULE 4: INTRODUCTION TO RETAILING 10 HOURS

Introduction to retailing, types of retailers and Retail formats including e-tailers, theories of retail development, Consumer shopping behaviour and decision-making process, the concept of franchising, Retail mix, measuring performance in retail, Introduction to multi-channel retailing, Retail Strategy

MODULE 5: STORES MANAGEMENT 8 HOURS

Key elements of store operations and managing touch points, role of a store manager, Retail location selection, Segmenting and targeting in retail, shopper marketing - components, store design and layouts, Visual Merchandising**.**

MODULE 6: IMC IN RETAILING 10 HOURS

Integrated marketing Communications in retailing, Merchandising concept and functions, Merchandise Management, Concept of CPFR, Category Management - Definition and process, Introduction to private labels. Customer services in retailing.

Suggested Readings:

- Valarie A Zeithml, Mary Jo Bitner and Ajay Pandit. 7th edition (2018). *Services Marketing – Integrating customer focus across the firm*. Paco Underhill.
- K Rama Mohana Rao. 2nd edition (2011). *Services Marketing*. Pearson Education India.
- W. Jochen. L Christopher. Chatterjee Jayanta. (2017). *Services Marketing -People Technology Strategy*. Pearson Education.

References:

- Simon & Schuster. (2008). *Why we buy – The Science of Shopping*. Paco Underhill.
- G.P.Sudhakar. (2012). *Integrated Retail Communication*. Prentice Hall of India Pvt Ltd.
- Rosemary Varley and Routledge. (2005). *Fundamentals of data visualization: a primer on making informative and compelling figures*. O'Reilly Media.

Name of the Program: Master of Business Administration

Course Code: 3.4.2

Name of the Course: Consumer Behavior

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Objectives:

1 To gain clear understanding of the factors that shape consumer behavior
2 To understand various theoretical models of consumer behavior.
3 To gain a perspective on consumer behaviour research and some important tools and techniques used.

Course Outcomes:

1. At the end of this course, students will be able to appreciate the importance of understanding consumer behaviour for marketing success, understand the various factors shaping consumer behaviour and choice, be able to conduct exploratory research in consumer behavior and be able to use understanding of consumer behaviour in making marketing plans.

COURSE CONTENT

MODULE 1: INTRODUCTION TO CONSUMER BEHAVIOUR 8 HOURS

Introduction: The Scope and importance of consumer behaviour, Concept, diversity of consumer behavior, Characteristics of Indian Consumers. Individual determinants of Consumer Behaviour, Motivation, Personality and Self Concept, Consumer Perception, Consumer Learning, Consumer Attitude Formation and Change.

MODULE 2: INDIVIDUAL & GROUP BEHAVIOUR 10 HOURS

Influences on the Consumer: Consumer needs, motives - positive and negative motivation - rational versus emotional motives. Consumer relevant reference groups - opinion leaders - family decision making and consumption related roles - family life cycle - social class and consumer behaviour - influence of culture on consumer

behaviour- cross cultural context. Diffusion of innovations: the diffusion and adoption process - consumer innovativeness and personality traits.

MODULE 3: CONSUMER DECISION MAKING MODELS 8 HOURS

Consumer decision making: Models of consumer decision making - Engle-Kollatt Blackwell model, Howard-Sheth Model, Bettman's Model, HCB Model. Concept of involvement, extensive/limited problem solving – routinized responsive behavior.

MODULE 4: CONSUMER SATISFACTION MODELS 8 HOURS

Post purchase behavior: Consumer satisfaction concept & Models – Expectancy Disconfirmation, Desires Congruency Model, Equity Theory, Attribution Theory, Cognitive dissonance, Consumer delight, consumer complaint behavior.

MODULE 5: CONSUMERISM 12 HOURS

Consumerism: Evolution of consumer society. Definition of consumerism, buyers & sellers rights, effects of consumerism. Organizational Buying: Concept & comparison with Consumer buying, Economic Influence; Political Influence; Legal Influence; Supplier's Influence; Technology Influence; Customer Influence; Government Influence; Labour Influence, Analyzing Buyers' strengths & Negotiation Capabilities.

MODULE 6: 10 HOURS

Organizational Influences on Buying Behavior: Buying Roles; Market Response: The Buy Grid Model; The Organizational Buying Decision Process; Buying Tasks; Interpersonal Influencing in Organizational Buying.

Suggested Readings:

- DebrajDatta and MahuaDatta. 1ST edition (2011). *Consumer behaviour and Advertising Management*. Vrinda Publication Pvt Ltd.
- K Rama Mohana Rao. 2nd edition (2011). *Services Marketing*. Pearson Education India.
- S.Sumathi and P. Saravanavel.. (2017). *Marketing Research and Consumer Behaviour*. Vikas Publishing House Pvt Ltd.

References:

- Rama Bijapurkar. (2013). *We are like that only*. Penguin India.
- Matinkhan. (2007). *Consumer Behaviour and Advertising Management* new age publishers.
- Conner Acevedo. (2018). *Consumer Behaviour and Advertising Management*. ED-TECH press.

Name of the Program: Master of Business Administration

Course Code: 3.4.3

Name of the Course: Rural and Agricultural Marketing

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Objectives:

1 To understand the opportunities and challenges in rural marketing
2 To understand the differences between Rural and Agricultural marketing.
3 To evaluate different marketing strategies used in rural distribution and promotion.

Course Outcomes:

1. At the end of the course, the student must develop an appreciation for rural and agricultural marketing.

COURSE CONTENT

MODULE 1:INTRODUCTION TO RURAL MARKETING 8 HOURS

Introduction to Rural Marketing: Definition and Scope of Rural Marketing, Components of Rural Markets, Classification of Rural Markets, Rural vs. Urban Markets. Population, Occupation Pattern, Income Generation, Location of Rural Population, Expenditure Pattern, Literacy Level, Land Distribution, Land Use Pattern, Irrigation, Rural Development Programs, Infrastructure Facilities, Rural Credit Institutions, Rural Retail Outlets.

MODULE 2:RURAL MARKETING MIX **10 HOURS**

Segmenting Rural Markets, Rural Marketing Mix Strategies: Positioning in rural markets, Rural Product Strategies and Brand Management – Rural Pricing Strategies – Rural Distribution Strategies – Innovative Distribution Channels like ITC E-choupal, Godrej Adhar, HUL Shakti, Mahindra Samriddhi sand Godrej Sakhi. Rural Promotional Strategies, Challenges in Rural Communication, Rural Media- Mass Media, Non- Conventional Media, Personalized Media, Rural Media Typology, Rural Media Innovation, Influence of Consumer Behaviour on Communication. Cases on FMCG /Beverages /OTC marketing in rural markets.

MODULE 3: RURAL MARKETING STRATEGIES **8 HOURS**

Marketing strategies for rural markets, Market Research in rural India including findings published reports like Thompson's rural market index and similar ones, Consumer Finance, Public-Private Partnership, E-Rural Marketing, Role of Government and NGOs in Rural Marketing. Qualitative research techniques for rural research, NSSO rural consumption studies

MODULE 4: AGRICULTURAL MARKETING **12 HOURS**

Agricultural Marketing: Nature and Scope, Objectives of Agriculture Marketing, classification of agricultural products and markets, how agricultural marketing is different from rural marketing, Challenges in Agricultural Marketing, Channels of Distribution for agricultural products, Managing rural distribution networks. Government led incentives for agricultural marketing like Krishimarata Vahini, online trading in Karnataka, and Agmarknet, Impact of Rural Credit and Finance on Rural Consumerism – Scope and role of Banking and NBFCs in Rural markets.

MODULE 5: COOPERATIVE MARKETING **8 HOURS**

Export potential for farm products - Role of APEDA, Global GAP, International Marketing and Export process -Supporting Services, Cooperative Marketing –Concept, History, Functions – Reasons for slow progress of cooperative sector and successful cases such as Amul. Supply Chain Management in Agricultural products including Post harvest processes and cold chains, commodity markets and futures, understanding the economics of fresh, chilled and frozen produce.

MODULE 6: FUTURE OF RURAL MARKETING **10 HOURS**

The Future of Rural Marketing, Concept and working of contract farming in India. Suggestions and group discussions from students on the future of Rural Marketing in India.

Case studies of Safal, Gherkin exports, and Poultry farming may be useful.

Suggested Readings:

- Kashyap. 3rd edition (2016). *Rural Marketing*. Pearson Education India.
- BalramDogra&KarminderGhuman.(2007). *Rural Marketing: Concepts and Cases*. Tata McGraw Hill Education Pvt Ltd
- Krishnamacharyulu. 2nd edition(2010). Rural Marketing: Text and Cases. Pearson India

References:

- D Kumar.P Gupta. (2017). *Rural Marketing: Challenges and Opportunities*. SAGE Publications Pvt. Ltd.
- NilabjaGhosh. (2013). *India's Agricultural Marketing: Market Reforms and Emergence of New Channels.* Springer India.
- Dr. SubhashBhave. Agribusiness Management in India –Text & Cases

3.5 HUMAN RESOURCES

Name of the Program: Master of Business Administration

Course Code:3.5.1

Name of the Course: Learning and Development

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Course Objectives:

1. To enable the students to understand the concepts, principles and process of learning and development.
2. To develop an understanding on various non-training solutions to improve employee performance

Course outcomes:

1. By the end of this course, a student would learn to develop an understanding of how to assess training needs and design training programmes in an Organisational setting. To familiarize the student with the levels, tools and techniques involved in evaluation of training effectiveness

Module 1: INTRODUCTION **8 Hours**

Introduction - Need and importance of Training and development in organizations - A Systematic approach to Training & Development - Assessment, Training and Development and Evaluation Phases, Training administration, difference between training and learning.

Module 2: ORGANISATIONAL DEVELOPMENT **10 Hours**

Need Assessment and Analysis - Organizational Support for need assessment - Operational / Organizational analysis - Requirement analysis - Individual analysis - Motivational aspects of HRD - Development cycle - Reinforcement for behaviour modification - Challenges to become learning organization - Trainee readiness - Trainee motivation to learn.

Module 3: TRAINING METHODS **10 Hours**

An overview of Instructional Approaches - Traditional and modern Instructional

Approaches - Internal Vs External Training - Training Methods - On the Job - Apprenticeship working – mentoring; Off the Job - Case studies - lectures - vestibule – sensitivity - in-basket - role plays - audio-visual & other contemporary methods - Adult learning principles or methods

Module 4: TRAINING EVALUATION AND MEASUREMENT 10 Hours

Training Evaluation and Measurement - Introduction to evaluation process - Criteria development - choosing criteria measures - Evaluation of Criteria - Experimental Designs - quasi experimental designs - Other methods of evaluation - External Training Validity - Models of Evaluation - ROI on Training

Module 5: HUMAN RESOURCE DEVELOPMENT 10 Hours

Human resource development - HRD at micro and macro levels - Sub-systems of HRD - role of HRD function - Concept of career – Career Stages - Steps in career Planning - Methods of career planning and development - Career development Actions and programs - Career problems and solutions - Guidelines for Career management – Concept, need and importance of management development - Management development process - Leader centred techniques of management development.

Module 6: Valuation of Mergers & Acquisition 8 Hours

Practical - Design and conduct training program and visit vocational training institutes.

- Create and implement a training needs analysis
- Develop and implement a training plan
- Assess and/or evaluate a training plan
- Propose alternatives to training

Suggested Readings

1. Goldstein, I. L., & Ford, J. K. (2002). Training in organizations: Needs assessment, development, and evaluation (4th ed.). Belmont, CA: Wadsworth.
2. Lynton & Parekh, (2011)., Training for Development, 3 ed. Sage Publications
3. Robert L. Craig, “ASTD Training and Development”, McGraw Hill Publications

References

1. Dugan laird, (2003), Approaches to Training and Development, Perseus Publishing.
2. Noe, A Raymond & Kodwani, Deo Amitabh, (2012), Employee Training and Development”, 5e, McGraw Hill Publications, 2012

Name of the Program: Master of Business Administration

Course Code:3.5.2

Name of the Course: Team Dynamics at Work

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	58 Hrs

Course Objectives:

1. To understand the purpose and the value of team building.
2. To apply as when teams are important and when they are not.
3. To describe how teams are formed and how they operate.
4. To comprehend and apply the techniques and principles of conflict resolution to make teams more effective.
5. To interpret the application of talent development within a team environment.
6. To evaluate the techniques to assure good team function.
7. Apply team-building activities.

Course outcomes:

1. To impart the fundamentals of the key elements of a business organization
2. To develop analytical skills to identify the link between the management practices in the functional areas of an organization and business environment.
3. To provide insights into latest technology, business communication, management concepts and to build team work and leadership skills among them.
4. To inculcate the habit of inquisitiveness and creativeness aimed at self-actualization and realization of ethical practices.

Module 1: INTRODUCTION **10 Hours**

Team composition, formation of teams and development- Intra team Dynamics -Inter group relations -Team Performance and Motivation-Team Conflict and Leadership-Team Decision Making, Group dynamics, Dynamics of teams and Team building

Module 2: LEADERSHIP TEAM DECSION MAKING **10 Hours**

Leadership-Team Decision Making, Discovering the interpersonal orientation through, training needs analysis, STAR team model (Strengths, Teamwork, Alignment and Results), Experiential learning Methodologies-T- group sensitivity training, encounter groups Culture, Types of culture in the organization, Culture, Discipline, Organizational Effectiveness in creating team culture

Module 3: TALENT MANAGEMENT **10 Hours**

Elements, benefits and challenges of Talent Management System - Building blocks of Talent management: competencies, performance management, evaluating employee Potential - Modern practices in talent attraction, selection, retention and engagement

Module 4: GROUPS **10 Hours**

Introduction to Groups, Nature of groups, stages of group development, Encounter groups, appreciative enquiry, Discover the facets of interpersonal trust through Johari window, communication skills.

Module 5: NEGOTIATION **8 Hours**

Introduction to Negotiation, Negotiation skills and strategies for team building, team morale, team building strategies at work place.

Module 6: CONFLICT AND STRESS **10 Hours**

Nature of conflict, theories of conflict, work place conflict, Conflict resolution in teams, competitive vs collaborative behaviour, developing collaboration. work stress and stress management

Suggested Readings

1. Levi, Daniel. (2014). Group Dynamics for Teams, 5th Edition, SAGE Publications.
2. Simon Hartley, Stronger Together: How Great Teams Work , Little, Brown Book Group UK

References

1. Greg L stewart, Charles C manz, Team Work and Group Dynamics, John Wiley and Sons

Name of the Program: Master of Business Administration

Course Code:3.5.3

Name of the Course: Performance Management System

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Course Objectives:

1. The objective of this course is to equip students with comprehensive knowledge and practical skills to improve their ability for performance appraisal in their organizations.

Course Objectives

1. It is particularly intended for students as future managers and supervisors who will conduct the performance appraisal of their subordinate

Module 1: INTRODUCTION **10 Hours**

Conceptual aspects of Performance System, Dimensions and excellence in performance- Pillars of human performance - Theoretical base for PMS - Objectives and functions of PMS - Performance Management Prism - Competency based PMS - Electronic PMS- Potential appraisal and HRM, Performance Management and Employee Development – Emerging trends in performance appraisal.

Module 2: TEAM PERFORMANCE MANAGEMENT **12 Hours**

Team performance Management - Building and leading high performance teams - Virtual teams - Remote working, prerequisites of remote team performance -Role of team leaders - Drivers of performance - Designing appraisal programs - Conducting appraisals - individuals and teams - Feedback mechanisms – Individual and team rewards.

Module 3: PERFORMANCE APPRAISAL **8 Hours**

Objectives, process, pros and cons of Performance appraisal - Design of appraisal forms using rating scales - Different methods of appraisals – Past, present and future oriented methods.

Module 4: PERFORMANCE MANAGEMENT CHECKLISTS **8 Hours**

Data collection on Performance information - Presentation, interpretation and corrective action - Performance management guidelines and checklists for managers - Common problems in assessment - Ways to avoid pain during appraisals.

Module 5: PAY AND PERFORMANCE **8 Hours**

Managing high performance - Pay for performance - Performance improvement - Identification of gaps - Creative performance strategies - Performance management skills

Module 6: ISSUES IN PERFORMANCE APPRAISAL **10 Hours**

Legal issues associated with performance appraisals - Mentoring and coaching - Counselling and Monitoring Managing development - Guidelines on appraising expatriate's Performance, counselling for better performance - Six sigma and bench marking.

Suggested Readings

1. B D Singh,(2012), Performance Management System – A Holistic Approach", Excel books
2. S Kohli and T Deb,(2008) "Performance Management", Oxford Higher Education

References

1. SoumendraNarainBagchi, (2013) "Performance Management 2 ed., Cengage Learning
2. Herman Aguinis, (2013) Performance Management" 3 ed. , Pearson.

3.6 HEALTH CARE MANAGEMENT

Name of the Program: Master of Business Administration

Course Code:3.6.1

Name of the Course: Perspectives On Health Care Sector

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview

The healthcare sector is one of the important social sectors operating in the economy which has a bearing on the performance of other sectors within the economy. This course will provide bird's eye view of health sector, including the policies pertaining to healthcare set- up in India. The course will help the participants to be familiar with terminology as applicable to healthcare set up including having overview of non-clinical disciplines. The course will also provide understanding of the roles of the government and different constituents in healthcare industry. It provides the general understanding of the gamut of the operations and impact of the same being undertaken by various stakeholders.

Course Objectives:

- To introduce the student to the overview and perspectives of healthcare sector.
- To develop sense of interest about healthcare sector among students.

Course Outcomes:

- By the end of the course, the student is expected to develop sensitivity about healthcare issues.

Unit 1: Introduction **8 Hours**

Meaning, Scope & Dimensions of health and well-being, Determinants of health, Role of healthcare in Human Development, economic Development and inclusive growth.

Unit 2: Healthcare Terminology **8 Hours**

Introduction to Epidemiology, Human Biology; Familiarization with terms like Bio-chemistry, Physiology, Anatomy, Microbiology, Pathology & Pharmacology.

Unit 3: Indian Healthcare **10 Hours**

Constitutional rights and obligations for citizens, Healthcare Delivery in India, Primary, Secondary and Tertiary Levels, Public and Private Health Systems-Indigenous Systems of Medicine, Health Policy, Healthcare Reforms in the recent years.

Unit 4: Healthcare Sector **12 Hours**

Introduction to Medical Diagnostics, Devices and Imaging Industry, Pharmaceuticals, Medical Tourism and Health Insurance-Drivers of healthcare industry-Government Policies and Regulations-Profiles of the major companies -Outsourcing; Challenges and Opportunities-Recent Trends-Research and Development Activities.

Unit 5: Status of the Healthcare Sector **12 Hours**

Introduction to Demographics- Statistics on healthcare infrastructure in India- Overview of international health systems as compared to Indian Health System-Plurality of healthcare situation-Coverage and the impact of the health services-Future of the Indian Health System-Challenges and emerging domains in the healthcare delivery- Social Audit

Unit 6: Practical Interaction **6 Hours**

Case Study Discussion and interaction with healthcare professionals from constituents of the healthcare sector.

References:

- Goel, S.L. (2004). "*Health Care Organization and Structure*", Deep and Deep Publications.
- Majumdar, P.K (2010). " *Fundamentals of Demography*", Rawat Publications.
- Moisio, Marie A (2000). "*A Guide to Health Insurance Billing*", Delmar Cengage Learning, Ist Edition.
- Kumar, Rajesh (2009). " *Global Trends in Health and Medical Tourism*", SBS Publishers and Distributors Pvt Ltd.

Name of the Program: Master of Business Administration

Course Code:3.6.2

Name of the Course: Management of Public Health Systems

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview

"Prevention is better than cure". This adage goes well with the public health systems. This course will help in learning, develop, implement and evaluate effective public health initiatives within the country. The knowledge attained by this course will enable professionals to conceptualize and analyze programs in the context of the communities they serve, taking into account cultural, social, economic, ethical and legal factors.

Course Objectives:

- To introduce the student to public health domain.
- To make the student understand the principles and dimensions of public health.

Course Outcomes:

- The student shall be in a position to appreciate the role and importance of public health in healthcare

Unit 1: Introduction to Public Health **8 Hours**

Meaning and scope - Changing concepts in public health – Concept of disease - Principles of disease transmission & disease control- Health for All vs Health for only those who can pay.

Unit 2: Public Health System **10 Hours**

Healthcare of community-Public Health Planning and Management- Role of environment (air, water and land) in Health-Disaster Management-Prediction, Preparation and Rehabilitation-Communitization of Health

Unit 3: Principles and Methods of Public Health **10 Hours**

Epidemiology of communication and non-communicable diseases-Vital Statistics of Public Health – Principles of epidemiological studies and epidemiological methods – Types of epidemiological studies- Surveillance, Monitoring.

Unit 4: National Health Programmes **12 Hours**

Health Programmes on Maternal and Child Health, Family Welfare, Occupational Health, Environmental Health, Genetics, Geriatric Health, Nutrition and Health and Mental Health-Evaluation of the programmes and schemes-National Health Mission- Community Health Programs-Community Participation-Role of NGOs-Advocacy Campaigns

Unit 5: Health Education and Communication **10 Hours**

Information, Communication and Education (ICE) in Health; Principles, Methods, and Materials-Role of Mass Media-Mass Communication.

Unit 6: Medical Ethics **6 Hours**

Codes of Conduct: MCI Regulations (Professional conduct etiquette and ethics) – Ethics of trust vs ethics of rights– Understanding of patient rights-Distributive justice in health care – Ethics in organ transplantation, clinical trial, care of terminally ill, Euthanasia (Assisted Death)

References:

- K Park. (2011). "*Text Book of Preventive and Social Medicine*", BanarasidasBhanot, 21edition .
- Webber, Roger. (2005). "*Communicable Disease Epidemiology and Control: A GlobalPerspective*" , Oxford University Press ; 2nd Edition.
- Rao, A.A. Kameswara. (2005). "*Community Medicine: Practical Manual*"
- Schneider, Mary-Jane. (2012). "*Introduction to Public Health*" ., Jones & Bartlett Publishers; 3 edition.
- Sathe&Sathe. (1997). "*Epidemiology & Management for Healthcare for all*", PopularPrakashanam.
- Francis C M. (1993). "*Medical Ethics*", Jaypee Brothers Medical Publishers (Pvt Ltd), NewDelhi.
- S. L Goel. (2001). "*Healthcare Systems and Managements; Primary Healthcare Management*", Deep and Deep Publications, New Delhi , Vol 4.

Name of the Program: Master of Business Administration

Course Code:3.6.3

Name of the Course: Health Economics

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview

Health Economics course has been designed to develop basic understanding and skills necessary to analyze issues and problems in utilization of health services from an economic perspective. Health sector consumes a large proportion of resources. As a consequence, there are major economic issues involved, not only on whether this amount is right, but how best to spend it and on whom. Therefore, this course becomes imperative for policy makers, planners, and managers in the field of healthcare. The course covers the basic theory of microeconomics in health care such as demand, supply, pricing; production, cost, competitive market equilibrium, monopoly and monopolistic market etc.

Course Objectives:

- To introduce the student to the micro and macro-economic principles as applicable to healthcare.
- To make the student to understand healthcare markets.

Course Outcomes:

- By the end of the course, the student shall be in a position to understand the application of healthcare economics.

Unit 1: Nature and Scope of Health Economics **6 Hours**

Definition , Concept and application in Health Systems-Health Economics vs Healthcare Economics-Basic Economic Concepts - Circular Flow of Economic Activity - Using Economics to Study Health Issues - Nature and relevance of Economics to Health and Medical care.

Unit 2: Healthcare and Macroeconomics **10 Hours**

Unique nature of health as an economic activity-Demand and supply of healthcare- Health as a consumer and investment good- Macro economic theory and policy - Valuation & Measurement of Health-Monetary evaluation of length of life- Valuation of the quality of life-Economic Evaluation in healthcare– Understanding of welfare economics.

Unit 3: Healthcare and Microeconomics **10 Hours**

Current Assets, Inventory valuation, Cost formulas (AS-2) Fixed Assets Cost of Acquisition (AS-10), Depreciation methods (AS-6), Liabilities and its classification.

Unit 4: Healthcare Economics and Planning **10 Hours**

Basic Economic Aspects in Healthcare-Externalities (Spillover Effects)-Equity and Health-Techniques of Economic Efficiency, Operational Efficiency and Allocative Efficiency - Economic aspects of Public Private Partnership (PPP).

Unit 5: Healthcare Market **12 Hours**

Meaning and definition, Role and Functions of financial markets, constituents of Financial Markets, Money Market and instruments, Capital Markets and Instruments.

Unit 6: Practical Assignment **8 Hours**

Assignment on demand and supply analysis of new hospitals.

References:

- Getzen, Thomas E. (2006). ”*Health Economics and Financing*” , Wiley , 3rd Edition.
- Dutta, ShuvenduBikash. (2014). ”*Health Economics for Hospital Management*” ,Jaypee Brothers Medical Publication Ltd.
- N K Anand&ShikhaGoel. (2010). “*Health Economics*”, A.I.T.B.S Publishers India, New Delhi,2nd Edition.
- V Raman Kutty. (1999). “*A Premier of Health Systems Economics*”, Allied Publishers, New Delhi.
- James Henderson. (2011). ”*Health Economics and Policy*”, Cengage Learning, 5 Edition.

3.7 BANKING FINANCE AND INSURANCE SERVICES MANAGEMENT (BFIS)

Name of the Program: Master of Business Administration

Course Code:3.7.1

Name of the Course: Strategic Credit Management in Banks

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60Hrs

Course Overview

Major challenge faced by every bank is its deteriorating quality of assets, specially the'advances'. A liberal lending policy of a bank can lead to high volume of non-performing assets while a rigid lending policy could get no business. Further, the competition amongbankscouldforcebankstoadoptshort-termmeasuresforboostingmeasures, having impact on long-run record of the business. Hence, it is essential for banks to have the idea of managing credit strategically. This course provides a framework of Credit Management of Banks from strategic perspective.

Course Objectives:

1. To provide a framework of banking in general, and functioning of banks in Indian context, in particular.
2. To provide knowledge of the credit management strategies of banks.
3. To make understand the process and procedures adopted by banks for processing loan applications.
4. Toprovideknowledgeofmanagementofnon-performingassetsofvariousbanks.

Course Outcomes:

1. Know the regulation of banks in Indian environment and their functioning.
2. Know the process, systems and procedures of sanctioning credit by various banks.
3. Obtain the skill of evaluating financial statements and other documents as appraised by the banks.

4. Know about the strategies used by banks for managing non-performing assets

COURSE CONTENT

Unit 1: EVOLUTIONOFBANKINGINSTITUTIONS 10 Hours

Introduction to banking business, Commercial Banking, Functions, Services, General Structure and methods of Commercial Banking in India, Mechanism of Credit Creation, Liabilities, Assets of Banking, Systems of Banking, Banking innovations, RBI, Function sand Role of RBI, Monetary policy of RBI.

Unit 2: OVERVIEW OF BANK'S CREDIT POLICY 8 Hours

Introduction to Credit policy, Importance, Objectives and Formulation of Loan policy, Credit Exposure and RBI norms, Different types of Loan and Advances, Fund based and Non-Fund based facilities.

Unit 3: APPRAISAL OF CREDIT PROPOSALS:SANCTIONING OF CREDIT LIMITS 10 Hours

Introduction, Meaning and Scope of Credit Appraisal, The credit process, Pre appraisal stage, Appraisal stage, Post-sanction Compliance: Monitoring and Supervision of Advances, Documentation, Purpose, Process for Fresh Advances, Documentation at time of Renewal/Enhancement/Death of a borrower.

Unit 4: CREDITANALYSIS: DIFFERENT TYPES OF BANK BORROWERS 10Hrs

Introduction, Credit Analysis of Sole Proprietary concern, Partnership firms, Limited companies, Local Bodies and Statutory Bodies/Corporations.

Unit 5: EVALUATING COMMERCIAL LOAN REQUEST: FINANCIAL STATEMENT ANALYSIS 10 Hours

Introduction, Financial statements, Ratio Analysis as a tool for Financial Statement analysis, Accounting ratios, Types of ratios used for appraisal of Credit Proposal

Unit 6: MANAGEMENT OF NON-PERFORMING ASSETS 8 Hours

Introduction, Meaning and Definition, Importance, and Classification of Non-Performing assets, Guidelines for classification, Provisioning norms, Recovery of NPA's, Strategies for reducing NPA's

Suggested Reading

1) Popli, G. S., & Puri, S. K. (2013). Strategic Credit Management in Banks. PHI Learning Pvt. Ltd..

2) Suresh, P., & Paul, J. (2014). Management of banking and financial services. Pearson Education India.

3) Gordon, E., & Natarajan, K. (2009). Financial markets and services. Mumbai: Himalaya Publishing House.

4) Khan, M. Y. (2013). Indian financial system. Tata McGraw-Hill Education.

5) Gupta, P. K. (2011). Insurance and risk management. Himalayan Books.

References

1) LOOMBA, J. (2013). Risk management and insurance planning. PHI Learning Pvt. Ltd.

2) Sethi, J., & Bhatia, N. (2012). Elements of Banking and Insurance. PHI Learning Pvt. Ltd..

Name of the Program: Master of Business Administration Course Code:3.7.2 Name of the Course: Insurance Planning &Management		
Course Credits	No of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60Hrs

Course Overview

Many Financial Products and Services have been innovated and introduced in financial markets over centuries. One of the Prominent Financial Products is Insurance. Being the need of every individual and organization, knowledge of its spread, systems and operations is essential for every person planning a career in Finance. This Course is introduced to provide a broad-based knowledge about various insurance products and the operational procedures associated with the major products.

Course Objectives:

1. To provide knowledge on the various forms of Life, Health and Property Insurance.
2. To provide orientation on selection of insurance products.
3. To outline the mechanism of pricing insurance products.
4. To orient about the operational procedures of various forms of insurance

Course Outcomes:

1) Know about the various forms of insurance and their suitability.
2) Know about the criteria for selection of various insurance products.
3) Know the pricing mechanism of insurance products.
4) Know the systems and procedures associated with various forms of insurance.

COURSE CONTENT

Unit 1: INTRODUCTION TO INSURANCE **8 Hours**

Introduction, Meaning, Origin and Development of Insurance, Characteristics, Purpose and Need, Benefits, Functions and Importance of Insurance, Principles and Nature of Insurance Contract,TypesofInsuranceContracts,FundamentalsofInsurability,Classifications of Insurance, Structure of Insurance Industry in India

Unit 2: LIFEINSURANCE,NEEDANDPOLICY ANALYSIS **10 Hours**

Introduction, Motives of Purchasing Life Insurance Policy, Life's need analysis, Determining the amount of Life Insurance, Human value approach, Need's approach, Capital retention approach, Life Insurance Policy, Types of Life Insurance Policy, Benefits of Life Insurance, Policy selection, Determining the cost of Life Insurance, Factors to consider while buying Life insurance.

Unit 3: MEDICALINSURANCE **10 Hours**

Health Insurance Policy, Health Insurance Policies in India-An Overview, Types of Health Insurance, Types of Coverage, Personal Accidents/Disability Income Insurance, Factors to consider while buying Medical Insurance

Unit 4: PERSONAL PROPERTY AND LIABILITY INSURANCE **8 Hours**

Home Owner's Insurance, Coverage Types, Claims procedure, Motor Vehicle Insurance-Types, Overseas and Travel Insurance-Types, Travel Insurance Policy exclusion

Unit 5: INSURANCE PRICING **10 Hours**

Pricing Objectives, Rate making, Life Insurance Pricing elements, Objectives of Rate making, Basis of rating in Indian context, calculation of Premium, Rate making in property and Liability Insurance, Method so floating

Unit 6: POLICY SERVICING AND CLAIMS SETTLEMENT **10 Hours**

Insurance Documents, Nomination, Alterations, Revival, Policy loans, Surrender value and Paid up value, Issue of Duplicate Policies, Cost Policies, Claim settlement Objectives, Types and Steps in Settlement of Claim, Claim settlement process for Life

Insurance,HealthInsurance,Re-Insurance,Need,TypesandAlternatives.

Suggested Reading

1. Jatinder Loomba : Risk Management and Insurance Planning PHI,2014
2. Misra M.Nand Misra S.R, Insurance Principles and Practice, S. Chand and Co. New Delhi, 2007
3. P.K.Gupta,InsuranceandRiskManagement,Himalayapublishinghouse,2015
4. Ganguly , Anad, “Insurance Management”, New Age International ,New Delhi

References:

1. JaveS. Trieschimam, Sandra G.Guatarson, Robert E Houyt, Risk Management and Insurance, ThomsonSowllaWesternSingapore,2003
2. Black, Kenneth and Horord D Shipper,“ Life and health Insurance”, Pearson Education, New Delhi.

Name of the Program: Master of Business Administration

Course Code:3.7.3

Name of the Course: Indian Financial System

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60Hrs

Course Overview

A finance professional needs knowledge of financial management practices within the organization, and financial systems which influence the organization from outside. The financial system comprises of financial institutions, financial markets, financial instruments, financial products and services. A thorough understanding of all these components will equip a finance manager to make better and informed decisions. Hence, the course on"IndianFinancialSystem"whichorientsthelearnerallttheexternalforcesinfluencingfinancialandstrategicdecisionsofa business enterprise is introduced.

Course Objectives:

1. To provide an insight into the functioning of Indian financial system.
2. To make students understand the various components of the financial system, the inter-relationship among different components and the impact on business enterprise.

Course Outcomes:

1. The frame work of Indian Financial System.
2. The various financial institutions that have impact and influence on business organizations and their functioning.
3. The financial markets and their mechanism, with special emphasis on Stock Exchanges.
4. Various financial services available for a business enterprise

COURSE CONTENT

Unit 1: OVER VIEW OF FINANCIAL SYSTEM **6 Hours**

Indian Financial System – Features, Constituents of Financial System –Financial Institutions, Financial Services, Financial Markets and Financial Instruments. Overview of Global Financial System

Unit 2: FINANCIALINSTITUTIONS 12 Hours

Meaning of Financial Institutions, Special Characteristics, Broad Categories – Money Market Institutions and Capital Market Institutions. Industrial Finance Corporation of India, Industrial Development Bank of India, State Financial Corporations, Industrial Credit and Investment Corporation of India, EXIM Bank of India,, National Small Industrial Development Corporation, National Industrial Development Corporation, Life Insurance Corporation of India, Unit Trust of India

Unit 3: NON-BANKING FINANCIAL INSTITUTIONS 8 Hours

Meaning, Registration, Principal Business of NBFCs, Structure, Supervision, RBI Measures for NBFCs, Other Measures.

Unit 4: FINANCIALSERVICES 12 Hours

Concept, Objectives/Functions, Characteristics, Financial Services–Concept, Classification, Regulatory Framework. Merchant Banking, Mutual Funds, Leasing, Credit Rating.

Unit 5: FINANCIAL MARKETS 12 Hours

Meaning and definition, Role and Functions of financial markets, constituents of Financial Markets, Money Market and instruments, Capital Markets and Instruments.

Unit 6: STOCK EXCHANGE 6 Hours

Meaning and definition, Role and Functions, Regulatory Framework of Stock Exchange, Profile of Indian Stock Exchanges, Listing, Trading.

Suggested Reading :

1. Guruswamy,S., “Indian Financial System”, The McGrawHill Companies.
2. L.M.Bhole: Financial Institutions & Markets, TataMcGrawHill, NewDelhi.
3. Khan,M.Y;“IndianFinancialSystem”,TheMcGrawHillCompanies.
4. KarkalG.C:Unorganised money markets in India, Lalwani, Bombay.
5. H.RMachiraju:Indian Financial System, VikasPub.House.

References:

1. ICWA, Financial Services, ICAI, Publication.
2. G.S.Patel CapitalMarket, Functioning and Trends, ICFAI Publication.

3.8 START-UPS AND SMEs MANAGEMENT

Name of the Program: Master of Business Administration Course Code:3.8.1 Name of the Course: perspectives on Startups and SMES		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview

Micro, Small and Medium Enterprises (MSME) contribute nearly 8 percent of the country's GDP, 45 percent of the manufacturing output and 40 percent of the exports. An estimated 47 million enterprises with an investment of Rs.13 trillion in fixed assets accounted for an employment of 106 million people in 2012-13. They provide the largest share of employment after agriculture. They are the nurseries for entrepreneurship and innovation. They are widely dispersed across the country, in both urban and rural areas, and produce a diverse range of products and services to meet the needs of the local markets, the global market and the national and international value chains. For these reasons, MSME is rightly recognized as an engine of economic growth and as an important and vibrant socio- economic actor in the national ecosystem. But, in an increasingly globalizing market, competitiveness is the key for the survival and growth of an MSME. This demands sound strategic and operational management of the enterprise. This course is aimed at imparting knowledge and skills to address this demand. This course exposes students to the objectives, challenges, and requirements for effectively managing the small to mid-sized business. The course assumes the venture in question is in existence, and therefore spends little or no time with startup related issues, which are covered in another elective in this stream.

Course Learning Objectives:

- To develop perspective and an appropriate understanding of Startups and SMEs inthe Indian context

Course Outcomes: On successful completion of the course, the students will be able to;

- By the end of the course, students will build an awareness and application level on the startups and SMEs.

MODULE 1: INTRODUCTION **8 HOURS**

Definition and meaning SMEs & startups, role, importance and present status in Indian economy, Factors influencing their emergence, Government Policies for startups and SMEs in India, Monetary and Fiscal Policies, Problems and Challenges.

MODULE 2: PROCESS OF NEW VENTURE **10 HOURS**

Registration & Licensing, bank & other statutory formalities. Organizing the basic infrastructure such as premises, water, power, transport etc., procurement ofmachinery & equipment, mobilization of human and material resources, trial run.

MODULE 3: LAUNCHING OF STARTUPS **10 HOURS**

Meaning, Registration, Principal Business of NBFCs, Structure, Supervision, RBIMeasures for NBFCs, Other Measures.

MODULE 4: SUPPORTING INSTITUTIONS **12 HOURS**

Concept of Market equilibrium and Revenue curves, Characteristics of different market structures, Price determination and firms equilibrium under perfect competition, monopolistic competition, oligopoly and monopoly, Price discrimination, International price discrimination and dumping, Pricing methods.

MODULE 5: FINANCING **8 HOURS**

Theories of factor pricing: wages and rent, Theories of interest and investmentdecisions, Profit and profit functions.

MODULE 6: PRACTICALS **8 HOURS**

Discussions on Live Case studies of two Enterprises, Talk by/ Interaction with two entrepreneurs from the start ups and established SME.

Suggested Reading:

- K.V. SubbaRao , "Entrepreneurial Development and New Enterprise Management", Adhyayan Publishers and Distributors, 2009
- Indian Institute of Banking and Finance , "Small and Medium Enterprises in India"Taxmann Publishers, 2013
- Dr. Vasant Desai, "Small scale industries and entrepreneurship", HimalayaPublishing House,9th Edition, 2014
- Preeti Singh , "Dynamics of Indian Financial System: Markets, Institutions andServices, Global Professional Publishing Ltd, 2012
- Longenecker, Moore et al , "Small Business Management", Thomson PublishingCompany ,14th edition, 2008

References:

1. Prof. AnjanRaichaudhuri, Managing New Ventures – Concepts and Cases on Entrepreneurship, PHI Learning Pvt Ltd,2010
2. Report of the Working Group on MSME for the 12th Five-Year Plan, Ministry ofMSME, Government of India.

Name of the Program: Master of Business Administration

Course Code:3.8.2

Name of the Course: Basic Management Aspects of Small Business

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview

Management includes management of business organizations, whether large, medium, small or micro. Small businesses are not necessarily managed in a way similar to that oflarge and multinational organizations. In other words, management of functional area of large organizations is different from that of small businesses because of size, resources, challenges and nature of the business. Hence entrepreneur of small business has to have better understanding of management of business organizations in general and managementof small business in particular. This will ensure success in not only establishment but also in management and growth of small business.

Course Learning Objectives:

- To make the students understand the managerial dimensions of small business.
- To help the students get equipped with necessary managerial skills for managingtheir enterprises in case of potentiality.

Course Outcomes:

By the end of the course, the confidence of students in managing the smallbusinesses will increase.

MODULE 1: INTRODUCTION **8 HOURS**

Characteristics of the small business – Differences with Large Business, Management of Small business Vis-a-Vis large business, Managing Business Environment for SMEs.

MODULE 2: MANAGING MARKETING **10 HOURS**

Internal and External environment scanning, Business Model Development, Idea Management, Marketing Plan, formal and informal Market Research, distribution channels, Role of ICT.

MODULE 3: MANAGING FINANCES **10 HOURS**

Challenges of Managing Finance, Taxation and Costing. Sources of Finance, Traditional costing vs Activity based costing, Handling petty cash, Business and checks, computerised accounting – advantages, Merchant accounts, accounting software.

MODULE 4: MANAGING HUMAN RESOURCE **10 HOURS**

Concept of Market equilibrium and Revenue curves, Characteristics of different market structures, Price determination and firms equilibrium under perfect competition, monopolistic competition, oligopoly and monopoly, Price discrimination, International price discrimination and dumping, Pricing methods.

MODULE 5: MANAGING PRODUCTION AND OPERATIONS **10 HOURS**

Production in small business vis-a-vis production in large business, size of the plant, process, planning and control of production in small business, cost of production, utilization of production capacities, technical knowhow.

MODULE 6: PRACTICALS **8 HOURS**

Interaction with any 3 small business entrepreneurs on experiences of managing Marketing, Finance, Human Resources & Production.

Suggested Reading:

1. Dr. Vasant Desai, “Dynamics of entrepreneurial development and management”, Himalayan Publishing House ,5th edition, 2014
2. Richard M. Hodgetts, Donald F Kuratko and Margaret Burlingame,”Small BusinessManagement” , Wiley Publishing, Ist Edition, 2007

References:

1. Fred S. Steingold, “Hiring your first employee: A step-by-step guide “, NOLO Ist Edition, 2008
2. Stuart Atkins MBA, “Small Business Marketing: A Guide for Survival Growth and Success”, Book Surge Publication, 2009
3. James Stephenson, “Ultimate Small Business Marketing Guide”, Entrepreneur Press, 2nd Edition, 200
4. Colin Barrow, “Financial Management for the small business”, Kogan Page Ltd, 6th Edition, 2006

Name of the Program: Master of Business Administration

Course Code:3.8.3

Name of the Course: Establishment of SMEs

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview

Many will have dreams of becoming an entrepreneur. It is required to recognize such instinct among student community by imparting such an education which will help them to become an entrepreneur. This course is intended to introduce and sensitize the potential onthe basic processes involved in starting a new business ventures.

Course Learning Objectives:

- The primary objective of this course is to encourage entrepreneurial thinking in the student community and give them a chance to evaluate their personal prospects for continuing or starting a business venture.
- Another objective is to make students to understand the essentials of establishing SMEs.

Course Outcomes: By the end of the course, the students must get clarity of vision and roadmap forestablishing a new business venture

MODULE 1: INTRODUCTION **8 HOURS**

Evolution of SMESs in India-Relevance to Indian Economy-Growth and development of SMEs before and after 1991-Government policies on SMEs-Present status of sector wise SMEs.

