MAHARSHI DAYANAND UNIVERSITY, ROHTAK

(Established under Haryana Act No. XXV of 1975)

'A+' Grade University accredited by NAAC

No. ACS-II/F-83/2019/12049-68
Dated: 8-8-2019

To

1. The Dean, Faculty of Engineering & Technology, M.D.University, Rohtak
2. All the Principals of Engineering Colleges (Affiliated to M.D.University)

Sub:- **Schemes of Examinations/Syllabus of various B.Tech courses under Faculty of Engineering & Technology**

Sir/Madam

In continuation to this office letter No. ACS-II/F-83/2019/1878-90 dated 29.05.2019 on the subject cited above, I am directed to inform you that the Vice-Chancellor under Section 9-A(5) in anticipation approval of the Academic Council, approved the recommendations of Faculty of Engineering & Technology in its meeting held on 19.07.2019, regarding minor changes in the Scheme of Examinations and syllabus of B.Tech. 2nd year (3rd and 4th Semester) Syllabus w.e.f 2019-20 as under:-

1. B.Tech (Civil Engineering)
2. B.Tech (Mechanical Engineering)
3. B.Tech (Electronics and Communication Engineering)
4. B.Tech (Electronics & Tele Communication)
5. B.Tech (Computer Science & Engineering)
6. B.Tech (Information Technology)
7. B.Tech (Computer Science & Information Technology)
8. B.Tech (Electrical Engineering)
9. B.Tech (Bio Technology)
10. B.Tech (Fashion & apparel Engineering)
11. B.Tech (Electrical & Electronics Engineering)
12. B.Tech (Textile Technology)
13. B.Tech (Textile Chemistry)
14. B.Tech (Fire Technology and Safety)
15. B.Tech (Printing Technology)
16. B.Tech (Electronics & Computer Engineering)

The Schemes of Examinations and Syllabi of all above courses duly approved are available on the University Website which may be downloaded and information to the students may be imparted accordingly.

Yours faithfully,

8/8/19

Superintendent (Academic)
For Registrar

Endst.No. ACS-II/F-/83/2019/12069-75

Dated: 8-8-2019

Copy of the above is forwarded to the following for information and further necessary action.

1. The Controller of Examination, M.D.University, Rohtak.
2. The Director (UCC) M.D.University, Rohtak with the request to replace the above schemes which was sent you vide this office letter No. ACS-II/F-83/2019/1878-90 dated 29.05.2019 on the University Website.
3. The Deputy Registrar (Secrecy, Conduct), M.D.University, Rohtak.
4. The Assistant Registrar(Result-IV/), M.D.University, Rohtak.

8/8/19

Superintendent (Academic)

Annexure-II

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

Bachelor of Technology

Scheme effective from ~~2018-19~~ 2019-20

SEMESTER 1st (COMMON FOR ALL BRANCHES)

Sr. No.	Category	Course Notation	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
					L	T	P			Mark of Class work	Theory	Practical	Total	
1	Basic Science Course	A	Refer to Table 1	Physics-1	3	1	0	4	4	25	75		100	3
		B	BSC-CH-101G	Chemistry-1	3	1	0	4	4	25	75		100	3
2	Basic Science Course	C	Refer to Table 2	Mathematics-I	3	1	0	4	4	25	75		100	3
3	Engineering Science Course	A	ESC-EE-101G	Basic Electrical Engineering	3	1	0	4	4	25	75		100	3
	Engineering Science Course	B	Refer to Table 3	Programming for Problem Solving	3	0	0	3	3	25	75		100	3
4	Engineering Science Course	A	ESC-ME-101G	Engineering Graphics & Design	1	0	4	5	3	25		75	100	3
		B	ESC-ME-102G	Workshop Technology	1	0	0	1	1	25	75		100	3
5	Basic Science Course	A	Refer to Table 1	Physics Lab-1	0	0	3	3	1.5	25		25	50	3
		B	BSC-CH-102G	Chemistry Lab-1	0	0	3	3	1.5	25		25	50	3
6	Engineering Science Course	A	ESC-EE-102G	Basic Electrical Engineering	0	0	2	2	1	25		25	50	3

				Lab										
		B	Refer to Table 3	Programming in C Lab	0	0	4	4	2	25		25	50	3
7	Engineering Science Course	B	ESC-ME-103G	Manufacturing Practices Lab	0	0	4	4	2	25		25	50	3
8	Humanities and Social science including Managemen t courses	C	HSMC-ENG-101G	English	2	1	0	3	3	25	75		100	3
								TOTAL CREDIT	**20.5**	**175/200**	**300/375**	**125/75**	**600/650**	

M.D. UNIVERSITY

SCHEME OF STUDIES AND EXAMINATION

Bachelor of Technology

Scheme effective from ~~2018-19~~ 2019-20

SEMESTER 2nd (COMMON FOR ALL BRANCHES)

Sr. No.	Category	Course Notation	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
					L	T	P			Mark of Class work	Theory	Practical	Total	
1	Basic Science Course	B	Refer to Table 1	Physics-1	3	1	0	4	4	25	75		100	3
		A	BSC-CH-101G	Chemistry-1	3	1	0	4	4	25	75		100	3
2	Basic Science Course	C	Refer to Table 2	Mathematics-II	3	1	0	4	4	25	75		100	3
3	Engineering Science Course	B	ESC-EE-101G	Basic Electrical Engineering	3	1	0	4	4	25	75		100	3
	Engineering Science Course	A	Refer to Table 3	Programming for Problem Solving	3	0	0	3	3	25	75		100	3
4	Engineering Science Course	B	ESC-ME-101G	Engineering Graphics & Design	1	0	4	5	3	25		75	100	3
		A	ESC-ME-102G	Workshop Technology	1	0	0	1	1	25	75		100	3
6	Basic Science Course	B	Refer to Table 1	Physics Lab-1	0	0	3	3	1.5	25		25	50	3
		A	BSC-CH-102G	Chemistry Lab-1	0	0	3	3	1.5	25		25	50	3

7	Engineering Science Course	B	ESC-EE-102G	Basic Electrical Engineering Lab	0	0	2	2	1	25		25	50	3
		A	Refer to Table 3	Programming in C Lab	0	0	4	4	2	25		25	50	3
8	Humanities and Social science including Management courses	C	HSMC-ENG-102G	Language Lab	0	0	2	2	1	25		25	50	3
9	Engineering Science Course	A	ESC-ME-103G	Manufacturing Practices Lab	0	0	4	4	2	25		25	50	3
								TOTAL CREDIT	**18.5**	**200/175**	**225/300**	**175/75**	**600/550**	

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Important Notes:

1. Significance of the Course Notations used in this scheme
   C = These courses are common to both the groups (Group-A and Group –B).
   A = Other compulsory courses for Group-A.
   B = Other compulsory courses for Group-B.

Course code for different branches

Table 1

Sr. No.	Course Name	Course Code	Branch
1.	Introduction to Electromagnetic Theory	BSC-PHY-101G	• Electronics and Communication Engineering • Electronics and Computer Engineering • Electronics and Telecommunication Engineering • Mechanical Engineering • Fire Technology and Safety Engineering • Mechanical and Automation Engineering • Automobile Engineering • Mining Engineering
2.	Waves and Optics & Quantum Mechanics	BSC-PHY-102G	• Electrical Engineering • Electronics and Electrical Engineering
3.	Semiconductor Physics	BSC-PHY-103G	• Computer Science Engineering • Information Technology • Computer Science and Information Technology
4.	Mechanics	BSC-PHY-104G	• Civil Engineering • Printing Technology
5.	Optics, Optical Fibre, Magnetism and Quantum Mechanics	BSC-PHY-105G	• Bio-Technology Engineering • Textile Technology • Textile Chemistry • Fashion and Apparel Engineering
6.	Introduction to Electromagnetic Theory (IEMT) Lab	BSC-PHY-111G	• Electronics and Communication Engineering • Electronics and Computer Engineering • Electronics and Telecommunication Engineering • Mechanical Engineering • Fire Technology and Safety Engineering • Mechanical and Automation Engineering • Automobile Engineering

			• Mining Engineering
7.	Wave Optics & Quantum Mechanics Lab	BSC-PHY-112G	• Electrical Engineering • Electronics and Electrical Engineering
8.	Semiconductor Physics Lab	BSC-PHY-113G	• Computer Science Engineering • Information Technology • Computer Science and Information Technology
9.	Mechanics Lab	BSC-PHY-114G	• Civil Engineering • Printing Technology
10.	Optics, Optical Fibre, Magnetism and Quantum Mechanics (OFMQ	BSC-PHY-115G	• Bio-Technology Engineering • Textile Technology • Textile Chemistry • Fashion and Apparel Engineering

Ta bl e 2

Sr. No.	Course Name	Course Code	Branch
1.	Math-I (Calculus and Matrices)	BSC-MATH-101G	• Mechanical Engineering • Electronics and Communication Engineering • Civil Engineering • Electrical Engineering • Electronics and Electrical Engineering • Printing Technology • Automobile Engineering • Mechanical and Automation Engineering • Electronics and Computer Engineering • Fire Technology and Safety Engineering • Electronics and Telecommunication Engineering • Textile Technology • Textile Chemistry • Fashion and Apparel Engineering • Mining Engineering
2.	Math-I (Calculus and Linear Algebra)	BSC-MATH-103G	• Computer Science Engineering • Information Technology • Computer Science and Information Technology
3.	Math-I (Series, Matrices and Calculus)	BSC-MATH-105G	• Bio-Technology Engineering
4.	Math-II (Multivariable Calculus, Differential equations and Complex Analysis)	BSC-MATH-102G	• Mechanical Engineering • Electronics and Communication Engineering • Civil Engineering • Electrical Engineering • Electronics and Electrical Engineering • Printing Technology

			• Automobile Engineering • Mechanical and Automation Engineering • Electronics and Computer Engineering • Fire Technology and Safety Engineering • Electronics and Telecommunication Engineering • Textile Technology • Textile Chemistry • Fashion and Apparel Engineering • Mining Engineering
5.	Math-II (Probability and Statistics)	BSC-MATH-104G	• Computer Science Engineering • Information Technology • Computer Science and Information Technology
6.	Math-II (Vector Calculus, Differential equations and Laplace Transform)	BSC-MATH-106G	• Bio-Technology Engineering

Table 3

Sr. No.	Course Name	Course Code	Branch
1.	Programming for Problem Solving	ESC-CSE101G	• Computer Science and Engineering • Electronics and communication Engineering • Information Technology • Computer Science and Information Technology • Electronics and Electrical Engineering
		ESC-CSE102G	For all remaining branches of B.Tech
2.	Programming in C Lab	ESC-CSE103G	• Computer Science and Engineering • Electronics and communication Engineering • Information Technology • Computer Science and Information Technology • Electronics and Electrical Engineering
		ESC-CSE104G	For all remaining branches of B.Tech

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH. (CIVIL ENGINEERING)

SEMESTER 3rd and 4th

Scheme effective from 2019-20

COURSE CODE ANDDEFINITIONS

Course Code	Definition
L	Lecture
T	Tutorial
P	Practical
BSC	Basic ScienceCourses
ESC	EngineeringScienceCourses
HSMC	Humanities and Social Sciences includingManagementcourses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

MAHARSHI DAYANAND UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION
Bachelor of Technology (Civil Engineering) Scheme effective from 2019-20
SEMESTER 3rd

Sr. No.	Course Code	Course Title	Hours per week	Contact hours per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L-T-P			Class work	Theory	Practical	Total	
1.	HSMC-201-G	Economics For Engineers	2-0-0	2	2	25	75	-	100	3
2.	PCC-201-G	Introduction to Civil Engineering	2-0-0	2	2	25	75	-	100	3
3.	BSC-Math-205-G	Mathematics III	2-1-0	3	3	25	75	-	100	3
4.	PCC-203-G	Engineering Mechanics	3-1-0	4	4	25	75	-	100	3
5.	*MC-106-G	Environmental Science	3-0-1	4	0	25	75	-	--	3
6.	PCC-CE-205-G	Fluid Mechanics	2-1-0	3	3	25	75	-	100	3
7.	PCC-CE-207-G	Surveying	2-1-0	3	3	25	75	-	100	3
8.	LC-CE-209-G	Building Drawing lab	0-0-2	2	1	25	-	25	50	3
9.	LC-CE-211-G	Engineering Mechanics Lab.	0-0-2	2	1	25	-	25	50	3
10.	LC-CE-213-G	Fluid Mechanics Lab.	0-0-2	2	1	25	-	25	50	3
11.	LC-CE-215-G	Surveying Lab.	0-0-2	2	1	25	-	25	50	3
				TOTAL	21					

MC-106Gis a mandatory non –credit course in which the students will be required passing marks in theory.