MODULE 2: ENTREPRENEURSHIP AS A CAREER **8 HOURS**

Choice of Entrepreneurship as a Career, Factors favouring entrepreneurship as a career - Reasons for the failure of entrepreneurship venture – Avoidance of failure - Concept & importance of Competence - Awareness & Assessment of Competence - Development of Competencies.

MODULE 3: ENTREPRENEURIAL PROCESS **10 HOURS**

Developing Successful Business Ideas - Recognizing and Evaluating the Opportunity - Feasibility Analysis - Industry and Competitor Analysis - Developing an Effective Business Model - Moving from an Idea to an Entrepreneurial Firm - Managing and Growing the Enterprise and Exercises – Types of entry strategies and selection.

MODULE 4: RESOURCE PLANNING AND DETAILED PROJECT REPORT 12 HOURS

Locational Considerations - Procurement of Land and Buildings- Procurement of Machinery-Equipment, Preparation of the Detailed Project report - Filing of Entrepreneur Memorandum - Processing for Financial Assistance - Obtaining Statutory Licenses and Clearances, Trail Production, Commercial Production.

MODULE 5: TOOLKIT FOR ENTREPRENEURS **8 HOURS**

Experiences of Entrepreneurs looking beyond placements & salaries - Entrepreneurs roadmap - Successful Entrepreneur's Personality - Managing excellence in Career - Business Start-up Checklist - Self Assessment Checklist for Entrepreneur, Critical thinking skills -Case Studies & Work Sheets etc.

MODULE 6: PRACTICALS **8 HOURS**

Reading of News Papers or a good business magazine and look for example, Reading of small or medium entrepreneur in Indian small or medium magazine, YFS Magazine Young, Fabulous and Self Employed, SME and Entrepreneurship Magazine, Reading of Forbes, Fast Company Inc., HBR

Suggested Reading:

1. Poornima M Charntimath, “Entrepreneurship development and small business enterprise”, Pearson Publishers, Ist Edition, 2005
2. David, Otes “A Guide to Entrepreneurship”, Jaico Books Publishing House Delhi,2004
3. A Sahay& V Sharma, “Entrepreneurship & New Venture Creation”, Excel Books, 1st Edition, 2008.

References:

1. William J. Stolze , “ Startup: an entrepreneur's guide to launching and managing a new venture, Rock Beach Press, 1989.
2. Justin Longenecker, Leo B. Donlevy, Terri Champion, Carlos W. Moore, J. William Petty, Leslie E. Palich “Small Business Management: Launching and Growing New Ventures, 5th Edition, 2013
3. Morse and Mitchell, “Cases in Entrepreneurship” Sage South Asia Edition, 2006
4. K Ramachandran, “Entrepreneurship – Indian cases on Change Agents” TMGH.

3.9 Business Analytics

Name of the Program: Master of Business Administration

Course Code:3.9.1

Name of the Course: The Data Science using R and Python

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Overview of the Course:

The field commonly known as “Data Science” lies at the intersection of mathematics, computer science, and domain expertise. Within the data science (DS) world, there are a multitude of areas of study, and exploration. The demand for skilled data science practitioners is rapidly growing, and this course prepares you to tackle real-world data analysis challenges. This course will introduce you to the basics of R programming.

Course Objectives:

- To make students understand the implementation of R and Python for data analytics
- To equip students to be skilled in the data analytics tools

Course outcomes:

- Analyze data sets using the various functions available in R and Python
- Create dashboards by visualization techniques in R and python

Unit 1: Introduction to R **8 HOURS**

Basic Concept in R, Data Structure, Import of Data. Graphic Concept in R: Graphic System, Graphic Parameter Settings, Margin Settings for Figures and Graphics, Multiple Charts, More Complex Assembly and Layout, Font Embedding, Output with cairo pdf, Unicode in figures, Colour settings, R packages and functions related to visualization.

Unit 2: Descriptive Analysis using R **12 Hours**

Computing an overall summary of a variable and an entire data frame, summary() function, sapply() function, stat.desc() function, Case of missing values, Descriptive statistics by groups, Simple frequency distribution: one categorical variable, Two-way contingency table: Two categorical variables, Multiway tables: More than two categorical variables.

Unit 3: Visualization of Data in R **10 Hours**

Bar Chart Simple, Bar Chart with Multiple Response Questions, Column Chart with two-line labeling, Column chart with 45o labeling, Profile Plot, Dot Chart for 3 variables, Pie Chart and Radial Diagram, Chart Tables, Distributions: Histogram overlay, Box Plots for group, Pyramids with multiple colors, Pyramid: emphasis on the outer and inner area, Pyramid with added line, Aggregated Pyramids, Simple Lorenz curve.

Unit 4: Introduction to Python **10 Hours**

Juypter Notebook, Python Functions, Python Types and Sequences, Python More on Strings, Reading and Writing CSV files, Advanced Python Objects, map(), Numpy, Pandas, , Series Data Structure, Querying a Series, The DataFrame Data Structure, DataFrame Indexing and Loading, Querying a DataFrame, Indexing Dataframes, Merging Dataframes

Unit 5: Data Aggregation, processing and Group Operations **10 Hours**

Time Series, Date and Time, Data Types and Tools, Time Series Basics, Date Ranges, Frequencies, and Shifting, Time Zone Handling, Periods and Period Arithmetic, Resampling and Frequency Conversion, Time Series Plotting, Moving Window Functions, Natural Language Processing, Image Processing, Machine Learning K Nearest Neighbors Algorithm for Classification, Clustering

Unit 6: Visualization of Data with Python **10 Hours**

Using Matplotlib Create line plots, area plots, histograms, bar charts, pie charts, box plots and scatter plots and bubble plots. Advanced visualization tools such as waffle charts, word clouds, seaborn and Folium for visualizing geospatial data. Creating choropleth maps

Reference Books:

- Ozdemir, S. (2016). *Principles of data science*. Packt Publishing Ltd.
- Grus, J. (2019). *Data science from scratch: first principles with python*. O'Reilly Media.
- Wickham, H., & Grolemund, G. (2016). *R for data science: import, tidy, transform, visualize, and model data*. " O'Reilly Media, Inc."
- VanderPlas, J. (2016). *Python data science handbook: Essential tools for working with data*. " O'Reilly Media, Inc.".

Name of the Program: Master of Business Administration

Course Code:3.9.2

Name Of the Course: Advanced Statistical Methods For Business Decision Making

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview:

The course is designed for acquiring professional skills and knowledge in the area of statistics. The students will be enabled to independent treatment of statistical research issues. Data analysis of typical research problems will be done to equip the students to better work with statistical tools like R and Python.

Course Objectives:

- To make students understand the importance of statistics for data analytics
- To equip students with strong theoretical knowledge of statistics and its applicability in data analysis

Course outcomes:

- Understand the various concepts of statistics used in data analysis

- Evaluate the best fit concept as a solution to problem
- Execute and solve problems using statistical concepts

Module 1: Introduction to Statistical Analysis

Introduction to Statistics – Descriptive and Inferential Statistics- Data Collection and Presentation - Categories of Data Groupings- Exploring Data Analysis - Descriptive Statistics: Measure of Central Tendency, Measure of Dispersion. Sampling and Inference about population- Hypothesis Testing Basics

Module 2: Essential Probability Distributions in Decision Making

Discrete and Continuous Probability Distributions - Normal Distribution- Chi Square Distribution- Poisson Distribution- F Distribution – Exponential Distribution- T- Distribution- Properties and Applications in Business

Module 3: Analysis of Cross Sectional Data Using Regression

Introduction to Cross Sectional Data- Analyzing Cross Sectional Data -Introduction to Linear Regression- OLS Estimation- Assumptions of Multi Collinearity, Heteroscedasticity and Auto Correlation in Model Estimation-Statistical Tests for Model Stability- Interpretation of Regression Coefficients- Model Testing- Prediction Accuracy Using Out of the Sample Testing

Module 4: Classification Methods- Multiple Discriminant Analysis and Logistic Regression

Discriminant model and analysis: a two-group discriminant analysis, a three-group discriminant analysis, the decision process of discriminant analysis (objective, research design, assumptions, estimation of the model, assessing overall fit of a model, interpretation of the results, validation of the results). Logistic Regression model and analysis: regression with a binary dependent variable, representation of the binary dependent variable, estimating the logistic regression model, assessing the goodness of fit of the estimation model, testing for significance of the coefficients, interpreting the coefficients.

Module 5: Dimension Reduction Techniques- Principal Components and Common Factor Analysis

Population and sample principal components, their uses and applications, large sample inferences, graphical representation of principal components, Biplots, the orthogonal factor

model, dimension reduction, estimation of factor loading and factor scores, interpretation of factor analysis.

Module 6: Structural Equation Modeling

Concept of structural equation modeling, Confirmatory factor analysis, canonical correlation analysis, conjoint analysis.

References:

- Adams, J., Khan, H. T., & Raeside, R. (2014). *Research methods for business and social science students*. SAGE Publications India.

- Marcoulides, G. A., & Hershberger, S. L. (2014). *Multivariate statistical methods: A first course*. Psychology Press.

- Ott, R. L., & Longnecker, M. T. (2015). *An introduction to statistical methods and data analysis*. Cengage Learning.

- Mertler, C. A., & Reinhart, R. V. (2016). *Advanced and multivariate statistical methods: Practical application and interpretation*. Routledge.

Name of the Program: Master of Business Administration

Course Code:3.9.3

Name of the Course: ANALYTICS FOR DECISION MAKING

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview:

This course focuses on the best practices and approaches for measurement and analysis of the crucial factors that impact the decision in the corporate world. The course will help to discover the techniques to develop quantitative models that leverage business data, statistical computation to enhance the various key factors in this field.

Course Objectives:

1. Get insights on various analytical tools to solve real-life challenges.
2. **Use the models and the tools to meet customer demands and make optimal decisions.**

Course Outcomes

1. To understand the advanced statistical tools used for analytics.
2. Use the data gained from the various sources to evaluate strategic alternatives.
3. Make efficient investments and assess your efforts.
4. Understand regression and conjoint analysis along with the topics of social media analytics.

Unit 1: Introduction to Business Analytics

What is business analytics? Historical Overview of data analysis, Data Scientist vs. Data Engineer vs. Business Analyst, Career in Business Analytics, What is data science, Why Data Science, Applications for data science, Data Scientists Roles and Responsibility

Unit 2: Data

Data Collection, Data Management, Big Data Management, Organization/sources of data, Importance of data quality, Dealing with missing or incomplete data, Data Visualization, Data Classification Data Science Project Life Cycle: Business Requirement, Data Acquisition, Data Preparation, Hypothesis and Modeling, Evaluation and Interpretation, Deployment, Operations, Optimization.

Unit 3: Introduction to Data Mining

The origins of Data Mining, Data Mining Tasks, OLAP and Multidimensional data analysis, Basic concept of Association Analysis and Cluster Analysis.

Unit 4: Introduction to Machine Learning

History and Evolution, AI Evolution, Statistics Vs Data Mining Vs, Data Analytics Vs, Data Science, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Frameworks for building Machine Learning Systems.

Unit 5: Decision Making Under Uncertainty:

Introduction to business decision making, Elements of decision analysis, One stage decision problems, The precision tree Add-in, Multi stage decision problems, Role of Risk Aversion

Unit 6: Application of Business Analysis

Retail Analytics, Marketing Analytics, Financial Analytics, Healthcare Analytics, Supply Chain Analytics.

Reference Books:

- Evans, J. R. (2017). *Business analytics* (p. 656). England: Pearson.
- Camm, J. D., Cochran, J. J., Fry, M. J., Ohlmann, J. W., & Anderson, D. R. (2016). *Essentials of business analytics*. Cengage Learning.
- Laursen, G. H., & Thorlund, J. (2016). *Business analytics for managers: Taking business intelligence beyond reporting*. John Wiley & Sons.
- Albright, S. C., & Winston, W. L. (2014). *Business analytics: Data analysis & decision making*. Cengage Learning.

3.10 SUPPLY CHAIN AND LOGISTICS MANAGEMENT SPECIALIZATION

Name of the Program: Master of Business Administration

Course Code:3.10.1

Name of the Course: **Inventory Management**

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Objectives: The objective of this course is to:

1. Understand and analyze managerial problems in industry so that they are able to use resources and inventory management more effectively.
2. Knowledge of formulating and executing various quantitative analysis of managerial problems in industry.
3. Use of inventory operations methods and computer tools in solving real problems in industry.
4. Understand various real-life problems in warehouse planning.

Course Outcomes:

On successful completion of this course students shall be able to:

1: Apply various inventory planning methods to execute day to day operations effectively.

2: Analyze the strengths and weaknesses of various inventory methods and perform cost analysis.

3: Develop the strategies that can be taken to manage inventories, including deciding the timing and quantity for replenishments without hurting the level of product availability..

4: Evaluate warehouse planning systems and apply these systems to improve management decision making

COURSE CONTENT

Module 1: Introduction **8 HOURS**

Introduction to Inventory Management, Working Capital Cycle, Importance of Inventory Management, The Financial Implications of Holding Inventory, Inventory Carrying Cost, Effect on Financial, and The Role of the Inventory Manager, Independent and dependent demands, Deterministic and stochastic demands, Different inventory systems.

Module 2: Inventory Planning **8 HOURS**

Introduction to Inventory Planning, Service Level Policies – OTIF,ABC Analysis, Traceability and Variety Reduction, Inventory Coding Systems, The Inventory Management Plan, Stages of Inventory Management Plan.

Module 3: Inventory Models: **12 HOURS**

Deterministic demand model, Independent and dependent demands, Joint replenishment inventory problem Series, assembly, tree and general production network systems, Optimal solution, heuristics and approximation, Bill of material and material requirements planning (MRP), Material management organization, Centralized and decentralized management.

Module 4: Inventory Operations **8 HOURS**

Introduction to Inventory Operations, Monitoring Movements– Inventory Accuracy, Measuring and Valuation of Inventory, Receipt & Issuance of Inventory, Systems to Replenish Inventory, EOQ, ROP, JIT.

Module 5: Effective Inventory Management System **10 HOURS**

Introduction to Effective Inventory Management System, Stages of Effective Inventory Management System, Inventory Management& the Supply Chain Strategy, Demand Forecasting, Lead time Management, Understanding ERP Fundamentals & Terminology.

Module 6: Warehouse Planning and System **10 HOURS**

Introduction to Warehouse Planning & Systems, Warehouse Location & Acquisition Options, Warehouse Design and Layout, Materials Handling & Equipment, Warehouse Operations, Record Keeping & Communication, Perpetual

Systems/Continuous Review Systems, International Quality Standards, Physical Inventory & Cycle Counting.

SUGGESTIVE READINGS:

1. Bowersox, D.J., Closs, D.J., Cooper, M.B., & Bowersox, J.C. (2013). Supply Chain Logistics Management. (4 th ed.), McGraw Hill/Irwin.

2. Toomey, J. W., Inventory Management: Principles, Concepts and Techniques. Kluwer Academic Publishers, 2000.

REFERENCES:

1. Zipkin, Paul H., Foundations of Inventory Management. The McGraw-Hill Company, 2000.

2. Silver, E. A., Pyke, D. F. and Peterson, R., Inventory Management and Production Planning and Scheduling. 3rd Edition, Wiley, 1999.

Name of the Program: Master of Business Administration

Course Code:3.10.2

Name of the Course: **Supply Chain Management**

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

COURSE OBJECTIVES

1. Impart the fundamentals of supply chain management and to apply them in real world problems.
2. Describe the increasing significance of logistics and its impact on both costs and service in business and commerce.
3. Incorporate and learn the critical elements of logistics and supply-chain management processes based on the most relevant application in forward-thinking companies.
4. Develop criteria and standards to achieve improved business performance by integrating and optimizing the total logistics and supply-chain process.

Course Outcomes:

On successful completion of this course students shall be able to:

1: Understand the importance of supply chain of an organization and its application in various sectors & sourcing management techniques to manufacturing systems.

2: The students should be able to apply the right information through the help of forecasting techniques in case of transportation, warehousing & distribution.

3: Apply various analytical methods and tools so that students are able to measure and evaluate various facets of supply chain performance.

4: Understand the global perspectives of planning and implementing supply chain practices in the operations.

COURSE CONTENT

Module 1: Introduction **8 HOURS**

Understanding the Supply Chain--The changing business landscapes driving forces --Supply chain concepts, characteristics and issues--Role of logistics in supply chains, value added role of logistics; logistics activities; interface with micro economy such as marketing, production and other functional areas and macro economy such as global economic policies; global dimensions of supply chains; global transportation options; strategic channel intermediaries; storage facilities and packaging.

Module 2: Managing Demand, Order and Supply **12 HOURS**

Demand Management: Balancing Supply and demand; traditional forecasting; sales and operations planning; CPFR; fulfillment models, Order management and customer service: Influencing the order through CRM; executing the order; e-commerce order fulfillment strategies; expected cost of stock outs; order management influences on customer service, Managing Inventory in Supply Chain

Module 3: Transportation and Distribution **10 HOURS**

Transportation: Managing the flow of the supply chain; modes of transportation; Transportation planning and strategy; transportation execution and control; transportation technology; Regulations in transportation industry; basis of transportation rates, Distribution -managing fulfillment operations: role of distribution in SCM; distribution planning and strategy; distribution execution; distribution metrics; distribution technology; warehouse management systems and material handling

Module 4: Supply Chain Network Analysis and Design **10 HOURS**

The need for long range planning; the strategic importance of supply chain network design; influence of shifting locations of customer or supply markets; logistics and supply chain network design process; major locational determinants; Modeling

approaches - optimization model; simulation model; heuristic models; The Grid Technique; transportation pragmatics.

Module 5: Sustainability and Challenges 8 HOURS

Supply Chain Sustainability: Framework; reverse logistics systems; reverse logistics system versus closed loops; managing reverse flows in supply chains. Strategic challenges and change for supply chains: Principles of SCM; focus of SC.M; supply chain strategies; supply chain transformation.

Module 6: Global perspective 8 HOURS

Global Perspective: Structure, Objective, Introduction, Motives and Development of Global Markets, Managing the International Supply Chain Operations, Supply Chain Reconsideration, and Risk Involved, Benchmarking Global Supply Chains.

SUGGESTED READINGS:

1. Supply Chain Management, Strategy, Planning, and Operation, Sunil Chopra & Peter Meindl, 3/e, PHI Learning Private Limited, 2007.
2. Textbook of Logistics & Supply Chain Management, Agrawal D. K., 1/ e, MacMillan Publishers India Ltd., 2010.
3. Modelling the Supply Chain, Jeremy F. Shapiro, 2/e, Duxbury Applied Series Cengage Learning, 2009.

REFERENCES:

1. Logistics, David J. Bloomberg, Stephen LeMay & Joe B. Hanna, 2/e, Pearson Education, 2002.
2. Supply Chain Logistics Management, Donald J Bowersox, Dand J Closs, M Bixby Coluper, 2/e, Tata McGraw-Hill Publishing Company Limited, 2008.

Name of the Program: Master of Business Administration

Course Code:3.10.3

Name of the Course: **Logistics Management Systems & Practices**

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Objectives:

1. Understand the concept, functions, objectives and importance of logistics management systems and practices in an organization
2. Apply the knowledge of the multimodal transportation model to get cost advantage
3. Outline the need for Warehouse Management.
4. Highlight the need and different techniques of logistic information systems.

Course Outcomes:

On successful completion of this course students shall be able to:

1. Understand the logistics Management function starting from Demand Management through Inventory Management.

2. Plan and implement suitable logistics management principles and practices in the operations.

3. Understand the need for Lean management System and Apply appropriate approaches to project using Lean tools and techniques.

4. Understand the working concept of logistic information systems principles and implementation.

COURSE CONTENT

MODULE 1: INTRODUCTION **8 HOURS**

Logistics: Evolution, objectives, components and functions of logistics management,

distribution related issues and challenges, gaining competitive advantage through logistic management, transportation- functions, costs and mode, Inbound, outbound and Reverse Logistics

MODULE 2: BASICS OF MULTIMODAL TRANSPORT 12 HOURS

Two, Three, Four and Five PL Models, Domestic and International trade logistics, Freight forwarding by Road, Rail, Sea and Air, Multi-Model transportation Models– Packing Models to minimize costs, damages and Handling of materials, LCL's, FCL's, Freight Consolidation, Freight Forwarders and NVOCC, Outsourcing of Logistics Services, Overview of MMTGAct (1993), Shipping Intermediaries and Formalities

MODULE 3: WAREHOUSE MANAGEMENT 10 HOURS

Warehousing – Centralized and Decentralized, Matrix Models, Hub & spike models, Carrying and Forwarding practices, Transfer of goods and costs associated, Cartels and Specialized warehouses, Freight consolidation, Shipment Documents – for Customs clearance, FEMA compliances, claiming export benefits, EDI networks, Self-Certification Systems, Role of Trade facilitating Bodies.

MODULE 4: LOGISTICS STRATEGIES 8 HOURS

Logistics Strategy: Strategic role of logistics – Definition-role of logistics managers in strategic decisions: Strategy options, Lean Strategy, Agile Strategies & Other strategies: Designing & implementing logistical strategy, Quality customer service & integrated logistics: Customer service-importance elements- the order cycle system-distribution channels-Functions performed-Types designing- Logistical packaging

MODULE 5: RETAIL LOGISTICS 10 HOURS

Retail Logistics Network Design for Global Operations: Global Logistics Network Configuration, Orienting International Facilities, Considerations and Framework, Trade-offs Associated with each Approach, Mapping the Different Approaches, Capacity Expansion Issues, Information Management for Global Logistics, The Global LIS/LITS, Capabilities and Limitations, Characteristics of Logistics Information and Telecommunications Systems.

MODULE 6: LOGISTICS INFORMATION SYSTEM 8 HOURS

Concept of Logistic Information System (LIS), Importance of LIS, Principles of designing LIS, Logistics Information architecture, application of information technology in logistics and supply chain management, requirements of logistics in E- commerce, E-logistics structure & operation, logistic resource management.

SUGGESTIVE READINGS:

1. Turkay Yildiz Optimization of Logistics and Supply Chain Systems: Theory and Practice, 2019.
2. Jeffrey K. Liker and Gary L. Convis, 1/e, Tata McGraw-Hill, 2012.
3. Textbook of Logistics & Supply Chain Management, Agrawal D. K., 1/ e, MacMillan Publishers India Ltd., 2010.

References:

1. Modelling the Supply Chain, Jeremy F. Shapiro, 2/e, Duxbury Applied Series Cengage Learning, 2009.

2. Logistics, David J. Bloomberg, Stephen LeMay & Joe B. Hanna, 2/e, Pearson Education, 2002.

Fourth Semester

Core Subject

Name of the Program: Master of Business Administration *Course Code:4.1* *Name of the Course: International Business*		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Course Objectives:

- To introduce complex problems and issues facing the International Business
- To develop ability to manage the opportunities & risks of international business
- To understand the special issues of managing an international organization
- To reinforce capacities of strategic analysis and application in an international context
- To help develop abilities to think outside narrow frameworks and incorporate broad perspectives into decision-making.
- To improve report writing and presentation skills

Course outcomes:

On successful completion of this subject, students should be able to:

- Demonstrate sound knowledge of how business organizations operate in international environment
- Explain the global trends that affect international management
- Examine systematically the main aspects of the international business environment including country competitiveness and risk factors.
- Know factors that influence location decisions, positioning strategies, international completion.
- Process of formulating and implementing international strategies.

MODULE 1: INTRODUCTION TO INTERNATIONAL BUSINESS, GLOBALIZATION AND TRADE 10 HOURS

Introduction to International Business. Differences between international business and domestic business, Stages of internationalization. Globalization and its impact on business, society and the environment.

International trade theories (Country-specific and firm-specific), Porter's diamond, Global Competitiveness Index and Business Competitiveness Index.

WTO, IMF, WB and Regional Economic integration and Trade blocks (ASEAN, NAFTA, OECD, European Union etc.)

MODULE 2: INTERNATIONAL BUSINESS ENVIRONMENT 10 HOURS

Economic Environment – Types of economies, Measures of economic success such as GDP, GNP, PPP, Inflation, Human Development Index, Global Happiness Index etc.

Social and Cultural Environment – Hofstede's cultural dimensions and its implications for cross-cultural management.

Technological Environment – Differences in level of technology and innovation and its implications for businesses.

Political and legal environment – Types of governments, Political risks and managing political risks.

Legal environment, Types of law, Basis of International law, Composition, jurisdiction and powers of International court of Justice.

MODULE 3: INTERNATIONAL BUSINESS STRATEGY AND OPERATIONS 10 HOURS

Assessing international business opportunities, Entry strategy and Modes of Entry. Green field ventures, Acquisitions,

Mergers and Strategic Alliances in the International context.

Operations management and competitive advantage, strategic issues in Operations Management (Manufacturing Management, Logistics Management and Procuring), Technology transfers – issues arising out of technology transfers.

MODULE 4: INTERNATIONAL MARKETING 8 HOURS

Introduction to International marketing: The globalization of Markets & Brands. Market Segmentation, Pricing and Distribution Strategy, Issues in Global Advertising

MODULE 5: INTERNATIONAL STAFFING AND EXPATRIATION 8 HOURS

Staffing Policy, Process of expatriation, Managing Expatriates, Performance Appraisal, Compensation & International Labor Relations.

MODULE 6: INTERNATIONAL TRADE, FINANCE AND INVESTMENT 8 HOURS

Foreign Exchange Markets, FDI- in World Economy, horizontal and vertical FDI, benefits of FDI to home and Host Country. FDI- Indian Scenario. EXIM, Export and Import financing, Export marketing, India's EXIM policy, Balance of Payments.
Roles of Institutions connected with EXIM.

Suggested Reading:

- Charles Hill, Tomas Hult and Rohit Mehtani (2019), International Business: Competing in the Global Marketplace (SIE) | 11th Edition, McGraw-Hill Publication
- Francis Cherunilam, International Business, Texts and Cases;, Prentice Hall Of India, 6th Edition, 2018
- John Daniels, Lee Radebaugh, Daniel Sullivan and Reid Click, "International Business-Environment and Operations, Prentice Hall, 17th Edition, 2019

Reference Books:

- Griffin, R.W. and Pustay, M.W. (2020) International Business: A managerial perspective, 8th Edition, Pearson Publ.
- Sundaram, A. K. & Black, J.S (1999), The international Business Environment: Text and Cases, Printice-Hall of India Publ.
- Hodgetts, R.M. and Luthans, F. (2005) International Management, 5th edition, Tata McGraw-Hill Publ.

Common Elective

Name of the Program: Master of Business Administration *Course Code:4.2.4, 4.3.4, 4.4.4, 4.5.4, 4.6.4, 4.7.4, 4.8.4 & 4.9.4* *Name of the Course: Data Analysis and Visualization using Tableau*		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Overview of the Course:

Data Visualization is a core component of the Business Analytics skill set. This course will provide an introduction to the main concepts of visual analytics such as visuals reports and dashboards with a hands-on tutorial to Tableau, a leading self-service Business Intelligence and Data Visualization tool.

Course Objectives:

- To familiarize the students about different kinds of representing the data.
- To introduce tableau for Visualization of the data

Course outcomes:

- Create and represent different kinds of data.
- Create story boards and dashboards for business decisions
- Evaluate the use of visualization tools for different contexts

MODULE 1: INTRODUCTION TO DATA VISUALIZATION **8 HOURS**

Introduction to data visualization, Need and importance of visualization, telling stories with data, Basic design principles for charts and graphs. Common tools for creating data visualizations, Application of design principles, Advantages of Modern Analytics platform.

MODULE 2: SKILL SET FOR VISUAL ANALYSIS **6 HOURS**

Information visualization, Effective data analysis, visual perception, Building blocks of

information visualization, analytical interaction and navigation, analytical patterns and examples.

MODULE 3: INFORMATION DASHBOARD DESIGN 8 HOURS

Characteristics of Dashboards, Visual Designing process, Designing dashboard for usability, Aesthetics of dashboards, testing for usability, Critical design practices.

MODULE 4: INTRODUCTION TO TABLEAU 12 HOURS

Introduction and Overview, Scope of tableau for data visualizations, Data preparation, the tableau workspace, working with measures and dimensions, saving, opening and sharing workbooks, Adding data sources in tableau – setting up data connectors, selecting data tables, joins and unions, data types, Meta data, Adding hierarchies, calculated fields and table calculation.

MODULE 5: DATA VISUALIZATION 14 HOURS

Specific types of charts including bar charts, line charts, scatter plots, waterfall chart, Gantt charts, histograms, bullet charts and several others, legends, filters, hierarchies, highlight tables, heat maps. Aggregation functions, calculated fields, Aggregation in calculated fields – text operators, date fields, Logical functions in calculated fields – parameters, searching text fields, table calculations – types, quick table calculations, customized table calculations, Level of detail expressions. Maps

MODULE 6: ADVANCED ANALYTICS AND INTERACTIVE DASHBOARD 12 HOURS

Overview of tableau analytics pane, constant, average and reference lines, trend lines, forecasts. Creating an interactive dashboard – dashboard pane, placing charts on dashboard, dashboard titles, navigation buttons, dashboard actions. Best practices for designing a dashboard.

Essential Reading:

- Loth, A. (2019). Visual Analytics with Tableau. John Wiley & Sons.
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Reference Books:

- Laursen, G. H., & Thorlund, J. (2016). Business analytics for managers: Taking business intelligence beyond reporting. John Wiley & Sons.
- Healy, K. (2018). Data visualization: a practical introduction. Princeton University Press.

- Wilke, C. O. (2019). Fundamentals of data visualization: a primer on making informative and compelling figures. O'Reilly Media.
- Baldwin, D. (2016). Mastering Tableau. Packt Publishing Ltd.

Elective Subjects

4.2 Finance

Name of the Program: Master of Business Administration *Course Code:4.2.1* *Name of the Course: Financial Techniques for Strategic Decision making*		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

Every Strategic Decision must be made considering all perspectives, most essentially, the financial perspective. Various tools and techniquesexist for making decisions from financial perspective. This course introduces the learners to few of the important tools and techniques which help in Strategic Decision Making. Further, decision-making can be made simple with use of appropriate skills and one essential skill is use ofSpreadsheets. This course also gives an orientation to fundamentals of financial modelling, which helps in decision-making process.

Course Objectives:

1. To give orientation on various financial tools and techniques used in decision-making process
2. To enable learners to make decisions from finance perspective
3. To introduce the learners to 'financial modelling' and give insights on use of spreadsheets.

Course outcomes:

This course will equip the students with required skills of Investment decisions and actions.

1. Identify the financial perspective in decision making process
2. Know about some of the important financial techniques used in decision making process
3. Acquire decision-making skills
4. Get acquainted with spreadsheet skills

MODULE 1: TECHNIQUES OF RISK ANALYSIS IN CAPITAL BUDGETING DECISION 6 HOURS

Risk Analysis in Capital Budgeting – Measuring and Managing Capital Budgeting Risks – Sensitivity Analysis, Scenario Analysis, Simulation, Standard Deviation and Co-efficient of Variation, Risk-Adjusted Discount Rate Method, Certainty Equivalent Co-efficient Method, Decision Tree Analysis and Probability Distribution Method.

MODULE 2: COST MANAGEMENT TECHNIQUES 12 HOURS

Target Costing, Value Analysis / Value Engineering, Pareto Analysis, Life Cycle Costing, EnvironmentalManagement Accounting.

MODULE 3: PRICING STRATEGIES AND DECISIONS 10 HOURS

Theory and principles of Product Pricing, Pricing – New Product, Finished Products and Pricing of Services,Sensitivity Analysis in Pricing Decisions, Pricing Decision under special circumstances, Pricing Strategies.

MODULE 4: PERFORMANCE MEASUREMENT AND EVALUATION 6 HOURS

Responsibility Accounting, Linking Critical Success Factors (CSFs) to Key Performance Indicators (KPIs) andCorporate Strategy.

Performance Measurement Models – Balanced Scorecard, The Performance Pyramid, The Performance Prismand The Building Block Model.

MODULE 5: STRATEGIC DECISION MAKING AND MANAGERIAL CONTROL 10 HOURS

Decision making using

- CVP Analysis
- Relevant Cost Concepts
- Activity Based Costing
- Ethical and Non-financial Consideration relevant to decision-making.

MODULE 6: FINANCIAL MODELLING 8 HOURS

EXCEL FUNCTIONS – IF, SUM, SUMIF, SUMIFS, AVERAGE, AVERAGEIF, AVERAGEIFS, INDEX ANDMATCH, V-LOOKUP, RANK, MIN AND MAX

COMMON ERRORS IN EXCEL – VALUE, NAME, DIV/0, REF, NUM, N/A, etc.

FINANCE FUNCTIONS – FV, PV, PMT, RATE, NPV, XNPV, IRR, XIRR, SLOPE (Beta Calculation), Financial Model for Calculation of WACC, Corporate Valuation and Stock Valuation.

Reference Books:

- Ryan and Ryan (2002), "Capital Budgeting Practices of Fortune 1000: How have things changed", Journal of Business andManagement, Volume 8, Number 4.
- Block, Stanley (2005), "Are there differences in capital budgeting procedures between industries? – An Empirical Study", The Engineering Economist, pp55-67,
- Jain and Yadav (2002), "Financial Management Practices in India, Singapore and Thailand", "Management and Accounting Research", Volume 3, No. 4, April-June, pp 84-102.
- Study material of the Institute of Chartered Accountants of India (ICAI), The Institute of Cost and Management Accountants of India(ICMAI), and The Institute of Company Secretaries of India (ICSI)
- Khan, M.Y., and Jain, P.K., "Financial Management – Text, Problems and Cases", Tata McGraw-Hill Publishing Company Limited.

Name of the Program: Master of Business Administration

Course Code:4.2.2

Name of the Course: International Financial Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

A business enterprise having international transactions is exposed to various risks. While understanding the global environment, the economic impact of the transactions, the procedures and formalities to be adhered to are on one side, the impact of transactions on cash flow of the entity on account of fluctuations in foreign exchange rate is another aspect that must be addressed. This course titled “International Financial Management” aims to orient all the aspects a professional need to know in carrying out international transactions.

Course Objectives:

1. To orient the students on global business environment.
2. To give knowledge on the foreign currencies and foreign exchange markets.
3. To make students understand the various risks an enterprise is exposed to on account of international transactions.
4. To provide knowledge and skills for hedging foreign currency risks.

Course outcomes:

- The global financial environment, currency system, relationship between economies and impact of international transactions on the economy.
- Functioning of international financial markets.
- Fixing of exchange rate.
- Foreign currency risks and hedging strategies.
- Interest rate risks and hedging strategies

MODULE 1: GLOBAL FINANCIAL MANAGEMENT 8 HOURS

Evolution of International Monetary System, Bimetallism, Classical Gold Standard, Interwar Period, Bretton Woods System, Flexible Exchange Rate Regime, current Exchange Rate Agreements, European Monetary System, Fixed vs. Flexible Exchange Rate Regime

MODULE 2: BALANCE OF PAYMENTS 8 HOURS

Introduction, Accounting Principles in Balance of Payments, Valuation and Timing, Components of the Balance of Payments, 'Surplus' and 'Deficit' in Balance of Payments, Importance and limitations of BOP Statistics, Relationship of BOP with other economic variables.

MODULE 3: FOUNDATION OF FOREIGN ECHANGE 8 HOURS

Quotations – Direct and Indirect; Ask Rate, Bid Rate and Spread Points; Spot, Future Spot and Swap Points;Appreciation and Depreciation of Currency (Premium / Discount), Cross Rates, Cross Currency Arbitrage.

MODULE 4: EXCHANGE RATE DETERMINATION 8 HOURS

Purchasing Power Parity Theory, Interest Rate Parity Theory, International Fischer's Effect, Pure ExpectationsTheory. Covered Interest Arbitrage

MODULE 5: FOREIGN EXCHANGE RISK AND RISK HEDGING STRATEGIES 16 HOURS

Transaction Risk, Translation Risk, Economic Risk. Risk Hedging Strategies: Internal – Netting, Leads and Lags. External – Forwards, Futures, Options, Money-market Hedging, Currency Swaps

MODULE 6: INTERNATIONAL FINANCIAL DECISIONS 12 HOURS

International Capital Budgeting Decisions: Home Currency Approach and Foreign Currency Approach; Impact ofInflation. International Financing Decisions: Sources of International Financing – ADRs, GDRs, FCCBs, ExternalCommercial Borrowings, Masala Bonds, Foreign Bonds, Euro Bonds, Floating Rate Notes etc. International Working Capital Management: Netting, Leads and Lags, International Money Markets.

Reference Books:

- Alan Shapiro (2008), “Multinational Financial Management”, Wiley India Private Limited, 8th Edition.
- Apte, Prakash (2007), “International Finance – A Business Perspective”, Tata McGraw Hill, 2nd Edition.
- David B. Zenoff & Jack Zwick (1969), “International Financial Management”, Prentice Hall.
- Rita M. Rodriguez L. Bigame Carter, (1979), “International Financial Management” Prentice Hall, 2nd Edition.
- V. A. Avadhani (2017), “International Finance- Theory and Practice”, Himalaya Publishing House, 8th Edition.

Additional Readings:

- Haugen Robert (2003*); “Modern Investment Theory”,* Pearson Education, 5th Edition.
- Bhalla, V.K. (2006); *“Investment Management”,* S. Chand; 12th Edition.
- Madura, Jeff,(2005*),“International Corporate Finance*”, Thomson South-Western, 8th International Edition.
- Sharan, Vyuptakesh (2012), “*International Financial Management”,* Prentice Hall of India, 6th Edition.
- A.V. Rajwade, (2014), “*Foreign Exchange International Finance and Risk Management*”, Prentice Hall. 5th Edition.

Name of the Program: Master of Business Administration

Course Code:4.2.3

Name of the Course: Risk Management and Derivatives

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

Uncertainty coupled with financial implication is 'risk'. Every business enterprise is exposed to various risks from the operations within and environmental forces outside. Unless the risks are understood, measured, analyzed and taken care of, the good prospects of the entity cannot be ensured. A finance professional must have knowledge of measuring and hedging various risks. This course entitled "Risk Management and Derivatives" aims at providing knowledge of risks and various hedging strategies.

Course Objectives:

1. To orient students on the meaning and types of risks.
2. To enable understanding of the functioning of Derivatives Market and the mechanism of Derivative Operations
3. To provide knowledge on volatility risks associated with investments and strategies for hedging the same with derivatives.
4. To give knowledge on Commodity Markets, risks associated with Commodities and Commodity Derivatives.
5. To equip learners with strategies for hedging interest rate risk

Course outcomes:

By the end of this course, a student would learn:

- Risk analysis in capital budgeting.
- Risks associated with investments and hedging with derivatives.
- Meaning and types of derivatives.
- Futures – terminology, mechanism, hedging and pricing.
- Options – terminology, mechanism, pay-offs, hedging and pricing.
- Commodity markets and commodity derivatives.

MODULE 1: INTRODUCTION TO RISK AND DERIVATIVES 8 HOURS

Meaning of Risk. Types of Risks of a Business Enterprise – Market Risk, Operating Risk, Interest Rate Risk, Legal Risk, Financial Risk, Liquidity Risk, Capital Budgeting Risk, Volatility Risk, Credit Risk, Forex Risk and Other Risks.

Derivatives – Meaning and Types. Derivatives Market – Functions, Players (Hedgers, Speculators and Arbitrageurs). Derivatives Market in India. Forward Agreements – Meaning and Features.

Future Contracts – Meaning. Terms associated with Futures. Differences between Forwards and Futures.

MODULE 2: FUTURE CONTRACT- MECHANISM, HEDGING AND TRADING 10 HOURS

Margin and Settlement Mechanism of Futures. Calculation of Value-at-Risk (VaR) Hedging with Futures – Stock Hedging: When there is a future contract available on the stock and when there is no future contract available on the stock. Portfolio Hedging: Adjusting Portfolio Risk. Pricing of Futures.

MODULE 3: OPTIONS – BASICS, MECHANISM AND STRATEGIES 12 HOURS

Option Contracts – Meaning, Types – Call, Put, American, European, In-the-Money, At-the-Money and Out-of-the- Money. Pay-off and Pay-off Diagrams for Options. Hedging Strategies – Protective Put & Protective Call Strategy: and Covered Call & Covered Put Strategy.Trading Strategies with Options – Straddle, Strip, Strap, Strangle, Spreads.

MODULE 4: OPTION PRICING 10 HOURS

Put-Call Parity Theory, Portfolio Replication Method, Risk Neutralization Method, Binomial Method and Black-Scholes Method. Option Greeks.

MODULE 5: INTEREST RATE RISK AND RISK HEDGING STRATEGIES 10 HOURS

Interest Rate Swaps, Forward Rate Agreements, Interest Rate Futures, Interest Rate Options, Caps, Floors andCollars, Swaption.

MODULE 6: COMMODITY RISKS AND COMMODITY DERIVATIVES 10 HOURS

Commodity Markets, Commodity Exchanges in India. Commodities traded in Exchanges. Meaning and features of Commodity Derivatives. Trading and Settlement System for Commodity Derivatives. Pricing of Commodity Futures. SEBBI guidelines for Indian Commodity Markets.

Suggested Reading:

- Damodaran Aswath (2014), *"Appliced Corporate Finance*", John Wiley & Sons Inc, 4th Edition..
- Chandra, Prasanna (2007), *"Financial Management – Theory and Practice*", Tata McGraw-Hill Publishing Company Limited, 10th Edition.
- Pandey, I M (2021), *"Financial Management",* Pearson Publications, 12th Edition.

Reference Books:

- Kapalesh Ashar (2019), *"Financial Management Essentials you always wanted to know*",Vibrant Publishers, 4th Edition.
- Rustagi (2020*), "Fundamentals of Financial Management*", Taxmann Publications Pvt. Ltd.; 15th edition

PRACTICALS / SKILL ENHANCEMENT ACTIVITIES

1. Measure the risk level associated with select stocks and design hedging strategy with Future Contracts
2. Design Option Strategies for hedging investment risk in Stocks.
3. Identify suitable Option Trading Strategies and the timing of execution for stock and index underlying
4. Ascertain the interest rate risk of at least 3 companies and strategies adopted by them for hedging such risk
5. Prepare report on the functioning and effectiveness of Commodity Derivatives in India.

4.3 Marketing

Name of the Program: Master of Business Administration *Course Code:4.3.1* *Name of the Course: Strategic Brand Management*		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

Brands that a firm has invested in and developed over time are their valuable assets. Processes, designs and strategies of organizations may be easily copied, but a strong brand is something which cannot be easily reproduced. Strong brands can influence purchase decisions by communicating the value of and providing differentiation for products and services. Effective brand management is critical to maintaining the long-term profitability of products and services. This course is designed to develop students' understanding of the importance of brand equity as well as how to build, measure and manage brand equity.

Course Objectives:

- To give students a deeper understanding of the process of brand building in a variety of business contexts, the integrated requirements for effective brand reinforcement, revitalization as well as the models, measures and impact of brand equity.

Course outcomes:

By the end of this course, a student would learn

- Understand key principles of branding, positioning and brand building strategies.

MODULE 1: PRODUCT MANAGEMENT **8 HOURS**

Product Planning and New Product Management- Product Portfolio Analysis - Market Attractiveness & Components of Market Attractiveness – Product Market Strategies - Product Life Cycle Stages And Corresponding Strategies – Competitor Analysis

MODULE 2: INTRODUCTION TO BRAND MANAGEMENT **10 HOURS**

Brands Vs Products- Brand Management - Brand Components & Attributes- Significance Of Branding To Consumers & Firms - Selecting Brand Names- Brand Identity – Kepferer Brand Identity Prizm Model - Branding Challenges & Opportunities

MODULE 3: BRAND EQUITY **12 HOURS**

Types of Brands - Strategic Brand Management Process – Brand Attribute Management & Architecture – Brand Portfolio Strategy – Brand Extension And Stretching - Making A Brand Strong-Sources Of Brand Equity-The 4 Steps Of Strong Brand Building- Aakers Brand Equity Model – Customer Based Brand Equity – Brand Leveraging, Brand Loyalty.

MODULE 4: BRAND POSITIONING **8 HOURS**

Types Of Positioning- Over, Under & Repositioning- Differentiation – Identifying Gaps Using Perceptual Maps - Co-Branding –Licensing – Celebrity Endorsement - Positioning Guidelines.

MODULE 5: BRAND AUDIT AND VALUATION **8 HOURS**

Brand Audit - Internal Branding- Introduction to Brand Valuation – Components & Types Of Valuation**.**

MODULE 6: BUILDING ONLINE BRANDS **10 HOURS**

Integrated Marketing Communication - The New Media Environment – Building and managing online Brands - Marketing Communication Options – Using social media to Build Brands – E-Commerce & Brands

Suggested Reading:

- Kevin Lane Keller M. G. Parameswaran and Isaac Jacob (2010), Strategic Brand Management, Pearson Education India, 3rd Edition.

- RamanujMajumdar (2007)," Product management in India", PHI Learning Pvt India.
- KirtiDutta (2012), Brand Management, Principles and Practices ,Oxford University Press, Ist Edition.

Reference Books:

- Kevin Lane Keller (2012), Strategic Brand Management: Building, Measuring, and Managing Brand Equity, Prentice Hall, 4th Edition, 2012
- MG Parameswaran , Building Brand Value – Five Steps to Building Powerful Brands, Tata McGraw hill, 2006
- SubrotoSengupta , Brand Positioning: Strategies for Competitive Advantage, Tata McGraw Hill Education, 2005
- J.N. Kapferer , The New Strategic Brand Management (Creating And Sustaining Brand Equity Long Term) , Kogan Page Publishers India, 2008.
- S.A. Chunawalla , Compendium of Brand Management,Himalaya Publishing House , 2011
- David A Aaker , Managing Brand Equity, Free Press, 1991.

Name of the Program: Master of Business Administration

Course Code:4.3.2

Name of the Course: Marketing Research and Metrics

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

The course will assist students to understand the process by which market information is collected and analysed and to apply this understanding to the development of a marketing plan in response to a real-life client problem.

Course Objectives:

- To enhance the students understanding of the marketing research industry.
- To develop skills required by the researcher and understand different applications of Marketing Research
- To be able to exploit Marketing Research data for management decision-making

Course outcomes:

By the end of this course, a student would learn

- Understand the process of marketing research and its different processes
- Identify sources of information
- Understand different research methods
- Apply selected research methods
- Analyze and interpret both qualitative and quantitative data
- Conduct and analyze a focus group discussion
- Build a simple questionnaire from a web-based survey administration site.

MODULE 1: INTRODUCTION TO MARKETING RESEARCH 8 HOURS

Introduction to Marketing Research, Nature and Scope, Difference between Market and Marketing Research, Marketing Research Process, Applications of Marketing Research, Limitations of Marketing Research, Ethical considerations in Marketing Research.

MODULE 2: QUESTIONNAIRE DESIGN AND SAMPLING 10 HOURS

Major Qualitative and Quantitative Research Designs, Types of Research Design, Designing Questionnaires for Market Research, Types of Questions, Schedule, Reliability and Validity of a Questionnaire, Sampling Techniques, Procedure for sample selection and sample determination, Design of fieldwork, Selection of cities/centers, Organizing Field Work, Selection of Respondents, Control procedures on the field.

MODULE 3: DATA ANALYTICS AND HYPOTHESIS TESTING USING STATISTICAL PACKAGE 12 HOURS

Introduction to statistical packages (SPSS, PASW, JASP, Jamovi etc.), Data input, coding, recoding, data cleaning, Split file, Group, Subset, merge file options, Descriptive and inferential statistics, Visualization, exploration and extracting data summary statistics, Overview of hypothesis, Parametric and Non-parametric tests and their applications in marketing research.

MODULE 4: INTRODUCTION TO MARKETING METRICS 10 HOURS

The alignment of business objectives, strategies and metrics; the potential gap between metrics and business outcomes, the importance of marketing metrics, measuring market effectiveness. Market share, relative market share, market concentration, market penetration, brand penetration, penetration share, share of requirements, heavy usage index, market share decomposition, brand development index and category development

index.

MODULE 5: PRICING, PRODUCT AND PORTFOLIO MANAGEMENT 10 HOURS

Price premium, maximum reserve price and maximum willingness to buy, price elasticity, optimal price, percentage breakeven price change, price discrimination, competitor reaction, elasticity and cross and residual price elasticity. Trial volume and trial rate, repeat volume and repeat rate, adjusted trial rate, cannibalization rate, weighted contribution margin and breakeven with cannibalization.

MODULE 6: SALES FORCE MANAGEMENT AND PROMOTION PROFITABILITY 10 HOURS

Sales funnel, sales pipeline, lead, closure rate, sales forecasting, workload, sales force effectiveness. Baseline sales, incremental sales, promotional lift, return on marketing investment, coupon redemption, pass-through, gross rating points, impression, cost per thousand impressions, reach, frequency, share of voice, page views, visitors, click-through rates, cost per click, cost per order, cost per customer acquired, bounce rate, abandonment rate. Customer lifetime value, retention rate, attrition rate & churn rate.

Essential Reading:

- Malhotra, N and Dash, S. (2019). Marketing Research – An Applied Orientation, (7th ed). Pearson Education
- Bendle, N.T., Farris, P.W., Pfeifer, P.E., and Reibstein, D.J. (2016) Marketing Metrics: The Manager's Guide to Measuring Marketing Performance (Third Edition). Upper Saddle River, New Jersey: Pearson.

Reference Books:

- Kozielski, Robert (2018), Mastering Marketing Analytics, 1st Edition, Emarald Publication.
- Sauders, M., Lewis, P & Thornhill, A (2016), Research Methods for Business Students, 7th Edition, Pearson Education.

Name of the Program: Master of Business Administration *Course Code:4.3.3* *Name of the Course: Digital Marketing*		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

Marketing has changed from traditional advertising media to online platforms. The course shall introduce the student to social media platforms. Market research forms the back bone of digital marketing. Reputation of entities can be altered within minutes which is of high risk. Use of social media effectively produces engaged customers and their posts are brand advertisements which spread through word of mouth. Digital marketing can be successful only if an organized plan has been drawn. Social relation building helps in increasing Customer Loyalty. Hence, it is not just online presence but also its maximum utilization that is important. There is a huge inflow of new digital marketing technology and tools. Choosing the right tool is essential for customer delight and deriving results. Most of the business have digital presence but lack a strategy to tackle the digital competition.

Course Objectives:

- To understand the basics of digital marketing.
- To develop a comprehensive digital marketing strategy
- To be able to use new media such as search engine and social networking.

Course outcomes:

- By the end of the course, the student will be able to evaluate the risks involved in digital marketing. It shall make them be able to attract and retain customers online.

MODULE 1: INTRODUCTION **10 HOURS**

Introduction to marketing in the digital environment, Types of web presence, common e-commerce business models, pure play, hybrid and multi-channel options. Media options online, Fulfilment options and strategies, Introduction to payment gateways and paypal.

MODULE 2: DIGITAL MARKETING RESEARCH **10 HOURS**

Audience profiling and segmentation, Internet usage patterns ,Post Internet consumer behaviour and understanding buyer behaviour online, pillars of direct marketing, Online research and behaviour tracking methods, Introduction to behavioural targeting. Online surveys, blog mining, data mining, Building customer profiles using navigation and sales data, Competitor analysis online, Integrating online and offline strategies.

MODULE 3: SEARCH ENGINE MARKETING **10 HOURS**

Email campaign creation and management, Google Adwords, search and display on search engines, pricing models online, Introduction to page rankings, googleAdwords analytics, Search Engine Optimization, Process and methodology, Long tail in SEO, Link building, Key word analysis, process and optimization. Search Engine Marketing - Paid versus natural Search, SEM landscape, Landing pages and their importance in conversion analysis, Google vs. Bing vs. Yahoo. Search Methodology.

MODULE 4: SOCIAL MEDIA AND e-PR **10 HOURS**

Using Facebook, Linked-in, twitter, Youtube including creating a channel on You Tube, Content guidelines for online communications, Social Media measuring, monitoring & reporting, Tracking & Monitoring platforms. Content seeding, How to use blogs, forums and discussion boards, Blogs, forums and communities, Viral campaigns and the social graph. Building relationships with different stakeholders online.

MODULE 5: ONLINE REPUTATION MANAGEMENT **8 HOURS**

Introduction to online reputation management, Importance of managing online reputation for a business, strategies and tools of online reputation management, handling negative comments.

MODULE 6: RECENT TRENDS **8 HOURS**

Localization of content and advertising. Marketing using mobile networks, evolution of Indian banking industry – journey from brick and mortar to mobile banking, Consumer

engagement – meaning and methods.

Suggested Reading:

- Deepak Bansal (2009), “A Complete Guide To Search Engine Optimization”, B.R Publishing Corporation, Ist Edition.
- Strauss.J and Frost . R (2009), “E- Marketing”, Pearson Education, 5th Edition.
- Ramsey (2010), “Seven Guidelines for Achieving ROI from Social Media”, eMarketer.

Reference Books:

- Godfrey Parkin (2009), “Digital Marketing: Strategies for Online Success”, United Kingdom: New Holland.
- Damian Ryan (2014), “Understanding Digital Marketing : Marketing Strategies for Engaging the Digital Generation”, Kogan Page, 3rd Edition.
- Jonah Berger (2013), “Contagious Why Things Catch On”, Simon & Schuster, 1st Edition.

4.4 HUMAN RESOURCES

Name of the Program: Master of Business Administration

Course Code:4.4.1

Name of the Course: Strategic HRM

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

With increasing competition, the technological, socio cultural and economic changes have triggered the need for constantly developing the human resources. HRD is no longer limited to the confines of a departmental activity, now it finds a place even in the vision and mission statements of the companies. The need to survive in the ever-changing business world demands a well-developed pool of human resources with strategies.

Course Objectives:

- To develop the perspective of strategic human resource management.
- Distinguish the strategic approach to human resources from the traditional functional approach.

Course outcomes:

- By the end of this course- a student would learn the relationship of HR strategy with overall corporate strategy and understand the strategic role of specific HR systems

MODULE 1: **8 HOURS**

HR environment HRM in knowledge economy Concept of SHRM Investment Perspective of SHRM Evolution of SHRM Strategic HR vs. Traditional HR –Barriers to strategic HR Role of HR in strategic planning.

MODULE 2: **10 HOURS**

Strategic fit frameworks - Linking business strategy with HR strategy - HR bundles approach, best practice approach - Business strategy and human resource planning - HRM

and firm performance linkages - Measures of HRM performance - Sustained competitive advantages through inimitable HR practices.

MODULE 3: 10 HOURS

HR Systems - Staffing systems - Reward and compensation systems - Employee and career development systems - performance management systems - Various Strategic Management frameworks.

MODULE 4: 10 HOURS

Strategic options and HR decisions – Downsizing and restructuring - Domestic and International labour market - Mergers and acquisitions - Outsourcing and off shoring.

MODULE 5: 10 HOURS

Strategic Responses of Organisations to Changing Environment – Portfolio process and structure related strategic responses. M & A s and Strategic HR .

MODULE 6: 8 HOURS

Conduct an Interview with CEO or Authorised authority and data collection on Strategic responses of Organisations to changing environment (Ref. Srinivas R. Kandula PHI 2012). Interview schedule for conducting case study

- Interviewee's awareness / knowledge of strategic responses being planned / implemented / progressed in the organization. (common)
- Compatibility between voluntary participative forums and collective bargaining forum (HR Managers)
- Reasons for strong / weak / no relationship (positive or negative) between strategic responses and SHRD system. (HR Manager / Individual / Trade Unions)
- Unions perception on the commitment of employer, frontline officers and workers in SHRD system (Trade union leaders)
-

Suggested Reading:

- Mello- Jeffrey A (2018),"Strategic Human Resource Management", Thomson Learning Inc, 1st Edition.
- Kelliher, C., Garavan, T., Bailey, C., Mankin, D. (2018). Strategic Human Resource Management. United Kingdom: Oxford University Press.

- Khandekar, A., Sharma, A. (2014). Strategic Human Resource Management: An Indian Perspective. (n.p.): Lulu.com.
- Strategic Human Resource Management: An International Perspective. (2017). United Kingdom: SAGE Publications.

Name of the Program: Master of Business Administration *Course Code:4.4.2* *Name of the Course: International HRM*		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

A challenging aspect of HRM in most firms with multinational operations is the multicultural nature of their work force, which is further compounded by its geographical dispersion. In addition, HRM like so many other managerial functions, takes place not in vaccum but within the overall internal organisational environment and the external national and international context in which the company operates an attempt is made to know the insight of IHRM.

Course Objectives:

- To be able to assess the extent to which multinational companies can have companywide HRM strategies, policies and practices

Course outcomes:

By the end of this course, a student would learn a perview of the major challenges that MNC's face and to be familiar, through a real-life case study, with some of the HRM issues faced by staff in a foreign subsidiary of a major multinational company

MODULE 1: **8 HOURS**

International HRM - Domestic HRM v/s IHRM - Managing International activities - Human Resource Planning - International recruitment and selection - Training and development of expatriates – M & A –Integration of acquired employees in newer cultures, Global Mobilty and HR-International postings.

MODULE 2: **10 HOURS**

Repatriation – Expatriation and repatriation - Selection methodology of expatriation - Process of repatriation, job related adjustments, organisational development - International compensation: components, objectives and methods of compensation - Taxation decisions

- Changing trends in International employment.

MODULE 3: 10 HOURS

Managing HR in Virtual Organisation: Meaning and types of virtual organisations - Difference between traditional and virtual organisations - Features of virtual organisation - Managing HR in virtual organisations - Challenges of International performance management - Career Management& International HRM.

MODULE 4: 10 HOURS

Knowledge management and International management development - Knowledge and Knowledge transfer - Knowledge and situated cognition - Implications for knowledge transfer - Knowledge management in MNCs - Knowledge management and IHRM - Changing scope of International management development - International manager roles: development implications, international management development initiatives, Future developments.

MODULE 5: 10 HOURS

IHRM Strategies and Developments - Managing diversity - Linking corporate and HRM strategy - Total quality in HRM - Scope of TQM - Comparison of Traditional and TQHRM approaches - Barriers to TQHRM - HR project planning - Importance of computerised information system - Conflict management - Human rights movement and IHRM, Experiences of Japan and China.

MODULE 6: 8 HOURS

Case Studies - Ethics and challenges in IHRM - Role of international education in IHRM - UNO and IHRM - Business leaders as global citizens - Futuristic view of IHRM – socio cultural factors and ethical issues in BPO Industry - Adventurous training - Problems of women expatriates - Globalisation and senior citizens – BPO and IHRM.

Suggested Reading:

- Rao, P. L. (2008). International Human Resource Management: Text and Cases. India: Excel Books.
- Dowling, P. J., Engle, A., Festing, M. (2013). International Human Resource Management. United Kingdom: Cengage Learning.
- Kandula, S. R. (2018). International Human Resource Management. India: SAGE Publications.

- Briscoe, D. R., Schuler, R. S. (2004). International Human Resource Management: Policy and Practice for the Global Enterprise. United Kingdom: Routledge.
- International Human Resource Management. (2004). India: SAGE Publications.

Name of the Program: Master of Business Administration

Course Code:4.4.3

Name of the Course: Talent and Knowledge Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

The explosion of interest in talent and knowledge management among academics, public policy makers, consultants, and business people began as recently as the mid-1990s.The level of interest in Talent & Knowledge management since then visible in a number of ways. It is growing rapidly more and more companies have built talent and knowledge repositories. Even new job titles have appeared from knowledge edge developer, to knowledge facilitator, to corporate knowledge officer

Course Objectives:

- To impart the knowledge on talent and knowledge management. its importance in contemporary business

Course outcomes:

By the end of this course, a student would learn the new concepts in talent and knowledge management and its relevance in the corporate.

MODULE 1: **8 HOURS**

Talent - Engine of new economy - Difference between talent and knowledge workers - Leveraging talent - Talent value chain - Elements of talent friendly organizations

MODULE 2: **12 HOURS**

Elements, benefits and challenges of Talent Management System - Building blocks of talent management: competencies, performance management, evaluating employee potential - Modern practices in talent attraction, selection, retention and engagement. Talent Management & Social Media - Emerging Trends in Talent Management.

MODULE 3: **10 HOURS**

Talent Planning – Succession management process - Cross functional capabilities and fusion of talents - Talent development budget - Value driven cost structure - Contingency plan for talent - Building talent - Leadership coaching.

MODULE 4: **6 HOURS**

Return on talent (ROT) - ROT measurements - Optimizing investment in talent - Integrating compensation with talent management - Developing talent management information system - Psychometrics for TM.

MODULE 5: **12 HOURS**

Knowledge economy - Understanding Knowledge management - Types of knowledge - Knowledge centric organizations - Knowledge management framework - Knowledge creation and capture - Designing of Knowledge management strategy - Issues and challenges in knowledge Management - Implementing knowledge management strategy - Knowledge management metrics and audit.

MODULE 6: **8 HOURS**

Conduct Interviews with five senior executives of two organisations on their talent and knowledge management practices. Conduct minimum one focus group discussion (FGD) on Knowledge Management Portal **.**

Suggested Reading:

- Berger, Lance A and Dorothy Berger (2010), “The Talent Management Handbook”, Tata McGraw Hill, New Delhi, 2nd Edition
- Masood, Anilkumarsingh and Somesh Dhamija (2017) , Talent management in India- challenges and opportunities, Atlantic publisher, New Delhi, Atlantic Publishers and Distributors Pvt Ltd, 1st edition
- Scullion, H., Collings, D. (2011). Global Talent Management. United States: Taylor & Francis.
- Talent Management of Knowledge Workers: Embracing the Non-Traditional Workforce. (2010). United Kingdom: Palgrave Macmillan UK.
- Thunnissen, M., Gallardo-Gallardo, E. (2017). Talent Management in Practice: An Integrated and Dynamic Approach. United Kingdom: Emerald Publishing Limited.
- The Oxford Handbook of Talent Management. (2017). United Kingdom: Oxford University Press.
- Macro Talent Management: A Global Perspective on Managing Talent in Developed Markets. (2018). United States: Taylor & Francis.

4.5 HEALTH CARE MANAGEMENT

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE:4.5.1

Name Of the Course: Basic Management Aspects of Health Care

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

Understanding and study of management of organizations in general would give a better perspective in the contemporary scenario. But the application and customization of the basics of management in various sectors of the industry is the need of the hour. Healthcare is one of the major emerging sectors of the Indian Economy. The application and customization of various functional areas of management would go a long way in the placement of management graduates in the healthcare sector. The present course makes a humble attempt to bridge the gap of fulfilling the felt needs of healthcare sector.

Course Objectives:

- To introduce the managerial dimensions of healthcare sector to students.
- To make students to get a glimpse of application of management in healthcare sector.

Course outcomes:

- By the end of the course, the students have to have better understanding of differences between management in general and management in healthcare sector

Unit 1: HEALTH CARE SECTOR **8 HOURS**

Historical perspective of Strategic management, Conceptual framework for strategic management, the Concept of Strategy and Strategy Formation Process – Stakeholders in business –Vision, Mission and Purpose – Business definition, Objectives and Goals. The SM model

Unit 2: ORGANIZATION BEHAVIOR **8 Hours**

Behavior of individuals, groups and teams-Conflict Management and Service Culture with special reference to healthcare sector.

Unit 3: HUMAN RESOURCE MANAGEMENT **8 Hours**

HRM challenges with reference to Recruitment, Selection, Retention, Training and Development, Compensation, Performance Management System, Competency Management in Healthcare

Unit 4: SERVICE MARKETING **10 Hours**

Marketing challenges to Service Marketing, Health Service Quality, Promotion Mix, Branding and Positioning, Marketing Communication, Media and Public Relations in healthcare-Application of marketing strategies in healthcare.

Unit 5: FINANCIAL MANAGEMENT **10 Hours**

Pricing of hospital services and new equipment usage, Pricing Policy, Rate Revision, Hospital Rate Setting, Replacement Analysis, Accounting Practices in Hospitals, Emerging Trends in Finance in Healthcare-Break Even Analysis in Healthcare Organizations, Costing Template

Unit 6: INVENTORY MANAGEMENT **12 Hours**

Stores Organization, Concept and Scope of Inventory Management as applicable to healthcare; Materials Planning, Procurement, Vendor Management, Purchase, Inspection. Hospital Equipment; Planning, Selection, Purchase, Repair and Maintenance-Condemnation and Disposal-Pilferage-ABC and VED Analysis

Reference Books:

- Kotler, Philip and Clarke, Robert," Marketing in Healthcare Organizations", Prentice Hall College Division, Ist Edition, 1986
- Beck, Donald F , "Basic Hospital Financial Management" , Aspen Systems Corp, 1980
- Joshi, D.C, "Hospital Administration" , Jaypee Publishers, Ist Edition, 2009
- Shi, Leiyu , "Managing Human Resources in Health Care Organizations", Jones & Bartlett Learning, 1st edition , 2007.
- Goel R.C, "HRM in Hospitals" , Prentice Hall of India Pvt Ltd, 3rd Edition, 2003
- P.G Ramanujam, "Marketing of Healthcare Services", Excel Books,2009
- Hyman Stanley" Supplies Management in Healthcare", Croom Helm, 1979
- Sakharkar B M, "Principles of Hospital Administration & Planning", Jaypee Brothers Publishers , New Delhi,2nd Edition, 2009

- Gupta, Shakthi and Kant, Sunil, " Hospital Stores Management , an integrated approach", Jaypee Brothers Publishers , New Delhi, 2004

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE:4.5.2

Name Of the Course: Strategic Management In Health Care Settings

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Overview of the Course:

For any organization to be successful, it needs to have an holistic approach towards business with accurate alignment of its objectives with business strategies. As healthcare industry is a unique service industry, different approach has to be followed to ensure the business performance and growth. The course will cover the basics of strategic management including quality and innovation as applied to healthcare sector

Course Objectives:

- To enable the students to understand the philosophy and rational of business strategies
- To enable the students to understand the various quality philosophies, significance and their application in healthcare settings.
-

Course outcomes:

- By the end of the course, the student will get a feel of the strategic dimensions of the management of healthcare organizations

Unit 1: INTRODUCTION **8 HOURS**

Strategic intent concepts; Healthcare Organization's Vision, Mission , Goals and Objectives-Business Models-Policy and Values; Balance Score Card, Critical Success Factors; Key performance Indicators in healthcare setting; Competition in healthcare business

Unit 2: STRATEGY FORMULATION AND IMPLEMENTATION **12 HOURS**

Competitive advantage in terms of facilities and services- Cost Leadership and differentiation in healthcare delivery-Core Competence in healthcare organizations-Growth and expansion of organizations-Mergers and Acquisitions, Outsourcing-Role and emergence of technology-Resource Allocations-Supportive Culture-Strategic Leadership-Corporate Culture-Functional and operational implementation.

Unit 3: QUALITY IN HEALTHCARE **10 HOURS**

Concept and significance-Quality Management Philosophies-Patient Focus and Involvement-TQM Models-Quality tools and techniques applied to healthcare- Continuous Quality Improvement-Quality Circles

Unit 4: QUALITY ACCREDITATION **10 HOURS**

Meaning and benefits-Quality Standards-Quality of patient care, focus and safety-Accreditation Process-National and International Bodies for accreditation in healthcare – ISO, QCI, NABH & JCI-Statutory Compliance

Unit 5: AUDIT IN HEALTHCARE **8 HOURS**

Concurrent, terminal and cyclic evaluation-Healthcare, Medical, Nursing, Clinical Pharmacy and Antibiotic Audits-Patient Satisfaction surveys -Integration of healthcare systems

Unit 6: INNOVATIONS IN HEALTHCARE **8 HOURS**

Innovation Process, Innovations in Healthcare delivery-Public and Private, Technology, New Product Development

Reference Books:

1. Girdhar Gyani& Alexander Thomas ,"Handbook of Healthcare Quality & Patient Safety", Jaypee Medical Publishers, Ist Edition, 2017.
2. Paul Trott, " Innovation Management and New Product Development", Prentice Hall,5th Edition ,2016
3. Kunders, G.D , "Designing for Total Quality in Health Care", Prism Books Pvt Ltd, IstEdition, 2002
4. Donald Lighter and Douglas," Quality Management in Healthcare: Principles and Methods", Janes and Berlett Publishers, 2004
5. Kropf, Roger , Greenberg, James A, "Strategic Analysis for Hospital Management",Aspen Publishers Inc, Ist Edition ,1984
6. Alan M.Zuckerman, Healthcare Strategic Planning, Prentice Hall of India, 2nd Edition,2005

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE: 4.5.3

Name Of the Course: Management Of Hospital Services

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview:

Hospitals are unique service-based organizations, different from other service organizations. Hospitals serve as the touchpoints of healthcare delivery, concentrating mostly on the curative health services. The patients approach hospitals for general and specialized services on short-, medium- and long-term basis. Hospital Managers have to make sure that healthcare services are rendered by the healthcare personnel effectively and efficiently. This requires, on the part of the hospital managers, to fully understand the various functions being carried out by different departments and design and develop hospital systems so that all functions are carried out in a coordinated manner. The course has been designed to give the detailed overview to hospital functioning in compliance with statutory and regulatory requirement in a holistic manner

Course Objectives:

- To introduce the basic services of hospitals to the students.
- To familiarize the students with management dimensions of hospital services.

Course outcomes:

- At the end of the course, the students would get an insight into structure of hospital services and delivery

Module 1: STRUCTURE OF SERVICES 8 HOURS

Uniqueness of Hospital Services-Differences with Non-Hospital Forms of Healthcare Services-Classification of Hospital Services based on Ownership, Extent of specialization and Nature – Hospitals in India today, hospital as a system.

Module 2: DESIGN AND PLANNING 8 HOURS

Classification of Healthcare Facilities- Phases of hospital project- Preliminary survey, Feasibility Survey, Financial & Equipment planning, site selection criteria, legal requirements & Design consideration, Flow chart of operation, Physical facilities and space requirements, statutory requirements, Documentation, Equipment & supplies, Hospital organization hierarchy – Roles & function of hospital administration.

Module 3: OUT-PATIENT SERVICES 10 HOURS

Outpatient Department- Planning and Management of Accident and emergency services, Physical medicine and Physiotherapy, Day care- Urgency and utilization management- Prioritization of Patient Needs

Module 4: IN-PATIENT SERVICES 10 HOURS

Operation of wards and facilities-Planning and Management of Medical and Surgical Services, Nursing services and administration, Critical Care Services like ICU Etc - Specialty Services In-patient department (General & Specialized unit), Burn Unit, OT, Super Specialty services.

Module 5: OTHER SERVICES 12 HOURS

Planning and Management of STP/ETP, Laundry, Central Sterile and Supplies Department(CSSD), Bio Medical Waste Management(BWWM) , Building, Water supply, Sanitary System and Fire safety, Laundry & Linen, Housekeeping, Maintenance department, Toilets, Other Supportive Services like Radiology, Laboratory etc- Blood Bank , Ambulance services, Pharmacy, Cafeteria and Mortuary.

Module 6: HOSPITAL INFORMATION SYSTEM 8 HOURS

Information, Communication and Technology in Healthcare-Barriers and facilitators in adoption of ICT-Telemedicine, Hospital statistics, evaluation of hospital services, Use of management information system.

References:

1. Goel, S.L and Kumar," Hospital Core Services: Hospital Administration in 21st Century", Deep and Deep Publications Pvt Ltd, Ist Edition, 2004.
2. Kunders, G.D," Hospitals: Facilities Planning and Management , TBS, 2007.
3. B.M.Sakharkar ," Principles of hospital administration and planning" , Jaypee Brothers Medical Publishers, 2nd Edition, 2009
4. Tabish S A," Hospitals and Nursing homes planning, organizing and management", Jaypee Publishers, Ist Edition, 2003
5. Srinivasan, A. V. (Ed.). (2008). Managing a modern hospital. SAGE Publications India.

4.6 BANKING FINANCE AND INSURANCE SERVICES MANAGEMENT (BFIS)

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE:4.6.1

Name of the Course: Banking Technology And Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Overview of the Course:

The System and Experience of Banking has changed drastically over time and the buzz words today are 'net banking', 'mobile banking' etc. While knowledge of the systems and operations of a bank is very important, the technology that drives the system is equally essential to know. A student seeks a career in banking need to be exposed to the 'Technology' that defines the work and responsibility in the changing scenario of bank functioning. Hence, this paper 'Banking Technology and Management'.

Course Objectives:

- To orient the students about the core banking and branch operations.
- To provide knowledge on delivery channels and back office operations.
- To give an exposure regarding interbank payment system and smart banking technologies.
- To discuss contemporary issues in banking techniques

Course outcomes:

- Learn the technology used in banking operations.
- Know the back-end operations enabling provision of services.
- Get exposed to the contemporary techniques influencing banking systems

MODULE 1: CORE BANKING AND BRANCH OPERATIONS **10 Hours**

Introduction and Evolution of Bank Management,Technological impact in Banking Operations, Total Branch Computerization, concept and opportunities, Centralized Banking, Concept, Opportunities, Challenges and Implementation

MODULE 2: DELIVERY CHANNELS **8 Hours**

Overview of Delivery Channels, Automated Teller Machine, Phone Banking, Call Centers, Internet Banking , Mobile Banking, Payment Gateways , Card Technologies, MICR Electronic Clearing

MODULE 3: BACK OFFICE OPERATIONS **8 Hours**

Back office Management, Inter branch reconciliation, Treasury Management, Forex Operations , Risk Management, Data Centre Management, Network Management, Knowledge Management (MIS / DSS / ESS) , Customer Relationships Management(CRM)

MODULE 4: INTERBANK PAYMENT SYSTEM **10 Hours**

Interface with payment system Network, Structured Financial Messaging System, Electronic Fund Transfer, RTGS, Negotiated Dealing Systems and SecuritiesSettlement Systems, Electronic Money, E-Cheques

MODULE 5: SMART BANKING TECHNOLOGIES **10 Hours**

Introduction, Characteristics of Smart Banking Environment, Components and Technologies of Smart Banking Environments, Issues in Smart Banking

MODULE 6: CONTEMPORARY ISSUES IN BANKING TECHNIQUES **10 Hours**

Analysis of Rangarajan Committee Reports – E Banking – Budgeting – Banking Softwares

– Case Study: Analysis of Recent Core Banking Software.

Reference Books:

1. Muraleedharan, D. (2014). Modern banking: theory and practice. PHI Learning Pvt. Ltd..
2. Dube, D. P., & Gulati, V. P. (2005). *Information system audit and assurance*. Tata

McGraw-Hill Education

3. Banking on Technology – Perspectives on the Indian Banking Industry, Indian Banks Association, January 2014.
4. Bhasin, Narinder Kumar, “Technology in Banking – the New S Curve”, The Indian Banker, Vol VII, No. 5, May 2012.
5. Mobile Banking – Report of the Technical Committee, The Reserve Bank of India, January 2014.
6. Working Group on Information Security, Electronic Banking, Technology Risk Management and Cyber Frauds – Report and Recommendations, The Reserve Bank of India, January 2011
7. Publications of Indian Institute of Banking and Finance, McMillan

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE:4.6.2

Name of the Course: International Financial Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Overview of the Course:

A business enterprise having international transactions is exposed to various risks. While understanding the global environment, the economic impact of the transactions, the procedures and formalities to be adhered to are on one side, the impact of transactions on cash flow of the entity on account of fluctuations in foreign exchange rate is another aspect that must be addressed. This course titled “International Financial Management” aims to orient all the aspects a professional need to know in carrying out international transactions.

Course Objectives:

- To orient the students on global business environment and international markets.
- To make students understand the various risks an enterprise is exposed to on account of international transactions.
- To provide knowledge and skills for hedging foreign currency risks.

Course outcomes:

- The global financial environment, currency system, relationship between economies and impact of international transactions on the economy.
- Functioning of international financial markets.
- Fixing of exchange rate.
- Foreign currency risks and hedging strategies.

Unit 1: GLOBAL FINANCIAL MANAGEMENT **10 Hours**

Evolution of International Monetary System, Bimetallism, Classical Gold Standard, Interwar Period, Bretton Woods System, Flexible Exchange Rate Regime, the current Exchange Rate Agreements, European Monetary System, Fixed vs. Flexible Exchange Rate Regime.

Unit 2: BALANCE OF PAYMENTS **5 Hours**

Introduction, Accounting Principles in Balance of Payments, Valuation and Timing, Components of the Balance of Payments, 'Surplus' and 'Deficit' in Balance of Payments, Importance and limitations of BOP Statistics, Relationship of BOP with other economic variables.

Unit 3: INTERNATIONAL FINANCIAL MARKETS **5 Hours**

Motives for using International Financial Markets. Foreign Exchange Market, History and Transactions, interpreting Foreign Exchange Quotations, International Money Markets, International Credit Markets and International Bond Markets. Comparison of International Financial Markets.

Unit 4: EXCHANGE RATE DETERMINATION **8 Hours**

Purchasing Power Parity Theory, Interest Rate Parity Theory, International Fischer's Effect, Pure Expectations Theory.

Unit 5: FOREIGN EXCHANGE RISK AND RISK HEDGING STRATEGIES **18 Hours**

Transaction Risk, Translation Risk, Economic Risk. Risk Hedging Strategies: Internal – Netting, Leads and Lags. External – Forwards, Futures, Options, Money-market Hedging, Currency Swaps.

Unit 6: INTEREST RATE RISK AND RISK HEDGING STRATEGIES **10 Hours**

Risk Management : Meaning and objectives, Basic categories risk, Methods of managing risk/ Risk mitigation, Enterprise risk management, Risk management process, Different scenarios and Risk management strategies, Personal risk management, Risk control and Risk financing, Insurance market dynamics, Loss Forecasting**.**

Essential Reading:

1. Shapiro, Alan C., and Paul Hanouna. *Multinational financial management*. John

Wiley & Sons, 2019.

2. Apte, Prakash G. *International finance: a business perspective*. Tata McGraw-Hill Publishing, 2010.
3. David B. Zenoff& Jack Zwick: International Financial Management.
4. Rita M. Rodriguez L. Bigame Carter: International Financial Management.
5. V. A. Avadhani: International Finance- Theory and Practice, Himalaya Publishing House

Reference Books:

1. Madura, Jeff, “International Corporate Finance”, Thomson South-Western.
2. Sharan, Vyuptakesh, “International Financial Management”, Prentice Hall of India.
3. Jain, Peyrard, and Yadav’ “International Financial Management”, MacMillan
4. J. Fred Weston, Bart: Guide to International Financial Management.
5. Robery O. Edmister: Financial Institutions - markets and Management.
6. A.V. Rajwade: Foreign Exchange International Finance and Risk Management, Prentice Hall
7. Madura, Jeff. *International financial management*. Cengage Learning, 2020.

Name of the Program: Master of Business Administration

Course Code:4.6.3

Name of the Course: Risk Management for Banks and Insurance Companies

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview:

Like every business, banks and insurance companies are exposed to risks. However, the risks are very unique and most of the times beyond prediction, guess or even comprehension. While 'risk-taking' is an integral part of both banking and insurance business, managing risk to boost performance is a matter of challenge. This courses provides an outline of 'risk management' among banks and insurance companies, highlighting the best practices in Indian and global context

Course Objectives:

- To provide knowledge on various risks faced by banking companies.
- To provide knowledge on various risks faced by insurance companies.
- To make understand the various strategies adopted by banks and insurance companies in effectively managing risks

Course outcomes:

- Know the risks faced by banking and insurance companies.
- Understand the challenges in managing banks.
- Know the risk management strategies for banks and insurance companies.
- Get exposed to the best practices in India and other parts of the world, in respect of 'risk management'

Module 1: OVERVIEW OF RISK MANAGEMENT IN BANKS 8 HOURS

Risk concept- Importance, The changing face of risk in banks, Types of Risks, Risk Management framework, Organizational structure, Risk Identification- Risk measurement/-Sensitivity, Risk monitoring and Control- Risk Reporting

Module 2: MANAGING CREDIT RISK 10 Hours

Defining Credit risk, The Basel Committee's Principles of Credit risk Management,

Measuring Credit risk, Credit rating framework, Introduction to some popular credit risk models: Credit risk transfers- Securitization, Loan sales, Covered bonds and Credit Derivatives, Managing credit risk.

Module 3: CAPITAL RISK - REGULATION AND ADEQUACY 10 Hours

Concepts of Economic and Regulatory capital, why regulate bank capital? Risk based Capital Standards, Regulatory capital: Basel Accord- I, II, III, Illustrative problems on calculating capital adequacy

Module 4: INTEREST RATE AND LIQUIDITY RISK 10 Hours

Introduction, Asset- Liability Management, Managing and Measuring Interest rate risk, Methods to reduce Interest rate risk, Managing Interest rate with Interest rate derivatives, Liquidity risk- Sources, Approaches, Measuring Liquidity risk

Module 5: MANAGING MARKET RISK – BANKS INVESTMENT PORTFOLIO 10 Hours

Basic concepts, The Treasury functions, Risks and Returns of Investment securities, Measuring Interest rate risk with VAR, Approaches to VAR Computation, The Interplay between Market and Credit risk.

Module 6: RISK MANAGEMENT IN INSURANCE COMPANIES 8 Hours

Risk Management : Meaning and objectives, Basic categories risk, Methods of managing risk/ Risk mitigation, Enterprise risk management, Risk management process, Different scenarios and Risk management strategies, Personal risk management, Risk control and Risk financing, Insurance market dynamics, Loss Forecasting

References:

- Padmalatha Suresh and Justin Paul, Management of Banking and Financial Services, Pearson, 3rd Edition, 2014
- P.K. Gupta, Insurance and Risk Management, Himalaya publishing house, 2015
- Harold D Stephen and W Jean Kwon, Risk Management and Insurance, BlackwellPublishing co., New York, 2007
- Jave S. Trieschimam, Sandra G. Guatarson, Robert E Houyt, Risk Management and Insurance, Thomson Sowlla Western Singapore, 2003
- K.C Shekhar and LekshmyShekhar, Banking Theory and Practice, Vikas Publication, 2013
- JatinderLoomba: Risk Management and Insurance Planning PHI, 2014

- L.M. Bhole and JitendraMahakud, Financial Institutions and Markets, 2012
- Indian Institute of Banking and Finance, Risk Management, Mac Millan 2010
- G. S. Popli and S. K. Puri, Strategic Credit Management in Banks, PHI, 2013
- JyotsnaSethi and Nishwan Bhatia, Elements of Banking and Insurance, PHI, 2nd Edition, 2012
- Bharati.V. Pathak, The Indian Financial system, Pearson Education, 2nd Edition, 2008
- Indian Institute of Banking and Finance, Bank Financial Management, Mac Millan, 2014
- IIBF, “Risk Management”, Mc Milan, New Delhi.
- Bagchi S.K., “Credit Risk Management”, Jaico Publishing House, Mumbai

4.7 STARTUPS AND SMEs MANAGEMENT

Name of the Program: Master of Business Administration *Course Code:4.7.1* *Name of the Course:* **Technology and Innovation**		
Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Overview of the Course:

Small and medium enterprises (SMEs) have been considered one of the 'driving Suorces' of modern economies due to their multifaceted contributions in terms of technological innovations, employment generation, export promotion, etc. Of these, the ability of SMEs to innovate assumes significance because innovation lends competitive edge to firms, industries and ultimately, economies. Therefore, technological innovation has the potential to spur growth of individual enterprises at the micro level and aggregate industries and economies at the macro level. Associated with this high growth rates, SMEs in India are also facing a number of problems like sub-optimal scale of operation, technological obsolescence, supply chain inefficiencies, increasing domestic and global competition, fund shortages, change in manufacturing strategies and turbulent and uncertain market scenario. To survive with such issues and compete with large and global enterprises, SMEs need to adopt innovative approaches in their working. Hence there is a need to study in this perspective of technology and innovation among SMEs.

Course Objectives:

- To understand the importance of technology and innovation for SMEs
- To learn and understand various other dimensions of technology and innovation.

Course outcomes:

- By the end of the course, the students who are entrepreneurially inclined would resort to better technology and more innovation

MODULE 1: INTRODUCTION **10 HOURS**

Definition and characteristics of Technology – Market based and resource-based views of Technology - Impact of technology on business – meaning, importance and recent developments in technological environment – Technology Trends in Indian Industry- Concept and significance of management of technology – Growing importance of Innovation in business

MODULE 2: SOURCES OF TECHNOLOGY AND INNOVATION **8 HOURS**

Sources of technology- process of new product development - Linkage between technology development and competition – IPR and Technology management. Sources of Innovation: Internal and external sources, Competitive advantage to SME.

MODULE 3: TECHNOLOGICAL INNOVATION **10 HOURS**

Relationship between Technology and Innovation - Forms of Technology Innovation – Characteristics of Product & Process innovation – Status of Technological innovation in Indian SMEs - Policy Imperatives

MODULE 4: TECHNOLOGY STRATEGY **10 HOURS**

Concept and Key principles of technology strategy – framework for technology strategy – relationship between technology and business strategies – Issues and constraints of SME's technology strategy.

MODULE 5: TECHNOLOGY, INNOVATION AND SMEs **10 HOURS**

Technology Business Incubation (TBI) - ICT (Information and Communications Technology) – Access to Modern affordable technology - Ecosystem for technology transfer - Govt. policy imperatives for technology upgradation.

MODULE 6: PRACTICALS **8 HOURS**

Using Matplotlib Create line plots, area plots, histograms, bar charts, pie charts, box plots and scatter plots and bubble plots. Advanced visualization tools such as waffle charts, word clouds, seaborn and Folium for visualizing geospatial data. Creating choropleth maps

Reference Books:

1. BalaSubrahmanya, M H, M Mathirajan and K N Krishnaswamy (2008) "The Influence of Technological Innovations on the Growth of Manufacturing SMEs", Report submitted to the Department of Science & Technology, Government of India, New Delhi.
2. Tim Mazzarol, Sophie Reboud (2011) "Strategic Innovation in Small Firms – An International Analysis of Innovation and Strategies Decision Making in Small to Medium Sized Enterprises", Edward Elgar Publishing.

3. Innovation readiness of Indian SMEs: and Challenges – FICCI MSME Summit 2012 Report: Theme: " Innovation & Clusters
4. Chaminade, C. Vang, J (2006), Innovation Policy for Asian SMEs: an Innovation Systems Perspective, in H. Yeung Handbook of Research on Asian Business. Edward Elgar.