Course Name	**:**	**ECONOMICS FOR ENGINEERS**	
Course Code	**:**	**HSMC-201-G**	**External marks: 75**
Credits	**:**	**2**	**Internal marks: 25**
L-T-P	**:**	**2-0-0**	**Total marks: 100**

Course Objectives:

1. Acquaint the students to basic concepts of economics and their operational significance.
2. To stimulate the students to think systematically and objectively about contemporary economic problems

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

SYLLABUS

UNIT-1

Definition of Economics- Various definitions, types of economics- Micro and Macro Economics, nature of economic problem, Production Possibility Curve, Economic laws and their nature, Relationship between Science, Engineering, Technology and Economic Development.

Demand- Meaning of Demand, Law of Demand, **Elasticity of Demand**- meaning, factors effecting it, its practical application and importance.

UNIT-2

Production- Meaning of Production and factors of production, Law of variable proportions, Returns to scale, Internal and external economies and diseconomies of scale.

Various concepts of cost of production- Fixed cost, Variable cost, Money cost, Real cost, Accounting cost, Marginal cost, Opportunity cost. Shape of Average cost, Marginal cost, Total cost etc. in short run and long run.

UNIT-3

Market- Meaning of Market, Types of Market- Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly (main features).

Supply- Supply and law of supply, Role of demand & supply in price determination and effect of changes in demand and supply on prices.

UNIT-4

Indian Economy- Nature and characteristics of Indian economy as under developed, developing and mixed economy (brief and elementary introduction), **Privatization -** meaning, merits and demerits.

Globalization of Indian economy - merits and demerits.

Banking- Concept of a Bank, Commercial Bank- functions, Central Bank- functions, Difference between Commercial & Central Bank.

Course Outcomes: By the end of this course the student will be able to:

1. The students will able to understand the basic concept of economics.
2. The student will able to understand the concept of production and cost.
3. The student will able to understand the concept of market.
4. The student will able to understand the concept of privatization, globalization and
5. banks.

Suggested Books:

1. Jain T.R., Economics for Engineers, VK Publication.
2. Chopra P. N., Principle of Economics, Kalyani Publishers.
3. Dewett K. K., Modern economic theory, S. Chand.
4. H. L. Ahuja., Modern economic theory, S. Chand.
5. Dutt Rudar & Sundhram K. P. M., Indian Economy.
6. Mishra S. K., Modern Micro Economics, Pragati Publications.
7. Singh Jaswinder, Managerial Economics, dreamtech press.
8. A Text Book of Economic Theory Stonier and Hague (Longman's Landon).
9. Micro Economic Theory – M.L. Jhingan (S.Chand).
10. Micro Economic Theory - H.L. Ahuja (S.Chand).
11. Modern Micro Economics : S.K. Mishra (Pragati Publications).
12. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co).

INTRODUCTION TO CIVIL ENGINEERING			
Course Code	**PCC-201-G**	**External marks:**	**75**
Credits	**2**	**Internal marks:**	**25**
L-T-P	**2-0-0**	**Total marks:**	**100**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- To provide the students an overview of the profession of Civil Engineering.
- To give the students an illustration of the Civil Engineering, properties of various building material, basic requirements of a building and explain the building construction aspects.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

COURSE CONTENT

SECTION-A

Module 1: Civil Engineering and Society

Basics of Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Early constructions and developments over time; Ancient monuments & Modern marvels, Works of Eminent civil engineers, Impact (social, economic, environmental) of Civil Engineering on Society, Introduction to green building concept and methods, Job opportunities in Civil Engineering.

Module 2: Masonry Construction

Introduction, Various terms used in brick masonry, classification of bricks, composition, bonds in brick work, laying brick work, structural brick work, reinforced brick work, Defects in brick masonry, Stone masonry and its classification, composite masonry, Glass block masonry.

SECTION-B

Module 3: Stones and Tiles

Stones: Classification, requirements of good structural stone, quarrying, blasting, dressing of stones, prevention and seasoning of stone; **Tiles:** Manufacturing of tiles, Terra-cotta and its types, uses of terracotta.

Module 4: Timber, paints and varnishes

Classification of timber, structure of timber, seasoning of timber, defects in timber, fire proofing of timber, advantages of plywood and fiber boards, Important Indian timbers; Basic constituents of paints, types of paints, constituents of varnishes, characteristics and types of varnishes.

SECTION-C

Module 5: Roofs and Floors

Types of roofs, various terms used, roof trusses-king post truss, queen post truss etc. Floor structures, ground, basement and upper floors, various types of floorings. Doors and Windows: Locations, sizes, types of doors and windows, fixtures and fasteners for doors and windows.

Module 6: Cavity, Partition Walls and Foundations

Cavity walls and its position, advantages of cavity wall, types of non-bearing partitions, constructional details and precautions, construction of masonry cavity wall. Types of foundations, sub-surface investigation, Foundation in water logged areas, Masonry wall foundation, Introduction to deep foundations.

SECTION-D

Module 7: Damp-Proofing, Water-Proofing and Fire protection

Dampness and its causes, prevention of dampness, materials used, amp-proofing treatment in buildings; Water proofing: water- proofing treatment of roofs; Fire protection: Fire resisting construction, fire protection requirements for buildings.

Module 8: Sound insulation and Acoustics

Classification, measurement and transmission of sound, sound insulation of buildings, Acoustical materials and geo-textiles, rubber and asbestos, laminates and adhesives, Graphene, Carbon composites and other engineering materials including properties and uses.

COURSE OUTCOMES:

At the end of the course, the students will be able to

- Explain the importance of Civil Engineering in the infrastructural development of the society.
- They will be able to illustrate the types and properties of various building materials.
- To be aware of various traditional building materials and also the emerging materials in the field of Civil Engineering construction.
- To select suitable type of flooring, Plastering, varnishes with their application.
- They should be able to describe the basic requirements to construct a building.

Suggested Books:

- Building Construction By Sushil Kumar, Standard Pub., N. Delhi
- Building Material By Rangawala
- Construction Engineering By Y.S. Sane
- Building Construction By Gurcharan Singh, Standard Pub., N. Delhi

Course Name	**:**	**Mathematics III**	
Course Code	**:**	**BSC-MATH-205-G**	**External marks: 75**
Credits	**:**	**3**	**Internal marks: 25**
L-T-P	**:**	**2-1-0**	**Total marks: 100**
Course Objectives:			

Course Objectives:
At the end of this course, the student should be able to learn the behaviour of civil engineering determinate structures under static and moving loads by analytical/experimental techniques and software tools. The student should also be able to acquire the ability to interpret and evaluate experimental results.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

SYLLABUS

Unit-I

Partial Differential equations: First order linear partial differential equations, First order non-linear partial differential equations, Charpit's method, Second order linear partial differential equations and their classifications, Method of separation of variables and its applications to wave equation, One dimensional heat equations and Two dimensional heat flow (steady state solutions only)

Unit-II

Numerical methods: Solution of Polynomial and Transcendental equations – Bisection method, Regula-Falsi method and Newton-Raphson method, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae, Numerical integration, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules

Unit-III

Transform Calculus: Laplace Transform, Properties of Laplace transform, Laplace transform of periodic functions, Inverse Laplace transform by different methods, Convolution theorem, Evaluation of integrals by Laplace transform, Solving ordinary differential equations by Laplace transform method

Unit-IV

Discrete Maths: Pigeon-hole principle, Permutation, Combination, Algebraic structures with one binary operation- Semi group, Monoid and Group, Cosets, Lagrange's theorem, Cyclic group, Normal subgroup

Course Outcomes: By the end of this course the student will be able to:
1. To solve field problems in engineering involving partial differential equations
2. To find roots of polynomial and transcendental equations using numerical methods and conduct numerical integration
3. To deal with the Laplace transform and its application
4. To classify algebraic structure of any mathematical problem.

Suggested Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers
4. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand and Company
5. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI.
6. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
7. C. L. Liu, Elements of Discrete Mathematics, Tata McGraw-Hill.
8. K. H. Rosen, Discrete Mathematics and its Applications, Tata McGraw-Hill.
9. J. L. Hein, Discrete Structures, Logic and Computability, Jones and Bartlett.

ENGINEERING MECHANICS			
Course Code	**PCC-203-G**	**External marks:**	**75**
Credits	**4**	**Internal marks:**	**25**
L-T-P	**3-1-0**	**Total marks:**	**100**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- Students should be able to identify and analyse the basic structural elements.
- Students can apply the concepts of analysis for the design of various civil engineering structures.
- Covers the relationship between stress and strain on deformable solids, principal stresses, maximum shearing stress, and the stresses acting on a structural member.
- To provide basic knowledge in mechanics of materials so that the students can solve real engineering problems and design engineering systems.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

COURSE CONTENT

SECTION-A

Module 1: Simple Stresses and Strains

Properties of Materials, i.e. tensile test, idealized stress- strain diagrams, isotropic, linear, elastic, Visco- elastic and plastic materials, Concept of stresses and strains, St.Venant's principle, relationship between elastic constants, Poisson's Ratio, Hoop stress, Stress and extension of uniform bar and tapered bar under its own weight and due to load, stresses produced in compound bars due to axial loads, Factor of Safety, Thermal stress and strain calculations, Shear stresses and shear strain, Complementary shear stress.

Module 2: Compound stress and strains

Normal stress, tangential Stresses, Stresses induced due to Uniaxial loads, stresses induced by state of simple shear, stresses induced due to biaxial loads, Mohr's Circle (Graphical Method), Principal stresses and principal planes, Maximum shear stresses, Proof stress.

SECTION-B

Module 3: Shear Force and Bending Moment in Beams and Frames

Type of loads, Shear force and bending moment, relation between Shear force and bending moment, Definition and Sign conventions, axial force, Shear force and Bending moment diagrams

Module 4: Bending stresses and Shear stresses in Beam

Pure bending, bending stresses, combined bending and direct stresses, Middle Third rule, composite beams, Variation of shear stresses for various cross-sections of a beam.

SECTION-C

Module 5: Torsion and Thin Cylinder

Torsion equation, its applications to the hollow and solid circular shafts, comparison of solid and hollow Shafts, shafts in series and parallel. Combined torsion and bending of circular shafts. Introduction to thin cylinder, Stresses in thin cylinder vessels subjected to internal pressure Circumferential stresses (Hoop Stresses), longitudinal stress.

Module 6: Column and Strut

Criteria for stability of columns, Buckling of columns, Euler's formula for various end restraints, Rankine's formula, eccentrically loaded struts, struts with initial curvature, struts with lateral loading.

SECTION-D

Module 7: Analysis of Plane Trusses

Different types of trusses, Analysis of plane determinate trusses by method of joints, method of sections and analysis of Space Trusses using Tension Coefficient Method.

Module 8: Failure Theories

Theories of failure: maximum principal stress theory, maximum principal strain theory, maximum shear stress theory, maximum strain energy theory, distortion energy theory, comparison of the failure theories.

Course Outcomes:

At the end of the course, the students will be able to

- Identify different materials and their behaviour.
- Analyse various civil engineering structures under different loading conditions.
- Apply the principles of structural mechanics in design structural elements.
- Apply the concepts of failure theories for design of structures.

Suggested Books:

- Strength of Material by G.H. Ryder, MacMillan Publishers India Ltd.
- Mechanics of Materials by E.J. Hearn, Elsevier Publications.
- Mechanics of Materials by Punmia and Jain, Laxmi Publications (P) Ltd.
- Mechanics of Materials by R.C.Hibbeler, Pearson Higher Education.
- Strength of Materials by Timoshenko and Young,, East West Press.
- Mechanics of materials by V Gupta, Narosa publishing house.

ENVIRONMENTAL SCIENCE, *MC-106-G

Objective: To provide the basic knowledge in Environmental Sciences to students of Engineering. It will guide the students living in a historic transitional period of burgeoning awareness of the conflict between human activities and environmental constraints to help and save the fragile and endangered planet with the natural resources already overexploited.

Course code: MC-GES-106-G

Environmental Studies (Semester 1)							
Lecture	Tutorial	Practical/Field visit	Credit	Theory	Field visit	Total	Time
3	0	1	-	75	25	-	3Hrs

MC-ENV : (ENVIRONMENTAL SCIENCE)

Theory 75 Marks Field Work 25 Marks (Practical/Field visit)

Unit-1 The Multidisciplinary nature of environmental studies. Definition, scope and importance. (2 lecture)

Unit-2 Natural Resources :

Renewable and non-renewable resources : Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non- renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.
* Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit-3 Ecosystems :

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.

b. Grassland ecosystem. c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit-4 Biodiversity and its conservation

* Introduction - Definition : Genetic, Species and ecosystem diversity.
* Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

(8 lectures)

Unit-5 Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.

b) Water pollution c) Soil pollution

d) Marine pollution e) Noise pollution

f) Thermal pollution g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6 Social issues and the Environment:

- From unsustainable to sustainable development.

- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people : its problems and concerns case studies.
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of pollution) Act.
- Water (Prevention and Control of pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- * Public awareness. (7 lectures)

Unit-7 Human population and the Environment.

Population growth, variation among nations. Population explosion- Family Welfare

Programme. Environment and human health.

Human Rights. Value Education. HIV/AIDS.

Woman and Child Welfare

Role of Information Technology in Environment and human health.

Case Studies. (6 lectures)

Unit-8 Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.

* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.

* Study of common plants, insects, birds.

* Study of simple ecosystems- pond, river, hill slopes, etc. (Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.
16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford & TBH Publ. Co. Pvt. Ltd. 345p.
17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ. House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science (TB).
20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).
21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno Science Publications (TR).

22. Wagner K.D., 1998, Environmental Management, W.B. Saunders co. Philadelphia, USA 499p.
23. A text book environmental education G.V.S. Publishers by Dr. J.P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.

Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory : 75 marks, Practical/ Field visit : 25 marks.
The structure of the question paper will be :

Part- A : Short Answer Pattern	:	15 marks
Part- B : Essay Type with inbuilt choice	:	60 marks
Part-C : Field Work (Practical)	:	25 marks

Instructions for Examiners :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.

Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

Fluid Mechanics			
Course Code	**PCC-CE-205-G**	**External marks:**	**75**
Credits	**3**	**Internal marks:**	**25**
L-T-P	**2-1-0**	**Total marks:**	**100**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- Introduce the concepts of fluid mechanics useful in Civil Engineering applications.
- To provide the students a first level exposure related to fluid statics, kinematics and dynamics.
- To provide the knowledge for measurement of pressure, computations of hydrostatic forces on structural components, concepts of Buoyancy and their applications in many engineering problems.
- Topics included in this course are aimed to prepare a student to build a good fundamental background useful in the application-intensive courses covering hydraulics, hydraulic machinery and hydrology in later semesters.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

COURSE CONTENT

SECTION A

Module 1: Basic Concepts and Definitions

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, cavitations; surface tension, capillarity, Bulk modulus of elasticity, compressibility, types of fluids

SECTION B

Module 2: Fluid Statics

Fluid Pressure: Pressure density height relationship, pressure at a point, Pascal's law, gauge and absolute pressure, Pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, pressure gauges,

Module 3: Hydrostatic pressure and force

Hydrostatic pressure and force: horizontal, vertical and inclined surfaces, centre of pressure. Buoyancy and stability of floating bodies, metacentric height

SECTION C

Module 4: Fluid Kinematics

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; rotation and circulation; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinates

Module 5: Fluid Dynamics
Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; limitations of Bernoulli's equation, Practical applications of Bernoulli's equation: Venturimeter, Orifice meter and Pitot tube

SECTION D

Module 6: Boundary Layer Analysis
Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries, Local and average friction coefficients Separation and Control.

Module 7: Dimensional Analysis and Hydraulic Similitude
Dimensional analysis, Buckingham theorem, important dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies, physical modelling, similar and distorted models.

COURSE OUTCOMES:

- Understand the broad principles of fluid statics, kinematics and dynamics
- Understand definitions of the basic terms used in fluid mechanics
- Understand classifications of fluid flow
- Be able to apply the continuity, momentum and energy principles
- Be able to apply dimensional analysis

SUGGESTED BOOKS:

- Hydraulic and Fluid Mechanic by P.N.Modi & S.M.Seth
- Introduction to Fluid Mechanics by Robert W.Fox & Alan T.McDonald 3 Fluid Mechanics Through Problems by R.J.Garde
- Engineering Fluid Mechanics by R.J.Garde & A.G.Mirajgaoker
- Fluid Mechanic and Hydraulic machines R.K. BANSAL

Surveying			
Course Code	**PCC-CE-207-G**	**External marks:**	**75**
Credits	**3**	**Internal marks:**	**25**
L-T-P	**2-1-0**	**Total marks:**	**100**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- To understand the importance of surveying in Civil engineering.
- To study the basics of linear, angular and direction measurements using chain/tape, theodolite and compass.
- To study the method of determination of height of points using various levelling method and tacheometer.
- To study the significance of Plane Table surveying in preparation of map and setting of different types of curves.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

COURSE CONTENT

SECTION A

Module 1: Basics of Surveying and Linear measurement

Definition, principles of surveying, objectives and classifications, Instruments used for measuring distance, chaining, errors in chaining, tape corrections and examples, concept of Geoids and reference spheroids.

Module 2: Direction Measurement

Types of compass- prismatic and surveyor's compass, Bearings and meridians, declination, local attraction, errors and adjustments, Methods of compass traversing, checks in traversing, adjustment of closed traverse and examples.

SECTION B

Module 3: Levelling

Terms used in levelling, types of levels and staff, principles of levelling, temporary adjustments of levels, reduction of levels and booking of staff readings, examples.

Module 4: Geodetic Trigonometric levelling

Height and distances- base of the object accessible and inaccessible, geodetical observation, correction due to curvature and refraction, axis signal correction, difference in elevation between two points.

SECTION C

Module 5: Plane Table Surveying

Plane table accessories, methods of plane table surveying, sources of error, advantages and disadvantages of plane table surveying; contouring and characteristics of contour lines, locating contours, interpolation of contours, contour maps.

Module 6: Angle Measurement

Theodolite, parts of theodolite, Temporary adjustment of Theodolite, measurement of horizontal and vertical angles by different methods, theodolite traversing, adjustments of closed traverse.

SECTION D

Module 7: Tachometric surveying

Principle of of tacheometric surveying, different instrument used in tacheometry, stadia and tangential method of tacheometry, tacheometric constants and their determinations, examples.

Module 8: Curves

Classification of curves, elements of simple circular curve, location of tangent points- chain and tape methods, instrumental methods, Examples; types of transition curves; Vertical Curves: Necessity and types of vertical curves, setting out of a vertical curve by tangent correction, chord gradient and sight distance method.

COURSE OUTCOMES:

At the end of the course, the students will be able to

- To carry out surveying in the field for various civil engineering projects, prepare a contour map and plan of the area.
- Taking accurate measurements with different surveying instruments.
- Adjustment of traverse, and understand the process of setting of different curves for road and railway designs.

SUGGESTED BOOKS:

- Surveying volume I and II: B C Punmia.
- Engineering Surveying (Sixth Edition): W. Schofield.
- Text Book of Surveying: C. Venkataramiah.
- Introduction to GPS: The Global Positioning System: Ahmed El-Rabbany.
- Various Online resources including NPTEL.

Building Drawing Lab.			
Course Code	**LC-CE-209-G**	**External marks:**	**25**
Credits	**1**	**Internal marks:**	**25**
L-T-P	**0-0-2**	**Total marks:**	**50**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- To understand the principles of planning and bylaws.
- To draw plan, elevation and section of bond in brick work, walls and foundations, load bearing and framed structures.
- To prepare detailed working drawing for different parts of a building.

COURSE CONTENT

LIST OF EXPERIMENTS

1. Cavity Wall.
2. Different Bonds in brick work.
3. Grillage foundation.
4. Preparation of building drawing mentioning its salient features including the following details: a) Ground floor plan b) Two Sectional Elevations c) Front and Side Elevations
5. Plan and Sectional Elevation of different Stair-Cases.
6. Plan and Sectional Elevation of different Doors and Windows.
7. Plan and Sectional Elevation of different Ventilators.
8. Plan and Sectional Elevation of Floors.
9. Plan and Sectional Elevation of different roofs.

Course Outcomes:

At the end of the course, the students will be able to

- Student’s ability to perform basic sketching techniques will improve.
- Students will be able to draw orthographic projections and sections.
- Student’s ability to use architectural and engineering scales will increase.
- To prepare drawings for doors, windows, floors etc.
- To use various Symbols, Conventions and Abbreviations for building drawing,
- Prepare detail planning for single and two storied residential building and public building.

ENGINEERING MECHANICS LAB			
Course Code	**LC-CE-211-G**	**External marks:**	**25**
Credits	**1**	**Internal marks:**	**25**
L-T-P	**0-0-1**	**Total marks:**	**50**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- Structural Analysis experiments help to understand, to know the practical behaviour of the physical structures like beams, roof truss etc.
- A proper structural analysis of these structures helps the students to solve the practical problems.
- Different structural apparatus like Simply Supported Beam, Curved Member of different shape, Pin Joint Truss are studied in the laboratory.

LIST OF EXPERIMENTS

1. To determine elastic properties of a beam.
2. Torsion of cylindrical rods (Shaft).
3. To determine and analyse deflection of curved beams.
4. Experimental and analytical study of behaviour of struts with various end conditions.
5. To determine deflection of trusses – Horizontal and vertical deflection of various joints of a pin jointed truss.
6. Experimental and analytical study of a 3bar pin jointed Truss.
7. Experimental and analytical study of an elastically coupled beam.
8. To plot stress- strain curve for mild steel – Demonstration.

COURSE OUTCOMES:

At the end of the course, the students will be able to

- To acquire the knowledge about stresses and strains.
- To get knowledge about loading systems, types of supports and beams and understand the behaviour of different structural system for different loading and deflection.
- Able to calculate the about forces, moments and deflections.
- To verify and compare different theoretical and experimental theorems.
- Analyse and assess the behaviour and serviceability of the structures using analytical/experimental methods.

Fluid Mechanics Lab.			
Course Code	**LC-CE-213-G**	**External marks:**	**25**
Credits	**1**	**Internal marks:**	**25**
L-T-P	**0-0-2**	**Total marks:**	**50**

COURSE OBJECTIVES:

- To understand the physical processes of fluid more closely.
- Various apparatus like, Verification of Bernoulli's theorem apparatus, venturimeter & Orifice meters, orifice & mouth piece apparatus Flow over notches apparatus, vortex flow apparatus etc helps to understand different process.

LIST OF EXPERIMENTS

1. Verification of Bernoulli's Theorem
2. Calibration of V notch
3. Calibration of Rectangular notch
4. Calibration of Trapezoidal notch
5. Study of Pressure Measuring Devices
6. Determination of Metacentric height
7. Hydrostatics Force on Flat Surfaces/Curved Surfaces
8. Venturimeter
9. Orifice meter
10. Determination of coefficient C_d, C_v, and C_c

COURSE OUTCOMES:

At the end of the course, the students will be able to

- Verification of Bernoulli's theorem.
- Calibration of different notches, venturimeter and orifice meter.
- Determination of different coefficient and their verification.
- Study the different property of fluid flow.

Surveying Lab			
Course Code	**LC-CE-215-G**	**External marks:**	**25**
Credits	**1**	**Internal marks:**	**25**
L-T-P	**0-0-2**	**Total marks:**	**50**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- To use of Chain for linear measurement and traversing.
- To use of different compass for determination of directions and for traversing.
- To use different levels and determine the reduced levels, elevation and depressions of ground.
- To prepare maps using plane table by applying different methods.

LIST OF EXPERIMENTS

1. Chain Traversing
2. Compass Traversing
3. Fly Levelling
4. Cross Sectioning
5. Profile levelling
6. Plane Table surveying: Radiation and Intersection
7. Resection- 2 and 3-point problem with plane Table
8. Contouring and preparation contour map.
9. Use of tangent clinometer

COURSE OUTCOMES:

On completion of the course, the students will be able to:

- Use conventional surveying tools such as chain/tape, compass, plane table, levels in the field for various civil engineering applications.
- Enter observation in field book, adjusting and plotting a traverse.
- To calculate the earth work for cutting and filling.
- To prepare contour maps of a small area and its importance in Civil Engineering.