ESSENTIAL READINGS

1. Betz F , "Strategic Technology Management" , McGraw Hill, 1993
2. V.K. Narayanan , "Managing Technology and Innovation for Competitive Advantage",Prentice Hall , Ist Edition, 2000
3. Tarek Khalil , "Management of Technology" , McGraw Hill, 2000
4. Melissa A Schilling , Strategic Management of Technological Innovation , McGraw Hill, 4th Edition, 2012
5. Brychan Thomas, Christopher Miller, Lyndon Murphy Innovation and Small Business –Volume 1,E-Book, www.bookboon.com

Name of the Program: Master of Business Administration

Course Code:4.7.2

Name of the Course: **Internationalization of SMEs**

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Course Overview:

The emergence of multinational firms has been a distinct feature of globalization in the developing countries. Many of the emerging multinational firms are small and medium enterprises (SME), seeking to capitalize on their unique skills and capabilities and achieve rapid growth and diversify the sources of their revenue streams. SMEs have used their social capital to penetrate into foreign markets and acquire market share. However, they are unable to observe the strategies behind internationalization processes of SMEs. As more and more firms enter the international business environment, there is increased competition. Technological advancements, declining trade barriers etc. are driving the world economy to become more and more integrated and this rapid globalization is enabling SMEs to become international in a quicker yet effective manner. Advancements in information technology and improvements in communication infrastructure have resulted in opportunities for SMEs to participate in global markets in both developing and developed countries. Since 1991, SMEs in India have been faced with new competitive intensity. Improvements in resource utilization make it possible to sell a variety of products and services from anywhere in the world and around the clock. This course will help to gain a better understanding of internationalization of SMEs, strategies behind the internationalization process of SMEs and various govt/non-govt support programs towards SMEs internationalization.

Course Objectives:

- The objective of this course is to motivate entrepreneurially minded students to attempt internationalization in SMEs that they own and work for

Course outcomes:

- At the end of the course, the students must understand the nuts and bolts of internationalization of SMEs

MODULE 1: INTRODUCTION **8 HOURS**

Internationalisation: Introduction; Definition or Meaning of Internationalisation- Factors influencing Internationalisation of SMEs - Steps in Internationalisation of SMEs- International opportunities for SMEs – Benefits of Internationalization of SMEs.

MODULE 2: APPROACHES TO INTERNATIONALISATION **10 HOURS**

Stages, Economic, Networks Holistic approaches - Integrative and knowledge-based models. Gradualist, Born-Global, Born-Again Global approaches.

MODULE 3: FORMS AND MODES OF INTERNATIONALIZATION **10 HOURS**

Forms: Exporting - Joint Venture - FDI. Modes: Management contracts -Turn-key Operations- Subcontracting – Licensing – Franchising – Overseas Branches – subsidiary -Mergers and acquisitions - Ecommerce, International Trade Exhibition - Trade Journals

MODULE 4: SELECTION OF MARKETS **10 HOURS**

Nature of Product - International market Information - Foreign Market Needs - Foreign Competition - Support of Government Agencies.

MODULE 5: STRATEGIES FOR INTERNATIONALIZATION **10 HOURS**

Geographical Concentration/Diversification, Product-Market Expansion Grid, Ethnocentric, Polycentric, Geocentric, Regiocentric Strategies - Offensive and Defensive Competitive Strategies.

MODULE 6: PRACTICALS **8 HOURS**

Three Case studies of Export Oriented Units (EOU) and one Visit.

Essential Readings:

- M V Ravikumar, N. Ramesh and M K Sridhar, " Internationalization of SMEs –Study of critical factors ", Research Study sponsored by Indo-Korean Institute for Science and Technology, 2011
- Top Barriers and Drivers to SME Internationalization", Report by the OECD Working

Party on SMEs and Entrepreneurship, OECD, 2009

- Karen Wilson , “Encouraging the Internationalization of SMEs”, OECD Papers, 2006, Vol 6, Issue 12, Pg 43
- Gabrielsson, M. and Kirpalani, M.V.H. (2004): “Born globals: How to reach new business space rapidly”, International Business Review, 13, 555-571.
- Kundu, S. K. and Katz, J.A. (2003): “Born-internationals SMEs: BI-level impacts of resources and intentions,” Small Business Economics, 20, 25–47

References:

- Betz F , “Strategic Technology Management” , McGraw Hill, 1993
- V.K. Narayanan , “Managing Technology and Innovation for Competitive Advantage”,Prentice Hall , Ist Edition, 2000
- Tarek Khalil , “Management of Technology” , McGraw Hill, 2000
- Melissa A Schilling , Strategic Management of Technological Innovation , McGraw Hill, 4th Edition, 2012
- Brychan Thomas, Christopher Miller, Lyndon Murphy Innovation and Small Business –Volume 1,E-Book, www.bookboon.com

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE:4.7.3

Name of the Course: Management of Start-ups

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Overview of the Course:

Most new ventures face near fatal situations during the initial few years, threatening their very existence. Many of these failures are for want of an understanding of the management challenges of a new venture which are avoidable. These challenges are not the same as those of a well-established firm. Managers and entrepreneurs, hence, need additional set of attitudes, skills and knowledge to overcome these issues. Traditional MBA courses start with the assumption of an existing business and its management where systems, processes and relationships are already in place. Managing a start up venture is altogether a new experience of simultaneously working on several fronts often with limited resources in hand. Entrepreneurs should try to compress the new venture phase and move to the growth phase like a meteor. This course will provide some insight into the challenges of successfully managing this phase of a venture and its growth phase.

Course Objectives:

- The course aims to make the students understand the managerial dimensions ofstart-up ventures.

Course outcomes:

- By the end of the course, the students must get clarity of vision and roadmap for managing the growth of new ventures

MODULE 1: BUILDING HUMAN CAPITAL **10 HOURS**

Recruitment of key individuals – man power planning and sourcing, talent Management, learning and development, productivity of employees

MODULE 2: BUILDING INFRASTRUCTURE **10 HOURS**

Expansion of land and building, planning and procurement of additional machinery and equipment, modernisation and technology up gradation, management of capital expenditure.

MODULE 3: BUILDING MARKETING NETWORKS **10 HOURS**

Expansion of market - Identifying new market segment, new distribution channels, promotional tools, Technology of Marketing, New age marketing tools, Digitalmarketing.

MODULE 4: BUILDING ORGANIZATION **10 HOURS**

Design and development of organization structure, Departmentalization, organization policies and processes, organizational culture - ethics and governance

MODULE 5: BUILDING VISION **8 HOURS**

Introduction – Characteristics of Smart Banking Environment – Components and Technologies of Smart Banking Environments – Issues in Smart Banking

MODULE 6: PRACTICALS **8 HOURS**

Two Industrial visits, Two Synergy case studies

Essential Readings:

- Justin Longenecker, Leo B. Donlevy, Terri Champion, Carlos W. Moore, J. William Petty, Leslie E. Palich , “Small Business Management: Launching and Growing New Ventures”,Cengage Publication,5th Edition, 2013
- Prof. Anjan Raichaudhuri , “Managing New Ventures – Concepts and Cases on Entrepreneurship”, PHI Edition, 2011
- Longenecker, Moore, Petty and Palich , “Managing Small Business”, Cengage Learning, 15th India Edition, 2010
- B.S. Bhatia, G.S. Batra , “Entrepreneurship and small business management”, Deep and Deep Publications, 2002

References:

- Chase, R.B, et. Al,” Operations Management for Competitive Advantage”, Tata McGraw Hill, New Delhi, 11 edition, 2008
- Berger, Lance A and Dorothy Berger, “The Talent Management Handbook”, Tata McGraw Hill, New Delhi , 2nd Edition, 2011

- Hartman, Laura P and AbhaChatterjee " Perspectives in Business Ethics", Tata McGraw Hill, 3rd Edition, 2006
- Hanson &Kalyanam, "Internet Marketing & e-commerce", Thomson Learning, Bombay.
- Rosenbloom, Bert, "Marketing Channels: A Management View", ThomsonLearning, New Delhi , 8th Edition, 2007
- Bohlander / Snell / Sherman , "Managing HR(for training and development)" Thomson Publication
- Joseph Weiss , "O.B & Change " , Vikas Publications , 2nd Edition
- Ken Tanner , "The Entrepreneur's guide to hiring a building the team" , Praeger Publishers, 2008
- A.Gupta , "Indian Entrepreneurial Culture", New Age International Publication, Ist Edition, 2009

4.8 BUSINESS ANALYTICS

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE: 4.8.1

Name Of the Course: Data Visualization

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview

Data Visualization is a core component of the Business Analytics skill set. This course will provide an introduction to the main concepts of visual analytics such as visuals reports and dashboards with a hands-on tutorial to Tableau, a leading self-service BI and Data Visualization tool.

Course Objectives:

1. To familiarize the students about different kinds of representing the data.
2. To introduce the tools for Visualization of the data

Course Outcomes:

1. Create and represent different kinds of data.
2. Create story boards and dashboards for business decisions
3. Evaluate the use of visualization tools for different contexts

Unit 1: Fundamentals of Visualizations with Tableau 10 Hours

Scope of tableau for data visualizations and story-telling, importing data into tableau workspace, Data joining, Measures and Dimensions in tableau, Worksheets and Dashboards. Use of various option on the workspace.

Unit 2: Visual Analytics with Tableau 10 Hours

Tableau tools in the areas of charting, dates, table calculations and mapping. Specific types of charts including scatter plots, Gantt charts, histograms, bullet charts and several others. Discrete and continuous dates to explain your data. Create custom and quick table calculations and parameters. Different types of geographic data, how to connect to multiple data sources and how to create custom maps. Create dashboards that help you identify the story within your data.

Unit 3: Fundamentals of Visualizations with Power BI 10 Hours

Scope of Power BI for data visualizations and story-telling, importing data into Power BI workspace, Data joining, Transforming data, Worksheets and Dashboards. Use of various option on the workspace.

Unit 4: Visual Analytics with Power BI 10 Hours

Power BI tools in the areas of charting, dates, table calculations and mapping. Specific types of charts including scatter plots, Gantt charts, histograms, bullet charts and several others. Discrete and continuous dates to explain your data. Create custom and quick table calculations and parameters. Different types of geographic data, how to connect to multiple data sources and how to create custom maps. Create dashboards that help you identify the story within your data.

Unit 5: Fundamentals of Visualizations with Google Data Studio 10 Hours

Scope of Google data Studio for data visualizations, importing data into data studio workspace, Data studio homepage, Data source overview.

Unit 6: Visual Analytics with Google Data Studio 10 Hours

Data studio tools in the areas of charting, dates, table calculations and mapping. Specific types of charts including scatter plots, Gantt charts, histograms, bullet charts and several others. Create custom and quick table calculations and parameters. Different types of geographic data, how to connect to multiple data sources and how to create custom maps. Create dashboards that help you identify the story within your data.

References:

- Laursen, G. H., & Thorlund, J. (2016). *Business analytics for managers: Taking business intelligence beyond reporting*. John Wiley & Sons.
- Healy, K. (2018). *Data visualization: a practical introduction*. Princeton University Press.
- Wilke, C. O. (2019). *Fundamentals of data visualization: a primer on making informative and compelling figures*. O'Reilly Media.
- Sievert, C. (2020). *Interactive web-based data visualization with R, plotly, and shiny*. CRC Press.
- Baldwin, D. (2016). *Mastering Tableau*. Packt Publishing Ltd.

- Ferrari, A., & Russo, M. (2016). *Introducing Microsoft Power BI*. Microsoft Press.

Name of the Program: Master of Business Administration

Course Code:4.8.2

NAME OF THE COURSE: BUSINESS FORECASTING

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Overview

This is a course on forecasting methods and their applications in business. Students will be introduced to techniques employed in the operations planning. They will be able to understand Data pattern and appropriate transformation. At the end of the course students should be able to identify the difference between qualitative and quantitative forecasting method and analyze the demand using the regression method. They can analyze the demand using exponential smoothing method and apprehend the different measures of forecast error.

Course Objectives:

- To expose to the data types and identification problem
- To equip with qualitative and quantitative forecasting techniques (with focus on non-econometric techniques)

Course Outcomes:

- Identify the factors that affect demand.
- Illustrate the forecasting techniques with the help of computer software and enable the interpretation of the results

Module 1: Introduction to Forecasting **10 Hours**

Introduction, Role of forecasting in business, Steps in forecasting and methods of forecasting. Correlation: Partial and Multiple correlation. Regression Analysis: Multiple regression analysis, Testing the assumptions of regression: multicollinearity, heteroscedasticity and autocorrelation.

Module 2 : Demand Analysis 10 Hours

An Overview; Significance of Demand Analysis and Forecasting, Determinants of Demand, Elasticity of Demand, Revenue and Profit of a Firm Estimation of Demand, Forecasting Demand, Selecting a Forecasting Technique, Purpose of Forecast, Type of Users

Module 3: Marketing Research **10 Hours**

Marketing Research Techniques, Consumer Surveys, Consumer Clinics and Focus Groups

Market Experiments in Test Stores, Statistical Estimations, Variable Identification, Time Series and Cross-Sectional Data Collection, Specification of the Model, Estimation of the Parameters, Interpretation of Regression Statistics, Time Series Regression; Forecasting with Regression Model: Unconditional Forecasting, Forecasting with Serially Correlated Errors, Conditional Forecasting

Module 4: Time Series Analysis **10 Hours**

Smoothing and Extrapolation of Time Series, Simple Extrapolation Models, Smoothing and Seasonal Adjustment; Properties of Stochastic Time Series: Characterizing Time Series: The Autocorrelation Function, Stationarity, Random Walk, Cointegrated Time Series; Linear Time Series: Moving Average Models, Autoregressive Models, Mixed Autoregressive and Moving Average Models, Homogeneous Non-Stationary Processes: ARIMA Models, Box-Jenkins Methodology, Specification of ARIMA Models, SARIMA, ARMAX Mode

Module 5: Forecasting with Time Series Models **10 Hours**

Computing a Forecast, The Forecast Error, Properties of ARIMA Forecasts, Causality, Exogeneity, VAR, Impulse Response Functions, Volatility Measurement, Modeling and Forecasting: The ARCH Process, The GARCH Process

Module 6: Qualitative Forecasting Techniques 10 Hours

Survey and Opinion Polling Techniques, Exponential Smoothing and Other Advanced Techniques, Barometric Techniques, Leading, Lagging and Coincident Economic Indicators, Diffusion and Composite Indexes, Accuracy of Forecast, Short Run Forecast, Long Term Forecast, Use of Software Packages for Forecasting.

References:

- Gilliland, M., Tashman, L., & Sglavo, U. (2015). *Business forecasting: Practical problems and solutions*. John Wiley & Sons.
- González-Rivera, G. (2016). *Forecasting for economics and business*. Routledge.
- Montgomery, D. C., Jennings, C. L., & Kulahci, M. (2015). *Introduction to time series analysis and forecasting*. John Wiley & Sons.

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE:4.8.3

Name Of the Course: *Data Warehousing and Data Mining*

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Overview of the Course:

This course is an introductory course on data mining. It introduces the basic concepts, principles, methods, implementation techniques, and applications of data mining, with a focus on data mining functions.

Course Objectives:

1. To study algorithms for finding hidden and interesting patterns in data and to understand the importance of pattern discovery concepts, methods, and applications.
2. To understand and apply various classification and clustering techniques using tools.

Course Outcomes:

1. Analyze algorithms and understand the patters in the data
2. Apply various techniques to mine data from various data sources

Module 1: Introduction to Data Ware Housing 10 Hours

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Module 2: Data Warehouse and OLAP Technology for Data Mining 10 Hours

Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

Module 3: Patterns and Association Rules 10 Hours

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

Module 4: Classification and Prediction 10 Hours

Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation,

Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

Module 5: Cluster Analysis **10 Hours**

Cluster Analysis Introduction- Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

Module 6 : Mining Streams, Time Series and Sequence Data **10 Hours**

Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multirelational Data Mining, Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Word Cloud, Sentiment Analysis, Text Mining, Mining the World Wide Web.

References:

- Provost, F., & Fawcett, T. (2013). *Data Science for Business: What you need to know about data mining and data-analytic thinking*. " O'Reilly Media, Inc.".
- Bhatia, P. (2019). *Data mining and data warehousing: principles and practical techniques*. Cambridge University Press.
- Tan, P. N., Steinbach, M., & Kumar, V. (2016). *Introduction to data mining*. Pearson Education India.
- Ratner, B. (2017). *Statistical and machine-learning data mining: Techniques for better predictive modeling and analysis of big data*. CRC Press.

4.9 LOGISTICS AND SUPPLY CHAIN MANAGEMENT

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE:4.9.1

Name Of the Course: Supply Chain Planning & Strategies

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Objectives:

1. Understand the concept of resource planning and scheduling in an organization.
2. Understand the importance of lean, hybrid and agile supply chains.
3. Understand the concept of supply chain measurement, different metrics and their application.
4. Measure the effectiveness of supply chain strategic design though scientific metrics.

Course Outcomes:

On successful completion of this course students shall be able to:

1. Understand opportunities, issues and challenges pertaining to resource planning and scheduling
2. Analyze and apply various techniques for supply chain strategic design.
3. Understand and apply various supply chain metrics in an organization.
4. Understand the effectiveness of metrics usage in different organizations.

COURSE CONTENT

Module 1: Resource Planning and Scheduling **10 HOURS**

Introduction to Sales and operations planning - Purpose of sales and operations plans - Decision context - Sales and operations planning as a process - Overview of decision support tools, Enterprise resource planning - Planning and control systems for manufacturers – Materials requirement planning - Drum – Buffer – Rope system – Scheduling - Scheduling service and manufacturing processes - Scheduling customer demand - Scheduling employees - Operations scheduling

Module 2: Supply chain strategy design **10 HOURS**

Supply chain design theory- Matching supply chain requirements and capabilities,

Lean concepts in supply chain management, agile concepts in supply chain management, Comparing lean and agile supply systems. Comparing lean, hybrid and agile supply chains

Module 3: Static Theory of Supply Chain Management 8 HOURS

Performance indicators- Efficiency, responsiveness, firm performance, Trade-offs of performance, Supply chain strategies- Efficiency oriented, responsiveness oriented, Hybrid strategies ideal & real supply chain strategies.

Module 4: Supply chain Measurement and Challenges 10 HOURS

Business metrics, Types of supply metrics & measurement, Importance of alignment between business goal and supply metrics, Issues faced by distribution network, distribution strategies, Quality management, Six sigma metrics, Total quality Management, Fishbone analysis.

MODULE 5 Green Supply Chain Management:

Introduction, Traditional Supply Chain and Green Supply Chain, Environmental Concern and Supply Chain, Closed-loop Supply Chain, Corporate Environmental Management, Green Supply Chain (GSCM): Definition, Basic Concepts, GSCM Practices. Case Studies

MODULE 6 Green Logistics

Green Logistics and Transportation, Definitions of Green Logistics, Critical drivers of Green Logistics, Green transportation and logistics practices, Environmental impacts of transportation and logistics, Closing the Loop: Reverse Logistics. Case Studies.

SUGGESTIVE READINGS:

- Simchi-Levi, David, Philip Kaminsky, and Edith Simchi-Levi. *Designing and Managing the Supply Chain*. McGraw Hill/Irwin, 2007. ISBN: 9780073341521.

- Hopp, Wallace, and Mark Spearman. Factory Physics. 2nd ed. McGraw-Hill/Irwin, 2000. ISBN: 9780256247954.

- Hopp, Wallace. Supply Chain Science. McGraw-Hill/Irwin, 2007. ISBN: 9780073403328.

REFERENCES:

- Nahmias, Steven. Production and Operations Analysis. McGraw-Hill/Irwin, 2000. ISBN: 9780072417418.

- Chopra, Sunil, and Peter Meindl. Supply Chain Management. 3rd ed. Prentice Hall, 2006. ISBN: 9780131730427.

- Shapiro, Jeremy F. Modeling the Supply Chain. Southwestern College Pub, 2000. ISBN: 9780534373634.

- Silver, Edward A., David F. Pyke, and Rein Peterson. Inventory Management and Production Planning and Scheduling. 3rd ed. Wiley, 1998. ISBN: 9780471119470.

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE: 4.9.2

Name Of the Course: Global Procurement And Sourcing

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Objectives:

1. Gain knowledge paradigms in global procurement and sourcing to gain insights into similarities/differences across cross-cultural markets.
2. Gain an understanding of storage management system.
3. Understand the need to appreciate the need of sourcing as a strategic function.
4. Acquaint with different skills and systems required to implement marketing strategies across country borders.

Course Outcomes:

On successful completion of this course students shall be able to:

1. Develop strategies to remove cultural biases and understandings from the equation in assessing foreign values, wants and needs.
2. Analyze, discuss, describe, and demonstrate the marketing processes and strategies that firms utilize when marketing their products in foreign countries.
3. Analyze, discuss, describe, and demonstrate the marketing processes and strategies that firms utilize when marketing their products in foreign countries.
4. Acquire skills and systems to implement strategies to measure performance of sourcing.

COURSE CONTENT

Module 1: Introduction **8 HOURS**

Objectives of Procurement System, Principles of Procurement, and History of procurement function: from administrative to strategic, value added role, Procurement Cycle, Procurement Planning, and Purchasing Mix: Six Rights, Selecting the right supplier, Source of information and process, Supplier appraisal/vendor capability, bidding process.

Module 2: Storage Management System **12 HOURS**

Storage Inventory Management – Functions of storage & Inventory - Classification of Inventory- Methods of Controlling Stock Levels- Always Better Control (ABC) Inventory system- Storage: storage policies - dedicated storage, randomized storage & class-based storage; Storage Methods-assembling & seasonal storage; stockpiling and rapid storage. Centralized and Decentralized Storage Systems.

Module 3: Sourcing as a Strategic Function **8 HOURS**

Evolution of Purchasing, Purchasing, Sourcing as a key organizational function, Sourcing objectives, Make or Buy decision, Types and methods of Sourcing in retail, Centralized vs. decentralized, single sourcing vs. multiple sourcing, day-to-day vs. long rang sourcing.

Module 4: Sourcing Process **8 HOURS**

Market analysis and supplier research, Prime sources of supplier information, Request for Proposal, Fundamental steps of the buying process, terms and condition of purchase, Buying Documentation, Negotiation, Use of IT in sourcing, Global Tenders and E-Procurement, Reverse Auctions, Expanded role of global purchasing

Module 5: Cross Functional Approach to Sourcing **10 HOURS**

Overview of material management function and supply chain alignment, Role of purchasing in supporting inventory objectives, Goals of Inventory Control, Hedging vs. Forward Buying, Risk management, Managing price fluctuation and volatility in international finance, matching supply with customer demand, managing inward logistics, Transportation modes and warehousing

Module 6: Global trends in Procurement and Sourcing **10 HOURS**

Global Trade Barriers, Dealing with international suppliers, UNO and GATT conventions, Legal, socio-cultural issues in international buying, Environmental issues-Green Procurement- Industry Best Practices, Measurement of sourcing performance, Benchmarking in Retail Procurement.

SUGGESTIVE READINGS:

- Johnson, Leenders, and Flynn: Purchasing and Supply Management. 14th Edition McGraw Hill. ISBN: 9780073377896

- Weele, Arjan J. Van (2014), Purchasing & Supply Chain Management, Cengage Learning.

- Fred Sollish & John Semanik (2011), Strategic GlobalSourcing Best Practices, Wiley.

REFERENCES:

- Robert J. Trent (2007), Strategic Supply Management, Creating the Next Source of Competitive Advantage, J. Ross Publishing.

- Branch, A.E. (2009), Global Supply Chain Management and International Logistics, Routledge. 5. Cheng, L.K. and Kierzkowski, H. (Eds) (2001), Global Production and Trade in East Asia, Kluwer.

NAME OF THE PROGRAM: MASTER OF BUSINESS ADMINISTRATION

COURSE CODE:4.9.3

Name Of the Course: Vendor Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

COURSE OBJECTIVES:

1. Demonstrate a basic understanding of vendor and sourcing management
2. To provide the basics understanding about the vendor selection and evaluation process
3. Understand the importance of emotions in the negotiation process
4. Build an insight towards the need of big data in procurement process

Course Outcomes:

On successful completion of this course students shall be able to:

1. Understand role of vendor management in an organization.
2. Analyze the vendor selection and evaluation process.
3. Articulate the various elements in an negotiation process.
4. Analyze data driven insights out of analytics and implement automation in procurement.

COURSE CONTENT

Module 1: Introduction **8 HOURS**

Introduction to Vendor Management, Six components of Vendor Management, Benefits of Vendor Management, Regulations of Vendor Management, Vendor Performance, Vendor Performance Management, Long term strategy for Vendor Management.

Module 2: Vendor and Sourcing Management **8 HOURS**

Sourcing Strategy basics and types, Low-cost Country Sourcing, Global Sourcing, Offshore Outsourcing, Outsourcing, Sourcing Advisory, Purchase and Sourcing from Low cost Global supply Chains, building Traceability and ethical sourcing, Captive sources, Vendor Monitored Supply Chains.

Module 3: Vendor Evaluation and Processing **10 HOURS**

Supplier Strategy, System of Vendor evaluation, Parameters for evaluation of Vendors Performance, Social Audit, Total Evaluation, Vendors Development by adopting appropriate Rating Systems, developing Lean Time and Supply period and creating multiple vendors for scarce inventory, Guidelines for Purchases through Tender, Purchase Review, import substitution.

Module 4: Vendor Negotiation **12 HOURS**

Definition of Negotiation, Preparing for the Negotiation Process, The Seven Basic Steps in Negotiation, Negotiation Styles, Strategies for Negotiation, Best Alternative to a Negotiated Agreement (BATNA), Approaches for Negotiation, Types of Negotiators, Tactics for Negotiation Process, Non-Verbal Communication, Emotions in the Negotiation Process.

Module 5: Vendor Selection and Review 10 HOURS

Searching for suppliers, The Supplier Selection Process, Retaining and Developing the Supplier Relationship, Agreements and policies for protecting the company's interests, Vendor Risk Assessment, Contract Management, Contract Lifecycle Management, Automating Contract Management, Change Management, Contract Compliance, Procurement and Contract Management.

Module 6: Ethics and Future Trends 8 HOURS

Ethical Concepts and Principles in Procurement, Unethical Practices Signs, Ethical, Procurement Requirements, Unethical Practices Prevention Tools, Procurement Future Trends, Sustainable Procurement, Procurement Automation, Big Data and Procurement

SUGGESTIVE READINGS

- Sollish, F. and Semanch, J. (2007), Strategic Global Sourcing: Best Practices, Wiley Publications Chartered Institute of Purchasing and Supply (CIPS), UK – Case Studies Chopra and Miendl (2003), Supply Chain Management: Strategy, planning and operation, Pearson Books

- Pooler, V.H. (1997) Purchasing and Supply Management: Creating the vision, Springer.

REFERENCES:

- Stephen R guth, 2007, The Vendor Management Office: Unleashing the Power of Strategic Sourcing

- Agostino Carrideo 2015, Vendor Management: An insider's strategies to win and create long lasting change

BANGALORE UNIVERSITY

REGULATIONS, SCHEME AND SYLLABUS

For the course

MASTER OF COMPUTER APPLICATIONS (MCA)

I to IV Semesters

(Choice Based Credit System –Y2K20 Scheme)

Revised w.e.f.

Academic Year 2020-21 and onwards

MCA PROGRAMME

JNANABHARATHI CAMPUS
BANGALORE UNIVESITY, BANGALORE

1 **TITLE OF THE COURSE:** The course shall be called MCA – Master of Computer Applications.

2 **DURATION OF THE COURSE**: The course of study shall be two years.

3 **ELIGIBILITY FOR ADMISSION**: A candidate with any degree of a minimum of 3 years duration (10+2+3) of Bangalore university or of any other University equivalent there in to with a minimum of 50% of marks in the aggregate of all subjects including languages, if any, provided further, that the candidate has studied Mathematics / Computer science /Business Mathematics / Statistics / Computer Applications / Electronics as a subject at PUC level or equivalent HSC (XII Standard) or at Degree level is eligible for admission to MCA Course. Relaxation to SC/ST, Group I be extended as per University norms.

4 **ATTENDANCE**: In each Semester a candidate should be considered to have successfully undergone the prescribed Course of study if the candidate has attended at least 75% of the classes in each subject (Theory, Lab & Practical).

5 **SCHEME OF EXAMINATION**:

A. The Internal Assessment marks should be decided for each of the theory subjects by conducting 2 tests, each of 60 minutes duration, spread over the span of a Semester. A seminar should also be given by the student in the second year and the same to be assessed and evaluated for internal assessment along with two tests.

B. The Internal Assessment marks in Practical course is based on the performance in the Laboratory. The Internal Assessment marks for Project work of a candidate is based on the dissertation and seminar.

6 **ELIGIBILITY TO GO TO THE HIGHER SEMESTER**:

A. A Candidate is allowed to carry over all the previous uncleared (failed) theory papers and Practicals to subsequent semesters from the first to fourth semester.

B. The maximum period for the completion of the course shall be four years from the date of admission.

7 **MINIMUM FOR PASS AND DECLARATION OF RESULTS**

A. For a pass in a semester, a candidate shall secure a minimum of 40% of the marks prescribed for a subject in the University Examination (Theory, Practical, Project work) and 50% of the marks in the aggregate inclusive of the Internal Assessment marks obtained in all subjects put together.

B. The candidates who do not satisfy 7(A) shall be deemed to have failed and have to take exams in the subjects in which he has secured less than 40% at the University examination.

C. Provision is made for rejection of results of all the subjects of a Semester only once, if the candidate decides to reappear for all the subjects of that semester. Such rejection should be made within 30 days of announcement of result, by making a written application, through the Head of the Institution. If such rejection is in respect of the results of all the subjects of one semester and earn fresh Internal marks as well.

D. The results of any semester will be declared as pass or fail as the case may be in accordance with regulation 7(A).

E. To be eligible for the award of the MCA degree, a candidate shall have completed the scheme of training and passed in all subjects prescribed for the Course.

F. Further to regulation 7(A), the classification followed by the University for all PG courses shall be made applicable for the declaration of results of each Semester.

8 **CLASSIFICATION OF RESULT FOR THE MCA COURSE AND DECLARATION OF RANKS:**

Further to regulations 7(A) and 7(F), the names of all successful candidates securing First Class with Distinction and First Class in the First attempt shall be arranged in the order of Merit and only first FIVE Ranks shall be declared.

9 A candidate shall complete examinations of all Semesters of <u>MCA Course within - FOUR years from the date of admission</u>

SCHEME OF STUDY AND EXAMINATION FOR MASTER OF COMPUTER APPLICATIONS (MCA)

Sem	Paper Code	Title of the paper	Hours / Week	Marks			Credits	
				IA	Exam	Total	Subject	Sem
I	1MCA1	The Art of Programming	4	30	70	100	4	28
	1MCA2	Discrete Mathematics	4	30	70	100	4	
	1MCA3	Computer Organization and Architecture	4	30	70	100	4	
	1MCA4	Theory of Computation	4	30	70	100	4	
	1MCA5	Object Oriented Programming	4	30	70	100	4	
	1MCA6	Data Structures	4	30	70	100	4	
	1MCA7	Data Structures Lab	8	30	70	100	2	
	1MCA8	Object Oriented Lab	8	30	70	100	2	
II	2MCA1	Operating Systems	4	30	70	100	4	28
	2MCA2	Database Management Systems	4	30	70	100	4	
	2MCA3	Computer Networks	4	30	70	100	4	
	2MCA4	Software Engineering	4	30	70	100	4	
	2MCA5	The Design and Analysis of Algorithm	4	30	70	100	4	
	2MCA6	Artificial Intelligence	4	30	70	100	4	
	2MCA7	Database Management System Lab	8	30	70	100	2	
	2MCA8	Unix Programming Lab	8	30	70	100	2	
III	3MCA1	Open Elective	3	30	70	100	3	26
	3MCA2	Soft Core	3	30	70	100	3	
	3MCA3	Research Methodology	4	30	70	100	4	
	3MCA4	Elective I	4	30	70	100	4	
	3MCA5	Elective II	4	30	70	100	4	
	3MCA6	Elective III	4	30	70	100	4	
	3MCA7	MINI PROJECT	8	30	70	100	4	
IV		MAIN PROJECT					16	16

FIRST SEMESTER MCA

1MCA1: THE ART OF COMPUTER PROGRAMMING

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [13 Hours]

Introduction: The Role of Algorithms in Computing, Algorithms as a technology, Analyzing algorithms, Designing algorithms, Growth of Functions, Asymptotic notation, Standard notations and common functions. Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial Computation, Generating of the Fibonacci sequence, Reversing the digits of an integer, Base Conversion, Character to number conversion.

UNIT - II [13 Hours]

C Programming: Getting Started, Variables and Arithmetic expressions. Input and Output: Standard input and output, formatted output- printf, variable length argument list, formatted input-scanf. Control Flow: Statements and Blocks, If-else, else-if, switch, loops: while loop, for loop, do while, break and continue, goto and labels. Pointers and Arrays: pointers and address, pointers and function arguments, multidimensional array, initialization of pointer arrays, command line arguments.

UNIT - III [13 Hours]

Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers, generating prime numbers, computing the prime factors of an integer, generation of pseudo random numbers, raising a number to a large power, computing the nth Fibonacci Number. Array Techniques: Array order Reversal, Array counting or Histogramming, Finding the maximum number in a set, removal of duplicates from an ordered array, partitioning an array, Finding the kth smallest element, multiplication of two matrices.

UNIT - IV [13 Hours]

Merging: the two-way merge. Sorting: Sorting by selection, sorting by exchange, sorting by insertion, sorting by diminishing increment, sorting by partitioning. Searching: binary search, hash search. Text processing and Pattern searching: text line length adjustment, left and right justification of text, keyword searching in text, text line editing, linear pattern search, sublinear pattern search.

Text Books:

1. *R.G.Dromey, "How to Solve it by Computer", Pearson Education India, 2008.*
2. *Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, The MIT Press Cambridge, Massachusetts London, England, 2009.*
3. *Brain M. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd edition, Princeton Hall Software Series, 2012.*

Reference Books:

1. *Steven S. Skiena, "The Algorithm Design Module", 2nd Edition, Springer-Verlag London Limited, 2008.*
2. *Donald E. Knuth, The Art of Computer Programming", Volume 1: Fundamental Algorithms, 3rd Edition, Addison Wesley Longman, 1997.*

3. *Donald E. Knuth, The Art of Computer Programming", Volume 2: Seminumerical Algorithms, 3rd Edition, Addison Wesley Longman, 1998.*
4. *Greg Perry and Dean Miller, "C programming Absolute Beginner's Guide", 3rd edition, Pearson Education, Inc, 2014.*

Web Resources:

1. *http://algorithmsforinterviews.com "Algorithms for Interviews"*

1MCA2: DISCRETE MATHEMATICS

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT – I [13 Hours]

Set Theory and Logic: Fundamentals of Set theory, Set Operations and the Laws of Set Theory, Counting and Venn Diagrams, Cartesian Products and Relations, Functions–One-to-One, Onto Functions, Function Composition and Inverse Functions. Mathematical Induction, The well ordering principle, Recursive Definitions, Structural Induction, Recursive algorithms. Fundamentals of Logic, Propositional Logic, Logical Connectives and Truth Tables, Logic Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs. Proof Methods and strategy.

UNIT - II [13 Hours]

Counting and Relations: Basics of counting, Pigeonhole Principle, Permutation and Combinations, Binomial coefficients. Recurrence relations, Modeling with recurrence relations with examples of Fibonacci numbers and the tower of Hanoi problem. Divide and Conquer relations with examples (no theorems). Definition and types of relations, Representing relations using matrices and digraphs, Partial Orderings, Hasse diagrams, Maximal and Minimal elements, Lattices.

UNIT - III [13 Hours]

Probability: The Concept of Probability-Sample Spaces, Probability as Relative Frequency, Axiomatic Definition of Probability, Properties of Probability, Additive Property, Conditional Probability, Multiplicative Law of Probability, Law of Total Probability, Bayes' Formula, Independent Events. Random Variables, Distribution Functions, Discrete Random Variables, Continuous Random Variables, Probability Mass Function and Probability Density Function, Expectation and Variance, Functions of Random Variables, Some important Probability Distributions: Discrete - Bernoulli Trials and Binomial distribution, Geometric distribution and Poisson distribution, Continuous - Uniform distribution, Normal distribution and Exponential distribution.

UNIT - IV [13 Hours]

Graph Theory: Graphs: Introduction, Representing Graphs, Graph Isomorphism, Operations on graphs. Trees: Introduction, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees, Prim's and Kruskul's Algorithms. Connectivity, Euler and Hamilton Paths, Planar Graphs. Directed graphs: Fundamentals of Digraphs, Computer Recognition - Zero-One Matrices and Directed Graphs, Out-degree, in-degree, connectivity, orientation, Eulerian and Hamilton directed graphs, tournaments.

Text Books:

1. *Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5thEdition, Pearson Education, 2004.*
2. *C. L. Liu: Elements of Discrete Mathematics, Tata McGraw-Hill, 2000.*
3. *Sheldon M Ross: Introduction to Probability Models, 12th edition, Academic Press, 2019.*
4. *F. Harary: Graph Theory, Addition Wesley, 1969.*

Reference Books:

1. *Kenneth H Rosen: "Discrete Mathematics and its Applications", McGraw Hill publications, 7th edition, 2007.*
2. *J. P. Tremblay and R.P. Manohar: Discrete Mathematical Structures with applications to Computer Science, Mc Graw Hill Ed. Inc. 1975.*
3. *Sheldon M Ross: Introduction to Probability and Statistics for Engineers and Scientists, 6th edition, Academic Press, 2020.*
4. *Michael Baron: Probability and Statistics for Computer Scientists, 3rd Edition, CRC, 2019*

Web Resources:

1. *https://www.my-mooc.com/en/categorie/mathematics*
2. *http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html*
3. *https://ocw.mit.edu/courses/mathematics/*

1MCA3: COMPUTER ORGANIZATION AND ARCHITECTURE

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [13Hours]

Number Systems: Binary, Octal, Hexa decimal numbers, base conversion, addition, subtraction of binary numbers, one's and two's complements, positive and negative numbers, character codes ASCII, EBCDIC etc. Computer Arithmetic: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations. Structure of Computers: Computer types, Functional units, Basic operational concepts, Von-Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Digital Logic Circuits: Logic gates, Boolean algebra, Map Simplification. Combinational Circuits: Half Adder, Full Adder, flip flops.Sequentialcircuits:Shiftregisters,Counters,IntegratedCircuits,Mux,Demux,Encoder,Decoder.Data representation: Fixed and Floating point, Error detection and correction codes.

UNIT - II [13Hours]

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC

UNIT - III [13Hours]

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit. Micro-programmed Control: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit. Input Output: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. Instruction level parallelism: Instruction level parallelism (ILP)-over coming data hazards, limitations of ILP

UNIT - IV [13Hours]

Memory System: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID. Multiprocessors And Thread level Parallelism: Characteristics of multiprocessors, Multi-Threaded Architecture,Distributed Memory MIMD Architectures, Architecture of MultiThreaded Processor, principle of MultiThreading, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence.

TEXT BOOKS:

1. *Mano M Morris, "Computer System Architecture", 3rd edition Pearson India(2019).*
2. *William Stallings, "Computer Organization and Architecture designing for performance", 10th edition, Pearson(2016)*

REFERENCE BOOKS:

1. *Subrata Ghoshal, "Computer Architecture And Organization", Pearson India(2011).*
2. *Andrew S. Tanenbaum " Structured Computer Organization", 5th edition, Pearson Education Inc(2006).*
3. *Carl Hamacher, Zvonks Vranesic,SafeaZaky, "Computer Architecture And Organization", 5th edition McGraw Hill New Delhi,India(2002).*
4. *Kai Hwang, "Advanced Computer Architecture - Parallelism, Scalability, Programmability", Tata Mcgraw-Hill (2008).*

1MCA4: THEORY OF COMPUTATION

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [13 Hours]

Introduction to Automata: The Principle of Mathematical Induction, Introduction to formal proof, Additional forms of Proof, Inductive Proofs. Finite Automata: Introduction, Deterministic Finite Automata (DFA) : Formal definition, simpler notations (state transition diagram, transition table), language of a DFA. Nondeterministic Finite Automata (NFA): Definition of NFA, language of an NFA, Equivalence of Deterministic and Nondeterministic Finite Automata, Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata.

UNIT - II [13 Hours]

Regular Expressions: Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions. Regular Grammars: Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular. Properties of Regular Languages: The Pumping Lemma for regular languages, Applications of the pumping lemma closure properties of regular languages, Decision properties of regular languages, Equivalence and minimization of automata. Context Free Grammer (CFG): Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG's, Minimization of CFG's, CNF, GNF, Pumping Lemma for CFL's, Enumeration of Properties of CFL.

UNIT - III [13 Hours]

Pushdown Automata Introduction: Definition, Formal definition of pushdown automata, A graphical notation for PDA's, Instantaneous descriptions of a PDA. Pushdown Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA. Deterministic Pushdown Automata: Definition of a deterministic PDA, Regular languages and deterministic PDA's, DPDA's and context-free languages, DPDA's and ambiguous grammars. Transducers: Moore machine, Mealy machine, Difference between Moore & Mealy machines, Properties, Equivalence of Moore & Mealy machines. Context Sensitive Languages: Linear bounded automata, Chomsky's hierarchy of languages.

UNIT - IV [13 Hours]

Introduction to Turing Machines: The Turing Machine: The instantaneous descriptions for Turing machines, Transition diagrams for Turing machines, The language of a Turing machine, Turing machines and halting programming techniques for Turing machines, Extensions to the basic Turing machine, Restricted Turing machines, Turing machines and computers. Undecidability: A language that is not recursively enumerable, Enumerating the binary strings, Codes for Turing machines, the diagonalization language, An undecidable problem that is RE: Recursive languages, Complements of recursive and RE languages, The universal languages, Undecidability of the universal language. Undecidable Problems About Turing Machines: Reductions, Turing machines that accept the empty language. Post's correspondence problem: Definition of post's correspondence problem, The "Modified" PCP, Other undecidable problems: Undecidability of ambiguity for CFG's. Unsolvable Problems and Computable Functions: A no recursive Language and Unsolvable Problem, Reducing one problem to another: The Halting Problem, Other unsolvable Problems involving TMs, Rice's Theorem and More Unsolvable problems.

Text Books:

1. *John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman (2007), Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson Education, India.*
2. *K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata Languages and Computation, 2nd Edition, Prentice Hall of India, India.*

Reference Books:

1. *Harry. R. Lewis and C. H. Papadimitriou - Elements of the Theory of Computation, Second Edition, PHI, 2003.*
2. *John C. Martin - Introduction to Languages and the Theory of Computation, Fourth Edition, TMH, 2011.*
3. *Micheal Sipser - Introduction of the Theory and Computation, Thomson Brokecole, Second Edition, 1997.*
4. *C. K. Nagpal - Formal Languages and Automata Theory, Oxford Higher Education, April 2011.*

Web Resources:

1. *Youtube Channel: nptelhrd, Playlist name: Theory of automata, formal languages and computation.*

1MCA5: OBJECT ORIENTED PROGRAMMING

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT-I [13 Hours]

Evolution of Higher Level Programming Languages, Complexity of Software and their Attributes Object Orientated Programming Paradigm, Principles of Object Oriented Programming – Data Encapsulation, Polymorphism and Inheritance, Advantages of Object Oriented Programming, Application areas of Object Oriented Programming, Object Oriented Programming Languages, Limitations of Object Oriented Programming.

Introduction to the JAVA language - Evolution of Java, The Salient Features of the JAVA Language, The Java Byte Code and the JVM, The JAVA platform, JAVA, Internet and WWW, JAVA Environment, Tokens, Keywords and Identifiers, Constants and Variables, Data types, Console I/O, Structure of a Java Program, Executing a Java program, Types of Errors, Operators in JAVA, Precedence and Associativity of Operators, Type Conversion,

Selection Structures- Simple-If statement, If-Else statement, Nested If-Else statement, Else-if ladder, The Switch Statement, Looping Structures- The while loop, The For loop, The Do-While loop, Nested Loops, The Break Statement, The Continue Statement, Labelled Loops.

UNIT-II [13 Hours]

Classes, Objects and Methods - Class Definition; Instance Variables and Member Methods, Declaration and Creation of Objects, Accessing Members, Classification of Member Methods, Constructors, Copy Constructor, this keyword , Objects as Arguments to methods, Methods returning an object, Static member data, Static member methods, Static Blocks, Nesting of Methods, Recursion, Nested Classes, Inner Classes, Static nested Classes, Local Classes, Anonymous Classes, Final members, Variable Arguments, Objects of one class as members of another class (Containment), Finalize Method and Garbage Collection.

Inheritance – Single-level Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Multiple Inheritance, Hybrid Inheritance, Constructors and Inheritance, Abstract Classes and Methods, Dynamic Method Dispatch, Object Slicing, Object Typecasting, Final Classes

Interfaces - Defining Interfaces, Implementing Interfaces, Polymorphism through interfaces, Implementing an Interface Partially, Extending Interfaces, Implementing Multiple Interfaces, Multiple Inheritance through Interfaces

UNIT-III [13 Hours]

Packages - Built-in Packages, User-defined Packages, Creating and using a Package, To create a package spread across multiple files, Importing classes from a package, Nested packages, Extending an imported class, Classes and interfaces in a package and using them, Static importing, Access Control. Arrays – One Dimensional Arrays, Two Dimensional Arrays, Three Dimensional Arrays, Arrays and methods, Arrays within classes, Array of objects, Strings – The String Class, The StringBuffer Class, Exception Handling- Types of Exceptions, Default Exception Handling Mechanism, User-Defined Exception Handling Mechanism, Try blocks, Catch Blocks, Nested Try Blocks, Stack Unwinding, Throw Statement, Throws Statement, Finally Statement

UNIT-IV [13 Hours]

Multithreaded Programming - The Java Thread Model, The Life Cycle of a Thread, The Thread Class, The Main Thread, Creating our own Threads -Extending the Thread Class, Implementing the Runnable Interface, Thread Groups, Thread Priorities, Synchronization, Deadlock, Suspending and Resuming Threads, Producer-Consumer Relationship between Threads, Daemon Threads. File Handling - The File Class, The Writer class and its subclasses, The Reader Class and its

subclasses, The OutputStream and its subclasses, The InputStream Class and its subclasses, The DataOutputStream Class, The DataInputStream Class, The ObjectOutputStream Class, The ObjectInputStream Class, Random Access files
Applets - Types of Applets, The Life Cycle of an Applet, Creating and Executing Applets, The Attributes in the <applet> tag, Passing Parameters to Applets, More about the <applet> tag, Working with Graphics

Textbooks:

1. E. Balagurusamy, Programming with JAVA, McGraw Hill, New Delhi, 2007

Reference Books:

1. Raj Kumar Buyya, Object Oriented Programming with JAVA, McGraw Hill, 2009
2. Herbert Schildt, Java A Beginner's Guide – Create, Compile, and Run Java Programs Today, Sixth Edition, Oracle Press, 2014
3. Ken Arnold, James Gosling, "The Java Programming Language, Fourth Edition, Addison Wisely, 2005
4. Herbert Schildt, 'The Complete Reference Java, 7th Edition, McGraw Hill, 2007

Web Resources

1. https://docs.oracle.com/javase/tutorial/
2. https://javabeginnerstutorial.com/core-java-tutorial/

1MCA6: DATA STRUCTURES

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT-I [13Hours]

Introduction and Overview: Definition, Elementary data organization, Data Structures, data Structures operations, Abstract data types, algorithms complexity, time-space trade off. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms. String Processing: Definition, Storing Strings, String as ADT, String operations, word/text processing, Pattern Matching algorithms.

UNIT-II [13Hours]

Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory, Traversing Linear arrays, Inserting and deleting, Multi-dimensional arrays, Matrices and Sparse matrices. Linked list: Definition, Representation of Singly Linked List in memory, Traversing a Singly linked list, Searching in a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list. Stacks: Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Conversion of infix expression to postfix expression, Evaluation of Post fix expression, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack. Queues: Definition, Array representation of queue, Linked list representation of queues. Types of queue: Simple queue, Circular queue, Double-ended queue, Priority queue, Operations on Queues, Applications of queues.

UNIT-III [13Hours]

Binary Trees: Definitions, Tree Search, Traversal of Binary Tree, Tree Sort, Building a Binary Search Tree, Height Balance: AVL Trees, Contiguous Representation of Binary Trees: Heaps, Lexicographic Search Trees: Tries, External Searching: B-Trees, Applications of Trees. Graphs: Mathematical Back ground, Computer Representation, Graph Traversal, Topological Sorting, Greedy Algorithm, Graphs as Data Structure.

UNIT-IV [13Hours]

Searching: Introduction and Notation, Sequential Search, Binary Search, Comparison of Methods. Sorting: Introduction and Notation, Insertion Sort, Selection Sort, Shell Sort, Divide And Conquer, Merge sort for Linked List, Quick sort for Contiguous List. Hashing: Sparse Tables, Choosing a Hash function, Collision Resolution with Open Addressing, Collision Resolution by Chaining.

Text Books:

1. Seymour Lipschutz, "Data Structures with C", Schaum's outLines, Tata Mc Graw Hill, 2011.

2. Robert Kruse, C.L.Tondo, Bruce Leung,Shashi Mogalla,"Data Structures and Program Design using C", Pearson Education, 2009.

ReferenceBooks:

1. Mark Allen Weiss," Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education,2013.

2. *Forouzan,"A Structured Programming Approach using C",2nd Edition, Cengage LearningIndia,2008.*

1MCA7: DATA STRUCTURES LAB PROGRAMS

* For all the programs write the output, flowchart and number of basic operations performed.

1. Given {4,7,3,2,1,7,9,0, find the location of 7 using Binary search and also display its first occurrence.
2. Given {5,3,1,6,0,2,4} order the numbers in ascending order using Quick Sort.
3. Perform the Merge sort on the input {75,8,1,16,48,3,7,0} and display the output in descending order.
4. Write a program to insert the elements 61,16,8,27 into singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion.
5. Write a program to add $6x^3+10x^2+0x+5$ and $4x^2+2x+1$ using linked list.
6. Write a program to push 5,9,34,17,32 into stack and pop 3 times from the stack, also display the popped numbers.
7. Write a recursive program to find GCD of 4,6,8.
8. Write a program to inert the elements {5,7,0,6,3,9} into circular queue and delete 6,9&5 from it(using linked list implementation).
9. Given S1={"Flowers"} ; S2={"are beautiful"} ,
   a) Find the length of S1.
   b) Concatenate S1 and S2.
   c) Extract the substring "low" from S1.
   d) Find "are" in S2 and replace it with "is".
10. Write a program to convert an infix expression x^y/(5*z)+2 to its postfix expression.
11. Write a program to evaluate a postfix expression 5 3+8 2 - *.
12. Write a program to create a binary tree with the elements 18,15,40,50,30,17,41 after creation insert 45 and 19 into tree and delete 15,17 and 41 from tree. Display the tree on each insertion and deletion operation.
13. Write a program to create binary search tree with the elements {2,5,1,3,9,0,6} and perform inorder, preorder and post order traversal.
14. Write a program to Sort the following elements using heap sort {9.16,32,8,4,1,5,8,0}.