MAHARSHI DAYANAND UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

Bachelor of Technology (Civil Engineering) Scheme effective from 2019-20

SEMESTER 4th

Sr. No.	Course Code	Course Title	Hours per week L-T-P	Contact hours per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
						Class work	Theory	Practical	Total	
1.	HSMC-202-G	Organization Behavior	3-0-0	3	3	25	75	-	100	3
2.	PCC-CE-202-G	Hydraulic engineering	3-1-0	4	4	25	75	-	100	3
3.	PCC-CE-204-G	Design of concrete structure	3-1-0	4	4	25	75	-	100	3
4.	PCC-CE-206-G	Structural Analysis	2-1-0	3	3	25	75	-	100	3
5.	PCC –CE-208-G	Geomatics & Aerial surveying	3-1-0	4	4	25	75	-	100	3
6.	PCC-CE-210-G	Material Testing & Evaluation	3-0-0	3	3	25	75	-	100	3
7.	LC-CE-212-G	Hydraulic engineering lab	0-0-2	2	1	25	-	25	50	3
8.	LC-CE-214-G	Structural Analysis Lab	0-0-2	2	1	25	-	25	50	3
9.	LC-CE-216-G	Geomatics & Arial surveying Lab.	0-0-2	2	1	25	-	25	50	3
10.	LC-CE-218-G	Material Testing & Evaluation Lab.	0-0-2	2	1	25	-	25	50	3
				TOTAL	**25**					

Note:

1. Students will be allowed to use non-programmable scientific calculator. However, sharing of Calculator and other materials will not be permitted in the examination.

2. (A) each student has to undergo practical training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc and its evaluation shall be carried out in the V semester on the basis of seminar, viva-voce, report and certificate of practical training obtained by the student.

Course Name	**:**	**ORGANIZATIONAL BEHAVIOUR**	
Course Code	**:**	**HSMC-202-G**	**External marks: 75**
Credits	**:**	**3**	**Internal marks: 25**
L-T-P	**:**	**3-0-0**	**Total marks: 100**

Course Objectives:
The objective of this course is to expose the students to basic concepts of management and provide insights necessary to understand behavioral processes at individual, team and organizational level.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

SYLLABUS

UNIT – 1

Introduction of Management- Meaning, definitions, nature of management; Managerial levels, skills and roles in an organization; Functions of Management: Planning, Organizing, staffing, Directing & Controlling, Interrelationship of managerial functions, scope of management & Importance of management. Management and social responsibility, difference between management and administration.

UNIT – 2

Introduction of organization:-
Meaning and process of Organization, Management v/s Organization;
Fundamentals of Organizational Behavior: Concepts, evolution, importance and relationship with other Fields; Contemporary challenges and opportunities of OB.
Individual Processes and Behavior-Personality- Concept, determinants and applications; **Perception-** Concept, process and applications, **Learning**- Concept ,theories ; **Motivation-** Concept, techniques and importance

UNIT - 3
Interpersonal Processes- Teams and Groups- Definition of Group, Stages of group development, Types of groups, meaning of team, merits and demerits of team; difference between team and group, **Conflict-** Concept, sources, types, management of conflict; **Leadership:** Concept, function, styles & qualities of leadership.
Communication – Meaning, process, channels of communication, importance ,barriers and overcome of communication..

UNIT - 4
Organizational Processes: Organizational structure - Meaning and types of organizational structure and their effect on human behavior; **Organizational culture** Elements, types and factors affecting organizational culture. **Organizational**

change:
Concept, types & factors affecting organizational change, Resistance to Change.

Course Outcomes: By the end of this course the student will be able to:
1. Students will be able to apply the managerial concepts in practical life.
2. The students will be able to understand the concept of organizational behavior at individual level and interpersonal level.
3. Students will be able to understand the behavioral dynamics in organizations.
4. Students will be able to understand the organizational culture and change

Suggested Books:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management, Pearson Education Asia, New Delhi.
2. Stoner, J et. al, Management, New Delhi, PHI, New Delhi.
3. Satya Raju, Management – Text & Cases, PHI, New Delhi.
4. Kavita Singh, Organisational Behaviour: Text and cases. New Delhi: Pearson Education.
5. Pareek, Udai, Understanding Organisational Behaviour, Oxford University Press, New Delhi.
6. Robbins, S.P. & Judge, T.A., Organisational Behaviour, Prentice Hall of India, New Delhi.
7. Ghuman Karminder, Aswathappa K., Management concept practice and cases, Mc Graw Hill education.
8. Chhabra T. N., Fundamental of Management, Sun India Publications-New Delhi.

Hydraulic engineering			
Course Code	**PCC-CE-202-G**	**External marks:**	**75**
Credits	**4**	**Internal marks:**	**25**
L-T-P	**3-1-0**	**Total marks:**	**100**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- To introduce the students to various hydraulic engineering problems like laminar flow, open channel flows, flow through pipes, hydraulic jump and its applications.
- At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

COURSE CONTENT

SECTION A

Module 1: **Laminar Flow**
Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity.

Module 2: **Turbulent Flow**
Reynolds experiment, Transition from laminar to turbulent flow, Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes

SECTION B

Module 3: Flow through Pipes
Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, siphon, power transmission through pipes, Analysis of pipe networks: water hammer in pipes and control measures, branching of pipes.

SECTION C

Module 4: Open Channel Flow: Uniform flow
Definition, Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channel flow.
Uniform Flow- Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient 'n', Most economical section of channel, Computation of Uniform flow, Normal depth.

Module 5: Open Channel Flow: Non-Uniform Flow
Specific energy, Specific energy curve, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Channel Transitions, Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile

SECTION D

Module 6: Hydraulic Jump
Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump,

Module 7:
Surges, Positive and negative surges, Dynamics of Fluid Flow- Momentum principle, applications: Force on plates, pipe bends, moments of momentum equation,

COURSE OUTCOMES:

- The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
- They will have knowledge in hydraulic jump and its applications.

SUGGESTED BOOKS:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth,
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.
- Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
- Burnside, C.D., “Electromagnetic Distance Measurement,” Beekman Publishers, 1971
- Fluid Mechanic and Hydraulic machines R.K. BANSAL

DESIGN OF CONCRETE STRUCTURE			
Course Code	**PCC-CE-204-G**	**External marks:**	**75**
Credits	**4**	**Internal marks:**	**25**
L-T-P	**3-1-0**	**Total marks:**	**100**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- The aim of this course is to provide students with a thorough understanding of the design of reinforced concrete structures.
- To become familiar with professional and contemporary issues in the design and fabrication of reinforced concrete members.
- Be able to identify and interpret the appropriate relevant industry design codes.
- The course focuses on understanding the behaviour of reinforced concrete components and systems subjected to gravity as well as lateral loads.
- Topics covered will include: design of beams, Column and slabs, detailing of reinforcement, design of foundation and retaining wall.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

COURSE CONTENT

SECTION-A

Module 1: Design methodology in Reinforced Concrete & Working stress Method
Working stress and limit state methods, Limit state v/s working stress method, Building codes, Normal distribution curve, Characteristic strength and Characteristics loads, Design values, Partial safety factors and Factored loads, Stress-Strain relationship for concrete and steel. Working Stress Method: Basic assumptions, permissible stresses in concrete and steel, design of singly and doubly reinforced rectangular and flanged beams in flexure, steel beam theory, inverted flanged beams, design examples.

Module 2: Limit State Method
Basic assumptions, Analysis and design of singly and doubly reinforced rectangular flanged beams, minimum and maximum reinforcement requirement and design examples. Continuous Beams both method -Basic assumptions, Moment of inertia, settlements, Modification of moments, maximum moments and shear.

SECTION-B

Module 3: Concrete Reinforcement and Detailing

Requirements of good detailing, Cover to reinforcement, Spacing of reinforcement, Reinforcement Splicing, Anchoring reinforcing bars in flexure and shear, Curtailment of reinforcement. Analysis and Design of Sections in shear, bond and torsion, Diagonal tension, shear reinforcement, Development length, Anchorage and flexural bond, Torsional stiffness, equivalent shear, Torsional reinforcement, Design examples.

Module 4: Serviceability Limit State

Control of deflection, Cracking, Slenderness and vibrations, Deflection and moment relationship for limiting values of span to depth, Limit state of crack width, Design examples.

SECTION-C

Module 5: Slabs

General considerations, Design of one way and two ways slabs for distributed and concentrated loads, Non-rectangular slabs, Openings in slabs, Design Examples.

Module 6: Retaining Walls

Classification, Forces on retaining walls, Design criteria, Stability requirements, Proportioning of cantilever retaining walls, counter fort retaining walls, criteria for design of counter forts, Design examples.

SECTION-D

Module 7: Columns

Effective length, Minimum eccentricity, Short columns, under axial compression, Uniaxial and biaxial bending, Slender columns. Design examples.

Module 8: Footings

Isolated and wall footings, Design examples. Foundations-Combined footings, raft foundation, design of pile cap and piles, under reamed piles, design examples.

Course Outcomes:

At the end of the course, the students will be able to

- Recognize the design philosophy of reinforced concrete structures.
- Be able to analyze reinforced concrete structural systems under gravity and lateral loads.
- Be able to design different elements of reinforced concrete structural systems subjected to gravity and lateral loads.
- Be able to analyze and design a complete structural system through a comprehensive design project.
- Summarize the fundamental mechanics of reinforced concrete and the empirical assumptions made for analysis.

- Be able to produce a complete project document and present in a concise and complete manner to include structural drawings and structural calculations.
- Design basic structural elements (beams, columns and slabs) according to the design approach of IS:456.

SUGGESTED BOOKS:

- Design Of Reinforced Concrete Structures By P.Dayaratnam, Oxford & IBH Pub.,N.Delhi.
- Design of Reinforced Concrete-Limit State Design By A.K.Jain, Nem Chand & Bros.,Roorkee.
- Design of Reinforced Concrete by I.C.Syal & A,K,Goel, A.H,Wheeler & Co.Delhi.Reinforced Concrete Design by S.N.Sinha, Tmh Pub.,N.Delhi.
- Sp-16(S&T)-1980, Design Aids For Reinforced Concrete to IS:456, BIS, N.Delhi.
- Reinfirced cement concrete design by Neelam Sharma , S.K.Kataria & sons, N.Delhi.
- Sp-34(S&T)-1987 Handbook on Concrete Reinforcement And Detailing`, BIS, N.Delhi.

STRUCTURAL ANALYSIS			
Course Code	**PCC-CE-206-G**	**External marks:**	**75**
Credits	**3**	**Internal marks:**	**25**
L-T-P	**2-1-0**	**Total marks:**	**100**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- To provide basic knowledge in mechanics of materials so that the students can solve real engineering problems and Design Engineering Systems.
- Covers the relationship between stress and strain on deformable solids, principal stresses, maximum shearing stress, and the stresses acting on a structural member.
- Applies analysis to members subjected to axial, bending, and Torsional loads.
- Learn to evaluate internal forces, moments and corresponding stresses in beams through problem solving sessions using different methods.
- This course provides foundation knowledge, skills and their application which are relevant to subsequent courses in Civil Engineering.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

COURSE CONTENT

SECTION-A

MODULE 1: Deflection of Statically determinate structures

Deflection of determinate beams by Double Integration Method, Conjugate Beam Method and Moment Area Methods, Principle of Virtual work (Unit load method) and Castigliano's theorem.

MODULE 2: Deflection of Statically determinate Frame & Truss

Deflection of determinate pin jointed trusses and rigid jointed frames by principle of virtual work, Strain Energy and Castiglino's theorem. Williot Mohr diagram method and Maxwell's laws of reciprocal theorem

SECTION-B

MODULE 3: Travelling Loads

Maximum Shear Force and Bending Moment diagrams for simply supported beams carrying following moving loads: A Single Concentrated Load, Uniformly Distributed Load, Two Concentrated Loads, fixed distance apart Series of Concentrated Loads, Enveloping parabola, equivalent UDL for BM and SF in each of the above cases.

MODULE 4: Influence Line

Influence lines for reactions, BM & SF for simply supported beam and Panelled Girders.

Influence lines for forces in trusses with top horizontal and curved both, Reversal of stresses, Use of influence lines for calculating design forces due to dead load and moving live loads. Influence lines using Muller Breslau principle.

SECTION-C

MODULE 5: Arches

Determination of horizontal thrust, shear force and bending moment diagram for:
1. Two Hinged Arches **2**. Three Hinged Arches **3**. Fixed Arches

MODULE 6: Column Analogy Method & Cable and Suspension Bridge

Elastic centre, properties of analogous column, application to beam & frames. Introduction of Cable and suspension Bridge uniformly loaded cables, Temperature stresses, and three hinged stiffening Girder and two hinged stiffening girder

SECTION-D

MODULE 7: Indeterminate Structures & Deflection methods

Introduction to Indeterminate Structures, Determination of kinematic and static indeterminacy of beams, frames and trusses, Slope Deflection and Moment Distribution Methods- Analysis of continuous beams & portal frames, Portal frames with inclined members.

MODULE 8: Kani's Method

Analysis of continuous beam and simple frames, Analysis of frames with different column lengths and end condition of the bottom storey.