1MCA8: OBJECT ORIENTED PROGRAMMING WITH JAVA LAB

PART-A

1. Develop a JAVA program to demonstrate the precedence and associativity among arithmetic operators. The program should also demonstrate how the default precedence can be overridden.
2. Write a JAVA program to validate a date. The program should accept day, month and year and it should report whether they form a valid date or not.
3. Write a JAVA program to display the following pattern.

```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

4. Write a JAVA program to print the first n members of Fibonacci series.
5. Write a program to generate the multiplication tables of a range of numbers between m and n inclusive and m < n.
6. Write a JAVA program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object.
7. Write a JAVA program to demonstrate static member data and static member methods
8. Write a JAVA Program to demonstrate nested classes
9. Write a JAVA program to demonstrate dynamic method dispatch.
10. Write a JAVA program to implement inheritance and demonstrate use of method overriding.

PART-B

11. Write a JAVA program to implement the concept of importing classes from user defined package and creating packages.
12. Write a program to demonstrate abstract class and abstract methods
13. Write a JAVA Program to implement an array of objects of a class.
14. Write a JAVA program to demonstrate String class and its methods.
15. Write a JAVA program to implement the concept of exception handling by creating user defined exceptions.
16. Write a JAVA program using synchronized threads, which demonstrates producer consumer concept.
17. Write a JAVA program that creates three threads. First thread displays “Good Morning” every one second, second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.
18. Write a JAVA program which uses FileInputStream / FileOutPutStream Classes.
19. Write a JAVA program to list all the files in a directory including the files present in all its subdirectories.
20. Write a JAVA program to demonstrate the life cycle of applet.

SECOND SEMESTER MCA

2MCA1: OPERATING SYSTEMS

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [13 Hours]

Introduction: Computer System Organization, Architecture, Structure, Operations, Process Management, Memory Management, Storage Management, Kernel Data Structures, Computing Environments. Operating System Structures: Services, System Calls, Types, Operating System Structure, System Boot. Processes: Process Concept, Scheduling, Operations, Interprocess Communication. Multithreaded Programming: Multicore Programming, Multithreading Models.

UNIT –II **[**13 Hours]

Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples. Process Scheduling: Criteria, Scheduling Algorithms, Multi-Processor Scheduling, Real-time CPU Scheduling. Deadlocks: System model, Characterization, Methods for handling deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery from deadlock.

UNIT – III [13 Hours]

Memory Management Strategies: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table. Virtual Memory Management: Demand Paging; Copy-on-Write, Page Replacement; Allocation of Frames; Thrashing, Memory-Mapped Files, Allocating Kernel Memory. File System: File Concept, Access Methods, Directory and Disk Structure, Protection. File-System Implementation: Structure, File-System and Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery. Mass-Storage Structure: Overview, Disk Scheduling, Disk Management.

UNIT - IV [13 Hours]

Protection: Goals, Principles, Domain of Protection, Access Matrix, Implementation of the Access Matrix, Access Control, Revocation of the Access Rights. Virtual Machines: Building Blocks, Types of VMs and their implementations. Distributed Systems: Advantages, Types of Network-based OS, Robustness, Design Issues, Distributed File Systems. Case Studies: The Linux System, Windows 10.

Text Books:

1. *Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating Systems Concepts, 9th Edition, 2016 India, Wiley.*

Reference Books:

1. William Stallings, "Operating Systems-Internals and Design Principles", Pearson, 9th Edition, 2018

2. D M Dhamdhere: Operating Systems – A Concept Based Approach, 3rd Edition, Tata McGraw – Hill, 2015.

3..Harvey M Deitel, Paul J Deitel, Dr Choffnes,"Operating Systems", Pearson Education Limited (Publisher), 3rd Edition, 2013.

4. J. Archer Harris, John Cordani, " Operating Systems", Schaum's Outline, Indian Edition, Mc Graw Hill Education (India), First Edition.

5. Gary Nutt, Nabendu Chaki, Sarmistha Neog, "Operating Systems" Pearson Education Limited, 3rd Edition, 2016.

2MCA2: DATABASE MANAGEMENT SYSTEMS

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - 1 [10 Hours]

Databases and Database Users: Introduction, An example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS. Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures, Classification of Database Management Systems.

UNIT - 2 [13 Hours]

Data Modeling Using Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design Company Database Diagrams, Naming Conventions and Design. Issues, File organization and storage, secondary storage devices, operations in file, heap files and sorted files, hashing techniques, type of single level ordered index, multi-level indexes, indexes on multiple keys, other types of indexes.

UNIT – 3 [16 Hours]

Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from SET Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra. Relational Database Design: Anomalies in a database, functional dependency, normal forms, lossless join and dependency, BCNF, normalization through synthesis, higher order normal forms. SQL- SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views(Virtual Tables) in SQL, Embedded SQL, Dynamic SQL,

UNIT – 4 [13 Hours]

Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, transaction support in SQL. Concurrency control techniques: two-phase locking techniques, concurrency control based on timestamp ordering, multi-version concurrency control techniques, validation concurrency control techniques. Recovery techniques: recovery concepts, recovery in multi-database systems, database backup and recovery from catastrophic failures.

Text Books:

1. *Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison -Wesley, 2016.*
2. *Silberschatz, Korth and Sudharshan Data base System Concepts, 7th Edition, Tata McGraw Hill, 2019.*

References:

1. *C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education, 2009*
2. *Database Management Systems :Raghu Ramakrishnan and Johannes Gehrke: , 3rd Edition, McGraw-Hill, 2003*

2MCA3: COMPUTER NETWORKS

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [13 Hours]

Introduction: Data Communications, Networks, Network Types, Internet History, Network Models: Protocol Layering, The OSI Model, TCP/IP Protocol Suite, Introduction to Physical Layer: Transmission Impairments, Data Rate Limits, Performance, Introduction to Data-Link-Layer: Link-Layer Addressing, Error Detection and Correction: Block Coding, Cyclic Codes, Checksum

UNIT - II [13 Hours]

Data Link Control: Data-Link Layer Protocols, HDLC, Point-To-Point (PPP), Media Access Control (MAC): ALOHA, CSMA, CSMA/CD, CSMA/CA, Reservation, Polling, Token Passing, FDMA, TDMA, CDMA

UNIT - III [13 Hours]

Introduction to Network Layer: Network-Layer Services, Packet Switching, Network-Layer Performance, IPV4 Addresses, Network Layer Protocols: Internet Protocol (IP), ICMPv4, Mobile IP, Unicast Routing: Routing Algorithms, Unicast Routing Protocols, Next Generation IP: IPv6 Addressing, The IPv6 Protocol.

UNIT - IV [13 Hours]

Introduction to Transport Layer: Introduction, Transport-Layer Protocols, Transport-Layer Protocols: User Datagram Protocol, Transmission Control Protocol: TCP Services, TCP Features, Segment, A TCP Connection, TCP Congestion Control, Flow Control, Error Control, Application Layer: WWW, E-MAIL, Domain Name System (DNS), Quality of Service: Flow Control To Improves QoS, Integrated Services, Cryptography and Network Security: Introduction, Confidentiality, Other Aspects of Security.

Text Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", 5th Edition, McGraw Hill Education, 2013.

Reference Books:

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks", 5th Edition, Prentice Hall, 2011.

2. Larry L. Peterson and Bruce S. Davie, "Computer Networks A System Approach", 5th Edition, MKP, 2012.

3. James F. Kurose , Keith W. Ross, " Computer Networking, A Top-Down Approach", 5th Edition, Pearson, 2012.

Web Resources:

1. *https://www.geeksforgeeks.org/computer-network-tutorials/*
2. *https://codescracker.com/networking/*
3. *https://youtube.com/playlist?list=PLxCzCOWd7aiGFBD2-2joCpWOLUrDLvVV_*

2MCA4: SOFTWARE ENGINEERING

Total Teaching Hours: 53 No. of Hours / Week: 04

UNIT - I [13 Hours]

Overview, Objectives ,Three Perspectives on Software Engineering , The Agile Manifesto , Individuals and Interactions over Processes and Tools, Working Software over Comprehensive Documentation, Customer Collaboration over Contract, Negotiation, Responding to Change over Following a Plan, Application of Agile Software Development , Data About Agile Software Development, Agile Software Development in Learning Environments University Course Structure, Teaching and Learning Principles, The Studio Environment, The Academic Coach Role ,Overview of the Studio Meetings. Teamwork: Overview, Objectives, A Role Scheme in Agile Teams, Remarks on the Implementation of the Role Scheme, Human Perspective on the Role Scheme, Using the Role Scheme to Scale Agile Projects, Dilemmas in Teamwork, Teamwork in Learning Environments, Teaching and Learning Principles, Role Activities, Student Evaluation. Customers and Users: Overview, Objectives, The Customer, Customer Role, Customer Collaboration, The User, Combining UCD with Agile Development, Customers and Users in Learning Environments, Teaching and Learning Principles, Customer Stories.

SOFTWARE DESIGN:

- Design Diagrams: Use Case Diagrams - Class Diagrams - Interaction Diagrams - State chart Diagrams - Activity Diagrams
- Design Process- Design concepts : Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring.
- Object Oriented Design Concepts, Design Classes- Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements ,
- Code review Analysis.

UNIT - II [13 Hours]

Time:

Overview, Objectives, Time-Related Problems in Software Projects, List of Time-Related Problems of Software Projects. the Time Perspective, Tightness of Software Development Methods, Sustainable Pace, Time Management of Agile Projects, Time Measurements, Prioritizing Development Tasks, Time in Learning Environments, The Planning Activity, Teaching and Learning Principles, Students' Reflections on Time-Related Issues, The Academic Coach's Perspective. Measures: Overview, Objectives, Why Are Measures Needed, Who Decides What Is Measured? What Should Be Measured, When Are Measures Taken? How Are Measures Taken? Who Takes the Measures? How Are Measures Used? Case Study, Monitoring a Large-Scale Project by Measures, Measure Definition, Measure Illustration, Measures in Learning Environments, Teaching and Learning Principles, Measurement Activities.

Quality:

Overview, Objectives, The Agile Approach to Quality Assurance, Process Quality, Product Quality, Test-Driven Development, How Does TDD Help to Overcome Some of the Problems Inherent in Testing, Learning: Overview, Objectives, Study Questions, How Does Agile Software Development Support Learning Processes.

UNIT - III [13 Hours]

Quality- Continued

Agile Software Development from the Constructivist Perspective, The Role of Short Releases and Iterations in Learning Processes, Learning in Learning Environments, Gradual Learning Process

of Agile Software Engineering, Learning and Teaching Principle, The Studio Meeting, End of the First Iteration, Intermediate Course Review and Reflection, Abstraction: Overview, Objectives, Study Questions, Abstraction Levels in Agile Software Development, Roles in Agile Teams.

Planning:
The Stand-Up Meeting, Design and Refactoring, Abstraction in Learning Environments, Teaching and Learning Principles. Trust: Overview, Objectives, Software Intangibility and Process Transparency, Game Theory Perspective in Software Development, Ethics in Agile Teams, Diversity, Trust in Learning Environments, Teaching and Learning Principle. Globalization: Overview, Objectives, Study Questions, The Agile Approach in Global Software Development, Communication in Distributed Agile Teams, Planning in Distributed Agile Projects, Case Study, Tracking Agile Distributed Projects, Reflective Processes in Agile Distributed Teams, Organizational Culture and Agile Distributed Teams, Application of Agile Principles in Non-Software Projects.

UNIT – IV [13 Hours]

Overview, Objectives, Case Study, Reflection on Learning in Agile Software Development, Reflective Practitioner Perspective, Retrospective, The Retrospective Facilitator, Case Study, Guidelines for a Retrospective Session, Application of Agile Practices in Retrospective Sessions, End of the Release Retrospective, Reflection in Learning Environments. Change: Overview, Objectives, A Conceptual Framework for Change Introduction, Changes in Software Requirements, Organizational Changes, Transition to an Agile Software Development Environment. Leadership: Overview, Objectives, Leaders, Leadership Styles, Case Study, The Agile Change Leader, Coaches, Leadership in Learning Environments, Teaching and Learning Principles. Delivery and Cyclicality: Overview, Objectives, Delivery, Towards the End of the Release, Release Celebration, Reflective Session Between Releases, Cyclicality, Delivery and Cyclicality in Learning Environments, The Delivery in the Studio, Teaching and Learning Principles.

Text Books:

1. *Orit Hazzan and Yael Dubinsky, Agile Software Engineering, Springer, 2009*
2. *Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, Pearson Education, 3rd edition, 2014.*
3. *David C. Kung, "Object oriented software engineering", Tata McGraw Hill,2015*

Reference books:

1. *Cockburn, Agile Software Development, Pearson Education India*
2. *Mike Cohn, Agile Estimating and Planning, Pearson Education, 2005*
3. *Michele Sliger, Stacia Broderick, The Software Project Manager's Bridge to Agility, Addison-Wesley Professional, 2008*

Web Resources:

1. *www.allaboutagile.com/what-is-agile-10-key-principles/*
2. *https://www.versionone.com/agile*
3. *https://www.youtube.com/watch?v=MTEl3LEI4EQ*
4. *https://azure.microsoft.com/en-in/cloud-adoption-framework/*

2MCA5: THE DESIGN AND ANALYSIS OF ALGORITHM

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [13 Hours]

Introduction: Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental Data Structures. Fundamentals of the Analysis of Algorithm Efficiency: The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive and Recursive Algorithms, Empirical Analysis of Algorithms, Algorithm Visualization.

UNIT - II [13 Hours]

Brute Force Method: Selection Sort and Bubble Sort, Sequential Search, Brute-Force String Matching, Exhaustive Search, Depth-First Search and Breadth-First Search. Decrease and Conquer: Insertion Sort, Topological Sorting, Algorithms for Generating Combinatorial Objects, Decrease-by-a-Constant-Factor Algorithms. Divide and Conquer: Merge Sort, Quick Sort, Binary Tree Traversals and Related Properties, Strassen's Matrix Multiplication.

UNIT - III [13 Hours]

Space and Time Tradeoffs: Sorting by Counting, Input Enhancement in String Matching, Hashing. Dynamic programming: Binomial Coefficient, Principle of Optimality, Optimal Binary Search Trees, Knapsack Problem and Memory Functions, Warshall's and Floyd's Algorithms. Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees.

UNIT - IV [13 Hours]

Limitations of Algorithm Power: Lower-Bound Arguments, Decision Trees, P, NP and NP-Complete Problems. Coping with the Limitations of Algorithm Power: Back Tracking: n-Queens problem, Hamiltonian Circuit Problem, Subset-Sum Problem, Branch-and-Bound: Assignment Problem, Knapsack Problem, Traveling Salesman Problem.

Text Books:

1. *Anany Levitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson, 2012.*
2. *Horowitz, Sahni, Rajasekaran, "Fundamentals of Computer Algorithms", 2/e, Universities Press, 2007.*

Reference Books:

1. *Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, The MIT Press, 2009.*
2. *A.V. Aho, J.E. Hopcroft, J.D. Ullmann, "The design and analysis of Computer Algorithms", Addison Wesley Boston, 1983.*
3. *Jon Kleinberg, Eva Tardos, "Algorithm Design", Pearson Education, 2006.*

Web Resources:

1. *https://onlinecourses.nptel.ac.in/noc20_cs27/preview*
2. *https://web.stanford.edu/class/archive/cs/cs161/cs161.1138/*

2MCA6: ARTIFICIAL INTELLIGENCE

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [13 Hours]

Introduction to AI: What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem solving: Problem-solving agents; Example problems; Searching for solution; Uninformed search strategies. Informed Search, Exploration, Constraint Satisfaction, Adversial Search: Informed search strategies; Heuristic functions; On-line search agents and unknown environment. Constraint satisfaction problems; Backtracking search for CSPs. Adversial search: Games; Optimal decisions in games; Alpha-Beta pruning.

UNIT - II [13 Hours]

Knowledge-based agents; The Wumpus world as an example world; Logic; propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic. Representation revisited; Syntax and semantics of first-order logic; Using first-order logic; Knowledge engineering in first-order logic. Propositional versus first-order inference; Unification and lifting, Forward chaining; Backward chaining; Resolution, Truth maintenance systems.

UNIT - III [13 Hours]

Basic plan generation systems – Strips -Advanced plan generation systems – K strips - Strategic explanations -Why, Why not and how explanations. Learning: Forms of Learning; Inductive learning; Learning decision trees; Ensemble learning; Computational learning theory. Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.

UNIT - IV [13 Hours]

Computer Vision, Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing, Spell Checking. Robotics: Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces. Expert Systems: Need and justification for expert systems, Architecture and role of expert systems, Case studies: MYCIN, DART and XOON. Neural Networks: Introduction - Features of Biological neural networks, Neuron models and Network Architectures – Basics of ANN, CNN, RNN and applications, Machine Learning, Deep Learning.

Text Books:

1. Stuart Russel, Peter Norvig, "Artificial Intelligence A Modern Approach", 4th Edition, Pearson Education, 2020.

2. Ela Kumar, "Artificial Intelligence", I.K.International Publishing House Pvt.Ltd, 2008.

Reference Books:

1. Elaine Rich, Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009.

2. Nils J. Nilsson," Principles of Artificial Intelligence", Elsevier, 1980.

3. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit- 3).

4. Andries P. Engelbrecht, "Computational Intelligence: An Introduction", John Wiley & Sons, 2nd edition, 2007.

5. John J. Craig, "Introduction to Robotics", Addison Wesley publication.

Web Resources:

1. *https://www.journals.elsevier.com/artificial-intelligence*
2. *https://nptel.ac.in/courses/106/105/106105078/*
3. *http://neuralnetworksanddeeplearning.com/*
4. *https://nptel.ac.in/courses/106/106/106106226/*
5. *https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2010/lecture-videos/*

2MCA 7: DATABASE MANAGEMENT SYSTEMS LAB

PART – A

1. **Draw E-R diagram** and convert entities and relationships to relation table for a given scenario.

a. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college)

Consider the Company database with following Schema

EMPLOYEE (FNAME, MINIT, LNAME, SSN, BDATE,ADDRESS,SEX,SALARY, SUPERSSN, DNO)

DEPARTMENT (DNAME, DNUMBER,MGRSSN,MSRSTARTDATE)

DEPT_LOCATIONS (DNUMBER, DLOCATION)

PROJECT (PNAME, PNUMBER, PLOCATION, DNUM)

WORKS_ON (ESSN, PNO<HOURS)

DEPENDENT (ESSN, DEPENDENT_NAME, SEX, BDATE, RELATIONSHIP)

2. Perform the following:
   a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
3. Perform the following:
   a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.
4. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause).
5. Execute the fallowing queries
   a. How the resulting salaries if every employee working on the 'Research' Departments is given a 10% raise.
   b. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department
6. Execute the fallowing queries
   a. Retrieve the name of each employee Controlled by department number 5 (use EXISTS operator).
   b. Retrieve the name of each dept and number of employees working in each department which has at least 2 employees
7. Execute the fallowing queries
   a. For each project, retrieve the project number, the project name, and the number of employee who work on that project.(use GROUP BY)
   b. Retrieve the name of employees who born in the year 1990's

8. For each department that has more than five employees, retrieve the department number and number of employees who are making salary more than 40000.

9.For each project on which more than two employees work, retrieve the project number, project name and the number of employees who work on that project.

10. For a given set of relation tables perform the following
    a. Creating Views (with and without check option), Dropping views, Selecting from a view

PART B

Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries.

BRANCH (Branchid, Branchname, HOD)
STUDENT (USN, Name, Address, Branchid, sem)
BOOK (Bookid, Bookname, Authorid, Publisher, Branchid)
AUTHOR (Authorid, Authorname, Country, age)
BORROW (USN, Bookid, Borrowed_Date)

1. Perform the following:
   a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
   Execute the following Queries:

2. a. List the details of Students who are all studying in 2nd sem MCA.
   b. List the students who are not borrowed any books.

3. a. Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_ Date of 2nd sem MCA Students who borrowed books.
   b. Display the number of books written by each Author.

4. a. Display the student details who borrowed more than two books.
   b.Display the student details who borrowed books of more than one Author.

5. a. Display the Book names in descending order of their names.
   b. List the details of students who borrowed the books which are all published by the same publisher.

Consider the following schema:
STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA)

6. Perform the following:
   a. Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

7. Execute the following queries:
   a. Find the GPA score of all the students.
   b. Find the students who born on a particular year of birth from the date_of_birth column.

8. a. List the students who are studying in a particular branch of study.
   b. Find the maximum GPA score of the student branch-wise.

9 . a. Find the students whose name starts with the alphabet “S”.
   b. Update the column total by adding the columns mark1, mark2, mark3.

10. Execute the following queries:

a. Find the students whose name ends with the alphabets “AR”.
b. Delete the student details whose USN is given as 1001.

2MCA 8: UNIX PROGRAMMING LAB
PART-A

1. Learn the use of basic UNIX commands –
    a. To access information using date, history, man, who, whoami, uptime, finger,cal.
    b. To display contents of files using cat, vi, more, head, tail, grep, cmp, wc
    c. To manage files using cat, cp, ls, mv,rm, chmod, find
    d. Process utilities using ps, pid, ppid, tty, time, kill, exit
    e. Directory handling utilities using cd, mkdir, rmdir, mv, pwd

2. Write a shell script that displays list of all the files in the current directory to which the user has read, write and execute permissions.

3. Write a shell script that accepts a list of file names as its arguments, count and reports the occurrence of each word that is present in the first argument file on other argument files.

4. Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.

5. Write grep commands to the following:
    a. To select the lines from a file that has exactly 2 characters.
    b. To select the lines from a file that has more2 than one blank spaces.

6. Write a shell script which accepts two file names as arguments. Compare the contents. If they are same, then delete the second file.

7. Write a shell script
    a. to count number of lines in a file that do not contain vowels.
    b. to count number of characters, words, lines in a given file.

8. Write a shell script to list all the files in a given directory.

9. Write a shell script to display list of users currently logged in.

10. Write a shell script to read three text files in the current directory and merge them into a single file and returns a file descriptor for the new file.

PART-B

1. Write a program to copy a file into another using system calls.

2. Write a program using system call: create, open, write, close, stat, fstat, lseek.

3. Write a program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.
4. Write a program to create a Zombie process.
5. Write a program to implement inter process communication using pipes.
6. Simulate the following CPU scheduling algorithms
    a. Round Robin
    b. SJF
7. Write a program that illustrates file locking using semaphores.
8. Write a program that implements a producer-consumer system with two processes (using semaphores).
9. Write a program that illustrates inter process communication using shared memory system calls.
10. Write a program that illustrates the following:
    a. Creating message queue.
    b. Writing to a message queue
    c. Reading from a message queue

Reference Books:

1. Sumitabha Das: “UNIX Concepts and Applications”, 4th Edition, Tata McGraw Hill, 2006.
2. Kenneth Roson et al ,“UNIX: The Complete Reference”, McGraw-Hill Osborne Media
3. M G Venkateshmurthy,“UNIX and Shell Programming”, Pearson Education Asia, 2005
4. Behrouz A. Forouzan, Richard F. Gilberg,“Unix and shell Programming.”, Brooks/Cole-Thomson Learning, 2003
5. Uresh Vahalia, “UNIX Internals”, Pearson Education, 2005.
6. Richard Stevens, Stephen Rago, “Advanced Programming in the UNIX Environment”, Pearson Education, 2/e.

3MCA2: QUANTITATIVE, TEACHING AND RESEARCH APTITUDE

Total Teaching Hours: 36 No. of Hours / Week: 03

UNIT – I [8 Hours]

Numbers Property – Simplification – Divisibility – HCF and LCM – Decimal Fractions –Square roots and Cube Roots – Logarithms – Antilogarithms - Surds and indices - Permutation and Combination – Probability – Odd man out series - Number series - letter series – codes – Relationships – classification.

UNIT – II [7 Hours]

Time and work – Problems on Ages – Calendar – Clock – Pipes and Cistern – Time and Distance – Problems of Train – Boats and Streams. Area – Volume and surface Areas – Heights and Distances – Data Interpretation: Tabulation – Bar Graphs – Pie Charts – Line Graphs. Data Interpretation - Sources, acquisition and interpretation of data; Quantitative and qualitative data; Graphical representation and mapping of data.

UNIT – III [7 Hours]

Simple Interest – Compound Interest – Stocks and Shares – True Discount – Banker's discount. Averages – Percentage – Profit and Loss - Ratio and Proposition – Partnership – Allegation and mixture – Chain rule. Understanding the structure of arguments; Evaluating and distinguishing deductive and inductive reasoning; Verbal analogies: Word analogy Applied analogy; Verbal classification; Reasoning Logical Diagrams: Simple diagrammatic relationship, multi diagrammatic relationship; Venn diagram; Analytical Reasoning.

UNIT – IV [7 Hours]

Teaching: Nature, objectives, characteristics and basic requirements; Learner's characteristics; Factors affecting teaching; Methods of teaching; Teaching aids; Evaluation systems. Research Aptitude: Meaning, characteristics and types; Steps of research; Methods of research; Research Ethics; Paper, article, workshop, seminar, conference and symposium; Thesis writing: its characteristics and format. Reading Comprehension: A passage to be set with questions to be answered. Communication: Nature, characteristics, types, barriers and effective classroom communication.

UNIT – V [7 Hours]

Higher Education System: Governance, Polity and Administration; Structure of the institutions for higher learning and research in India; formal and distance education; professional/technical and general education; value education: governance, polity and administration; concept, institutions

Reference

1. R.S. Aggarwal, Quantitative Aptitude, S. Chand & Company, New Delhi, 2012
2. Govind Prasad Singh and Rakesh Kumar, Text Book of Quickest Mathematics (for all Competitive Examinations),
3. Kiran Prakashan, 2012.R.S. Aggarwal, Objective Arithmetic, S. Chand & Company, New Delhi, 2005.

4. Dr. Lal,Jain,Dr. K. C. Vashistha, “U.G.C.- NET/JRF/SET Teaching & Research Aptitude”, Upkar Prakashan, 2010.
5. “UGC NET/SLET: Teaching & Research Aptitude”, Bright Publications, 2010.

3MCA3: RESEARCH METHODOLOGY

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT – I [12 Hours]

Introduction: Definition and objectives of Research – Types of research, Various Steps in Research process, Mathematical tools for analysis, Developing a research questionChoice of a problem Literature review, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation, Research Purposes, Ethics in research – APA Ethics code.

UNIT – II [10 Hours]

Quantitative Methods for problem solving: Statistical Modeling and Analysis, Time Series Analysis Probability Distributions, Fundamentals of Statistical Analysis and Inference, Multivariate methods, Concepts of Correlation andRegression, Fundamentals of Time Series Analysis and Spectral Analysis, Error Analysis, Applications of Spectral Analysis.

UNIT – III [10 Hours]

Tabular and graphical description of data: Tables and graphs of frequency data of one variable, Tables and graphs that show the relationship between two variables , Relation between frequency distributions and other graphs, preparing data for analysis

UNIT - IV [10 Hours]

Soft Computing: Computer and its role in research, Use of statistical software SPSS, GRETL etc in research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.

UNIT - V [10 Hours]

Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing.

Reference

1. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006.
2. Donald H.McBurney, Research Methods, 5th Edition, Thomson Learning, ISBN:81-315-0047-0,2006.
3. Donald R. Cooper, Pamela S. Schindler, Business Research Methods, 8/e, Tata McGraw-Hill Co. Ltd., 2006.
4. Fuzzy Logic with Engg Applications, Timothy J.Ross, Wiley Publications, 2nd Edition, 2004.
5. Simulated Annealing: Theory and Applications (Mathematics and Its Applications, by P.J. van Laarhoven & E.H. Aarts[e], 19.
6. Genetic Algorithms in Search, Optimization, and Machine Learning by David E. publisher

MACHINE LEARNING (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Module 1 : Introduction to Machine Learning [12 Hours]

Introduction**,** Perspectives & Issues in ML**,** designing learning systems, Concepts of hypotheses, Version space, inductive bias, Performance metrics-accuracy, precision, recall, sensitivity, specificity, AUC, RoC, Bias Variance decomposition. Decision Trees Learning: Basic algorithm (ID3), Hypothesis search and Inductive bias, Issues in Decision Tree Learning – Overfitting, Solutions to overfitting, dealing with continuous values.

Module 2: Supervised Learning with KNN, ANN, SVM [10 Hours]

Instance-based learning: k-nearest neighbour learning, Artificial Neural networks: Introduction, Perceptrons, Multi-layer networks and back-propagation, Activation Units, Support Vector Machines – margin and maximization, SVM - The primal problem, the Lagrangian dual, SVM – Solution to the Lagrangian dual.

Module 3: Probabilistic and Stochastic Models: [10 Hours]

Bayesian Learning – Bayes theorem, Concept learning, Maximum likelihood, Bayes optimal classifier, Gibbs algorithm, Naive Bayes classifier, Expectation maximization and Gaussian Mixture Models, Hidden Markov models

Module 4: Unsupervised Learning and Association Mining [10 Hours]

Hierarchical vs non-hierarchical clustering, Agglomerative and divisive clustering, K-meansclustering, Bisecting k-means, K-Means as special case of Expectation, Maximization, K-medoid clustering, Association Mining: Apriori algorithm. Finding frequent itemsets, mining association rules, FP-growth – FP trees, Mining frequent items from an FP-Tree, Dimensionality reduction techniques – PCA, SVD.

Module 5: Genetic Algorithms [10 Hours]

Genetic Algorithms – Representing hypothesis, Genetic operators and Fitness function and selection, Simple applications of the Genetic Algorithm, application of GA in Decision tree, Genetic Algorithm based clustering, Single Objective and Bi-objective optimization problems using GA, using GA to emulate Gradient descent/ascent.

Reference Books:

1. Ethem Alpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition 2014
2. Jiawei Han and Micheline Kambers and Jian Pei, "Data Mining –Concepts and Techniques", 3rd edition, Morgan Kaufman Pub
3. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC Press, 2014.

4. Charu C. Aggarwal, “DATA CLUSTERING Algorithms and Applications”, CRC Press, 2014.

5. “Machine Learning”, Tom Mitchell, McGraw Hill Education (India), 2013.

BIG DATA & ANALYTICS (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Unit I [10 Hours]

Introduction to Big Data, Big data definition, enterprise / structured data, social / unstructured data, unstructured data needs for analytics, what is Big Data, Big Deal about Big Data, Big Data Sources, Industries using Big Data, Big Data challenges.

Unit II [10 Hours]

Data Pre-processing, why to pre-process data? Data cleaning: Missing Values, Noisy Data, Data Integration and transformation, Data Reduction: Data cube aggregation, Dimensionality Reduction, Data Compression, Numerosity Reduction, Data Mining Primitives, Languages and System Architectures: Task relevant data, Kind of Knowledge to be mined, Discretization and Concept Hierarchy

Unit III [10 Hours]

Introduction to Classification and Prediction, Issues regarding Classification, Classification using Decision trees, Bayesian Classification, Classification by Backpropagation, Prediction Classification Accuracy, Introduction of Clustering, Spatial mining, Web mining, Text mining

Unit III [10 Hours]

Introduction of Big data programming-Hadoop, History of Hadoop, The ecosystem and stack, Components of Hadoop, Hadoop Distributed File System (HDFS), Design of HDFS, Java interfaces to HDFS, Architecture overview, Development Environment, Hadoop distribution and-basic commands, Eclipse development.

Unit V [12 Hours]

Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.

Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.

Hbase: HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL

Data Analytics with R Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering.

Case Study: Implement your leanings to find sectors in which different companies ought to inves

Reference

1. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

2. Tom White “ Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
3. Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph. By David Loshin, Elsevier, August 23, 2013.
4. White, T. (2012). Hadoop: The definitive guide. " O'Reilly Media, Inc."Smolan, R. (2013). The human face of big data.
5. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
6. Mayer-Schönberger, V., & Cukier, K. (2013). Big data: A revolution that will transform how we live, work, and think. Houghton Mifflin Harcourt. Holmes, A. (2012). Hadoop in practice. Manning Publications Co..
7. Simon, P. (2013). Too big to ignore: the business case for big data (Vol. 72). John Wiley & Sons.
8. Robert D. Schneider , Hadoop for Dummies, Wiley India.

CRYPTOGRAPHY AND NETWORK SECURITY (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Unit I [12 Hours]

Security Trends, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Symmetric Ciphers, Classical Encryption Techniques, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography

Unit II [10 Hours]

Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design The AES Polynomials with Coefficients in GF(28), Simplified AES, Multiple Encryption and Triple DES, Block Cipher Modes of Operation, Stream Ciphers and RC4

Unit III [10 Hours]

Fermat's and Euler's Theorem, The Chinese Remainder Theorem, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and Macs

Unit IV [10 Hours]

Digital Signatures, Authentication Protocols, Digital Signature Standard, Kerberos, X.509 Authentication Service, Public-Key Infrastructure, IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management

Unit V [10 Hours]

Web Security, Secure Socket Layer and Transport Layer Security, Intruders, Intrusion Detection, Password Management, Malicious Software, Firewalls

References

1. William Stallings, Cryptography and Network Security: Principles and Practice, 7th Edition, Pearson

CLOUD COMPUTING (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Unit I [10 Hours]

Introduction of Cloud Computing: What is Cloud Computing, How it works, Types of Cloud, Goals & Challenges, Leveraging Cloud Computing, Cloud Economics and Total Cost of Ownership Cloud Service Models.

Unit II [12 Hours]

Software as a Service (SaaS): Overview of the Cloud application development lifecycle, Challenges in SaaS Model, SaaS Integration Services, Advantages and Disadvantages. Infrastructure as a Services (IaaS): Evolution of infrastructure migration approaches, Virtual Machines, VM Migration Services, Cloud Infrastructure services, Advantages and Disadvantages.

Unit III [10 Hours]

Platform as a service (PaaS): Evolution of computing paradigms and related components (distributed computing, utility computing, Cloud computing, grid computing, etc.), Cloud platform services, Integration of Private and Public Cloud, Advantages and Disadvantages.

Unit IV [10 Hours]

Programming Model: Parallel and Distributed Programming Paradigms, MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Mapping Applications, Programming Support Google App Engine, Amazon AWS, Cloud Software Environments, Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.

Unit V [10 Hours]

Cloud Security Tools and technologies: Infrastructure Security, Network level security, Host level security, Application level security, Data privacy and security Issues, Access Control and Authentication in cloud computing, the data security in Private and Public Cloud Architecture, Legal issues and Aspects, Multi-tenancy issues

References:

1. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud” O'Reilly Gautam Shroff, Enterprise Cloud Computing, Cambridge University Press,2011
2. Judith Hurwitz, R Bloor, M.Kanfman, F.Halper “Cloud Computing for Dummies”, Wiley India Edition, First Edition
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, “Cloud Computing : Principles and Paradigms”, Wiley Publication,2011
4. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From ParallelProcessing to the Internet of Things”, Morgan Kaufmann Publishers, 2012
5. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, ‘Mastering Cloud Computing”, TMGH,2013

WEB PROGRAMMING (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Unit I [12 Hours]

HTML5 and JavaScript: Local Storage, Web Workers, Drag and Drop, Introduction to Client-Side Scripting, JavaScript Basics, Functions, Objects, Hoisting, Arrays, JavaScript Objects

Unit II [10 Hours]

DOM and DOM Events: Accessing and modifying DOM, Events and Event Handlers - Load, Mouse, Synthetic Events, Key and Form Related Events, Event Bubbling, Cookies

Unit III [10 Hours]

Apache: MIME, http, httpd Server, Request Response Formats Basics, Configuration, Debugging, .htaccess

Unit IV [10 Hours]

AJAX: File Handling and System Calls, Strings and Regular Expressions, Arrays, Cookies, Sessions, Functions, Classes, Database Access AJAX: Asynchronous GET/POST using XMLHttpRequest

Unit V [10 Hours]

AJAX Advanced: JS objects, prototype inheritance, Dynamic Script Loading, XMLHttpRequest, Image- Based AJAX, Cross-Domain Access (CORS), Introduction to XML, Parsers, Styling RSS / Atom Feeds, JSON and XML, JSON vs XML.

Reference Book(s):

1. “JavaScript Absolute Beginner's Guide”, Kirupa Chinnathambi, Que Publishing, 1st Edition, 2017.
2. “Programming the World Wide Web”, Robert W Sebesta, Pearson, 7th Edition, 2013. 3. “HTML5 Up and Running”, Mark Pilgrim, O’Reilly, 1st Edition, 2015
3. “AJAX: The Complete Reference”, Thomas A Powell, McGraw Hill, 2008.

BANGALORE UNIVERSITY

Master of Commerce
M.Com (Degree) Regular
(CBCS – Semester Scheme)
New Syllabus: 2020-21

(Revised Syllabus as on BOS held on 11th December 2020)

Chairperson – BOS

Prof. R. Sarvamangala

DEPARTMENT OF COMMERCE

JNANABHARATHI CAMPUS,
BENGALURU - 560056

REGULATIONS PERTAINING TO *MASTER OF COMMERCE* (M.Com.) COURSE UNDER CBCS SYSTEM FROM 2020-21 ONWARDS

1. Objective:

The broad objective of the Master of Commerce course is to impart to the Students, professional education and training in various aspects of business and its environment and provide them with opportunities to develop managerial and analytical skills in order to meet the challenges of business at the national and global level. The platform will also enrich the students to cope up with recent changes in business world.

2. Eligibility for Admission:

A candidate who has passed the B.Com./B.B.A./BMS Degree examination of this University or of any other University recognized as equivalent thereto and has secured not less than 50% of the marks in the aggregate in all the Commerce subjects of Business Education in all the years shall be eligible for admission to the course. In case of SC/ST/CAT-1 students and PWD Students, there will be relaxation of 5% in the minimum required percentage of marks.

3. Duration of the Course:

The course of study for M.Com., degree shall extend over a period of two years divided into 4 (four) semesters. Each Semester will be of 16 weeks or more duration with a minimum of 90 actual working days.

4. Scheme of Instruction:

1. In each semester there will be six to seven papers (including practicals)
2. There will be 24 to 27 contact hours per week. This includes practicals.

5. Attendance:

Each course (theory/practical) shall be treated as an independent unit for the purpose of attendance. A student shall attend a minimum of 75% of the total instruction hours in a course (theory/practical) including tutorials and seminars in each semester. There shall be no provision for condonation of shortage of attendance and a student who fails to secure 75% attendance in a course, shall be required to repeat that semester.

6. Medium of Instruction:

The medium of instruction shall be English. However, a candidate will be permitted to write the examination either in English or in Kannada.

7. Registering for the Examination:

A candidate shall register for all the papers of a semester when he appears for the examination of that semester for the first time.

8. Scheme of Examination:

8.1 There shall be a University examination at the end of each semester. The maximum marks for the university examination in each paper shall be 100 as shown below:

Particulars	Course	Duration	Internal Assessment	Theory Examination	Total Marks
Subject without Practicals	M.Com	2 years, (4 Semesters)	30	70	100

8.2 For subjects having practical examination (Advanced Research Methodology) theory examination will remain for 70 Marks, but in the place of Internal Assessment, Practical examination will be conducted, the marks allotment is as follows:

- End Semester Practical Examination 10 Marks
- Record 10 Marks
- Viva-Voce Examination 05 Marks
- Attendance 05 Marks

Total Marks 30 Marks

8.3 Each semester will normally have six (Hardcore) and one (soft core) paper and each shall be for 100 marks.

8.4 (i) The composition of theory and internal assessment marks for each paper will be 70 and 30 respectively.

ii. Duration of examination per theory paper of 70 marks shall be for 3 hours, for practicals it will be $1^{1/2}$ (one and half) hours for each batch.

iii. Practical records will be evaluated as part of the practical examination.

iv. In case of practical examinations, students will be assessed on the basis of knowledge of processes, skills operations involved, results/calculations and reporting.

v. Practical examination will be conducted by the Board of Examiners with Pre-Approved Panel of Examiners.

8.5 Every theory paper shall ordinarily consist of two/three sections, developed to test conceptual skills, understanding skills, comprehension skills, articulation, and application skills in the question paper's composition in examinations.

8.6 (i) In case of theory papers the various components of internal assessment will be as follows:

a) Assignment – 5 Marks
b) Attendance – 5 marks (75% => 80% - 1 Mark, 80% > 85% - 2 Marks, 85% > 90% - 3 Marks, 90% to 95% - 4 Marks, 95% => 5 Marks)
c) Internal Test – 20 Marks

(The test shall be for $1^{1/2}$ - hour duration carrying 40 marks. The marks scored by the candidate shall be later reduced to 20 marks).

(ii) The Departmental Council / College / Centre shall notify in the first week of each semester, scheme of internal assessment, containing the details of tests, assignments, and seminars.

(iii) Co-ordination Committee: In order to monitor IA tests there shall be Co-ordination Committee consisting of the following:

1. Chairman BOS: Chairman
2. Two Senior Faculty Members
3. Two members from affiliated colleges as recommended by the BOS
4. For **Advanced Research Methodology** Subject, A Viva-Voce and Practical Exam for 30 marks will be conducted by the Board of Examiners.

(iv) At least one week prior to the last working day, I.A. marks secured by the candidates shall be displayed on the notice board.

(v) The Departmental Council / College / Centre may decide to give test/seminar to candidates who absent themselves for the above, only if the Council is convinced that the absence of the candidate is on valid grounds. However, the Council will allow the candidate to avail of this provision within the duration of that semester.

(vi) The statement of internal assessment shall be sent to the Registrar (Evaluation) one week prior to the commencement of that particular semester examination.

8.5 **Question Paper Pattern:**

Section – A:

Answer any Seven Questions out of Ten. Each Question Carries Two Marks (7x2=14)

Section – B:

Answer any Four Questions out of Six. Each Question Carries Five Marks (4x5=20)

Section – C:

Answer any Two Questions out of Four. Each Question Carries Twelve Marks (2x12=24)

Section – D: (Compulsory Skill-based Question on Subject / Paper)

Skill-based Question (1x12=12)

8.6.a MOOC Course & Certification Programme:

A. The student has to undergo a certification course in any MOOC platform such as SWAYAM, NPTEL, AICTE, CEC of 8 Weeks / 12 Weeks / 16 Weeks Programme at the beginning of the 1st semester, submit the certificate at the end of 2nd Semester examinations, which is compulsory.

B. Certification Programme: The student must undergo a Skill-based Training Certification Course from FKCCI / MSME / SME / KSSIC / KASSIA / BCIC and submit the certificate within 3rd Semester examinations to the Head of the department of PG Studies. The allotment of the skill-based training program is at the beginning of the 3rd semester, and proper time allocation in the college timetable.

8.6.b Industrial Visit

Note: During **3rd Semester** Compulsorily Students should undergo Industrial Visit to enhance the Practical Knowledge and Industrial Visit Report should be prepared and Submitted to the College.

8.6.c Dissertation:

Each student will choose business research project/live business problem in a business organization, Institution or Industry, and prepare a dissertation report. He/she will formulate it as a research/consultancy problem, work under the guidance of a faculty member on it during IV semester and submit a report. The report will be evaluated for 70 marks. Project Dissertation guidance for a faculty member will involve a workload of 4 hours per week in a semester. Dissertation guidance of 8 students by a faculty member will be equivalent to the teaching of one paper per semester. Viva-voce examination will be conducted for 30 marks by BOE.

The Research Supervisor should have a Ph.D. degree / a minimum of 10 Years of Research Experience with atleast 10 Publications in UGC Recognized Journals.

9. Board of Examiners and Valuation of Answer Scripts:

9.1 There shall be a Board of Examiners for scrutinizing and approving the question papers and scheme of valuation.

9.2 About 50% of the examiners appointed for setting of question papers and valuation work in each semester shall be external.

9.3 Each written paper shall be valued by one internal examiner and one external examiner.

9.4 If the difference in marks between two valuation is more than 15%, the Chairman, BOE shall arrange for third valuation by examiners from the approved panel of examiners.

9.5 In case of two valuations, the average of the two valuations and if there are three valuations, the average of the nearest two valuations shall be taken for declaring results. The candidates not satisfied with the results may apply for photocopies of the answer scripts and / or challenge valuation (**If University Regulations Permits**).

10. Classification of Successful candidates:

Minimum for a pass in each paper shall be 40% in Semester paper and 50% in aggregate of all the papers in that semester.

The results of successful candidates at the end of each semester shall be declared on the basis of Percentage of Aggregate Marks and in terms of Grade Point Average (GPA) and alpha – sign grade. The results at the end of the fourth semester shall also be classified on the basis of Percentage of Aggregate Marks and on the basis of the Cumulative Grade Point Average (CGPA) obtained in all the four semesters and the corresponding overall alpha – sign grade. An eight-point grading system, alpha – sign grade as described below shall be adopted.

First Class with Distinction	70% and above (A+, A++ or O)
First Class	60% and above but less than 70% (A)
High Second Class	55% and above but less than 60% (B+)
Second Class	50% and above but less than 55% (B)
Pass Class	40% and above but less than 50% (C)

Eight Point Alpha – Sign Grading Scale:

Grade Point Average	<4	4-<5	5-<5.5	5.5-<6	6-<7	7-<8	8-<9	9-10
Alpha-Sign Grade:	D	C	B	B+	A	A+	A++	O

The Grade Point Average (GPA) in a Semester and the Cumulative Grade Point Average (CGPA) at the end of fourth semester shall be computed as follows:

Computation of Grade Point Average **(GPA):**

The grade points (GP) in a course shall be assigned based on the basis of actual marks scored in that course as per the table below. They shall be generally percentages divided by 10. The Grade Point Weights (GPW) shall then be calculated as the product of the grade points earned in the course and the credits for the course. The total GPW for a semester is obtained by adding the GPW of all the courses of the semester.

ILLUSTRATION 1 (26 Credits)

Papers	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**Total**
Max. marks	100	100	100	100	100	100	100	700
% Marks Obtained	77	73	58	76	64	66	82	496
Grade Points Earned (G.P.)	7.7	7.3	5.8	7.6	6.4	6.6	8.2	-
Credits for the Course (C)	4	4	4	4	4	4	2	26
Total GPW = GP x C	30.8	29.2	23.2	30.4	25.6	26.4	16.4	182

Semester Aggregate Marks : **496 / 700 = 70.86%**

Classification of Result **:** First Class with Distinction

The GPA shall then be computed by dividing the total GPW of all the courses of study by the total credits for the semester, GPA = Total GPW / Total Credits = 182 / 26 **= 7.0**

Semester Alpha Sign Grade: **A+**

ILLUSTRATION 2 (24 Credits)

Papers	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**Total**
Max. marks	100	100	100	100	100	100	600
% Marks Obtained	67	73	78	76	84	88	466
Grade Points Earned (G.P.)	6.7	7.3	7.8	7.6	8.4	8.8	-
Credits for the Paper	4	4	4	4	4	4	24
Total GPW = GP x C	26.8	29.2	31.2	30.4	33.6	35.2	186.4

Semester Aggregate Marks: **466 / 600 = 77.67%**

Classification of Result**:** First Class with Distinction

GPA = Total GPW / Total Credits = 186.4 / 24 **= 7.77**

Semester Alpha Sign Grade: **A++**

11. <u>Calculation of Cumulative Grade Point Average (CGPA):</u>

The Cumulative Grade Point Average (CGPA) at the end of the fourth semester shall be calculated as the weighted average of the semester GPW. The CGPA is obtained by dividing the total of GPW of all the four semesters by the total credits for the programme.

ILLUSTRATION I

Semester	I	II	III	IV	Total
Total Marks per Semester	700	700	600	600	2600
Total Marks Secured	496	560	466	510	2032
Semester Alpha Sign Grade	A+	A++	A+	A++	-
Semester GPA	7.0	8.0	7.77	8.5	-
Semester Credits	26	26	24	24	100
Semester GPW	182	208	186.5	204	822.9

Aggregate Percentage of Marks = 2032 / 2600 = 78.15 **%**

Classification of Result**: *First Class with Distinction***

Cumulative Grade Point Average (CGPA)

= Total of Semester GPW / Total Credits for the programme = 780.5 /100 = **7.805**

Programme Alpha Sign Grade: **A++**

These are the sample illustrations of computing semester grade point averages and cumulative grade point average and the alpha – sign grades assigned.

12. MINIMUM FOR A PASS:

12.1 A candidate shall be declared to have passed the PG program if he/she secures at least a CGPA of 4.0 (Course Alpha-Sign Grade C) in the aggregate of both internal assessment and semester end examination marks put together in each unit such as Theory Papers / Practical's / Project Work / Dissertation / Viva-Voce.

12.2 The candidates who pass all the semester examinations in the first attempts are eligible for ranks provided they secure at least CGPA of 6.0 (or Alpha-Sign Grade A).

12.3 The results of the candidates who have passed the fourth semester examination but not passed the lower semester examinations shall be declared as NCL (Not Completed Lower semester examinations). Such candidates shall be eligible for the degree only after completion of all the lower semester examinations.

12.4 A candidate who passes the semester examinations in parts is eligible for only Class / CGPA and Alpha-Sign Grade but not for ranking.

12.5 There shall be no minimum in respect of internal assessment.
However minimum pass in each paper shall be 40% in semester end exam (25 Marks out of 70 Marks) and 50% aggregate of all papers in that semester including practical paper.

12.6 A Candidate who fails in any of the unit / dissertation / viva-voce shall reappear in that unit / dissertation / viva-voce and pass the examination subsequently.

13. CARRY OVER PROVISION: Candidates who fail in a lower semester examination may go to the higher semesters and take the examinations.

14. REJECTION OF RESULTS:

i. A candidate who fails in one or more papers of a semester may be permitted to reject the result of the whole examination of that semester. **Rejection of result paper wise shall not be permitted**. A candidate who rejects the results shall appear for the examination of that semester in the subsequent examination.

ii. Rejection shall be exercised only once in each semester and the rejection once exercised shall not be revoked.

iii. Application for rejection along with payment of the prescribed fee shall be submitted to the Registrar (Evaluation) through the department/college together with the original statement of marks within 30 days from the date of publication of the result.

iv. A candidate who rejects the result is eligible for only class and not for ranking.

15. IMPROVEMENT OF RESULTS:

i) A candidate who has passed in all the papers of a semester may be permitted to improve the result by reappearing for the whole examination of that semester.

ii) The reappearance could be permitted twice during double the period without restricting it to the subsequent examination only. The regulation governing maximum period for completing various degree/ diploma programme notified by the University from time to time shall be applicable for improvement of results also.

iii) The student could be permitted to apply for the improvement examination 45 days in advance of the pertinent semester examination whenever held.

iv) If the candidate passes in all the subjects in reappearance, higher of the two aggregate marks secured by the candidate shall be awarded for that semester. In case the candidate fails in the reappearance, candidate shall retain the first appearance result.

v) A candidate who has appeared for improvement is eligible for class only and not for ranking. Internal assessment marks shall be shown separately in the marks card. A candidate who has rejected the result or who, having failed, takes the examination again or who has appeared for improvement shall retain the internal assessment marks already obtained.

A candidate who fails in any of the semester examinations may be permitted to take the examinations again at a subsequent appearance as per the syllabus and scheme of examination in vogue at the time the candidate took the examination for the first time. This facility shall be limited to the following two years.

16. POWER TO REMOVE DIFFICULTIES

i) If any difficulty arises in giving effect to the provisions of these regulations, the Vice-Chancellor may by order make such provisions not inconsistent with the Act, Statutes, Ordinances or other Regulations, as appears to be necessary or expedient to remove the difficulty.

ii) Every order made under this rule shall be subject to ratification by the Appropriate University Authorities.

17. UPDATION OF SYLLABUS - The BOS has to revise the syllabus from time to time based on current trends and updations where ever it is necessary. The suggestions of faculties of commerce, considered for revision and updation of the syllabus with prior approval of BOS- PG Commerce, Faculty of Commerce and the Academic Council of the University.

APPENDIX "A"

M.Com (MASTER OF COMMERCE) - COURSE MATRIX

I SEMESTER M.Com. (MASTER OF COMMERCE)

Paper Code	Subjects	Instruction Hrs/Week	Duration of Exam (Hrs)	Marks			Credits
				IA	Exam	Total	
1.1	Monetary System	4	3	30	70	100	**4**
1.2	International Business Environment	4	3	30	70	100	**4**
1.3	Principles and Practices of Business Decisions	4	3	30	70	100	**4**
1.4	Information Technology for Business	4	3	30	70	100	**4**
1.5	Managerial Finance	4	3	30	70	100	**4**
1.6	Global Talent Management	4	3	30	70	100	**4**
1.7	**SOFT CORE** **Corporate Communication Skills**	3	3	30	70	100	**2**
I SEMESTER TOTAL OF CREDITS							**26**

Note: The student has to undergo a certification course in any MOOC platform such as SWAYAM, NPTEL, AICTE, CEC of 8 Weeks / 12 Weeks / 16 Weeks Programme at the beginning of the 1st semester submit the certificate at the end of 2nd Semester examinations, which is compulsory.

II SEMESTER M.Com. (MASTER OF COMMERCE)

Paper Code	Subjects	Instruction Hrs/Week	Duration of Exam (Hrs)	Marks			Credits
				IA	Exam	Total	
2.1	Modern Indian Banking	4	3	30	70	100	**4**
2.2	Risk Management & Derivatives	4	3	30	70	100	**4**
2.3	Advanced Research Methodology	4	3	30 (P*)	70	100	**4**
2.4	Digital Marketing	4	3	30	70	100	**4**
2.5	Emerging Trends in Entrepreneurship	4	3	30	70	100	**4**
2.6	Indian Ethos and Leadership	4	3	30	70	100	**4**
2.7	**SOFT CORE** **Artificial and Business Intelligence**	3	3	30	70	100	**2**
II SEMESTER TOTAL OF CREDITS							**26**

Note: Certification Programme: The student must undergo a Skill-based Training Certification Course from FKCCI / MSME / SME / KSSIC / KASSIA / BCIC and submit the certificate within 3rd Semester examinations to the Head of the department of PG Studies. The allotment of the skill-based training program is at the beginning of the 3rd semester, and proper time allocation in the college timetable.

*Practical Examination will be conducted by the Board of Examiners.

III SEMESTER M.Com. (MASTER OF COMMERCE)

GROUP– I: ACCOUNTING & TAXATION

Paper Code	Subjects	Instruction Hrs/Week	Duration of Exam (Hrs)	Marks			Credits
				IA	Exam	Total	
3.1	Intellectual Property Rights	4	3	30	70	100	**4**
3.2	Logistics and Supply Chain Management	4	3	30	70	100	**4**
3.3	Corporate Reporting Practices-I	4	3	30	70	100	**4**
3.4	Strategic Cost Management – I	4	3	30	70	100	**4**
3.5	Corporate Tax Planning	4	3	30	70	100	**4**
3.6	**Open Elective**	4	3	30	70	100	**4**
III SEMESTER TOTAL OF CREDITS							**24**

Note: During 3rd Semester Compulsorily Students should undergo Industrial Visit to enhance the Practical Knowledge and Industrial Visit Report should be prepared and Submitted to the College.

III SEMESTER M.Com. (MASTER OF COMMERCE)

GROUP– I: FINANCE & BANKING

Paper Code	Subjects	Instruction Hrs/Week	Duration of Exam (Hrs)	Marks			Credits
				IA	Exam	Total	
3.1	Intellectual Property Rights	4	3	30	70	100	**4**
3.2	Logistics and Supply Chain Management	4	3	30	70	100	**4**
3.3	Financial Markets & Services	4	3	30	70	100	**4**
3.4	Financial Planning	4	3	30	70	100	**4**
3.5	Innovation in Banking & Technology	4	3	30	70	100	**4**
3.6	**Open Elective**	4	3	30	70	100	**4**
III SEMESTER TOTAL OF CREDITS							**24**

Note: During 3rd Semester Compulsorily Students should undergo Industrial Visit to enhance the Practical Knowledge and Industrial Visit Report should be prepared and Submitted to the College.

IV SEMESTER M.Com. (MASTER OF COMMERCE)

GROUP– II: ACCOUNTING & TAXATION

Paper Code	Subjects	Instruction Hrs/Week	Duration of Exam (Hrs)	Marks			Credits
				IA	Exam	Total	
4.1	Business Analytics	4	3	30	70	100	**4**
4.2	Forensic Accounting & Auditing	4	3	30	70	100	**4**
4.3	Corporate Reporting Practices-II	4	3	30	70	100	**4**
4.4	Strategic Cost Management - II	4	3	30	70	100	**4**
4.5	Customs Duty and GST	4	3	30	70	100	**4**
4.6	**Dissertation / Project**	4	--	**Viva - Voce** 30	70	100	**4**
IV SEMESTER TOTAL OF CREDITS							**24**

IV SEMESTER M.Com. (MASTER OF COMMERCE)

GROUP– II: FINANCE & BANKING

Paper Code	Subjects	Instruction Hrs/Week	Duration of Exam (Hrs)	Marks			Credits
				IA	Exam	Total	
4.1	Business Analytics	4	3	30	70	100	**4**
4.2	Forensic Accounting & Auditing	4	3	30	70	100	**4**
4.3	Forex Management	4	3	30	70	100	**4**
4.4	Security Analysis & Portfolio Management	4	3	30	70	100	**4**
4.5	Strategies for Banking Risk and Marketing Management	4	3	30	70	100	**4**
4.6	**Dissertation / Project**	4	--	**Viva - Voce** 30	70	100	**4**
IV SEMESTER TOTAL OF CREDITS							**24**

Total Credits – M.Com. Programme

1st Semester M.Com. : 26 Credits
2nd Semester M.Com. : 26 Credits
3rd Semester M.Com. : 24 Credits
4th Semester M.Com. : 24 Credits
Total Credits : 100 Credits

Name of the Program: Master of Commerce

Name of the Course: 1.1 MONETARY SYSTEM

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the Students will be able to understand the Principles & Systems of Note Issue present in India and other countries. The contents will expose students to the depth of the Domestic and International Monetary system and practices in general.

Syllabus:

Module 1: Money: Introduction & Invention of Money, Meaning, Definition, Evolution: Stages (Barter System to Bitcoin), Characteristics, Functions, Approaches, Types of Money, Role of Money, Importance of Money, Evils of Money, Money and Near Money, Time Value of Money, Circular Flow of Money – Sectors. Theories of Value of Money - Quantity Theory of Money: Fisher's Transaction Approach & Cambridge Cash Balance Theory, Income Theory of Money, Liquidity Theory of Money, Friedman's Restatement of the Quantity Theory of Money, Keynesian Theory of Money, Modern Monetary Theory.

Module 2: Monetary Standards: Meaning & Definition, History, Gresham's Law, Types of Monetary Standards: Monometalism, Bimetallism, Paper Currency and Virtual Currency: Features, Types, Reforms, Pros & Cons. Gold Standard: Meaning, Types, Features, Functions, Pros & Cons, Domestic and International Gold Standards, Working of Gold Standard: Conditions, Qualities of Good Monetary System. Introduction to Paper Currency Standard: Meaning & Definition, Principles of Note Issue, Right of Note Issue, Method of Note Issue, Essentials of Sound Currency System. Introduction to SDR or Paper Gold: Meaning & Definition, Features, Role of SDR, Working of SDR, Basket of Currencies, IMF Quota - SDR, SDR allocations & Interest Rate.

Module 3: International Monetary System: Meaning & Definition, History, Evolution - Bimetallism before 1875, Classical Gold Standard 1876 – 1913, Interwar Period 1914 – 1944, Bretton Woods System 1945 – 1973 (IMF & World Bank), Flexible Exchange Rate Regime (1972 to Present), Smithsonian Agreement, Triffin's Paradox, Nixon Shock; Characteristics & Importance. Introduction to Flexible Exchange Rate Regime: Meaning & Definition, Characteristics, Functions, Pros & Cons of Fixed & Flexible Exchange Rate Regime, Fixed v/s Flexible Exchange Rate Regime, Current Exchange Rate Regime and Exchange Rate Management in India.

Module 4: **International Financial System:** Meaning & Definition, International Financial System v/s International Monetary System, Evolution, Components of International Financial System. Introduction to International Financial Markets: Meaning & Definition, Participants, Elements, Forex Market, Euro Currency Market, Euro Bond Market, Depository Receipts - ADRs, GDRs & IDRs; Bond Market - Masala Bonds, Green Masala Bonds, Samurai Bond, Yankee Bond, Panda Bonds and others.

Module 5: Balance of Payment & Balance of Trade (BOP & BOT): Introduction to BOP & BOT: Meaning & Definition, Features, Components, Structure of BOP, BOP v/s BOT, Equilibrium & Disequilibrium in BOP, Types and Causes of Disequilibrium in BOP, Methods to Correct Disequilibrium in BOP, Devaluation and Depreciation of Currency – Recent Trends. Capital Account & Current Account: Meaning, Structure, Convertibility, Capital Account v/s Current Account.

Suggested Books/Articles/Links for References:

1. K. N. Verma, Monetary System, Vishal Publishing Company
2. P. Agarwal, International Financial Management, HPH
3. V.K. Bhatta, International Financial Management Anmol publication Pvt. Ltd. New Delhi.
4. K.K. Dewet, Modern Economic Theory, Shyam Lal chaintable Trust, Ramnagar, New Delhi.
5. Apte P.G: International Financial Management, TMH

6. Lavi Maurice: International Finance, Mc Graw Hill
7. Dr. P. C. Jain & Dr. S. S. Verma, Money and Financial System, Sahitya Bhavan Publications
8. L. Randall Wray, Modern Money Theory: A Primer on Macroeconomics for Sovereign Monetary Systems, Palgrave Macmillan.
9. M C Vaish, Monetary Theory, Vikas Publishing
10. Dr. S K Singh & Dr. Madhulika Singh, Applied Money and Banking, Sahitya Bhavan Publications.
11. Robert E. Wright, NYU, Money and Banking , Saylor Foundation.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 1.2 INTERNATIONAL BUSINESS ENVIRONMENT

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the Students will be able to learn nature, scope and structure of Global Business Environment, and understand the influence of various environmental factors on global business operations.

Syllabus:

Module 1: International Business & Environment: Importance, nature and scope of International business; Modes of entry into International Business; globalization process and managerial implications; multinational corporations and their involvement in global Business: Issues in foreign investments, technology transfer, pricing and regulations. Introduction to Economic environment – political and regulatory environment – demographic environment – social, cultural and technological environment.

Module 2: International Economic Environment: Regional integration and trade blocks – Types of integration – theory of customs union, European union – regional groupings – integration of developing countries – ASEAN ,SAARC, SAPTA, global commodity agreements – quota agreements – Cartels – Bi-lateral & Multi-lateral contracts– Economic institutions – International Monetary Funds (IMF) – World Bank, Asian Development Bank, UNCTAD, UNIDO, International Trade Centre, WTO, GATS, TRIM, TRIPS.

Module 3: **International Trade and Investment Environment:** Government Influence on Trade: Trade in merchandise – Trade in services – Global sourcing – degree of dependence – balance of payments – trade and BOP of India. Cultural contacts of global management – Understanding the role of culture – communicating across cultures – cross cultural negotiations and decision making. Types and significance of foreign investments – factors affecting global investment – growth and dispersion of FDI – cross border mergers and acquisitions – foreign investment in India – The New Policy – EURO/ADR issues – M & A – Indian companies going global.

Module 4: Multi National Corporation: Definition and Meaning – Importance and dominance of MNCs – Code of conduct – MNCs in India Transnational Companies and Global Companies–Their nature, Transfer of Technology – global competitiveness – indicators of competitiveness -competitive advantage of nations – Technology and Global competitiveness. global Operations – Global supply chain management – global manufacturing strategies – factors affecting global HRM and staffing policy – global negotiations – global asset protection –Protection of IPRs.

Module 5: Social Responsibilities and Ethics: Social Responsibilities and Ethics, MNE Social Responsibilities – philanthropic Responsibility, Ethical Responsibility, Legal Responsibility, Economic Responsibility, Foreign Corrupt Practices Act, Cases.

Suggested Books/Articles/Links for References:

1. P Subba Rao, International Business, Himalaya Publications
2. O P Agarwal, International Business, Himalaya Publications
3. Aswathappa. K., International Business, Tata McGraw Hill
4. Darrell Mahoriy, etal, International Business, Longman.
5. Charles W.L. Hill, International Business, McGraw – Hill.
6. John D. Daniels, etal, International Business, Pearson Education.
7. Don Ball and Wendell McCulloch, International Business, McGraw – Hill.
8. A.V. Vedipurishwar, The Global CEO, Vision Books.
9. Dr. Ansarul Haque, Dr. S. Porkodi, International Business Environment, Global Academic Publishers & Distributors, 2nd Edition, 2015
10. J. Stewart BlackAnant K. Sundaram, The International Business Environment 1st

Edition, Pearson, 2015
11. Aniket Shonak, International Business Environment, Straight Forward Publishers (P) Ltd., 2011
12. Bennet, Roger, International Business, Financial Times, Pitman Publishing, London.
13. Bhattacharya, B., Going International: Response Strategies of the Indian Sector, Wheeler Publishing, New Delhi.
14. Czinkota, Michael R., et. al., International Business, the Dryden Press, Fortworth
15. Hill, C., Cronk,T., & Wickramasekera, R. (2011). Global Business Today: An Asia Pacific Perspective. 2nd Edition. McGraw-Hill
16. Danoes, John D. and Radebaugh, Lee H., International Business: Environment and Operations, Addison Wesley, Readings.
17. HILL Charles W.L. (2011), International Business: Competing in the Global Marketplace (8/E.), McGraw-Hill

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 1.3 PRINCIPLES AND PRACTICES OF BUSINESS DECISIONS

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: To familiarise students with key macro-economic variables and their behaviour, and enable them to critically evaluate different economies and to enable students to integrate macroeconomic analysis into business decisions.

Syllabus:

Module 1: Introduction to Economics: Introduction to economics, macroeconomics, and its interface with business and industry. Nature and Scope of managerial economics. Objectives of the firm, Economic, Managerial and Behavioural theories of the firm. Resources and Goals of an economic systems, Perfect Market, Free market and Mixed Economy. National Income and product concept, computation of National Income and related aggregates, problems in computation of national income. Concept of GDP, GNP, NDP and NNP.

Module 2: Public Financial Policy: Public Finance branches – Principle of maximum social advantages – Sources of public revenue – canons of taxation – direct and indirect taxes – impact and incidence – effects of taxation on production, consumption and distribution side of economy – recent policy changes in direct and indirect – public expenditure – causes for growth – effects of public expenditure – public debt – sources of public borrowing – methods of debt redemption – debt trap - budget – types and deficit.

Module 3: Demand Analysis & Consumer Choice: Individual and market demand functions; Law of demand, determinants of demand; Elasticity of demand – its meaning and importance; price elasticity, income elasticity and cross elasticity – Using elasticity in managerial decisions; numerical problems and case studies. Introduction to Consumer Choice, Sovereignty, Cardinal and ordinal utility approach, indifference approach, revealed preference and theory of consumer choice under risk; Demand estimation for major consumer durable and non-durable products; Demand forecasting techniques; numerical problems and case studies.

Module 4: Production Theory: Production function – production with one and two variable inputs, Stages of production; Economies of scale; Estimation of production function; cost theory and estimation; Economic value analysis; Short and long run cost functions – their nature, shape and inter-relationship; Law of returns to scale; numerical problems and case studies.

Module 5: Pricing Practices & Strategies: Determinants of pricing policy, pricing methods: Marginal Cost Pricing, Target Rate Pricing, Product Line Pricing, administered pricing, competitive bidding, dual pricing, transfer pricing. Price discrimination: requirements, types and dumping strategies. Pricing over product life cycle: skimmed pricing, penetration pricing, product –line pricing and price leadership. Impact of pricing on business decisions.

Suggested Books/Articles/Links for References:

1. M.L. Seth Monetary Economics, Vikas Publishing
2. M.C. Vaish – Micro and Macro Economics, Vikas Publishing
3. KPM Sundaram – Indian Economy, S. Chand Publishing
4. Maheshwari K.L. & Varshney R.L – Managerial Economics, Sultan Chand & Sons
5. M.L. Seth – Macro Economic Theory – Vikas Publishing
6. I.C. Dhingra – Indian Economy, Sultan Chand & Sons.
7. Suraj B. Gupta, Monetary Economics, S. Chand & Company.
8. P.L Mehta; Managerial Economics, Sultan Chand & Sons, New Delhi.12
9. 2R.L Varshney and K.L Maheshwari; Managerial Economics, Sultan Chand & Sons, Delhi.
10. Karma Pal : Managerial Economics, Excel Books.

11. H.L Ahuja; Business Economics, S. Chand & Company Ltd., New Delhi
12. S.K. Chakapaborti, Macroeconomics, HPH
13. Gupta G. S. - Macroeconomic theory- Tata Mc-Graw Hill publications
14. Dr. M. Muniraju, Macro Ecnomics for Business Decisions, HPH,
15. Samuelson,Paul – Economics, Tata Mc-Graw Hill publications
16. Dornbush R & Fisher S – Macroeconomics – Tata Mc-Graw Hill publications
17. Blanchard O. J & Stanley Fischer – Lectures on Macro-economics – Tata Mc Graw Hill publications
18. Misra & Puri, Indian Economics, HPH
19. Dwivedi D N – Managerial Economics – Vikas publications
20. J. K. Bhagawathi – Economics of Underdeveloped Countries – All India Traveler Book Seller Publishing Company.
21. A. K. Agarwall – Indian Economics – Problems of Development and planning – D.K Publishers.
22. V. K. R. V. Rao - National Income of India – 1950 to 1980 Sage Publishers
23. Bimal Jalan – India's Economic Crisis, Oxford, IBM.
24. Rangarajan C. – Principles of Macro Economics, Tata McGraw Hill Pub co.
25. Vaish M. C – Macro Economic Theory – Willey Eastern
26. Jha. R – Contemporary Macroeconomic Theory and Policy
27. Schultze C. L – National Income Analysis
28. Bramhananda P R & V R Panchamukhi – Development process of Indian Economy Survey (Various issues) – Ministry of Finance Government of India Publications, New Delhi.
29. Sheth M. L – Macroeconomic theory – S.Chand, New Delhi.
30. Bhole. L.M, Financial Institutions and Markets, Tata McGraw Hill.
31. Frank R.H: Principles of Macroeconomics, Tata McGraaw Hill.
32. Colander: Macroeconomics TMH.
33. Fischer and Blanchard: Lecturer and Macroeconomics PHI.
34. Turnovsky: Methods of Macroeconomics Dynamis, PHI.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 1.4 INFORMATION TECHNOLOGY FOR BUSINESS

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**60 Hrs**

Course Outcomes: On successful completion of the course, the students will be able to understand E-Commerce Business Models, Security Threats & Protections as well as application of Technology in every corner of the business in the world.

Syllabus:

Module 1: Introduction to E-Commerce: Introduction, E-Commerce – Definition, History of E-commerce, Online Extension of a BAM Model, Transition to E-Commerce in India, E-Commerce v/s Traditional Commerce, E - Commerce v/s E - Business. Electronic Commerce – Cutting Edge Technologies, Strengths, Weakness, Opportunities and Challenges of E-Commerce, Components of E-Business, E-Commerce Business models – B2C, B2B, C2B, C2C, B2G, C2G, Brokerage, Advertising, Infomediary, Merchant, Manufacturer (Direct), Affiliate, Community, Subscription, Utility. Ecommerce Business Revenue Models & Types, Impact of E-Commerce on business, Successful Business Models in India.

Module 2: Hardware and Software for E-Business: Web Servers – Browsers – Server Software – Web Authoring Tools - Database System - World Wide Web – Domain Name – Hardware requirements, Brief on Shopping Cart, Point of Sale, Wireless Payment Device**,** Strategies for Web Auction, Virtual Communities, Web Portal. Electronic Retailing and Malls. Electronic Shopping - Process, Electronic Catalogues, Interactive Advertising and Marketing.

Module 3: Privacy & Technology: Introduction to Internet Security – Secure Transactions – Computer Monitoring – Privacy Issues – Privacy on the Internet – Cyber Crimes & Types, Recent Cyber Attacks, Major types of Security Problems/Common Threats – E-Commerce and Security – Security for Internet Trading – Electronic Security Challenges. Introduction to Encryption: Elements & Methods of Encryption, Secret key, Private & Public key, Digital Signature, Digital Certificates. Modern Cryptography: Types, Tools & Applications, VPNs, SSL Protocol, Firewalls.

Module 4: **IT Act of 2000 (Amendment in 2008 & 2018):** Introduction to Cyber Laws, Evolution & Need of Cyber Laws, Internet Frauds, Features, Objectives, Applicability & Non-applicability, Sections of IT Act ((Amendment) Act, 2018.), Section 43(A) (SPDI – Sensitive Personal Data), ISO 27001 guidelines, How to prevent Cyber Crimes?, Some Pioneering Indian Case Studies, E-Transition Challenges for Indian Companies.

Module 5: EDI: Electronic Data Interchange (EDI): Meaning & Definition, History & Evolution, Uses, EDI Standards, EDI Working Concept, Implementation difficulties of EDI, Financial EDI, EDI and Internet, EDI services, ANSI X12 and EDIFACT.

Suggested Books/Articles/Links for References:

1. Raydu – E Commerce, HPH
2. Suman. M – E Commerc & Accounting - HPH
3. Kalakota Ravi and A. B. Whinston : Frontiers of Electronic Commerce, Addison Wesley
4. Watson R T : Electronic Commerce – the strategic perspective. The Dryden press
5. Amrutha Gowry & Soundrajana, E – Business & Accounting, SHBP.
6. C.S.V Murthy- E Commerce, HPH
7. Agarwala K.N and Deeksha Ararwala: Business on the Net – Whats and Hows of E-Commerce
8. P. Diwan / S. Sharma – E – Commerce

9. Srivatsava: E.R.P, I.K. International Publishers
10. Bharat Bhasker, Electronic Commerce – Frame work technologies and Applications, 3rd Edition. Tata McGraw-Hill Publications.
11. Kamlesh K. Bajaj and Debjani Nag, Ecommerce- the cutting edge of Business, Tata McGraw-Hill Publications.
12. Kalakota et al, Frontiers of Electronic Commerce, Addison Wesley.
13. E- Commerce Strategies, Technology and applications (David) Tata McGraw-Hill
14. Introduction to E-commerce (Jeffrey) Tata- McGraw-Hill
15. E-Business and Commerce- Strategic Thinking and Practice (Brahm) Biztantra.
16. Deepak Bharihoke- "Fundamentals of Information Technology".

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 1.5 MANAGERIAL FINANCE

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**60 Hrs**

Course Outcomes: On successful completion of the course, the Students will be able to understand the advanced tools and techniques used in evaluating projects for financial decisions. The theories on financial management concepts will help the students to attain a greater anatomy on effective financial decision making in business.

Syllabus:

Module 1: Introduction to Finance: Introduction to Finance: Concept, Meaning, Principles & Types of Finance, Functions of Finance, Financing Decisions, Factors influencing Financial Decisions, Objectives of Corporate Financial Decisions. Introduction to Financial Management, Meaning & Definition, Evolution, Scope, Methods, Importance, Functional areas of Modern Financial Management, Financial Management Process. Planning and Policy; Approaches to Capital Structure: Net Income Approach, Net Operating Income Approach, The Traditional approach, Modigliani & Miller Approach - Concept & Problems. Optimal Capital Structure: Meaning & Concept, Trade-Off-Theory v/s Pecking Order Theory, EBIT – EPS Approach – Concept & Problems.

Module 2: Investment Decisions: Introduction to Investment Decisions: Meaning, Need and Factors, Efficient Investment Analysis. Introduction to Capital Budgeting Decisions – Meaning, Features, Process and Factors, Capital Budgeting Techniques: Traditional and Modern Techniques, Varying Opportunity Cost of Capital, NPV v/s IRR, Incremental IRR, Modified Internal Rate of Return (MIRR) – Concept, Evaluation Criteria & Problems, Fisher's Rate and Aggregate Capital Needs in Investment Decisions, Project Selection under Capital Rationing: Meaning, Types, Pros & Cons, Problems on Divisible & Indivisible Projects, Multi-Period Capital Rationing, Capital Budgeting under Inflationary Conditions.

Module 3: Risk Analysis in Capital Budgeting: Risk Analysis in Capital Budgeting – Meaning, Analysis of Risk and Uncertainty, Sources and Perspectives of Risk, Measurement of Risk, Nature of Risk in Capital Budgeting Decisions, Techniques for Risk Analysis: Risk Adjusted Discount Rate, Certainty Equivalent Method, Probability Method, Sensitivity Analysis, Scenario Analysis, Simulation Analysis, Hiller Model, Break-Even Analysis, Corporate Risk Analysis, Decision Tree Analysis – Sequential Investment Decisions, Market Risk Analysis – Concept & Problems, Backward Induction Method, Utility Theory and Capital Budgeting.

Module 4: **Corporate Restructuring:** Introduction to Corporate Restructuring: Mergers, Acquisitions, Takeovers, Spinoff, Synergies, Strategic Alliance, Joint Venture, Leveraged Buyouts, Management Buyouts (MBO) & Buy-in (MBI), Franchising, Intellectual Property Rights (IPRs), Sell-off, Demerger, Disinvestment v/s Divestment, Slump Sale, Reverse Merger, Equity Carveout – Concept & Types. Valuation under M&A: Discounted Cash Flow Method (DCF), Price-Earnings Ratio (P/E Ratio), EPS Approach, Enterprise-Value-to-Sales Ratio (EV/Sales), Replacement Cost Method – Concept & Problems.

Module 5: Dividend & Working Capital Decisions: Introduction to Dividend Decisions, Meaning & Definition, Forms of Dividend, Types of Dividend Policy, Significance of Dividend, Impact of Dividend Policy on Company, Factors affecting Dividend Policy, Dividend Decision Theories – Walter's Model, Gordon's Model, MM Theory – Concept, Assumptions, Formula, Criticisms & Problems. Introduction to Working Capital, Meaning & Definition, Types of Working Capital, Significance of Adequate Working Capital – Evils of Excess or Inadequate Working Capital – Determinants of Working Capital – Sources of Working Capital, Techniques

for managing Working Capital – Concept & Problems.

Suggested Books/Articles/Links for References:

1. G. Sudarsana Reddy, Financial Management, HPH.
2. Khan & Jain, Financial Management, Tata McGraw Hill.
3. I.M. Pandey, Financial Management, Viaks Publishing House
4. Prasanna Chandra, Financial Management, Theory and Practice, Tata McGraw Hill
5. Schall & Haley, Financial Management, McGraw Hill, New york.
6. Sudhindra Bhat, Financial Management: Principles and Practice, Excel Books India
7. Patel Bhavesh, Fundamentals of Financial Management, Vikas Publications
8. Sharan, Fundamentals of Financial Management, Pearson Education India
9. Shri. Narendra Singh, Advanced Financial Management, HPH.
10. Dr. B. G. Sathya Prasad & M. N. Arora, Management Accounting and Financial Management, HPH.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce Name of the Course: 1.6 GLOBAL TALENT MANAGEMENT		
Course Credits	**No. of Hours per Week**	**Total No. of Teaching Hours**
4 Credits	**4 Hrs**	**60 Hrs**

Course Outcomes: On successful completion of the course, the students will be able to understand the core concepts of Talent management and application of Talent management in various multi-disciplinary areas.

Syllabus:

Module 1:.Introduction to Talent Management: Introduction, Talent Management – Overview, Talent Management – History, Scope of Talent Management, Need of Talent Management, Key Processes of Talent Management, Talent vs knowledge people, Source of Talent Management, Consequences of Failure in Managing Talent, Tools for Managing Talent, Building Blocks of Effective Talent Management System, Life Cycle of Talent Management ,Role of HR in Talent Management, Compensation and reward strategies for Effective Talent Management, Human Capital- Meaning, Definition and Characteristics.

Module 2: Talent Planning and Acquisition:

Talent Planning: Objectives of Talent Planning, Steps in Strategic Talent Planning, Succession Planning Program, Innovative talent planning, Current Industry Practices for Strategic Talent Planning, Ensuring Leadership

Talent Acquisition: Introduction, Talent Acquisition, Recruiting Process, Strategic Trends in Talent Acquisition, Talent acquisition management solutions

Module 3: Talent Engagement and Retention:

Introduction, Concept of Talent Engagement, Retention, Employee Engagement and Retention, the Race for Talent: Retaining and Engaging Workers, Best Practices for Talent Engagement, Improving Employee Retention

Module4: **Information Technology and HR Analytics in Talent Management:** Introduction, Role of Information Technology in Talent Management Systems, Talent Management Information System, Creating Business Value through Information Technology, Five Steps to a Talent Management Information Strategy, HR Analytics for TM Processes, Design Development through Rapid Prototyping and Scaling, Implementation and Maintenance, Audit and Update.

Module 5: Contemporary Talent Management Issues, Challenges, Best Practices and Innovation: Introduction, Organisational Issues, Talent Management Challenges, Best Practices of Talent Management, Talent Management in India, AI applications in Human Resource Management Practices, E-Frauds in Talent Acquisition, Development, Utilization and Seperation.

Suggested Books/Articles/Links for References:

- Ravinder Shukla, Global India Publications, TALENT MANAGEMENT: Process of Developing and Integrating Skilled Workers
- Talent Development by Dave Collins; Aine MacNamara, Routledge
- Sloan, Hazucha, and Van Katwyk , Strategic management of global leadership talent Advances in global leadership
- Pascal, Talent management systems: Best practices in technology solutions for

recruitment, retention, and workforce planning.

- Willam Barther (2020), AI Applications in HR Practices, Prentice Hall, NewYork.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 1.7 CORPORATE COMMUNICATION SKILLS

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
2 Credits	3 Hrs	45 Hrs

Course Outcomes:

1. To sharpen the Analytical, written, non-verbal, Spoken Communication and interpersonal skills essential in organizations involving Decision making and implementation.
2. To demonstrate good team work and negotiation skills.

Syllabus:

Module 1: Introduction to Corporate Communication

Nature of Corporate Communication, Advantages of Corporate Communication, Corporate Communication for Managerial Functions, Networked Communications, Meta Communications system in Organization. Formal and Informal Communications in Organizations, Cost of poor Decisions and Communication gap. Importance of Corporate communication for value creation , Communication mechanism with stake holders- Corporate liasoning, The Role of C-Suite executives in Corporate Communication and Decisions.

Module 2: Public Speaking

Characteristics of effective speech, voice quality, rate of speaking, clear articulation, eye contact, use of expressions, and gestures and posture; Types of managerial speeches: speech of introduction, speech of vote of thanks, occasional speech, theme speech, formal speeches during meetings, Role of Public speaking for better navigation by executives and Managers in Organizational Hierarchy, Public speaking for developing leadership skills, Trouble shooters and corporate communications.

Module 3: Soft skills

How communication skills and soft skills are inter-related, Body language-posture, eye-contact, handling hand movements, gait - Voice and tone, Meeting and Boardroom Etiquettes - Guidelines for planning a meeting, Before the meeting, On the day of the Meeting, Guidelines for Attending the meeting, For the Chairperson, For attendees, For Presenters, Telephone Etiquette, Cell phone etiquette, Telephone etiquette guidelines, Mastering the telephone courtesy, Active listening, Putting callers on hold, Transferring a call, Screening calls, Taking a message, Voice Mail, Closing the call, When Making calls, Closing the call, Handling rude or impatient clients, Cross-cultural communication, cultural sensitivity, Cross-cultural issues which affect Communication across different Cultures, Culture and non-verbal communication, Effective intercultural communication, Business and social etiquette.

Module 4: Presentation skills of Executives and Employees

Principles of Effective Presentations, Planning, Structure and Delivery, Principles governing the use of Audio-visual media, Time management - Slide design and transition: representation of textual information into visuals for effectiveness of communication - Style and persuasiveness of the message - Adherence to the number of slides, Dynamics of group presentation and individual presentation.

Module 5: Technology in Corporate Communication.

Web /video conferencing, tele-meeting. Virtual Meeting Mechanisms-etiquette, personation skills, Work from home communications, E-Training and performance appraisal Physical Appearance; Communication Style; Content of Communication, Emerging Trends in Virtual Communication.

Suggested Books/Articles/Links for References:

1. Monipally MM, Busines Communication Strategies, McGraw Hill
2. Bovee, Till and Schatzman, Business Communication today, Pearson
3. Scot Ober, Contemporary Busines Communication, Biztantra
4. Parag Diwan, Business Communication, Excell books
5. Murphy, Effective Business Communication, McGraw-hill
6. Teaching and learning Resources;
http://eff.cls.utk.edu/fundamentals/eff standards.htm
http://www.ndted.org/teachingResources/ClassroomTips/Communication.htm

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 2.1 MODERN INDIAN BANKING

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the students will be able to understand the core banking services, prudential norms, new technologies and the latest transformation or reforms in Indian Banking Sector.

Syllabus:

Module 1: Introduction to Indian Banking: Introduction to Indian Banking: Phases of Indian Banking System, Introduction on SBI, Nationalized Banks, Private Banks, Local Area Banks, Small Finance Banks, Payment Banks, Foreign Banks, Cooperative Banks and Regional Rural Banks: Features, Functions & Objectives. Acts: Banking Regulation Act, 1949, Deposit Insurance and Credit Guarantee Corporation Act 1961, The Securitization and Reconstruction of Financial Assets and Enforcement of Securities Interest Act, 2002 (SARFAESI Act), Prevention of Money Laundering Act 2002, Banking Ombudsman Scheme – Introduction & Concept. Major Reforms in Banking Sector in India.

Module 2: Reserve Bank of India: Reserve Bank of India: History, Key Landmarks, Objectives, Organization Structure, Functions, recent measures by RBI. Introduction to Monetary Policy: Techniques of Monetary Policy – Qualitative & Quantitative (CRR, SLR, Repo, Reverse Repo, Bank Rate, MSF Rate, MCLR Rate, Liquidity Adjustment Facility, Open Market Operations, Marginal Stability Scheme), Monetary Policy and Indian Economy.

Module 3: Non-Performing Asset (NPA): Introduction to NPA: Meaning & Definition, Identification of NPA, Asset Classification & Guidelines by RBI, Provisioning – Asset Classification, Causes for NPA, Effects of NPA, Impact of NPA on Balance Sheet, Balance Sheet Cleaning, Monitoring of NPA, Measures to overcome NPA, Writing off of NPAs, NPA Management. NPA norms by RBI. IRAC Norms (i.e., Income Recognition and Asset Classification norms), Debt Recovery Tribunals, Willful Defaulters, Introduction to Credit Information Bureau (India) Limited (CIBIL), Insolvency and Bankruptcy Code (IBC), 2016.

Module 4: **BASEL Norms:** Introduction to BASEL, History of BASEL, BASEL: I, II and III – Objectives, Framework, Challenges, Pillars and Impact. BASEL Norms – Guidelines by RBI. Recession and Indian Banking Sector.

Module 5: Asset & Liability Management: Introduction, Meaning & Definition, Types and Characteristics of Assets & Liabilities, ALM Strategies, Risk Management Concepts, VAR Analysis, Back-testing and Stress Test for Banks, E-Frauds in banking System – Challenges and Solutions.

Suggested Books/Articles/Links for References:

1. Gorden and Natarajan: Banking Theory Law and Practice
2. Tannan M L: Banking Law and Practice in India
3. Vasant Desai, Bank and Institutional Management, HPH,
4. Muralisubbakrishna, Bank Credit Management,
5. O Payramval, Modern Banking of India.
6. Shekar K C: Banking Theory Law and Practice
7. S.P. Srivastava: Banking Theory Law and Practice
8. Kiran Prakashan: Banking and Financial Awareness
9. Moorad Choudhry: The Principles of Banking,
10. S Natarajan & Dr. R. Parameswaran, Indian Banking, Kindle Edition

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 2.2 RISK MANAGEMENT & DERIVATIVES

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the students will be able to understand the basic knowledge of risk, type of risks and tools of risk management. They can understand the role of derivatives as financial instruments to mitigate the risks in Business.

Syllabus:

Module 1: Introduction to Risks: Introduction to Risks: Meaning, Definition, Evolution, Types, Classification, Sources, Scope, Challenges of Risks to Business. Introduction to Risk Management: Meaning & Definition, Steps in Risk Management, Objectives, Process, Role of Risk Management in Business & Finance - Risk Management Techniques, Risk and Uncertainty, Perils, Clauses and Risk Covers. Risk Management Practices in Business, Insurance, Banks and Finance, Concept of Agri Risk Management.

Module 2: Credit Risk Management: Credit Risk and Risk Management Models: Introduction to Credit Risk, Meaning & Definition, Sources, Components, Classification of Credit Risk, Factors affecting Credit Risk. Introduction to Credit Risk Management – Meaning, Principles, Prudential Norms, Process, Tools of Credit Risk Management, Functionality of Good Credit. Concept & Problems on Credit Risk Management Models: Altman's Z Score Model, RAROC Model, KMV Model, VAR Model, Credit Metrics Model, Credit Risk Rating Model, Credit Risk Score by CIBIL – Mechanism.

Module 3: Market Risk & Operations Risk: Introduction to Market Risk: Meaning & Definition, Types, Yield Curve & Types. Introduction to (Value at Risk) VaR Model: Meaning & Definition, Why VaR?, Calculation of VAR, Pros & Cons of VaR, Methods of VaR – Historical Simulation, Model Building Approach, Linear Approach, Quadratic Model, Monte Carlo Simulation, Stress Testing and Back Testing – Concept & Problems. Introduction to Operations Risk Management (ORM): Meaning & Definition, Features, Types & Causes of Operations Risk, ORM Process, Why ORM?, Risk Modelling Methods, 5M Model – Concept.

Module 4: **Basics of Derivatives:** Introduction to Derivatives, Evolution of Derivatives, Meaning & Definition, Characteristics, Functions, Participants, Economic Benefits of Derivatives, Factor Contributing to the growth of Derivatives Market in India, Types of Derivatives – Concept, Meaning & Definition. Recent Trends in Derivatives.

Module 5: Futures, Options & Swaps: Introduction to Futures Market: Meaning & Definition, Evolution, Types, Features, Terminologies, Pros & Cons, Forwards v/s Futures, Margin & Types of Margin, Mark to Market – Concept & Problems, Cost of Carry Model – Concept & Problems, Clearing & Settlement of Future Contract. Introduction to Options Contract: Meaning & Definition, Evolution, Types, Features, Terminologies, Pros & Cons, Options Market Trading Mechanism, Futures v/s Options, Option Valuation: Binomial Option Pricing Model, Black-Scholes Option Pricing – Concept & Problems. Introduction to Swaps: Meaning & Definition, Types, Features, Pricing of Swaps: Concept & Problems.

Suggested Books/Articles/Links for References:

1. P.K. Supta, Insurance & Risk Management, HPH
2. G. Koreshwar, Risk Management, HPH
3. S.K. Poddar, Risk & Insurance Management, HPH
4. John C. Hull, Risk Management & Financial Institutions, HPH
5. Robert W. Kolb, James A. Overdahl, Financial Derivatives: Pricing and Risk Management, John Wiley & Sons.
6. Sundaram Janakiramanan, Derivatives and Risk Management, Pearson Education India

7. Verma, Derivatives and Risk Management, Tata McGraw-Hill Education
8. KHATRI, DHANESH KUMAR, Derivatives and Risk Management, PHI Learning Pvt. Ltd.
9. Steve L. Allen, Financial Risk Management, Wiley
10. Philippa X. Girling, Operational Risk Management, Wiley

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 2.3 ADVANCED RESEARCH METHODOLOGY

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the Students will be able to learn concepts, tools and techniques of the methodology of business research. It also gives an opportunity to do a research / consultancy project in future.

Syllabus:

Module 1: Introduction to Research: Introduction to Research: Meaning, Characteristics, Objectives, Motivation in Research, Types, Methods, Significance, Process, Approaches, Criteria of Good Research. Concept of Theory, Empiricism, Deductive and Inductive Theory. Introduction to Ethics in Research, Plagiarism, Limitations and Ethical Issues in Research, Software for Detection of Plagiarism, Plagiarism level in National and International Publications, Problems encountered by researchers in India.

Module 2: Research Topic & Research Design: Selecting a Topic for Research, Types of Research Problems in Social Science, Components & Sources of Research Problem, Techniques involved in Defining Problem, Definition of Problem and Evaluating Problem, Review of Literature: Need, Purpose & Note Taking, Research Gap Identification. Introduction to Research Design: Meaning, Need & Importance, Types & Uses of Research Design, Features of Good Research Design, Types of Research Design – Concept, Pros & Cons. Qualitative, Quantitative and Mixed Research Designs, Steps in Sample Design, Complex Random Sample Designs, Variables in Research: Introduction, Meaning, Types.

Module 3: Scales of Measurement & Data Processing: Scales of Measurement: Types of Data Measurement Scale, Techniques of Data Scaling, Goodness of Measurement Scales, Deciding the Scale, Validating the Scale. Data Processing: Processing and Distribution - Field Work Validation - Tabulation - Editing - Coding - Classification and Tabulation of Data - Presentation - Graphical Representation. Reliability and Validity: Meaning, Types and Need. Sources of Data: Primary and Secondary Sources – Qualitative and Quantitative Methods of Data Collection, Constructing Questionnaire, Standardized Questionnaire, Questionnaire v/s Schedules.

Module 4: Sampling & Hypothesis: Introduction to Sampling: Concepts of Population, Sample, Sampling Frame, Sampling Error, Sample Size, Characteristics of a good sample, Types of Sampling - Probability and Non-Probability, Determining Size of the Sample, Sample v/s Census, Introduction to Hypothesis: Meaning, Concepts & Types. Type I and Type II Errors, Level of Significance, Testing of Hypotheses: Concepts, Steps in Testing of Hypothesis, P – Value Approach.

Module 5: Statistical Tests & Software's: Univariate and Multivariate Data Analysis, Descriptive vs Inferential Analysis - Descriptive Analysis of Univariate Data and Bivariate Data, Parametric and Non-Parametric Tests, Correlation Analysis, Multiple regression analysis, t-Test, Z-Test, F-Test, Chi-Square, ANOVA and Econometrics Model – Concept & Problems. Importance of Report Writing - Types of Reports, Footnotes and Bibliography, Reference Management Software like Zotero/Mendeley, Research Software like SPSS, AMOS, GRATEL, R TOOLS., PYTHON, etc.

- **In the place of Internal Assessment, Practical Tests shall be conducted through Statistical software packages (SPSS, AMOS) for Research.**
- **Practical Examination will be conducted by the BOE.**

Suggested Books/Articles/Links for References:

1. Moses, C.A. Survey Methods in Social Investigation.
2. Goode & Hatt, Methods in Social Investigation.
3. William Emory, Business Research Methods.
4. Vemon Colver & H.L. Balsleg, Business Research Methods.
5. Krishnaswamy O.R, Methodology of Research in Social Sciences, Himalya Publishing house.
6. Kothari. C.R, Methodology of Research, Vikas Publishing House.
7. K.R. Sharma, Research Methodology, National Publishers, Jaipur.
8. Wilkinson & Bhandarkar, Methodology and Techniques of Social Research.
9. Cooper D.R and P.S. Schindler, Business Research Methods, Tata McGraw Hill.
10. C.S. Raydu, E-Business of E-Commerce, HPH
11. Dr. Usha Devi, Business Research Method, HPH
12. J.K Sachdeva, Business Research Methodology,
13. William Emory, Business Research Methods.
14. Dr. O. R. Krishnaswami, "Business Research Methods", Himalaya Publishing House, 2020, Mumbai.
15. P.K. Mozi, Research Methodology, HPH
16. Dr. Usha Devi, Business Research Method, HPH

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 2.4 DIGITAL MARKETING

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the students will gain industry background knowledge to knowledgeably navigate Digital Marketing topics including Digital advertising, search, social media, and online privacy.

Syllabus:

Module 1: Introduction to Digital Marketing: Introduction, Meaning & Definition, History, Objectives, Features, Scope, Benefits and Problems, Techniques, Digital Marketing v/s Real Marketing. Landscape – Past – Today – Future; Internet Infrastructure Stack Business Models & Strategies: Strategic Planning – Strategy to Electronic Planning – Strategic Drivers of the Internet Economy – Business Models to Digital Business Models – E-Business Models– Performance Metrics – The Balanced Scorecard.

Module 2: Digital Marketing Environment: Product – Products on Internet – Creating Customer Value Online – Product Benefits – E-Marketing Enhanced Product Development – Price – Change in Pricing Strategies – Buyer and Seller Perspectives – Payment Options – Pricing Strategies – Distribution– Online Channel Intermediaries – Distribution Channel Length and Functions – Channel Management and Power – Distribution Channel Metrics – Promotion – Integrated Marketing Communication (IMC) – Internet Advertising – Marketing Public Relations – Sales Promotion Offers – Direct Marketing – Personal Selling – IMC Metrics-Search Engine Optimization (SEO) – Contents, Tools & Optimization. Content Management – SWOC.

Module 3: Research Environment: Data Driven Strategy – Marketing Knowledge Management – Monitoring Social Media – Technology-Enabled Approaches – Real-Space Approaches – Marketing Databases and Data Warehouses – Data Analysis and Distribution – Knowledge Management Metrics - Consumer Behaviour Online – Segmentation – Targeting – Differentiation – Positioning Strategies, Online Marketing Research Tools, Affiliated Marketing – Concept. Overview of Global E-Marketing Issues – Country and Market Opportunity Analysis – Technological Readiness Influences Marketing – Wireless Internet.

Module 4: **Customer Acquisition and Retention:** Profile of Consumers – Browsing Behaviour Model – Elements of Social Media – Social Media Strategies – Social Media Performance Metrics – Building Customer Relationships – Relationship Marketing – Stakeholders – Three Pillars of Relationship Marketing – Customer Relationship Management (CRM) – CRM Building Blocks – Ten rules for CRM Success – CRM Platforms, Strategies & Models. E-CRM System: Why & Uses, Website Solution Method, Web Analytics & Use of Google Analytics – Reports.

Module 5: Emerging Issues: Online Governance and ICANN – Jurisdiction – Fraud – Consumer Loyalty of Website-Services – The Quadratic Effect of Flow – Role of Technology Readiness in Developing Trust and Loyalty for E-Services in Developing. Access – The Digital Divide Ethical and Legal Issues – Privacy – Digital Property – Online Expression – Cyber Security –Cyber Crime. Email, Facebook, Instagram, LinkedIn and other Social Applications Marketing – Concept.

Suggested Books/Articles/Links for References:

1. KAUSHIK, A, Web Analytics 2.0 (1st ed.). Wyley Publishing, Inc.TK 5105.88817 K38i
2. KRUG, S, Don't make me think, Revisited (3nd ed.). New Riders Press TK 5105.888 K78
3. HUNT, B. Convert! Designing websites to increase traffic and conversion (1st ed.). Wiley Publishing.TK 5105.888 H85

4. BAILEY. M, Internet Marketing: An Hour a Day (1st ed.). Wiley Publishing. HF 5415.1265 B29
5. KERPEN, D. Likeable Social Media (1st ed.). McGraw-Hill HF 5415.1265 K47
6. RYAN, D. & JONES, C. (2012). Understanding Digital Marketing (2nd ed.). Kogan Page Publishers. HF 5415.1265 R93 2012
7. STOKES, R. eMarketing. The essential guide to marketing in a digital world (5th. ed.). Retrieved from http://www.redandyellow.co.za/product/textbook-digital/
8. P E-Marketing, Judy Strauss and Raymond Frost, Prentice Hall, 6th Edition, 2013
9. Internet Marketing: Integrating Online and Offline Strategies. M. L. Roberts and Debra Zahay, 3rd edition, Cengage Publishing.
10. Digital Marketing: Strategy, Implementation and Practice, Chaffey D., Ellis-Chadwick, 5th Edition, F., Pearson.
11. E Marketing – The essential guide to online marketing, Rob Stokes, Flat world knowledge.
12. E-marketing in Developed and Developing Countries: Emerging Practices, Hatem El-Gohary and Riyadh Eid, IGI Global.
13. The Essential Guide to Online Marketing, Rob Strokes, Quirk, ISBN: 9781936126323
14. The New Rules of Marketing and PR: How to Use Social Media, Blogs, News Releases, Online Video, and Viral Marketing to Reach Buyers Directly, David Meerman Scott, 2ndEdition.
15. E-Commerce: An Indian Perspective, P. T. Joseph, Prentice Hall, 4th Edition.
16. Electronic Commerce: A Simplified Approach, Munesh Chandra Trivedi, Jaico Publishing House.
17. Online Display Advertising: Targeting and Obtrusiveness, Marketing Science, Gold farband Tucker.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 2.5 EMERGING TRENDS IN ENTREPRENEURSHIP

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the students will gain in-depth knowledge on venture creation and development of business plan. The students are exposed to successful entrepreneurship stories and encourage them to start their own enterprise.

Syllabus:

Module 1: Entrepreneurship: Introduction – Meaning & Definition of Entrepreneurship, Entrepreneur & Enterprise – Differences between Entrepreneurship, Entrepreneur & Enterprise – Functions of Entrepreneur – Types of Entrepreneurs - Role of Entrepreneur for Economic Development - Factors influencing Entrepreneurship - Pros and Cons of being an Entrepreneur – Differences between Manager and Entrepreneur – Qualities of an Entrepreneur – Types of Entrepreneurs. Entrepreneurship Development- Need – Problems – National and State Level Institutions, Recent Government policies and programmes in the promotion of entrepreneurial environment.

Module 2: Entrepreneurship Development and Leadership: Types of start-ups; Entrepreneurial class theories; Entrepreneurial training; EDP programmes; Characteristics of entrepreneurial leadership, Components of entrepreneurial leadership; International Entrepreneurship- Opportunities and challenges; Entrepreneurial challenges; Source of innovative ideas; Entrepreneurship and creativity; Techniques for generating ideas, Impediments to creativity, Contemporary Entrepreneurship – Gig Economy Entrepreneurs, Niche Entrepreneurs, Digital Nomodism, Distruptive Technology Entrepreneurs and New age Entrepreneurs.

Module 3: New Venture Planning: : Introduction to Venture, Meaning & Definition, Objectives, Characteristics, Types, Stages, Methods to Initiate Ventures; Acquisition- Advantages of acquiring an ongoing venture and examination of key issues; Franchising- how a franchise works, franchising law, evaluating of franchising opportunities; Developing a marketing plan- customer analysis, sales analysis and competition analysis, steps in marketing research; Business plan-benefits of drivers, perspectives in business plan preparation, elements of a business plan; Business plan failures, Challenges in Indian Market for Ventures and Franchisees.

Module 4: **Financing Venture:** Financing stages; Sources of finance; Venture capital; Angel Investment, Crowd Funding; Criteria for evaluating new venture proposals; Evaluating Venture Capital- process.

Module 5: Issues for Ventures: Legal issues – Forming Business Entity, considerations and criteria, requirements for formation of a Private/Public Limited Company, Intellectual Property Protection- Patents, Trademarks and Copyrights – Importance for start-ups, legal acts governing business in India; Opportunities and challenges for starts ups in India/Ethical Issues.

Suggested Books/Articles/Links for References:

1. Vasant Desai: The Dynamics of Entrepreneurship Development and Management, HPH
2. Mark. J. Dollinger, Entrepreneurship – Strategies and Resources, Pearson Edition.
3. Satish Taneja: Entrepreneur Development, HPH.
4. UdaiPareek and T.V. Rao, Developing Entrepreneurship
5. S.V.S. Sharma, Developing Entrepreneurship, Issues and Problems, SIET, Hyderabad
6. Srivastava, A Practical Guide to Industrial Entrepreneurs, Sultan Chand.
7. Government of India, Report of the committee on small and medium entrepreneurs.

8. VidyaHattangadi ; Entrepreneurship, HPH.
9. N.V.R. Naidu : Management and Entrepreneurship, I.K. International
10. Bharusali, Entrepreneur Development,
11. K. Venkataramanappa, Entrepreneurial Development, SHB Publications
12. Anil Kumar : Small Business and Entrepreneurship, I.K. International
13. Rekha & Vibha – Entrepreneurial Management, VBH.
14. Entrepreneurship Development and Communication Skills Hardcover – 1 January 2012 by R R Chole (Author), P S Kapse (Author), P R Deshmukh (Author).
15. Khanka S S : "Entrepreneurial Development"
16. Dr P T Vijayashree & M Alagammai ; "Entrepreneurial Development and Small Business Management"
17. V Desai ; "Dynamics of Entrepreneurial Development and Management"
18. Desai ; "Entrepreneurial Development"
19. Steven Rogers and Roza E Makonnen ; "Entrepreneurial Finance, Third Edition: Finance and Business Strategies for the Serious Entrepreneur"

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 2.6 INDIAN ETHOS AND LEADERSHIP

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the Students will be able to learn Indian Ethos and values along with its relevance on Leadership to take managerial decision making in the organization.

Syllabus:

Module 1: Introduction to Indian Ethos: Indian Ethos- Meaning, Features, Need, History, Relevance, Principles Practiced by Indian Companies, Requisites, Elements, Role of Indian Ethos in Managerial Practices, model of management in the Indian socio-political environment, Management Lessons from Kautilya's Arthashastra Indian Heritage in Business, Management, Production and Consumption. Ethics v/s Ethos Indian Management v/s Western Management –Case Studies.

Module 2: Work Ethos and Values: Work Ethos- Meaning, Levels, Dimensions, Steps, Factors Responsible for Poor Work Ethos. Values: Meaning, Features, Values for Indian Managers, Relevance of Value Based Management in Global Change, Impact of Values on Stakeholders: Employees, Customers, Government, Competitors and Society. B: Relevance of values in management: need for values in global change- Indian perspective; values for managers; holistic approach for managers in decision making; secular versus spiritual values in management, Trans-Cultural Human Values in Management and Management Education, Importance of Value System in Work Culture, teaching ethics–Case Studies.

Module 3: Leadership: concept and components of leadership. Trait approach in theories of leadership. Personal characteristics that support effective leadership. Leader and values, Moral Leadership, The significance of self-awareness for the role of leader. Significance of communication skills for work life and leadership, Personality Development: Meaning, Determinants, Indian Ethos and Personality Development. Competency and behaviour approaches to leadership, Leadership and organization culture–Case Studies.

Module 4: Leadership development: Skills for leadership and performance management: Goal setting, support of employee development and communication of feedback; delegation; solving of conflict situations and negotiation. Tools for analysis of leadership styles and 360-degree feedback. Couching and mentoring. Emotions and self-management, emotional intelligence and its significance in the role of leader. Handling emotions and stress. Creative leadership: Influence on the creative potential of work groups and teams; formation of innovative climate in organizations–Case Studies.

Module 5: Stress Management: Meaning, Types of Stress at Work, Causes of Stress, Consequences of Stress, Problems relating to stress in corporate management –Indian perspective, Stress Management Techniques: Meditation- Meaning, Techniques, Advantages, Mental Health and its Importance in Management, Brain Storming, Brain Stilling, Yoga: Meaning, Significance–Case Studies.

Suggested Books/Articles/Links for References:

1. R Nandagopal, Ajith Sankar RN: Indian Ethics and Values in Management, Tata Mc Graw Hill
2. Bhatta, S.K., Business Ethics & Managerial Values.
3. K. Nagarajan ; Indian Ethos and Values : For Leadership Excellence
4. G. D. Sharma ; Management and the Indian Ethos (Paperback) by Rupa & Co, India
5. B.K. Nair,K.C.R. Raja,S. Balachandran ; Ethics, Indian Ethos and Management
6. G. D. Sharma ; Management and the Indian Ethos.

7. Ganjre, Pawar & Laxman ; Indian Ethos - Modern Management Mantra; by Himalaya Publishing House Pvt. Ltd.
8. S.K. Bhatia; Business Ethics and Global Values (For Management Courses: Focus on Indian Ethos, Ethics in Profession, Corporate Governance, MNCs Values) by REGAL Publications.
9. M. K. Joseph, Business Ethos and Values, Anmol Publications Pvt. Limited
10. Alok Chakrawal, Pratibha Goyal, Stress Management, Studera Press

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 2.7 ARTIFICIAL INTELLIGENCE IN BUSINESS

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
2 Credits	3 Hrs	45 Hrs

Course Outcomes: In the business world, competition is the main factor, intelligence is prerequisite for understand to meet competition. AI and BI are essential learning and analytical concepts. So that, students can enhance their intelligence and they can take-up career in these fields.

Syllabus:

Module 1: Artificial Intelligence: Meaning, scope, nature of business problem solving, cognitive science, knowledge acquisition techniques, knowledge sharing and transformation of knowledge

Module 2: Knowledge Mapping: Inheritable knowledge, machine and robotic knowledge, knowledge mapping system, knowledge V/s skills, re-skills, knowledge creation with the help of AI, forward and backward thinking, value system and mind mapping techniques, human capital analytics.

Module 3: Modelling of AI: Intelligent system, areas of AI, Psychological modeling, improving efficiency, business model analysis, appreciative intelligence, benchmarking analysis and business model analysis.

Module 4: Intelligent Cycle: Intelligent cycle components, forms of analysis: facts, perception, beliefs, assumptions, projections and synthesis. Intelligent decision-making, intelligent solution to business problems, unlock value of AI in business, avoiding analysis pitfalls and developing analytical fitness through AI, Introduction to Machine Learning and Concepts of Data Science.

Module 5: Business Intelligence: Meaning, importance in business decision-making interpretation of big data, business and competitive intelligence, business analytics, BI capabilities in business solutions, recent trends in BI.

Suggested Books/Articles/Links for References:

1. Anu Singh Lather, Anil S Saini and Sanjay Dhingra: Business Intelligence and Data ware housing: Narosa Publishing House.
2. Barr et al Handbook of Artificial Intelligence: Morgan Kaufmann.
3. Business Intelligence: Concepts, methods, tools and application by MAIR (Management Association Information Resources) IGI Global Publisher 2015.