Course Outcomes:

At the end of the course, the students will be able to:

- Helps to determine the deflections and rotations produced by the three fundamental types of loads: axial, Torsional, and flexural.
- Identify the internal forces and moments in beams to develop shear force and bending moment diagrams. Assess section properties, bending and deflections in beams.
- Use various classical methods for analysis of indeterminate structures.
- Determine the effect of support settlements for indeterminate structures.
- Apply the concepts of ILD and moving loads on structures.
- Demonstrate the concepts of qualitative influence line diagram for continuous beams and frames
- Apply the methods of indeterminate truss analysis demonstrate the behaviour of arches and their methods of analysis.

Suggested Books:

- Statically Indeterminate Structures by C.K. Wang, McGraw Hill Book Co., New York.
- Advanced Structural Analysis by A.K. Jain, Nem Chand & Bros., Roorkee.
- Indeterminate Structures by R.L. Jindal, S. Chand & Co., New Delhi.
- Theory of Structures, Vol. I, by S.P. Gupta & G.S.Pandit, Tata McGraw Hill, New Delhi.

GEOMATICS AND AERIAL SURVEYING			
Course Code	**PCC-CE-208-G**	**External marks:**	**75**
Credits	**4**	**Internal marks:**	**25**
L-T-P	**3-1-0**	**Total marks:**	**100**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- To understand the principle of surveying on very large scale by locating precise horizontal controls.
- To learn about surveying applications in setting out works.
- To learn about determining absolute positions of a point using celestial measurements.
- To learn about different types of errors in measurements and their adjustment.
- To introduce the basic concept of photogrammetry, Remote sensing, and GIS.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

COURSE CONTENT

SECTION A

Module 1: Triangulation and Trilateration

Triangulation systems, classification, strength of figure, selection of triangulation stations, grade of triangulation, field work of triangulation, triangulation computations, Trilateration-Principle, Methods, advantages and disadvantages, introduction to total station.

Module 2: Survey Adjustment and computations

Definitions, types of error, weight of an observation, law of weights, most probable values, principle of least squares, method of correlates, normal equation, adjustment of triangulation figures by method of least squares.

SECTION B

Module 3: Astronomy

Definitions of astronomical terms, celestial coordinate systems, Napier's rule of circular parts, star at elongation, star at prime vertical, star at horizon, star at culmination, Astronomical triangle, various time systems: sidereal, apparent, solar and mean solar time, equation of time-its cause and effect, inter-conversion of time, determination of azimuth, latitude, longitude etc. by astronomical observations.

SECTION C

Module 4: Elements of Photogrammetry

Introduction, types of photographs, aerial camera, scale of a photograph, height displacements of vertical photographs, flight planning and its uses, crab and drift, number of photographs, relief displacements, Stereoscopic vision and stereoscopes, height determination from parallax measurement, flight planning, principle of photo interpretation, photogrammetric monitoring.

SECTION D

Module 5: Introduction to remote sensing

Definition of Remote Sensing, types of remote sensing, remote sensing system and components. EMR source and characteristics, active and passive remote sensing, EMR propagation through medium, Role of atmosphere, Atmospheric windows, EMR interaction with objects, Spectral signature, EMR interaction with vegetation, soil and water. Satellite orbits and platforms: Geostationary and sun synchronous satellites, Resolution, Applications of remote sensing in civil engineering.

Module 6: Geographical Information System (GIS)

Definition, and Objectives, Components of GIS, Spatial data models: Raster and Vector, Data inputting in GIS, Linkage between spatial and non spatial data, Spatial data analysis: Vector and raster based spatial data analysis, Integration of RS and GIS data, Digital Elevation Model, GIS Software Packages.

Course Outcomes:

- Students would be able to know about advanced methods of locating horizontal controls.
- Set out various civil engineering structures, learn about different types of time and solution of astronomical triangle.
- Apply corrections to the measurements for different errors, and understand the difference between aerial photograph and satellite images and their use in map making.

Suggested Books:

- Chang.T.K. 2002: Geographic Information Systems, Tata McGrawHill
- Punmia, B.C. 2005: Surveying I and II, Luxmi Publications
- Charles D. Ghilani: Adjustment Computations: Spatial Data Analysis (Fifth Edition)
- Paul R Wolf: Elements of Photogrammetry
- G S Srivastava: An introduction to Geoinformatics
- Basudeb Bhatta: Remote Sensing and GIS
- G. L. Hosmer: Text-book on Practical Astronomy
- Various Online resources including NPTEL

Material Testing and Evaluation			
Course Code	**PCC-CE-210-G**	**External marks:**	**75**
Credits	**3**	**Internal marks:**	**25**
L-T-P	**3-0-0**	**Total marks:**	**100**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- To provide the students an knowledge about various engineering materials.
- To understand the properties of ingredients of concrete.
- To study the behaviour of concrete under different states.
- To study about the concrete design mix.
- To understand special concrete and their use.
- To know various heavy construction projects and the equipments used for these.

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all the section which will be Q. 1. Question number 1 will be compulsory and of short answer type. Each question carry equal marks (15 marks). Students have to attempt five questions in total by selecting one question from each section.

COURSE CONTENT

SECTION-A

Module 1: Introduction to Engineering Materials

Cements, M-Sand, Concrete (plain, reinforced and steel fibre/glass fibre- reinforced, light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics and Refractories, Bitumen and asphaltic materials, Glass and Plastics, Structural Steel and other Metals

Module 2: Limes, cement and mortars

Lime: classification of lime, manufacturing, testing of lime, storage of lime, Cement: cements composition, types of cement, manufacturing of ordinary portland cement, special types of cement, storage of cement, testing of cement. Mortars: Proportions of lime and cement mortars, mortars for masonry and plastering.

SECTION-B

Module 3: Concrete making materials

Proportions of cements, aggregates, water and admixtures; properties of fresh and hardened concrete, variability of concrete strength, extreme weather concreting, prestressed concrete; Durability of concrete - alkali aggregate reaction, reinforcement corrosion, freezing and thawing, etc.

Module 4: Mix Design

Principles of concrete mix design, basic considerations, Factors in the choice of mix design, outline of mix design procedure, ACI mix design practice, USBR method, British mix design method IS guidelines.

SECTION-C

Module 5: Steel and its testing

Types of steel, mechanical behaviour and mechanical characteristics; Elasticity – principle and characteristics; Plastic deformation of metals; tensile test – standards for different material (brittle, quasi-brittle, elastic and so on); Bending and torsion test, procedure and standards, Strength of ceramic, Internal friction, creep – fundaments and characteristics; Brittle fracture of steel – temperature transition approach; concept of fracture mechanics; fracture toughness testing.

SECTION-D

Module 6: Testing and Evaluation Procedures

Testing of concrete mixes, description for various concrete, steels, aggregates ; Elastic deformation; Plastic deformation; Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Shrinkage, Creep.

Module 7: Construction equipments and Heavy Construction

Construction of large structures, dams, bridges, multi storeyed buildings etc, Construction Equipments - crushers, hot mix, plants, dozers etc, Introduction to heavy construction equipment.

Course Outcomes:

At the end of the course, the students will be able to

- To explain various type of constructions in Civil Engineering.
- Design the concrete mix using ACI and IS code methods.
- Determine the properties of fresh and hardened of concrete.
- Design special concretes and their specific applications ensure quality control while testing/ sampling and acceptance criteria.

SUGGESTED BOOKS:

- Handbook of mix design - BIS
- Concrete Technology by M.S. Shetty.
- Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.),R. Butterworth- Heinemann
- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, ' Highway Materials and Pavement Testing', Nem Chand& Bros, Fifth Edition
- Various related updated & recent standards of BIS, IRC, ASTM, RILEM, AASHTO, etc. corresponding to materialsused for Civil Engineering applications
- Kyriakos Komvopoulos (2011), Mechanical Testing of Engineering Materials, Cognella
- E.N. Dowling (1993), Mechanical Behaviour of Materials,Prentice Hall International Edition
- American Society for Testing and Materials (ASTM), Annual Book of ASTM Standards (post 2000)

HYDRAULIC ENGINEERING LAB.			
Course Code	**LC-CE-212-G**	**External marks:**	**25**
Credits	**1**	**Internal marks:**	**25**
L-T-P	**0-0-2**	**Total marks:**	**50**

COURSE OBJECTIVES:

- To understand the flow measurement in a pipe flow.
- To determine the energy loss in pipe flow.
- To study the loss due to pipe fittings.
- To measure the discharge in a open channel flow etc.

LIST OF EXPERIMENTS

1. To determine the coefficient of drag by Stokes law for spherical bodies.
2. To study the phenomenon of cavitations in pipe flow.
3. To determine the critical Reynolds number for flow through commercial pipes.
4. To determine the coefficient of discharge for flow over a broad crested weir.
5. To study the characteristics of a hydraulic jump on a horizontal floor and sloping glacis including friction blocks.
6. To study the scouring phenomenon around a bridge pier model
7. To study the scouring phenomenon for flow past a spur.
8. To determine head loss due to various pipe fittings.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

- Measure discharge in pipes determines the energy loss in conduits.
- Carry out discharge measurements in open channel etc.

STRUCTURAL ANALYSIS LAB			
Course Code	**LC-CE-214-G**	**External marks:**	**25**
Credits	**2**	**Internal marks:**	**25**
L-T-P	**0-0-2**	**Total marks:**	**50**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- Structural Analysis experiments help to understand, to know the practical behaviour of the physical structures like beams, different arches, roof truss etc.
- A proper structural analysis of these structures helps the students to solve the practical problems.
- Different structural apparatus like Two-Hinge Arch, Three- Hinge Arch are studied in the laboratory.

COURSE CONTENT

SECTION-A

1	To verify moment area theorem regarding slope and deflection in a beam
2	To verify Maxwell's Reciprocal Theorem.
3	Begg`sdeformeter- verification of Muller Breslau principle
4	Experiment on a two – hinged arch for horizontal thrust and influence line for horizontal thrust
5	Analytical and experimental study of three hinged arch
6	Experimental and analytical study of unsymmetrical bending of a cantilever beam
7	Sway in portal frames – Demonstration

Course Outcomes:

At the end of the course, the students will be able to:

- Various experimental and analytical studies for different structural members and their comparison.
- Demonstration of frame.
- Able to calculate the about forces, moments and deflections.
- To understand the Able to calculate the deflection of springs
- To verify and compare different theoretical and experimental theorems.

GEOMATICS AND ARIAL SURVEYING LAB.		
Course Code	**LC-CE-216-G**	**External marks: 25**
Credits	**1**	**Internal marks: 25**
L-T-P	**0-0-2**	**Total marks: 50**
		Duration of Examination: 3 hrs

COURSE OBJECTIVES:

- To study and use of theodolite for angle measurements
- To use tacheometer for horizontal and vertical distances.
- To draw simple circular curves.
- To measure base line measurement.
- To study total station and its use for measuring distance, elevation and coordinates.

LIST OF EXPERIMENTS

1. Study various parts of a theodolite
2. Measurement of horizontal and vertical angles with theodolite
3. Measurement of Tachometric constants.
4. Calculating horizontal distance and elevations using tachometer.
5. Exercise of triangulation including base line measurement.
6. Setting out simple circular curves by deflection angle method.
7. Study the various parts of a total station.
8. Measurements of distance, elevation, coordinate with total station.
9. Special problems with total station.

COURSE OUTCOMES:

On completion of the course, the students will be able to:

- Use the theodolite for measuring angles and use of tacheometer to determine distance and elevation.
- Draw simple circular curves.
- Calculate base line measurement and importance of triangulation.
- Use a total station to measure distance, elevation and coordinates.
- Use total station to plot a map of given area with software.

Material Testing & Evaluation Lab.			
Course Code	**LC-CE-218-G**	**External marks:**	**25**
Credits	**1**	**Internal marks:**	**25**
L-T-P	**0-0-2**	**Total marks:**	**50**
		Duration of Examination:	**3 hrs**

COURSE OBJECTIVES:

- To determine important properties of cement with different tests.
- To study the various test on aggregates and concrete.

LIST OF EXPERIMENTS

1. Standard consistency of cement using Vicat`s apparatus.
2. A) Fineness of cement by Sieve analysis and Blaine`s air permeability method.
   B) Fineness modulus of coarse and fine aggregates.
3. Soundness of cement by Le-Chatelier`s apparatus.
4. Setting time of cement, initial and final of cement.
5. Compressive strength of cement.
6. A) Measurement of specific gravity of cement.
   B) Measurement of Heat of Hydration of cement.
7. Moisture content and bulking of fine aggregate.
8. Workability of cement concrete by (a) Slump test (b) Compaction factor test (c) Flow table test.
9. Compressive strength of concrete by (a) Cube test, (b) Cylinder test
10. Indirect tensile strength of concrete-split cylinder test.
11. Modules of rupture of concrete by flexure test.
12. Bond strength between steel bar and concrete by pull-out test.
13. Non-destructive testing of concrete.

Course Outcomes:

At the end of the course, the students will be able to:

- To able understand the importance of testing of cement, sand and aggregate.
- Able to perform different tests of concrete to check their suitability.
- Study of various properties of cement, aggregate and concrete for any project work.
- To check the suitability of material for practical application.

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH (MECHANICAL ENGINEERING)

SEMESTER 3rd & 4th

Scheme effective from 2019-20

COURSE CODE AND DEFINITIONS

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

MAHARSHI DAYANAND UNIVERSITY, ROHTAK

Scheme of Examination for Semester III (Second Year)

B.Tech (MECHANICAL ENGINEERING)w.e.f. 2019-20

Sr. No.	Category Course Notation	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Mark of Class work	Theory	Practical	Total	
1	Basic Science course	BSC-ME-201G	Physics II(Optics & Waves)	3	0	0	3	3	25	75		100	3
2	Basic Science course	BSC-ME-203G	Mathematics-III	3	1	0	4	4	25	75		100	3
3.	Basic Science course	BSC-BIO-205G	Biology	2	1	0	3	3	25	75		100	3
4.	Engineering Science course	ESC-ECE-207G	Basics of Electronics Engg.	2	0	0	2	2	25	75		100	3
5.	Engineering Science course	ESC-ME-209G	Engineering Mechanics	3	0	0	3	3	25	75		100	3
6.	Engineering Science course	ESC-ME-211G	Basics of Mechanical Engg.	2	0	0	2	2	25	75		100	3
7.	Professional Core courses	PCC-ME-213G	Thermodynamics	3	1	0	4	4	25	75		100	3
8.	Engineering Science course	LC-ME-215G	Basics of Mechanical Engg. lab	0	0	2	2	1	25		25	50	3
TOTAL CREDIT								**22**				**750**	

MAHARSHI DAYANAND UNIVERSITY, ROHTAK

Scheme of Examination for Semester IV (Second Year)

B.Tech.(MECHANICAL ENGINEERING)w.e.f. 2019-20

Sr. No.	Category Course Notation	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Mark of Class work	Theory	Practical	Total	
1	Professional Core courses	PCC-ME-202G	Applied Thermodynamics	3	1	0	4	4	25	75		100	3
2	Professional Core courses	PCC- ME-204G	Fluid Mechanics	3	1	0	4	4	25	75		100	3
3	Professional Core courses	PCC- ME-206G	Strength of materials	3	1	0	4	4	25	75		100	3
4	Professional Core courses	PCC- ME-208G	Materials Engineering	3	0	0	3	3	25	75		100	3
5	Professional Core courses	PCC- ME-210G	Instrumentation & Control	3	0	0	3	3	25	75		100	3
6	Professional Core courses	LC- ME-212G	Applied Thermodynamics Lab	0	0	2	2	1	25		25	50	3
7	Professional Core courses	LC- ME-214G	SOM Lab	0	0	2	2	1	25		25	50	3
8	Professional Core courses	LC- ME-216G	Fluid Mechanics Lab	0	0	2	2	1	25		25	50	3
9	Professional Core courses	LC- ME-218G	Materials Lab	0	0	2	2	1	25		25	50	3
10	Professional Core courses	LC- ME-220G	Instrumentation Lab	0	0	2	2	1	25		25	50	3
11	Mandatory course	*MC-106G	Environment Science	3	0	1	-		25	75		-	4
							TOTAL CREDIT	**23**				**750**	

***MC-106G** is a mandatory non –credit course in which the students will be required passing marks in theory.

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

<table>
<tr><td>Course code</td><td colspan="5">BSC-ME- 201G</td></tr>
<tr><td>Category</td><td colspan="5">Basic Science course</td></tr>
<tr><td>Course title</td><td colspan="5">Physics-II (Optics and Waves)</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-III</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Objectives:</td><td colspan="5">➢ To acquire skills allowing the student to identify and apply formulas of optics and wave physics using course literature
➢ To be able to identify and illustrate physical concepts and terminology used in optics and to be able to explain them in appropriate detail.
➢ To be able to make approximate judgements about optical and other wave phenomena when necessary</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-1

Simple harmonic motion, damped and forced simple harmonic oscillator, Mechanical and electrical simple harmonic oscillators, differential equation of simple harmonic motion, damped harmonic oscillator , quality factor, forced mechanical and electrical oscillators, steady state motion of forced damped harmonic oscillator.

UNIT-2

Sinusoidal waves (concept of frequency and wavelength), types of waves, the one dimensional wave, transverse vibrations of stretched strings. Longitudinal sound wave in solid, The matrix method in paraxial optics (unit plane and nodal plane) wave group and group velocity, Fermat's principle and its applications (mirage effect, laws of reflection and refraction), Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's angle and total internal reflection.

UNIT-3

Wave optics

Huygen's principle, superposition of waves and interference of light by wavefront splitting and amplitude splitting, Young's double slit experiment, Newton's rings, Michelson interferometer, Fraunhofer's diffraction from a single slit, the Rayleigh criterion for limit of just resolution and its application to vision, Diffraction grating (Transmission), its dispersive and resolving power.

UNIT-4

Lasers

Stimulated and spontaneous emission, Einstein's theory of matter-radiation interaction, Einstein's coefficients, amplification of light by population inversion, Pumping in lasers, three and four level laser systems, different types of lasers: gas lasers (He-Ne, CO_2), solid-state lasers (Ruby, Neodymium), Properties of laser beams: mono-chromaticity, coherence, directionality and intensity, laser speckles, applications of lasers in science, engineering and medicine.

Course Outcomes: On successful completion of this course, students should be able to:

1. Calculate wave properties from a microscopic model.
2. Analyze optical systems (diffraction and interference).

References:

1. I. G. Main, "Vibrations and waves in physics", Cambridge University Press, 1993.

2. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006.

3. E. Hecht, "Optics", Pearson Education, 2008.

4. A. Ghatak, "Optics", McGraw Hill Education, 2012.

5. O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.

<table>
<tr><td>Course code</td><td colspan="5">BSC-ME- 203G</td></tr>
<tr><td>Category</td><td colspan="5">Basic Science course</td></tr>
<tr><td>Course title</td><td colspan="5">Mathematics III
(PDE, Probability & Statistics)</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-III</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>Objectives:</td><td colspan="5">(1) To introduce the solution methodologies for second order Partial Differential Equations with
applications in engineering
(2) To provide an overview of probability and statistics to engineers</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method. Second-order linear equations and their classification, Initial and boundary conditions, D'Alembert's solution of the wave equation;

UNIT-II

Duhamel's principle for one dimensional wave equation. Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables.

UNIT-III

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

Continuous random varibales and their properties, distribution functions and densities, normal, exponential and gamma densities.Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

UNIT-IV

Basic Statistics, Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, Tests for single mean, difference of means, and difference of standard deviations. Test for ratio of variances – Chisquare test for goodness of fit and independence of attributes.

Course Outcomes:

Upon completion of this course, students will be able to solve field problems in engineering involving PDEs. They can also formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
4. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

Course code	**BSC-BIO-205G**				
Category	Basic Science Course				
Course title	**Biology**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-III/ V/ VII**
	2	**1**		**3**	
Branches (B. Tech.)	**All Branches**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives

To convey that Biology as an important scientific discipline.

To convey that "Genetics is to biology what Newton's laws are to Physical Sciences"

To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine

The molecular basis of coding and decoding genetic information is universal.

How to analyse biological processes at the reductionist level

UNIT – I

Introduction to living world: Concept and definition of Biology; Aspect of biology. Need to study biology. Characteristic features of living organisms; Cell theory, Structure of Prokaryotic and Eukaryotic cell. Distinguish between animal and plant cell. Concept of single celled organisms, Ecological aspects of single celled organisms, Types of microbes and their important properties. Economic importance of microbes.

Genetics : Mendel's laws of inheritance, Concept of allele. Concepts of recessiveness and dominance . Gene interaction , Epistasis.

Cell division- Mitosis and Meiosis. Evidence of nucleic acid as a genetic material. Concept of genetic code, Central Dogma.

UNIT – II

Introduction to Biomolecules: Definition, structure and important functions of carbohydrates (glucose, fructose, disaccharides, starch and cellulose), lipids (phospholipid, cholesterol), Amino acids. Proteins- structure and function. Primary secondary, tertiary and quaternary structure.

Nucleic acid- Structure of DNA and RNA, types of RNA, Watson and Crick model of DNA

UNIT – III

Introduction to Genetic Engineering: Concept of genetic engineering. Tools used in recombinant DNA Technology. Restriction enzymes and DNA modifying enzymes, ligases. Gene cloning; plasmid vector. Transgenic plants and animals

UNIT – IV

Applications of Biotechnology: Applications of biotechnology in Agriculture, Medicine, Environment (sewage treatment), enzyme technology.

Course Outcomes

After studying the course, the student will be able to:
Understand about living organisms, type of cells and microbes.
Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
Identify DNA as a genetic material in the molecular basis of information transfer.

References:

1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons
3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

6) https://onlinecourses.nptel.ac.in/noc18_bt23 by K. Suraishkumar and Madhulika Dixit

7) Campbell, NA and Reece JB, Biology, International edition, 7th edition or later, Benjamin Cummings, New York (2007 or later)
8) Karp, G, Cell and Molecular Biology: Concepts and Experiments, 7th edition, Wiley, New York (2013).

Course code	**ESC-ECE-207G**				
Category	Engineering Science course				
Course title	**Basics of Electronic Engineering**				
Scheme and Credits	L	T	P	**Credits**	Semester-III
	2	0	0	2	
Objectives:	To provide an overview of electronic device components to Mechanical engineering students.				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Semiconductor Devices and Applications: Introduction to P-N junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, capacitor filter. Zener diode and its characteristics, Zener diode as voltage regulator. Regulated power supply IC based on 78XX and 79XX series, Introduction to BJT, its input-output and transfer characteristics, BJT as a single stage CE amplifier, frequency response and bandwidth.

UNIT-II

Operational amplifier and its applications: Introduction to operational amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, op-amp with negative feedback, study of practical op-amp IC 741, inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

UNIT-III

Timing Circuits and Oscillators: RC-timing circuits, IC 555 and its applications as astable and mono-stable multi-vibrators, positive feedback, Barkhausen's criteria for oscillation, R-C phase shift and Wein bridge oscillator.

UNIT-IV

Digital Electronics Fundamentals :Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K-map, Logic ICs, half and full adder/subtractor, multiplexers, de-multiplexers, flip-flops, shift registers, counters, Block diagram of microprocessor/microcontroller and their applications.

Electronic Communication Systems: The elements of communication system, IEEE frequency spectrum, Transmission media: wired and wireless, need of modulation, AM and FM modulation
schemes, Mobile communication systems: cellular concept and block diagram of GSM system.

Course Outcomes:

At the end of this course students will demonstrate the ability to
1. Understand the principles of semiconductor devices and their applications.
2. Design an application using Operational amplifier.
3. Understand the working of timing circuits and oscillators.
4. Understand logic gates, flip flop as a building block of digital systems.
5. Learn the basics of Electronic communication system.

Text /Reference Books:

1. Floyd ," Electronic Devices" Pearson Education 9th edition, 2012.
2. R.P. Jain , "Modern Digital Electronics", Tata Mc Graw Hill, 3rd Edition, 2007.
3. Frenzel, "Communication Electronics: Principles and Applications", Tata Mc Graw Hill, 3rd Edition, 2001

<table>
<tr><td>Course code</td><td colspan="5">ESC-ME- 209G</td></tr>
<tr><td>Category</td><td colspan="5">Basic Science course</td></tr>
<tr><td>Course title</td><td colspan="5">Engineering Mechanics</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-III</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Objectives:</td><td colspan="5">1. To understand the basic force system.
2. To learn about Applying principles of particle kinematics.
3. To understand the concepts of particle dynamics.
4. To Learn energy methods & momentum methods.</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Introduction: Force system, dimensions and units in mechanics, laws of mechanics, vector algebra, addition and subtraction of forces, cross and dot products of vectors, moment of a force about a point and axis, couple and couple moment, transfer of a force to a parallel position, resultant of a force system using vector method, Problems involving vector application

Equilibrium: Static and dynamic equilibrium, static in determinacy, general equations of equilibrium, Varingnon's theorem, Lami's theorem, equilibrium of bodies under a force system, Problems.