4. Charniak and McDermott: Introduction to Artificial Intelligence Addison Wesley.
5. Craig S. Fleisher and Babette E. Bensoussan: Business and Competitive Analysis, Pearson.
6. Elaine Rich and Kevin Knight: Artificial Intelligence, Second edition: McGraw-Hill –Inc.
7. Genesereth & Nilsson : Logical Foundation of Artificial Intelligence: Morgan Kaufmann. 21
8. John Boyer et al: Business Intelligence Strategy: A Practical Guide for achieving business intelligence excellence: McGraw Hill.
9. John Brooks: Business Adventures: John Murracy Learning Private Information and Business Development.
10. Nilsson : Principles of Artificial Intelligence: Morgan Kaufmann.
11. Rajiv Sabherwar, et al, Business Intelligence Practice: Practices, Technologies and Management, Willey.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 3.1 INTELLECTUAL PROPERTY RIGHTS

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the students will understand fundamental aspects of Intellectual Property Rights to students who are going to play a major role in development and management of innovative projects in industries and an ample scope of knowledge on copyrights and its related rights and registration aspects.

Syllabus:

Module 1: Introduction to IPR: Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - Nature of Intellectual Property - Industrial Property - Technological Research, Inventions and Innovations – Important examples of IPR. - IPR in India. Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, Berne Convention, 1886, Universal Copyright Convention, 1952, WIPO Convention, 1967, Patent Co-operation Treaty, 1970, TRIPS Agreement, 1994 and others.

Module 2: Registration & Laws of IPR: Meaning and Practical aspects of registration of IPRs in India and Abroad**:** Registration Process in India, Office of the Controller General of Patents, Designs & Trade Marks (CGPDTM), National IPR Policy – Features. Laws of IPR: Patents Act, 1970, Trade Mark Act, 1999, The Designs Act, 2000, The Geographical Indications of Goods (Registration and Protection) Act, 1999, Copyright Act, 1957, The Protection of Plant Varieties and Farmers' Rights Act, 2001, The Semi-Conductor Integrated Circuits Layout Design Act, 2000, Aesthetic Values and Trade Secrets, Utility Models and others. Personal Data Protection Bill 2019. Career Opportunities in IPR.

Module 3: Patents & Copy Rights: Patents - Elements of Patentability: Novelty, Non-Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board. Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights**.**

Module 4: **Trade Marks & others:** Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non-Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board. Plant Variety Protection & Layout Design Protection: Registration procedure

Module 5: Design & Geographical Indicators (GI): Design: meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection. Geographical indication: meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection.

Suggested Books/Articles/Links for References:

1. Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.
2. 2. Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning

Private Limited.
3. Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: Lexis Nexis.
4. Subramanian, N., & Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf
5. World Intellectual Property Organisation (https://www.wipo.int/about-ip/en/)
6. Office of the Controller General of Patents, Designs & Trademarks (http://www.ipindia.nic.in/)
7. Journal of Intellectual Property Rights (JIPR): NISCAIR
8. Deborah E. Bouchoux, ―Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets‖, Cengage Learning, Third Edition, 2012.
9. Prabuddha Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy‖, McGraw Hill Education.
10. Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd.
11. V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd.
12. Sunita K. Sreedhararn , An Introduction to Intellectual Asset Management.
13. Patrick H. Sullivan, Profiting from Intellectual Capital: Extracting Value from Innovation
14. Tulika Rastogi, IP Audit: Your Way to Healthy Organisation
15. Gordon V. Smith and Russell L. Parr, Valuation of Intellectual Property and Intangible Assets, 3rd Edition
16. Bruce Berman, From Assets to Profits: Competing for IP Value and Return (Intellectual Property-General, Law, Accounting & Finance, Management, Licensing, Special Topics).

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 3.2 LOGISTICS and SUPPLY CHAIN MANAGEMENT

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the Students will be able to understand the concepts of Logistics and also to understand the importance Supply Chain Management in different kinds of Industries.

Syllabus:

Module 1: Elements of Logistics & Supply Chain Management: Introduction – Positioning of Information in Logistics and Supply Chain Management – Logistics Information System (LIS) – Operational Logistical Information System –Emerging Technologies in Logistics and Supply Chain Management, Growth of Logistics and Supply Chain Management in national and international scenarios.

Module 2: Value Chain Management: Value Chain – Functions and Contributions – Supply Chain Effectiveness and Indian Infrastructure – Framework for Supply Chain Solution – Outsourcing and 3PLs – Fourth-party Logistics (4PLs) –Supply Chain Relationships – Conflict Resolution Strategies for Harmonious Relationships.

Module 3: Supply Chain Sustainability-Triple Bottom Line –Profit, Planet, People-CSR-Ethics in Supply Chain Management.

Module 4: **Supply Chain Partners:** Introduction– Concepts of Warehousing– Types of Warehouse– Functions of Warehousing– Strategic Warehousing, Warehouse Operations, Ownership Arrangements, Warehouse Decisions, Warehouse Management Systems, Packaging Perspectives, Packaging for Material Handling Efficiency, Materials Handling, Supply Chain Logistics Design: Global Strategic Positioning; Global SC Integration, SC Security, International Sourcing, Distribution control & evaluation.

Module 5: Supply Chain and Logistics Administration: Relationship Development Management- Relationship Management, Customer Relationship Management (CRM) Focus, Internal Supply Chain Management (ISCM) Focus, Supplier Relationship Management (SRM) Focus. Operational Performance, Financial Performance, Social Performance

Suggested Books/Articles/Links for References:

1. Nandi S. K, Logistics Management, Oxford publications
2. Christopher Martin, Logistics and Supply Chain Management, Pearson
3. Bowersox, Supply Chain Logistics Management, McGraw Hill
4. Gaurdin, Kent N., Global Logistics Management (2001), Blackwell Publishers Ltd., Oxford.
5. Martin Christopher, Logistics and Supply Chain Management, Financial Times Management, Pitman Publishing, London.
6. Kapoor Satish K., and KansalPurva, Basics of Distribution Management: A Logistical Approach',Prentice HALL of India
7. D K Agrawal, Distribution and Logistics Management: A Strategic Marketing Approach ', Macmillan publishers India.
8. Alan Ruston, Phil Crouches, Peter Baker, The Handbook of Logistics and Distribution Management kogan page India new Delhi.
9. Stuart Russell and Peter Norvig ; "Artificial Intelligence: A Modern Approach".
10. Nils J Nilsson ; "Artificial Intelligence: A New Sythesis"

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 3.3 (Accounts) CORPORATE REPORTING PRACTICES- I

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**60 Hrs**

Course Outcomes: On successful completion of the course, the Students will be able to understand the reporting aspects of different elements, standards of Financial Statements.

Syllabus:

MODULE 01 : Conceptual Framework of Financial Statements and IND-AS - Introduction- Framework and its purpose- scope of the "framework"- users of financial statements - objectives to prepare financial statements- underlying assumptions- Accrual Basis, Going Concern- qualitative aspects of financial statements- constraints on relevant and reliable information- elements of financial statements- recognition of the elements of financial statements- measurement of the elements of financial statements- financial capital maintenance vs. Physical capital maintenance.

IND-AS: Introduction to IND- AS, Adoption vs Convergence, roadmap for implementation of the Indian Accounting Standards (IND- AS), Financial statements as per schedule iii to the companies' act, 2013- list of Indian Accounting Standards converged with IFRS.

MODULE 02: Measurement Based on Accounting Policies

Ind AS 8: Accounting Policies, Changes in Accounting Estimates and Errors- **(Provisions) ,** Ind AS 10: Events after the Reporting Period**- (Provisions) ,** Ind AS 113: Fair Value Measurement- **(Provisions),** Ind AS 20 "Accounting for Government Grants and Disclosure of Government Assistance"**-(Provisions),** Ind AS 102 "Share Based Payment"-(**Provisions),** Ind AS 101 "First-time Adoption of Indian Accounting Standards**"-(Provisions)**

MODULE 03: Asset Based Standards

Ind AS 2 "Inventories" - Ind AS 16 "Property, Plant and Equipment"- Ind AS 116 "Leases"- Ind AS 23 "Borrowing Costs" -Ind AS 36 "Impairment of Assets"- Ind AS 38 "Intangible Assets"- Ind AS 40 "Investment Property"

(Note : Provisions & Practical Problems to be taught for all IND AS)

Module 04: Liability Based Standards

Ind AS 37 "Provisions, Contingent Liabilities and Contingent Assets" - Scope, provision, liability, obligating event, legal obligation, constructive obligation, contingent liability, contingent asset, relationship between provisions and contingent liability, recognition of provisions, Contingent asset and contingent liability, Measurement and Disclosure of Information in the Financial Statements.

(Note : Provisions & Practical Problems to be taught)

Module 05: Revenue Based Standards

Ind AS "115 Revenue from Contracts with Customers", Ind AS 113 Fair Value Measurement" Contract, Customer, Income, performance obligation, Revenue, transaction price, Applicability of Ind AS 115, Recognition and identifying performance obligation, determining the transaction price, disclosure requirements in Financial Statements **(Note: Provisions & Practical Problems to be taught).**

Suggested Books/Articles/Links for References:

1. CA Anand Banka- Comprehensive guide to IND AS implementation.
2. CA Praveen Kumar- Consolidation under IND AS- IFRS converged standard
3. CA. Kamal Garg, Corporate Social Responsibility, Bharath Publication
4. Sanjay K Agarwal, Corporate Social Responsibility in India, SAGE Response
5. IFRS for India, Dr.A.L.Saini, Snow white publications
6. Roadmap to IFRS and Indian Accounting Standards by CA Shibarama Tripathy
7. IFRS explained – A guide to International financial reporting standards by BPP learning Media
8. IFRS for finance executives by Ghosh T P, taxman allied services private limited
9. IFRS concepts and applications by Kamal Garg, Bharath law house private limited
10. IFRS: A Quick Reference Guide by Robert J. Kirk, Elsevier Ltd.
11. First lesson to International Financial Reporting Standards beginners guide by MP Vijay Kumar, prime knowledge services.
12. Sariha Gosain and Rajeeh Gosain- Practical approach to IND AS implementation, illustrations, summary & comparisons
13. **https://www.icai.org/post.html?post_id=16002**

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 3.4 (Accounts) STRATEGIC COST MANAGEMENT – I

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the Students will be able to understand the internal environment of business and to enable them to formulate strategies relating to cost.

Syllabus:

Module 1: Costing Strategy: Influence of different classification of cost elements on business enterprise, Importance of analysing cost elements, cost control and cost reduction: meaning, process, methods and techniques of cost control and cost reduction, cost management: areas of cost management, difference between cost management and cost accounting, role of cost accounting in strategic planning and management control.

Module 2: Activity Based Costing System: Introduction to traditional methods of overhead absorption, problems of overhead absorption system under Traditional System, introduction to ABC, Kaplan and Coopers approach to ABC, cost drivers and cost activities, allocation of overheads under ABC, Characteristics of ABC, benefits from adaptation of ABC System, problems on comparison between traditional system and ABC system**(Problems).**.

Module 3: Life Cycle Costing: Meaning of LCC, factors affecting Life cycle costing, phases in product life cycle, characteristics, product life cycle and cost control. Experience curve in product life cycle costing. Project life cycle costing: Meaning, categories of project life cycle costs, optimization of project life cycle costs**(Problems).**

Module 4: **Just in Time, Kaizen and Lean Costing:**
JIT – features, methodology in implementation of JIT, Benefits of JIT ((**Problems).**
Kaizen Costing: concept, procedure for implementation, evaluation, benefits of Kaizen costing.
Lean Cost Management: Meaning, definition, factors, applications, procedure to implementation, comparison with traditional management system, Modern production management techniques, benefits and drawbacks of Lean Cost Management **(Problems)**.

Module 5: Strategic Cost and Performance Evaluation: Integration of strategic cost management with performance evaluation, Strategic cost management issues in different elements of cost; material, labour and overheads; product design, value analysis and value engineering, strategic analysis of cost, business process re-engineering, benchmarking.

Suggested Books/Articles/Links for References:

1. Ravi. M. Kishore, Cost Management, Taxman, Allied Services (p) Ltd.,
2. Sharma &Shashi. K Gupta ; Cost & Management Accounting Kalyani Publishers
3. Arora M N – A Text book of Cost & Management Accounting, Vikas Publishing, New Delhi
4. Lal Jawahar, Srivastava Seema. Cost Accounting, 5thEdition, Tata Mcgraw-Hill, Delhi
5. S.K.R. Paul, *Management Accounting,* New Central Book Agency Private Ltd., Calcutta.
6. Horngren T. Charles, Datar M. Srikant and Rajan V. Madhav. Cost Accounting: A Managerial Emphasis, 15th Edition, Prentice Hall publishers, Delh
7. Roger Cowe, *Hand Book of Management Accounting,* A Grower Handbook.
8. S. Mukherjee & A.P. Roychowdhury, *Advanced Cost and Management Accountancy,* New Central Book Agency, Calcutta
9. Brown &Haward, Mac Donald , Evans, *Principles of Management Accountancy,* London.
10. John K. Shank, *Cases in Cost Management: A Strategic Emphasis,* South-Western Publishing, Thomson Learning. **Note: Latest edition of text books may be used.**

Name of the Program: Master of Commerce

Name of the Course: 3.5 (Accounts) CORPORATE TAX PLANNING

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**60 Hrs**

Course Outcomes: Corporate tax planning is a specific and specialized area where the students may acquire knowledge on the subject. Corporate tax planning as a subject is very interesting to know how the corporate assesses plan to utilize various provision as provided in the Income Tax Act 1961 with an objective to minimize their tax liability. The students have to keep themselves updated with Finance Act applicable for respective financial year.

Syllabus:

Module 1: Basic frame work of Direct Taxation – Introduction to Taxes, History of Taxation in India- Principles of Direct Taxation- Appraisal of Annual Finance Act, Tax Planning and its methods, Advance Tax Rulings .**(Provisions)**

Module 2: Assessment of Company – Meaning, Types, Salient features of company taxation, – Head – wise computation of income of companies, Depreciation U/S 32 - set-off and carry forward of losses, deductions from gross total income 80G-80GGA-80GGB,80JJA,80IA-80IB-80IC, Calculation of Taxable Income and Tax Liability as per Normal Provisions, MAT (Minimum Alternative Tax) 115 JB and Tax Credit. **(Provisions and Practical Problems)**

Module 3: Tax planning and Management - Meaning, Objectives, Scope, Tax Avoidance, Tax Evasion, and Tax Management-Tax planning with reference to setting up of new business, Location of new business, Nature of new Business, Forms of Organization- Tax planning with respect to amalgamation and mergers, multinational companies, double taxation treaties, joint ventures and foreign collaborations, Tax Haven, Vivad se Viswas, (Settlement of Pending Litigations) .**(Provisions)**

Module 4: Corporate Restructuring & Tax Planning –

Capital Structure Issues & Issues of Bonus Shares, Make or Buy, Own or Lease, Retain or Replace, Repairs, Renewal, Transfer pricing. **(Provisions and Practical Problem)**

Contemporary Issues like Direct Tax Code and its implication to various Indian sectors, Budget Implications to Income Tax provisions.**(Provisions)**

Module 5: Tax Payments- E-TDS/TCS, advance payment of tax, e-filing of tax returns and assessments, CBDT Tribunal, Appeals to High Court/Supreme Court and Settlement Commission, refunds, and revision,. **(Provisions and Practical Problems)**

Suggested Books/Articles/Links for References:

1. Vinod K Singhania and Kapil Singhania, Direct Tax Planning and Management, Taxman.
2. Vinod, K. Singhania, Direct Taxes - Law and Practices, Taxman.
3. Mehrotra, H. C, Income Tax Law and Accounts including Tax Planning, Sahitya Bhawan Publications.
4. Narang and Gaur, Income Tax, Himalaya Publishing House.
5. Prasad, B, Direct Taxes -Law and Practices, Wishwa Prakashana
6. T. N. Manoharan, Students Handbook on Income Tax Law, Snow White Publications
7. Harshad. C. Chowdhry, Central Excise and Customs, Ashoda Publications

8. E. A. Srinivas, Corporate Tax Planning, Tata McGraw Hill
9. Income tax Act 1961 as amended till date.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 3.3 (Finance) FINANCIAL MARKETS & SERVICES

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: This course is designed to provide the students with a conceptual understanding of how financial markets-work, how they are structured, and provide insight into the functioning of various components of financial market and distinctive financial services offered by financial institutions.

Syllabus:

Module 1: Introduction to Primary Market: Meaning, functions; Methods of floating new issues: (a) Public issue- process of public issue, prospectus, contents of prospectus, Red-herring prospectus, stock invest scheme, book-building-benefits and limitations of book building; (b) Bought out deals; (c) Rights Issue- procedure for rights issue; (d) Private placement and preferential offer. Parties involved in the new issue market, Government and statutory agencies, collection centres. Pricing of new issue and SEBI guidelines; SEBI and investor protection in the primary market.

Module 2: Introduction to Secondary Market: Meaning and importance; organization of stock exchanges; listing of securities in stock exchanges- listing requirements, listing procedure, listing application, listing agreements; trading mechanism- open outcry system, screen based trading, online-trading WAP (Wireless Application Protocol) trading, the process of buying and selling shares, types of orders, share groups; settlement- Fixed settlement system, Rolling settlement. Risk Management; Margins-VaR (Value of Risk) based margin, mark to market margin, margins based on turnover, exposure limits, Gross exposure limits, violation charges, price bands; carry forward transactions. Individual stock quotations; stock market indices. Brief on Stock Markets in India.

Module 3: Introduction to Financial Services: Introduction to Financial Services: Meaning & Definition, Nature, Scope and Characteristics, Classification, Importance of Financial Services for Economic Development, Fund Based & Fee Based Financial Services, New Financial Products and Services, Challenges facing the Financial Service Sector.

Module 4: **Mutual Funds & Venture Capital:** Introduction to Mutual Funds – Meaning, Definition, Scope, Types, Importance, Risks, Net Asset Value, Mutual Fund in India & Abroad, Performance of Mutual Fund Industry in India. Introduction to Venture Capital – Meaning, Definition, Scope, Importance, Methods of Venture Financing, SWOC of Venture Capital, Growth of Venture Capital in India.

Module 5: Credit Rating & Emerging Technology: Introduction to Credit Rating, Meaning & Definition, Features, Need, Process, Agencies of Credit Rating, Rating Framework, Factors considered for Rating and Types of Rating, Pros & Cons, Credit Rating in India, International Rating Agencies, Use of AI in Financial Services.

Suggested Books/Articles/Links for References:

1. Dalton, John M: How the stock markets works, Practice Hall, Delhi.
2. Machiraju H R: Working of Stock Exchanges in India, Wiley Eastern Ltd, New Delhi.
3. Gupta L. C.: Stock Exchange Trading in India Society for Market Research and Development, Delhi.
4. Raghunatham V: Stock Exchange and Investments, Tata, McGrawHill, New Delhi
5. Gorden & Nataraj: Financial Markets and Services, Himalaya Publishing House
6. Avadhani: Investment and securities markets in India, Himalaya Publishing House
7. Khan M Y: Indian Financial System, Tata McGraw Hill, New Delhi.

8. Giddy I H: Global Financial Markets, AITBS New-Delhi.
9. Preethi Singh: Investment Management, Himalaya Publishing house
10. Guruswamy, S: Financial services, Vijay Nicole imprints, Chennai.
11. P.K. Sahoo, Financial Services and markets, Himalaya
12. I.M. Pondey Venture Capital; The Indian Experience Prentice Hall, New Delhi.
13. J.K. Dietrich, Financial Services and Financial Institution, Prentice Hall.
14. Sashi. K. Gupta & Nisha Aggarwal, Financial Services, Kalyani Publication

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 3.4 (Finance) FINANCIAL PLANNING

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**60 Hrs**

Course Outcomes: The Course in Financial Planning intent to enable critical thinking in students with respect to analysis and application of innovative solutions to varied financial problems and make plan as per their financial situation.

Syllabus:

Module 1: Introduction to Financial Planning: Introduction, Meaning & Definition, Golden Rules of Financial Plan, Objectives, Process & Stages, Characteristics, Functions, Importance, 1H & 4W approach on Financial Plan, Financial Planning for Individual & Organisation, Life Cycle Approach, Formulation of Financial Plan, Financial Planning in India. Introduction to Financial Goals, Salient Features of Financial Goals, Stages of Financial Goals.

Module 2: Introduction to Investment Avenues: Introduction to Investment Avenues, Risk and Return Analysis of: Direct Equity, Equity & Debt Mutual Funds, National Pension Scheme, Public Provident Fund, Provident Fund, Pension Fund, Bank Savings Account, Bank Fixed Deposit Account, Bank Recurring Deposit Account, Senior citizens' savings scheme, Pradhan Mantri Vaya Vandana Yojana (PMVVY), Real Estate, Precious Metals like Gold & Silver, RBI Taxable Bonds, Unit Linked Insurance Plans (ULIPs), Equity Linked Savings Scheme (ELSS), IPO, FPO, Gold Exchange Traded Funds (ETF), Unit Linked Insurance Plans (ULIPs), Sovereign Gold Bond Scheme, Commodities, Insurance Products, and others.

Module 3: Developing Financial Plan: Introduction to Financial Plan, Meaning & Definition, Critical analysis of Investment Opportunities, Risks in Financial Plan, Risk Assessment of Individual and Companies in general. Steps in Financial Plan, Factors considered for Financial Plan, Evaluation & Revision of Financial Plan.

Module 4: **Retirement & Tax Benefits:** Introduction, Meaning & Definition, Objectives, Importance, Types of Retirement Plans, Savings Pattern for Retirement Benefits, how to plan your Retirement? Retirement Plans in India. Introduction to Tax Benefit Schemes, Meaning, Types, Benefits, Tax Benefit Plans in India.

Module 5: Chartered Financial Planner & Analysts: Introduction, Meaning & Definition, Objectives, Characteristics of Chartered Financial Planner and Analyst, Steps in Financial Planning, Importance, Organisational Hierarchy. Factors to be considered for Investment & revision of portfolio, employment opportunities for Financial Planner & Analysts in India and abroad.

Suggested Books/Articles/Links for References:

1. Sinha, "Financial Planning: A Ready Reckoner", McGraw Hill Publications
2. Dr. Pradip Kumar Sinha & Dr. Ajit S. Thite, " Personal Financial Planning Management", Nirali Prakashan
3. Buffet, Marry and Clark, David . Warren Buffett and the Interpretation of Financial Statement. Unit(s) - I, II.
4. Fisher, A. Philip . Common Stocks and Uncommon Profits. Wiley.
5. Unit(s)- I, II Graham, Benjamin . The Intelligent Investor. Unit(s) - I, II Keown, A. J. (2017). Personal Finance – Turning money into wealth. Pearson Publication, Unit(s) - III, V

6. Khurshed, Arif ; Initial Public Offerings: The mechanics and performance of IPOs, Harriman House Publishing.
7. Unit(s) - IV Madura, Jeff ; Personal Finance. Pearson. Unit(s) I, III, V
8. Soota, Ashok and Gopalan, S. R.; Entrepreneurship Simplified: From Idea to IPO. Penguin Random House India. Unit(s) - IV Spier, Guy (2014). The Education of Value Investor. Palgrave. Unit(s) - I, II .

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 3.5 (Finance) INNOVATIONS IN BANKING & TECHNOLOGY

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: The students can understand the crux of core banking solutions and applications of cognitive banking and technology on Banking Operations.

Syllabus:

Module 1: Introduction to Banks: Bank, Banker, Banking, Evolution, Role of Banking System in India, Classification, Objectives, Functions, Schedule v/s Non-Schedule, Public v/s Private, Traditional v/s Modern Payment Banks, Banking System in India.

Module 2: Core Banking: Introduction, Meaning & Definition, Characteristics, Pros and Cons, Evolution of Bank Management - Technological Impact in Banking Operations - Total Branch Computerization - Concept of Opportunities - Centralized Banking - Concept, Opportunities, Challenges & Implementation.

Module 3: Cognitive Banking: Introduction, Meaning & Definition, Characteristics, Pros and Cons, Fintech Technologies in Banking – Industrialisation 4.0, Artificial Intelligence, Cognitive Banking, Blockchain Technology and Cloud Computing: How it works? Cognitive Analytics, AI Tools in Banking Industry, Robotics in Banks.

Module 4: **Technology in Banking–** Plastic Card, Wireless / Wired Point of Sale Machines, Bar Code & QR Code Payment, Recent developments in Payment Systems, e-KYC, Truncated Cheque, NFS, MICR, EFT, ECS, NEFT, RTGS, IMPS, AEPS, USSD, UPI, E-Wallet, Mobile Point of Sale, M-Banking Services and Nano Banking.

Module 5: Frauds in Banking Industry: Introduction, Types of Frauds, Issues in online and offline Banking System, Financial Scams, Online Scams, Precautionary Measures to be taken by Banks and Customers, OTP, TTP, Security measures by Banks in India.

Suggested Books/Articles/Links for References:

1. Ramashish Purvey, New Dimensions of Indian Banking, Serials Publications.
2. M. Revathy Sriram, P. K. Ramanan, R. Chandrasekhar, "Core Banking Solution – Evaluation of Security and Controls", PHI learning private limited.
3. Indian Institute of Banking & Finance; Advanced Bank Management, Macmillan publication.
4. Indian Institute of Banking & Finance; Principles & Practices of Banking. Macmillan Publication.
5. Jessica, K. Financial Services Information Systems (2 ed.). Auerback publications
6. Indian Institute of Banking & Finance, Bank Financial Management, Macmillan publication.
7. Srivastava, & Divya, Nigam, Management of Indian Financial Institutions, Himalaya Publishing House.
8. Vasant, Joshi &Vinay, Joshi, Managing Indian Banks- Challenges Ahead, sage publications.
9. M. Y. Khan, Indian Financial System, Tata McGraw Hill.
10. O.P, Bhat& K. K, Saxena, Bank marketing, skylark publications.
11. https://blog.gft.com/blog/2019/02/11/cognitive-banking-building-the-bank-of-the-future/
12. https://tearsheet.co/wtf/wtf-is-cognitive-banking/
13. https://personetics.com/cognitive-banking/
14. https://www.finextra.com/blogposting/15588/top-5-fintech-and-banking-trends--cognitive-banking-enables-ai-to-create-solutions-based-on-bigdata

15. RBI Manuals to be Referred.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 4.1 BUSINESS ANALYTICS

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the student can understand the importance of analytics in business and application of various tools and techniques to evaluate the performance by generating reports.

Syllabus:

Module 1: Introduction to Analytics: Introduction, Meaning & Definition, Characteristics, Applications of Analytics, Meaning of Business Analytics, SWOC of Analytics, Importance of Analytics, Tools & Techniques of Analytics, Functions of Analytics, Reports in Analytics, Relevance of Analytics in Business, Latest Softwares for Business Analytics.

Module 2: HR Analytics: Introduction, Meaning & Definition, Features, Objectives, Importance, Functions, Types of HR Analytics, Employee Performance Evaluation, Employee Attrition Rate, Recruitment Analytics, Compensation Analytics, Talent Analytics, Training Analytics, Workforce Analytics, Role of Analytics in HRD as a whole, Potential Application of Analytics in HR Department Relevance of HR Analytics in Business, Latest Softwares for HR Analytics.

Module 3: Marketing Analytics: Introduction, Meaning & Definition, Characteristics, Objectives, Importance, Functions, Types of Marketing Analytics, Buying Pattern Behaviour Analysis, Analysis of Trends, Identification of Target Audience, Advertising Techniques, Forecasting Demand & Supply, Segmentation, Marketing Mix Optimization, Competitor Analysis, Channel Analysis, Sales Performance Analysis, Campaign Analysis, Sales Pipeline Reporting, Use of Google Analytics in Marketing, Social Media and its relevance on Marketing Analytics, Potential Application of Analytics in Marketing Department, Latest Softwares for Marketing Analytics.

Module 4: CRM Analytics: Introduction, Meaning & Definition, Characteristics, Objectives, Importance, Functions, Types of Customer Analytics, e-CRM, m-CRM, Role of Analytics in CRM, Purchasing Pattern Analysis, Life Style of Customers, Loyalty Analytics, Customer Life Time Value, Propensity Analytics, Churn Analytics, Customer Segmentation, Cross- Sell or Upsell Models, Analytics and Innovation, Potential Application of Analytics in CRM, Relevance of CRM Analytics in Business, Latest Softwares for CRM Analytics.

Module 5: Finance Analytics: Introduction, Meaning & Definition, Characteristics, Objectives, Importance, Functions, Critical Financial Analytics, Risk based Pricing, Fraud Detection and Prediction, Recovery Management, Loss Forecasting, Risk Profiling, Portfolio Stress Testing, Potential Application of Analytics in Finance Department, Relevance of Financial Analytics in Business, Latest Softwares for Finance Analytics(Simple Practical Applications of Financial Analytics for Business Decisions).

Suggested Books/Articles/Links for References:

1. Hastie, Trevor, et al. The elements of statistical learning. Vol. 2. No. 1. New York: springer.
2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons.
3. Tom White "Hadoop: The Definitive Guide" Third Edit on, O'reily Media.
4. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley.
5. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer.

6. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press.
7. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.
8. Anand Rajaraman and Jef rey David Ulman, “Mining of Massive Datasets”, Cambridge University Press.
9. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
10. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications.
11. ArvindSathi, “Big Data Analytics: Disruptive Technologies for Changing the Game”, MC Press.
12. Paul Zikopoulos , Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications.
13. Marketing Analytics by Wayne L Winston – “Data-driven techniques with Microsoft Excel.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 4.2 FORENSIC ACCOUNTING & AUDITING

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the Students will be to identify, analyse and interpret indicators of financially fraudulent activity and to explain investigative processes and the nature and range of investigative techniques, and identify situations for their application

Syllabus:

Module 1: Forensic Accounting: Forensic Accounting: Meaning, Concept, Role of the professional forensic accountant, Requirements of professional forensic accountant, Responsibilities of accounting investigators and auditors. Fraud – Introduction, Types of fraud, Reasons of fraud, Fraud cycle, Bank Fraud, Corporate Fraud, Insurance Fraud, Cyber Frauds, Securities Fraud, Consumer Frauds, Traits & behaviours of fraudsters, Targets of fraudsters, case studies.

Module 2: Fraud Detection Techniques: Fraud detection techniques, Effective information gathering methods, Fraud risk factors, Professional analytical procedures and techniques. Financial statement fraud – Meaning, Introduction, revenue recognition detection, ratio analysis, horizontal analysis, vertical analysis, cash flow analysis, case studies.

Module 3: Fraud Risk Assessment: Profiling Fraudsters, Organisational profiling methods, Risk analysis & assessment, variety of risk assessment factors, best practices. Fraud risk prevention – meaning, importance, combatting actual instances of fraud, case studies.

Module 4: Forensic Audit: Meaning and Significance – Meaning of Audit – Audit: An Adhering Significance – Stages of Audit – Meaning of Forensic Audit – Significance of Forensic Audit – Key Benefits of Forensic Audit – Need and Objectives: Forensic Audit – Fraud and Forensic Audit: An Introspect – Forensic Audit vis-à-vis Audit.

Module 5: Audit and Investigations: Tools for handling Forensic Audit – Forensic Audit Thinking (Thinking Forensically) – Forensic Audit Procedures – Appropriate Use of Technology - Investigation Mechanism - Types of Investigations - Methods of Investigations: Computer Assisted Auditing Techniques (CAATs) and tools (CAATT) Generalized Audit Software (GAS), Common Software Tools (CST). Finding Facts and Conducting Investigations - Red Flags - Green Flags.

Suggested Books/Articles/Links for References:

1. Ibrahim Kabir (2016), Forensic Audit, Forensic Tools and Techniques for Internal Auditors.
2. Pickett K H , The Internal Auditing Handbook, 3rd Edition, John Wiley and Sons, Inc.
3. Shah Bhavesh , Basics about Forensic Accounting and Auditing, The LinkedIn
4. Study on Forensic Accounting and Fraud Prevention, ICAI , NEW Delhi
5. George A. Manning, Financial Investigation and Forensic Accounting, 3rd Edition, CRC Press.
6. Gupta and Gupta (2015), Corporates Frauds in India – Perceptions and Emerging Issues, Journal of Financial Crime, 22(1): 79 -103.
7. ICSI Study Material on Forensic Audit.
8. Forensic Accounting and Fraud Examination by William Hopwood, Jay Leiner and George Young, McGraw-Hill Companies, Inc.
9. Forensic Accounting for Dummies, Frimette Kass-Shraibman and Vijay Sampath,

Wiley Publishers 5. A Guide to Forensic Accounting Investigation, Thomas Golden, Steven Skalak and Mona Clayton, Wiley Publishers

10. Forensic Accounting and Fraud Examination, Mary-Jo Kranacher, Richard Riley and Joseph Wells, Wiley Publishers

11. Bologana and Robert , Fraud Auditing and Forensic Accounting: New Tools and techniques, 2nd Edition.

12. Gangully Jagdish (2015), Lecture Notes on Forensic Accounting Investigations, Acc 551 at SUNY Albany.

13. Silverstone and Pedneault, Forensic Accounting and Fraud Investigation for Non-Experts, 3rd Edition, ISBN-13: 978-0470879597.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 4.3 (Accounts) CORPORATE REPORTING PRACTICES-II

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the Students will be able to understand the wide range of choices of accounting treatments in different parts of the world, their approaches to basic accounting issues and their choices of accounting rules.

Syllabus:

Module 1: Interpretations of Financial Statements

An overview of Annual Reports, Contents of Annual Report, Key Indicators of Financial and Non- Financial Performance, Nature and extent of Reportable segments, Disclosures of segment information, Management discussions and Analysis.

Module 2: Disclosures in the Financial Statements

Ind AS 24 "Related Party Disclosures", Ind AS 33 "Earnings per Share", Ind AS 108 "Operating Segments", IND AS-34 "Interim Financial Reporting", Ind AS 102 Share-based Payment **(Note: Provisions & Practical Problems to be thought for all IND AS).**

Module 3: Accounting and Reporting of Financial Instruments

Presentation of Financial Instruments (Ind AS 32) – Meaning, Financial Assets, Financial Liabilities - Presentation Recognition and Measurement of financial Instruments (Ind AS 39) – Initial and Subsequent Recognition and measurement of Financial Assets and Financial Liabilities, Derecognition of Financial Assets and Financial Liabilities- Disclosures of Financial Instruments (Ind AS 107)

(Note: Provisions & Practical Problems to be thought for all IND AS).

Module 4: Business Combination and Corporate Restructuring

Introduction- Relevant Terms, Types of merger, methods of accounting, Recognition and Measurement Criteria as Per Ind AS (IND AS 103) treatment of Goodwill arising on merger, purchase consideration and settlement; Accounting in books of vendor/transferor company, Accounting for investment in subsidiary, Accounting for holding companies (including chain holdings, multiple holdings), Corporate Financial Restructuring (including intercompany holdings), Reconstruction schemes, De-merger.

(Note: Provisions & Practical Problem to be thought)

Module 5: Recent Developments in Financial Reporting:

Triple bottom line reporting (TBL) – concept, benefits, implementation, forms, users, Challenges. Sustainability Reporting - Concept, Forms, Benefits, Global Reporting Initiative (GRI). Corporate Social Responsibility- Meaning, importance, requirements and users of CSR Report, benefits, reading of CSR Report, Companies Act-2013 and CSR Policies, Evaluation of CSR reports, innovation in CSR Reporting. Value Added Statement, Economic Value Added, Market Value Added, Shareholders' Value added, Human Resource Reporting

(**Provisions & Case Studies).**

Suggested Books/Articles/Links for References:

1. IFRS explained – A guide to International financial reporting standards by BPP learning Media
2. IFRS: A Quick Reference Guide by Robert J. Kirk, Elsevier Ltd.
3. A. K. Das Mohapatra, international Accounting, PHI Learning Pvt Ltd.

4. Doupnik, T. S. & Perera, H. (2012). International accounting (3rd ed.). New York, NY: McGraw-Hill
5. Choai FDS and Mueller G G, International Accounting, Prentice hall.
6. Mucller G G, International Accounting Part I, Macmillan.
7. Peter Holzerr H. et al, International Accounting, Harper and Row Publishers, New York.
8. Sharokh Saudagaran, International Accounting, Thomson Learning.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 4.4 (Accounts) STRATEGIC COST MANAGEMENT – II

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**60 Hrs**

Course Outcomes: On successful completion of the course, the Students will be able to understand the external environment of business and to enable them to formulate strategies relating to cost and pricing.

Syllabus:

Module 1: Pricing Strategies in Decision Making: Pricing strategies: Pricing policy, process, Role and methods: cost plus pricing, Marginal cost pricing, pricing for target rate of return, added value method of pricing, differential cost pricing going rate pricing, opportunity cost pricing, standard cost pricing, customary pricing, pricing strategy for Export oriented products, methods of export pricing, pricing strategies for new products, management accountant role in product pricing**.(Problems to be taught for all the pricing methods)**

Module 2: Transfer Pricing: Transfer Pricing – meaning, necessity, Objectives, applications, Methods (Cost Based, Market Price Based and Negotiated Pricing), Advantages and Disadvantages, Criteria for setting Transfer Prices, Guiding Principles in the fixation of transfer prices, Transfer Price in different situations. International transfer pricing: meaning, factors affecting international transfer pricing. **(Problem to be taught)**

Module 3: Learning Curve Theory: Introduction, meaning and definition of learning curve, phases in learning curve, applications of learning curve, factors affecting learning curve, comparison between learning curve and experience curve. **(Problem to be taught)**

Module 4: **Cost of Quality and TQM:** Definition, classification of quality costs, cost of Conformance, Prevention costs, appraisal costs, cost of Non-conformance, optimization of quality cost, TQM Core concepts of TQM, Benefits of TQM. TQM –basics, stages, principles, control, corrective actions, PRAISE- steps, problems, implementation Cost of quality report Continuous process improvement.

Module 5: Balanced Scorecard and Benchmarking: BSC: Introduction, drawback of traditional financial measures, attributes to good performance measurement system, concept of balanced score card, perspectives of B.SC and implementation of Balanced score Card, case studies on BSC. Benchmarking – Concepts, Benchmarking process, Impact on Indian Industry, Types of Benchmarking.

Suggested Books/Articles/Links for References:

1. Ravi. M. Kishore, Cost Management, Taxman, Allied Services (p) Ltd.,
2. Sharma &Shashi. K Gupta ; Cost & Management Accounting Kalyani Publishers
3. Arora M N – A Text book of Cost & Management Accounting, Vikas Publishing, New Delhi
4. Lal Jawahar, Srivastava Seema. Cost Accounting, 5thEdition, Tata Mcgraw-Hill, Delhi
5. S.K.R. Paul, *Management Accounting,* New Central Book Agency Private Ltd., Calcutta.
6. Horngren T. Charles, Datar M. Srikant and Rajan V. Madhav. (2014) Cost Accounting: A Managerial Emphasis, 15th Edition, Prentice Hall publishers, Delh
7. Roger Cowe, *Hand Book of Management Accounting,* A Grower Handbook.
8. S. Mukherjee & A.P. Roychowdhury, *Advanced Cost and Management Accountancy,* New Central Book Agency, Calcutta.
9. Brown &Haward, Mac Donald , Evans, *Principles of Management Accountancy,* London.

10. John K. Shank, *Cases in Cost Management: A Strategic Emphasis,* South-Western Publishing, Thomson Learning.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 4.5 (Accounts) CUSTOMS DUTY and GST

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, students will be able to understand the GST law in the country and provide an insight into practical aspects of GST and equip them to become tax practitioners.

Syllabus:

Module 1: Introduction to GST

Introduction to GST- GST Acts- Meaning-Definition-Objectives-Features-Need and Benefits-Dual GST Model- Classification of Goods and Services: Taxable – exempted–Composition Scheme - Rates of GST- Registration: CGST, KGST (Karnataka State) and IGST Acts, 2017.

GST Network (GSTN) – Goods and Services Tax Suvidha Providers (GSP) – GSP Eco system. (Provisions only)

Module 2: Levy and Collection of GST

Supply under sec 7 – Relevant definitions – supply for further business - supply without consideration, composite and mixed supplies - Place of supply.

Time and Value of supply of Goods u/s 12 and Services u/s 13: Relevant definitions- time of supply of goods u/s 12 services u/s 13, forward charge and reverse charge, vouchers for exchangeable goods, residual goods, interest and late fee for delayed payment u/s 12(6), Value of supply u/s 15- inclusions u/s 15(2) a,b,c,d – exclusions u/s 15(3), supply where value can't be determined and notified supplier, related person supply. Methods of Valuation of Goods and Services- Problems including Composition levy.

(Provisions and Practical Problem)

Module 3: Input Tax Credit:

Relevant definitions- Eligibility and conditions for claiming credit – Apportionment of credits and blocked credit – Credit on Capital goods – Availability of credit in special circumstances – Transfer of Input tax credit – Claim of Input tax credit – Matching, reversal and reclaim of Input tax credit, Recovery of Input tax credit and interest there on – Taking input tax credit in respect of inputs sent for job work. – Problems on claiming Input Tax Credit and Assessment of Tax Liability.**(Provisions and Practical Problem)**

Module 4: Procedure and Administration Under GST:

All procedures including registration, tax invoice, credit and debit notes, electronic way bill, accounts and records, returns (GSTRs), payment of tax including reverse charge, refund, job work-Provisions relating to electronic commerce-Liability to pay in certain cases Administration of GST; Assessment and Audit- Inspection, Search, Seizure and Arrest Demand and Recovery-Offences and Penalties-Advance Ruling- Appeals and Revision. **(Provisions Only)**

Module 5: Customs Act, 1962:

Introduction to customs duty **-** Customs Procedures – levy and collection of customs duty-exemptions from customs duties – Methods of Valuation of Customs Duty [including anti-dumping and safe guard duty] - Baggage –Recent Amendments to Customs– Problems.

Detailed procedure in relation to transportation and warehousing – relevant rules and regulations. Drawbacks of customs duties paid – Preparation and submission of drawback claim forms. Adjudication and appeals before the customs authorities and the appellate Tribunal.**(Provisions and Practical Problem)**

Suggested Books/Articles/Links for References:

1. GST Acts and Rules as amended till date
2. V S Datey, Indirect Taxes Law and Practice, Taxmann Publications, New Delhi
3. CA Anoop Modi and CA Mahesh Gupta, GST and Customs Law: SBPD Publication
4. Dr. H C Mehrotra, Prof. V P Agarwal, Goods and Services Tax and Customs Duty Sahitya Bhavan Publications.
5. B.K. Ghargava, Indirect Tax Laws, Taxman Allied Services.
6. V.S. Datey, U.K. Bhargava, Indirect Tax Law and Practice.
7. Commercial's GST, Commercial law publisher (India) Pvt Ltd, New Delhi.
8. Datey V.S.: GST Ready Reckoner, Taxman Publication, New Delhi
9. Koolwal, Ashish & Ritu: Goods and Services Tax ; Commercial Law Publisher (India) Pvt. Ltd.
10. Patel, Chaudhary: Indirect Taxes, Chaudhary Publication, Jaipur
11. Goel Pankaj, GST Ready Referencer, Commercial Law Publisher (India) Pvt. Ltd.
12. Rastogi, Abhishek: Professionals guide to GST Ideation to reality.

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 4.3 (Finance) FOREX MANAGEMENT

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: The purpose of this course is to give the students an exposure to the way foreign Exchange Market operates, to understand the principles of Currency valuation, techniques that can be used to hedge foreign exchange risk and to create an understanding on foreign exchange Management in India.

Syllabus:

Module 1: Elements for Foreign Exchange: International Monetary Systems: Concept, Gold standard, Fixed Exchange Rates, Flexible Exchange Rates, Managed Float System, Fluctuations in Foreign Exchange Rate: Causes and Effects - Need for stability in Foreign Exchange Rate. Introduction to Forex, Evolution, Importance, Features & Objectives, Foreign Exchange Market, Intermediaries, Exchange Rate Forecasting.

Module 2: Determination of Exchange Rates: Types of Foreign Exchange Risks, Factors affecting exchange rates - International trade - Theories of determination of foreign exchange rates - The Law of One Price, Purchasing Power Parity, Interest Rate Parity, Flow Model, Asset Market Model. Balance of payment theory - Forecasting Forex Rates, Technical Forecasts, Economic Models, forecasting of fixed exchange rates from convertible currencies. Nominal Effective Exchange Rates and real Effective Exchange rates, Impact of exchange rate on BOP - Remedial measures taken by Government & Regulatory Authorities in India.

Module 3: Forex Trading & Contracts: Forex trading infrastructure and networks, control's on order placing, direct and indirect quotas, cross rates, speculation, exchange arithmetic psychology of the forex trader, computerized trading programme, information analysis of trading, Problems on Direct and Indirect Quotes. Contracts - Hedging against Exchange Rate Fluctuations: Forwards, Options & Swaps – Problems.

Module 4: **Exchange Payments:** Cash and Spot Exchange Markets, Eurocurrency Markets, The Role of Commercial Banks, Mechanics of Making Foreign Payment, SWIFT, LERMS, Costs Associated with International payments, Basket of Currencies.

Module 5: Forex Risk Management – Meaning & Definition, Importance, Objectives, Features, Methods, Applications. Hedging, Speculation and Management of types of exposures in Forex Market. Using forward markets for hedging – hedging with money market, currency options and currency futures: problems. Internal & External Hedging Strategies – speculation in foreign exchange and money markets.

Suggested Books/Articles/Links for References:

1. Alan C Shapiro, Multi National Financial Management,
2. Clare C Gump, ABC of Foreign Exchange
3. Krishnamoorthy S, Guide to Foreign Exchange Regulations
4. Chaterjee A K, Principles of Foreign Exchanger
5. RAjwadi, Foreign Exchange Management
6. Keith Red Head, Financial Derivatives
7. V V Keshkamat , Foreign Exchange Arithematic, – Vivek Publications ,Mumbai
8. C Jeevandam, Foreign Exchange Arithematic and Risk Management, – Sulthanchand & Sons 9.

9. B K Chaudhuri, Finance of Foreign Trade and Foreign Exchange– Himalaya Publishing House
10. Harris Manville, International Finance.
11. Madhu Vij, International Finance.
12. Keith Pibean, International Finance.
13. Avadhani B.K, International Finance Theory and Practice.
14. R.M Srivastava , Multinational Financial Management.
15. P.A. Apte, International Financial Management.
16. Bndar D.C, International Finance.
17. Murthy E.N, International Finance & Risk Management.
18. M.L. Verma, Foreign Trade & Management in India.
19. Rao and Chary, International Finance.
20. Ramachandra & Others ; International Finance
21. Shapiro Alan. C., Multinational Financial Management, Prentice Hall, New Delhi.
22. Apte P.G, International Financial Management, Tata McGraw Hill, New Delhi.
23. Mcrae T.N and D.P Walkar, Foreign Exchange Management, Prentice Hall.
24. Evilt H.E, Manual of Foreign Exchange.
25. Holgate H.C.F, Exchange Arithmetic.
26. Rajwade A.V., Foreign Exchange Risk Management, Prentice Hall of India

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 4.4 (Finance) SECURITY ANALYSIS & PORTFOLIO MANAGEMENT

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: On successful completion of the course, the students will get to know the terms such as common stock, stock market, stock options, and approaches to investing in the stock market and building stock portfolios. It also provides a basic introduction to portfolio theory and study on various portfolio modelling associated with risks.

Syllabus:

Module 1: Introduction to Securities : Investment – Meaning & Definition, Types or Avenues of Investment, Investment v/s Gambling v/s Speculation v/s Arbitration v/s Hedging, Factors to be considered for Investment, Investment Policy, Risk and Return Analysis, Types of Risk Appetite, Types of Risks in Investment, Sources of Risk, Risk Measurement – Standard Deviation, Covariance, Beta, Correlation (problems), Legal framework and Regulatory cover for Investment in India.

Module 2: Security Analysis: Introduction to Fixed and Variable Income Securities, Equity Valuation Models, Fixed Income Securities Valuation Models: Bonds, Introduction to – Fundamental Analysis, Economic Analysis, Industry Analysis, Company Analysis, Technical Analysis – Modern Tools for Technical Analysis – Line, Point and Figure, Candlestick, Renko Chart, Heikin Ashi, etc. Price Patterns of Stock, Price Trends of Stock, Practical explanation on Technical Indicators used in Stock Market. Dow Theory & Efficient Market Hypothesis (EMH) – Meaning and Types.

Module 3: Introduction to Portfolio Management & Models: Meaning of Portfolio Management, Need, Objectives, Process, Selection of Securities, Harry Markowitz Optimum Portfolio Theory, Capital Asset Pricing Model, CML, SML, Beta Factor – Alpha and Beta Coefficient – Problems, Sharpe Single Index Model (Theory), Arbitrage Pricing Theory, Principle of Arbitrage, Arbitrage Portfolios; Two Factor and Multi Factor Models.

Module 4: Portfolio Evaluation & Revision: Portfolio Evaluation Strategies - Sharpe Model – Jensen Model – Treynor Model and MM Model – Problems Portfolio Revision, Active and Passive Management, Formula Plans, Measure of Return, Risk Adjusted Measures of Performance Evaluation, Market Timing, Evaluation Criteria and Procedures. Recent development in strategies.

Module 5: Global Markets: Global Investment Benefits – Introduction to ADRs, GDRs, IDRs, Green Bond, Masala Bond, FCCBs, Externa Commercial Borrowings, Foreign Bonds, Global Mutual Funds – Relationship between Trends in Global Markets and the Domestic Markets, International Investing, International Funds Management, Emerging Opportunities.

Suggested Books/Articles/Links for References:

1. A. Brahmiah & P. Subba Rao, Financial Futures and Options, HPH.
2. Kevin, S. (2010). Security Analysis and Portfolio Management. (2 ed.). New Delhi: PHI learning Pvt Ltd.
3. Singh Preeti, Investment Management, HPH
4. Alexander Fundamental of Investments, Pearson Ed.
5. Hangen: Modern Investment theory. Pearson Ed.
6. Kahn: Technical Analysis – Plain and sample Pearson Ed.
7. Alexander, shampe and Bailey – Fundamentals of Investments Prentice Hall of India
8. Newyork Institute of Finance – How the Bond Market work – PHI.
9. Mayo – Investment Thomason hearning

10. Pandian, P. (2005). Security analysis and portfolio management. (2ed.). Noida: Vikas publishing house Pvt Ltd.
11. Bhat, S. (2008). Security analysis and portfolio management. (1 ed.). New Delhi: Excel Books.
12. Chandra. (2011). Security Analysis and Portfolio Management. (4 ed). New Delhi: Tata McGraw Hill Publishing company.
13. Ranganatham, M., & Madhumathi, R. (2004). Investment analysis and portfolio management. (4 ed.). New Delhi: Pearson Education

Note: Latest edition of text books may be used.

Name of the Program: Master of Commerce

Name of the Course: 4.5 (Finance) STRATEGIES FOR BANKING RISK AND MARKETING MANAGEMENT

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	60 Hrs

Course Outcomes: The objective of this course is to provide an insight of Risk and Marketing Management in Managerial Decision Making of Banking Industry.

Syllabus:

Module 1: KYC, AML and Account Opening Process

Importance of KYC and AML, Why RBI insists on KYC procedures, The role of Banks in implementing KYC, penalties for non-adherence; Different stages of money laundering, Understand the importance of AML at the time of account opening; Customer acceptance policy: low, medium and high risk customers; Customer verification procedure, KYC documents required for account opening, verification process; Account opening formalities, forms, documents, procedures; Risk management ,KYC, AML – monitoring transactions and reporting of suspicious transactions

Module 2: CASA Deposits

Meaning; Importance; Features and Benefits; Understand what are CASA deposits; Importance of CASA deposits for banks ; Impact on profitability of banks; Features and benefits of current accounts, savings accounts and their variants; Transactions, services and channels offered by banks for CASA account holders; Benefits of CASA deposits to customers

Module 2: Banking Services to CASA Customers, Cross Sell Products Investments and Loans.

Service channels – branch, ATM, internet, mobile banking; Payment and collection services – cheques, electronic funds transfers, cash management, cheque clearing; Ancillary services – locker and safe custody, payment of taxes and bills; Financial services – Sale of insurance mutual funds, gold coins, Government bonds; Depository services – Demat and web trade; Wealth management; Foreign exchange ; Principles of lending, concepts, regulations ; Retail lending – secured and unsecured; Home loan, car loan, loan against securities, Credit cards, personal loan and educational loan ;Business credit – working capital and term loan. Over draft cash credit, term loans, fund based and non-fund based; Priority sector lending – Agri credit, MSME ; NPA management

Module 3: Strategies for Increasing CASA Deposits through Sales and Marketing

Identify the targets and goals product wise for the year and for each month ; Plan the marketing mix for achieving the goals- segmenting targeting products positioning, resource planning ; Plan promotional activities to spread awareness; Collaborate with the team for assigning individual targets, review and performance support; Catchment mapping – Identify the area covered by the branch, identify different segments of customers, potential for business, banking needs, competition; Promotional activities and campaign for lead generation; Recording of leads, Understand the sales funnel, follow up suspects, identify prospect; Field visit route map – Plan the route and customer visits per day; Sales call review and monitoring

Module 4: Selling Skills and Customer Relationship Management

Continuous self- improvement Positive attitude, updated knowledge professional attire, etiquette, behavior, communication skills; Understanding customer segments and needs – Profiling of customers, analyzing customer's financial goals, needs and banking transactions, identifying appropriate products to satisfy the needs; Sales process – Pre sale – fixing up appointments preparing the sales kit- Sales execution – Follow the five steps – opening,

developing a need, proposing products based on benefits; Handing objections, different types of customers, practice the art of probing, listening and persuasion; Practice different type of closure, close the sale; Post – sale analysis, follow – up and service; Account opening – assist in documentation, completion of formalities and activation of account handing over account opening kit to client, explain how to use the features, explain fees and charges; Understanding customer needs and cross sealing appropriate products that satisfy the needs of customers; Customer service management – handing complaints, resolving issues; Building win-win relationships, balance compliance with service
Suggested Books/Articles/Links for References: 1. Uppal RK, Rimpi Kaur, Banking Sector Reforms in India, New Century Publications, New Delhi 2. Agarwal OP, Banking and Insurance, Himalaya Publishing House, Mumbai 3. Vijayaragavan Iyengar, Introductioin to Banking, Excel Books, New Delhi 4. The Indian Institute of Bankers, Modern Banking, Mumbai 5. Indian Institute of Banking and Finance, Risk Management, Mumbai **Note: Latest edition of text books may be used.**

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