UNIT-II

Truss and Frames:Truss, classification of truss, assumptions in truss analysis, perfect truss, analysis of perfect plane truss using method of joints and method of sections, Problems. Centroid , Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Problems.

UNIT-III

Moment of Inertia: Area moment of inertia, mass moment of inertia, parallel axis and perpendicular axis theorems, radius of gyration, polar moment of inertia, product of inertia, principle axis, problem based on composite figures and solid objects.

Kinematics: Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problems.

UNIT-IV

Particle Dynamics: Energy methods and momentum methods, Newton's laws, work energy equation for a system of particles, linear and angular momentum equations, projectile motion, problem.

Shear Force and Bending Moment Diagram for statically determinant beams Classification of beams, types of loads, shear force and bending moment calculation and their graphical presentation, point of inflection, problem.

Course Outcomes (COs): At the end of the course, the student shall be able to:

1. Understand the basic force system.
2. Apply principles of particle kinematics.
3. Grasp the concepts of particle dynamics.
4. Learn energy methods & momentum methods.

Recommended Books:-

Engineering Mechanics – Irving H. Shames, PHI Publication
Engineering Mechanics – U.C.Jindal, Galgotia Publication
Engineering Mechanics – A.K.Tayal, Umesh Publication

Course code	**ESC-ME-211G**				
Category	Engineering Science courses				
Course title	**Basics of Mechanical Engineering**				
Scheme and Credits	L	T	P	**Credits**	Semester-III
	2	0	0	2	
Objectives:	1. To Learn Manufacturing Processes. 2. To Understand Basic Refrigeration & Air Conditioning Processes. 3. To Understand Hydraulic Turbines & Pumps. 4. To learn power transmission methods.				
Class work mark	25 Marks				
Practical mark	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Introduction to Commonly used Machine Tools in a Workshop : Lathe, Shaper, Planer, Milling, Drilling, Slotter, Introduction to Metal Cutting. Basic concept of thermodynamics Introduction, States, Work, Heat, Temperature, Zeroth, 1st, 2nd and 3rd law of thermodynamics,Concept of internal energy, enthalpy and entropy, Problems.

Properties of Steam & Steam Generator: Formation of steam under constant pressure, Thermodynamic properties of steam, use of steam tables, measurement of dryness fraction by throttling calorimeter.

UNIT-II

Refrigeration & Airconditioning: Introduction to refrigeration and air-conditioning, Rating of refrigeration machines, Coefficient of performance, simple refrigeration vapour compression cycle, Psychrometric charts and its use, Human comforts.

Hydraulic Turbines & Pumps : Introduction, Classification, Construction details and working of Pelton, Francis and Kaplan turbines, Specific speed and selection of turbines, Classification of water pumps and their working.

UNIT-III

Power Transmission Methods and Devices : Introduction to Power transmission, Belt, Rope, Chain and Gear drive, Types and functioning of clutches.

Stresses and Strains : Introduction, Concept & types of stresses and strains, Poison's ratio, stresses and strains in simple and compound bars under axial loading, flexure & torsional loading, Stress-strain diagrams. Hook's law, Elastic constants & their relationships.

UNIT-IV

Introduction to Manufacturing Systems, Fundamentals of Numerical Control (NC). Advantage of NC systems, Classifications of NC, Comparison of NC and CNC.

Course Outcomes: At the end of the course, the student shall be able to:

1. Understand the principles and applications of various manufacturing processes.
2. Understand the concept of strain and strain for the strength of materials.
3. Grasp the concepts of power transmission devices.
4. Understand methods of thermodynamics, refrigeration & air conditioning in mechanical system.
5.

Text Books :

1. Elements of Mechanical Engineering- R.K. Rajput LAkmi Pub., Delhi.
2. Elements of Mechanical Engineering- D.S. Kumar, S.K. Kataria and Sons
3. Engineering Thermodynamics - P.K. Nag TMH, New Delhi.
4. Refrigeration & Airconditioning- Arora & Domkundwar, Dhanpat rai & Co. Pvt. Ltd.
5. Worshop Technology Volt. I & II - Hazra & Chaudhary, Asian Book Comp., New Delhi.
6. Process and Materials of Manufacture- Lindberg, R.A. Prentice Hall of India, New Delhi.
7. Principles of Manufacturing Materials and Processes- Compbell, J.S. - McGraw Hill.

Reference Books :

1. Strength of Materials- Popov, Pub. - PHI, New Delhi.
2. Hydraulic Machines- Jagdish Lal, Pub. Metropolitan, Allahabad.
3. Strength of Materials- G.H. Ryder, Pub. ELBS.
4. Hydraulic and Fluid Mechanics- Modi and Seth, Pub.- Standara Book House, New Delhi.
5. Engineering Thermodynamics- C.P. Arora, Pub. - TMH, New Delhi.
6. Refrigeration & Airconditioning- C.P. Arora, Pub. -TMH, New Delhi.
7. Manufacturing Science- Amitabha Ghosh & Ashok Kumar Malik, East-West Press.
8. Manufacturing Process and Systems- Ostwaid, Munoz, John Wiley.
9. Workshop Technology, Vol. 1, 2, & 3- Chapman, WAJ Edward Amold.

Course code	**PCC-ME 213G**				
Category	Professional Core Courses				
Course title	**Thermodynamics**				
Scheme and Credits	L	T	P	**Credits**	
	3	1	0	4	
Objectives:	• To learn about work and heat interactions, and balance of energy between system and its surroundings • To learn about application of I law to various energy conversion devices • To evaluate the changes in properties of substances in various processes • To understand the difference between high grade and low grade energies and II law limitations on energy conversion				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Fundamentals - System & Control volume; Property, State & Process; Exact & Inexact differentials; Work-Thermodynamic definition of work; examples; Displacement work; Path dependence of displacement work and illustrations for simple processes; electrical, magnetic, gravitational, spring and shaft work.

Temperature, Definition of thermal equilibrium and Zeroth law; Temperature scales; Various Thermometers- Definition of heat; examples of heat/work interaction in systems- First Law for Cyclic & Non-cyclic processes; Concept of total energy E ; Demonstration that E is a property; Various modes of energy, Internal energy and Enthalpy.

UNIT-II

Definition of Pure substance, Ideal Gases and ideal gas mixtures, Real gases and real gas mixtures, Compressibility charts- Properties of two phase systems - Const. temperature and Const. pressure heating of water; Definitions of saturated states; P-v-T surface; Use of steam tables and R134a tables; Saturation tables; Superheated tables; Identification of states & determination of properties, Mollier's chart.

UNIT-III

First Law for Flow Processes - Derivation of general energy equation for a control volume; Steady state steady flow processes including throttling; Examples of steady flow devices; Unsteady processes; examples of steady and unsteady I law applications for system and control volume.

Second law - Definitions of direct and reverse heat engines; Definitions of thermal efficiency and COP; Kelvin-Planck and Clausius statements; Definition of reversible process; Internal and external irreversibility; Carnot cycle; Absolute temperature scale.

UNIT-IV

Clausius inequality; Definition of entropy S ; Demonstration that entropy S is a property; Evaluation of S for solids, liquids, ideal gases and ideal gas mixtures undergoing various processes; Determination of s from steam tables- Principle of increase of entropy; Illustration of processes in Ts coordinates; Definition of Isentropic efficiency for compressors, turbines and nozzles-Irreversibility and Availability, Availability function for systems and Control volumes undergoing different processes, Lost work. Second law analysis for a control volume. Exergy balance equation and Exergy analysis.

Thermodynamic cycles - Basic Rankine cycle; Basic Brayton cycle; Basic vapor compression cycle and comparison with Carnot cycle.

Course Outcomes:

1. After completing this course, the students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions
2. Students can evaluate changes in thermodynamic properties of substances
3. The students will be able to evaluate the performance of energy conversion devices
4. The students will be able to differentiate between high grade and low grade energies.

Text Books:

1. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons.
2. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India
3. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
4. Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd.

<table>
<tr><td>Course code</td><td colspan="5">LC-ME-215G</td></tr>
<tr><td>Category</td><td colspan="5">Engineering Science courses</td></tr>
<tr><td>Course title</td><td colspan="5">Basics of Mechanical Engg. Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2"></td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Objectives:</td><td colspan="5">To understand various basic issues of Mechanical Engineering like IC engines, machines and mechanics of machines.</td></tr>
<tr><td>Class work mark</td><td colspan="5">25 Marks</td></tr>
<tr><td>Practical mark</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

List of Experiments

1. To study various types of boilers & also study mountings and accessories in boilers.
2. To study various types of internal Combustions Engines.
3. To calculate the Mechanical Advantage, Velocity Ratio and Efficiency of single start, Double start and Triple start worm & Worm Wheel.
4. To find the Mechanical Advantage, velocity Ratio and Efficiency of a Differential Wheel and Axle.
5. To find Moment of Inertia of a Fly Wheel.
6. Verification of reciprocal theorem of deflection using a simply supported beam.
7. Verification of moment area theorem for slopes and deflections of the beam.
8. Deflections of a truss-horizontal deflections & vertical deflections of various joints of a pin-jointed truss.
9. Elastic displacements (vertical & horizontal) of curved members.
10. Experimental and analytical study of 3 hinged arch and influence line for horizontal thrust.
11. Experimental and analytical study of behavior of struts with various end conditions.
12. To determine elastic properties of a beam.
13. Experiment on a two-hinged arch for horizontal thrust & influence line for Horizontal thrust.
14. Experimental and analytical study of a 3 bar pin jointed Truss.
15. Experimental and analytical study of deflections for unsymmetrical bending of a Cantilever beam.

Course Outcomes: The students who have undergone the course will be able to understand working of IC engines, types of boilers and accessories and understand the basic mechanics.

Note:

1. At least ten experiments are to be performed in the Semester.

SEMESTER-IV SYLLABUS

Course code	**PCC-ME 202G**				
Category	Professional Core Courses				
Course title	**Applied Thermodynamics**				
Scheme and Credits	L	T	P	**Credits**	Semester-IV
	3	1	0	4	
Objectives:	(1)To learn about of I law for reacting systems and heating value of fuels (2)To learn about gas and vapor cycles and their first law and second law efficiencies (3) To understand about the properties of dry and wet air and the principles of psychrometry (4) To learn about gas dynamics of air flow and steam through nozzles (5) To learn the about reciprocating compressors with and without intercooling (6) To analyze the performance of steam turbines				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Introduction to solid, liquid and gaseous fuels–Stoichiometry, exhaust gas analysis- First law analysis of combustion reactions- Heat calculations using enthalpy tables- Adiabatic flame temperature- Chemical equilibrium and equilibrium composition calculations using free energy.

UNIT-II

Vapor power cycles Rankine cycle with superheat, reheat and regeneration, exergy analysis. Supercritical and ultra super-critical Rankine cycle- Gas power cycles, Air standard Otto, Diesel and Dual cycles-Air standard Brayton cycle, effect of reheat, regeneration and intercooling- Combined gas and vapor power cycles- Vapor compression refrigeration cycles, refrigerants and their properties.

UNIT-III

Properties of dry and wet air, use of pschyrometric chart, processes involving heating/cooling and humidification/dehumidification, dew point.
Basics of compressible flow. Stagnation properties, Isentropic flow of a perfect gas through a nozzle, choked flow, subsonic and supersonic flows- normal shocks- use of ideal gas tables for isentropic flow and normal shock flow- Flow of steam and refrigerant through nozzle, super saturation compressible flow in diffusers, efficiency of nozzle and diffuser.

UNIT-IV

Reciprocating compressors, staging of reciprocating compressors, optimal stage pressure ratio, effect of intercooling, minimum work for multistage reciprocating compressors.
Analysis of steam turbines, velocity and pressure compounding of steam turbines

Course Outcomes:

1. After completing this course, the students will get a good understanding of various practical power
cycles and heat pump cycles.
2. They will be able to analyze energy conversion in various thermal devices such as combustors, air
coolers, nozzles, diffusers, steam turbines and reciprocating compressors
3. They will be able to understand phenomena occurring in high speed compressible flows

Text Books:

1. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons.
2. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India
3. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
4. Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd

Course code	**PCC-ME-204G**				
Category	Professional Core Courses				
Course title	**Fluid Mechanics**				
Scheme and Credits	L	T	P	**Credits**	Semester-IV
	3	1	0	4	
Objectives:	• To learn about the application of mass and momentum conservation laws for fluid flows • To understand the importance of dimensional analysis • To obtain the velocity and pressure variations in various types of simple flows				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Fluid Properties and Fluid Statics: Concept of fluid and flow, ideal and real fluids, continuum concept, and properties of fluids, Newtonian and non-Newtonian fluids. Pascal's law, hydrostatic equation, hydrostatic forces on plane and curved surfaces, stability of floating and submerged bodies, relative equilibrium, Problems. Fluid Kinematics: Eulerian and Lagrangian description of fluid flow; stream, streak and path lines; types of flows, flow rate and continuity equation, differential equation of continuity in cylindrical and polar coordinates, rotation, vorticity and circulation, stream and potential functions, flow net, Problems.

UNIT-II

Fluid Dynamics: Concept of system and control volume, Euler's equation, Bernoulli's equation, venturimeter, orifices, orificemeter, mouthpieces, kinetic and momentum correction factors, Impulse momentum relationship and its applications, Problems. Compressible Fluid Flow: Introduction, continuity momentum and energy equation, sonic velocity, propagation of elastic waves due to compression of fluid, propagation of elastic waves due to disturbance in fluid, stagnation properties, isentropic flow, effect of area variation on flow properties, isentropic flow through nozzles,diffusers,injectors,Problems..

UNIT-III

Viscous Flow: Flow regimes and Reynolds's number, Relationship between shear stress and pressure gradient, uni-directional flow between stationary and moving parallel plates, movement of piston in a dashpot, power absorbed in bearings. Problems. Flow Through Pipes: Major and minor losses in pipes, Hagen-Poiseuilli law, hydraulic gradient and total energy lines, series and parallel connection of pipes, branched pipes; equivalent pipe, power transmission through pipes, Problems.

UNIT-IV

Boundary Layer Flow: Boundary layer concept, displacement, momentum and energy thickness, von-karman momentum integral equation, laminar and turbulent boundary layer flows, drag on a flat plate, boundary layer separation and control. Streamlined and bluff bodies lift and drag on a cylinder and an airfoil, Problems. Turbulent Flow: Shear stress in turbulent flow, Prandtl mixing length hypothesis, hydraulically smooth and rough pipes, velocity distribution in pipes, friction coefficients for smooth and rough pipes, Problems.

Course Outcomes: At the end of the course, the student shall be able to:

1. Expedite the properties of fluid along with pressure measurement techniques and concept of stability.
2. Understand the characteristics of fluid and application of continuity and Bernoulli's equation.
3. Conceptualisation of boundary layer, laminar and turbulent flow.
4. Analyse flows through pipes and open channels.

TEXT BOOKS:

1. Fluid Mechanics – Streeter V L and Wylie E B, Mc Graw Hill
2. Mechanics of Fluids – I H Shames, Mc Graw Hill

REFERENCES BOOKS:

1. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som and G. Biswas, TMH
2. Fluid Mechanics and Fluid Power Engineering – D.S. Kumar, S.K. Kataria and Sons
3. Fluid Mechanics and Machinery – S.K. Agarwal, TMH, New Delhi

<table>
<tr><td>Course code</td><td colspan="5">PCC-ME-206G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Strength of Materials</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-IV</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>Objectives:</td><td colspan="5">• To understand the nature of stresses developed in simple geometries such as bars, cantilevers, beams, shafts, cylinders and spheres for various types of simple loads
• To calculate the elastic deformation occurring in various simple geometries for different types of loading</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Deformation in solids- Hooke's law, stress and strain- tension, compression and shear stresseselastic constants and their relations- volumetric, linear and shear strains- principal stresses and principal planes- Mohr's circle.

UNIT-II

Beams and types transverse loading on beams- shear force and bend moment diagrams- Types of beam supports, simply supported and over-hanging beams, cantilevers. Theory of bending of beams, bending stress distribution and neutral axis, shear stress distribution, point and distributed loads.

UNIT-III

Moment of inertia about an axis and polar moment of inertia, deflection of a beam using double integration method, computation of slopes and deflection in beams, Maxwell's reciprocal theorems. Columns & Struts: Column under axial load, concept of instability and buckling, slenderness ratio, derivation of Euler's formulae for the elastic buckling load, Eulers, Rankine, Gordom's formulae Johnson's empirical formula for axial loading columns and their applications, eccentric compression of a short strut of rectangular & circular sections, Numerical.

UNIT-IV

Torsion, stresses and deformation in circular and hollow shafts, stepped shafts, deflection of shafts fixed at both ends, stresses and deflection of helical springs.
Axial and hoop stresses in cylinders subjected to internal pressure, deformation of thick and thin cylinders, deformation in spherical shells subjected to internal pressure.

Slope & Deflection: Relationship between bending moment, slope & deflection, Mohr's theorem, moment area method, method of integration, Macaulay's method, calculations for slope and deflection of (i) cantilevers and (ii) simply supported beams with or without overhang under concentrated load, Uniformly distributed loads or combination of concentrated and uniformly distributed loads, Numerical.

Course Outcomes:

1. After completing this course, the students should be able to recognise various types loads applied on machine components of simple geometry and understand the nature of internal stresses that will develop within the components
2. The students will be able to evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading

Text Books:

1. Egor P. Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi, 2001.
2. R. Subramanian, Strength of Materials, Oxford University Press, 2007.
3. Ferdinand P. Been, Russel Johnson Jr and John J. Dewole, Mechanics of Materials, Tata McGrawHill Publishing Co. Ltd., New Delhi 2005.

<table>
<tr><td>Course code</td><td colspan="5">PCC-ME-208G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Materials Engineering</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-IV</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Objectives:</td><td colspan="5">1. Understanding of the correlation between the internal structure of materials, their mechanical properties and various methods to quantify their mechanical integrity and failure criteria.
2. To provide a detailed interpretation of equilibrium phase diagrams
3. Learning about different phases and heat treatment methods to tailor the properties of Fe-C alloys.</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Crystal Structure: Unit cells, Metallic crystal structures, Ceramics. Imperfection in solids: Point, line, interfacial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress.

Mechanical Property measurement: Tensile, compression and torsion tests; Young's modulus, relations between true and engineering stress-strain curves, generalized Hooke's law, yielding and yield strength, ductility, resilience, toughness and elastic recovery; Hardness: Rockwell, Brinell and Vickers and their relation to strength.

UNIT-II

Static failure theories: Ductile and brittle failure mechanisms, Tresca, Von-mises, Maximum normal stress, Mohr-Coulomb and Modified Mohr-Coulomb; Fracture mechanics: Introduction to Stressintensity factor approach and Griffith criterion. Fatigue failure: High cycle fatigue, Stress-life approach, SN curve, endurance and fatigue limits, effects of mean stress using the Modified Goodman diagram; Fracture with fatigue, Introduction to non-destructive testing (NDT)

UNIT-III

Alloys, substitutional and interstitial solid solutions- Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. Iron Iron-carbide phase diagram and microstrctural aspects of ledeburite, austenite, ferrite and cementite, cast iron.TTT-curve

UNIT-IV

Heat treatment of Steel: Annealing, tempering, normalising and spheroidising, isothermal transformation diagrams for Fe-C alloys and microstructure development. Continuous cooling curves and interpretation of final microstructures and properties- austempering, martempering, case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, vacuum and plasma hardening

Alloying of steel, properties of stainless steel and tool steels, maraging steels- cast irons; grey, white, malleable and spheroidal cast irons- copper and copper alloys; brass, bronze and cupro-nickel; Aluminium and Al-Cu – Mg alloys- Nickel based superalloys and Titanium alloys

Course Outcomes:

1. Student will be able to identify crystal structures for various materials and understand the defects in such structures
2. Understand how to tailor material properties of ferrous and non-ferrous alloys
3.How to quantify mechanical integrity and failure in materials

Text Books:

1. W. D. Callister, 2006, “Materials Science and Engineering-An Introduction”, 6th Edition, Wiley India.
2. Kenneth G. Budinski and Michael K. Budinski, “Engineering Materials”, Prentice Hall of India Private Limited, 4th Indian Reprint, 2002.
3. V. Raghavan, “Material Science and Engineering’, Prentice Hall of India Private Limited, 1999.
4. U. C. Jindal, “Engineering Materials and Metallurgy”, Pearson, 2011.

Course code	**PCC-ME-210G**				
Category	Professional Core Courses				
Course title	**Instrumentation and Control**				
Scheme and Credits	L	T	P	**Credits**	Semester-IV
	3	0	0	3	
Objectives:	1. To provide a basic knowledge about measurement systems and their components 2. To learn about various sensors used for measurement of mechanical quantities 3. To learn about system stability and control 4. To integrate the measurement systems with the process for process monitoring and control				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT-I

Measurement systems and performance – accuracy, range, resolution, error sources; Instrumentation system elements – sensors for common engineering measurements; Signal processing and conditioning;

Instruments and Their representation : Introduction, Typical Applications of Instrument Systems, Functional Elements of a Measurement System, Classification of Instruments, Standards and Calibration..

UNIT-II

Transducer Elements : Introduction, Analog and Digital Transducers, Electromechanical; Potentiometric, Inductive Self Generating and Non-Self Generating Types, Electromagnetic, Electrodynamic, Eddy Current,

Magnetostrictive, Variable Inductance, Linearly Variable Differential Transformer, Variable Capacitance, PiezoElectric Transducer and Associated Circuits, Unbonded and Bonded Resistance Strain Gages. Strain Gage Bridge circuits, Single Double and Four Active Arm Bridge Arrangements, Temperature Compensation, Balancing and Calibration, Ionisation Transducers, Mechano Electronic Transducers, Opto-Electrical Transducers, Photo Conductive Transducers, Photo Volatic Transducers, Digital Transducers, Frequency Domain Transducer, Vibrating String Transducer, Binary codes, Digital Encoders.

UNIT-III

Motion, Force and Torque Measurement : Introduction, Relative motion Measuring Devices, Electromechanical, Optical, Photo Electric, Moire-Fringe, Pneumatic, Absolute Motion Devices, Seismic Devices, Spring Mass & Force Balance Type, Calibration, Hydraulic Load Cell, Pneumatic Load Cell, Elastic Force Devices, Separation of Force Components, Electro Mechanical Methods, Strain Gage, Torque Transducer, Toque Meter. Intermediate, Indicating and Recording Elements : Introduction Amplifiers, Mechanical, Hydraulic, Pneumatic, Optical, Electrical Amplifying elements, Compensators, Differentiating and Integrating Elements.

Temperature Measurement : Introduction, Measurement of Temperature, Non Electrical Methods – Solid Rod Thermometer, Bimetallic Thermometer, Liquid-in-Glass thermometer, Pressure Thermometer, Electrical Methods – Electrical Resistance Thermometers, Semiconductor Resistance Sensors (Thermistors), Thermo–Electric Sensors, Thermocouple Materials, Radiation Methods (Pyrometry), Total Radiation Pyrometer, Selective Radiation Pyrometer.

UNIT-IV

Control systems – basic elements, open/closed loop, design of block diagram; control method – P, PI, PID, when to choose what, tuning of controllers; System models, transfer function and system response, frequency response; Nyquist diagrams and their use.
Practical group based project utilizing above concepts.

Pressure and Flow Measurement : Pressure & Flow Measurement, Introduction : Moderate Pressure Measurement, Monometers, Elastic Transducer, Dynamic Effects of Connecting Tubing, High Pressure Transducer, Low Pressure Measurement, Calibration and Testing, Quantity Meters, Positive Displacement Meters, Flow Rate Meters, Variable Head Meters, Variable Area Meters, Rotameters, Pitot-Static Tube Meter, Drag Force Flow Meter, Turbine Flow Meter, Electronic Flow Meter, Electro Magnetic Flow meter. Hot-Wire Anemometer.

Course Outcomes:

Upon completion of this course, the students will be able to understand the measurement of various quantities using instruments, their accuracy & range, and the techniques for controlling devices automatically.

Text Books:

1.Instrumentation and control systems by W. Bolton, 2nd edition, Newnes, 200
2.Thomas G. Beckwith, Roy D. Marangoni, John H. LienhardV , Mechanical Measurements (6th Edition) 6th Edition, Pearson Education India, 2007
3.Gregory K. McMillan, Process/Industrial Instruments and Controls Handbook, Fifth Edition, McGraw-Hill: New York,1999.

Course code	**LC-ME-212G**			
Category	Professional Core Courses			
Course title	**Applied Thermodynamics Lab**			
Scheme and Credits	L	T	P	**Credits**
	0	0	2	1
Objectives:	1. To understand Vapour power cycles. 2. To understand steam boilers, their types and components. 3. To learn fundamentals of flow of steam through a nozzle. 4. To understand Steam turbines ,condensers and compressors.			
Class work mark	25 Marks			
Practical mark	25 Marks			
Total	50 Marks			
Duration of Exam	03 Hours			

List of Experiments:

1.To study low pressure boilers and their accessories and mountings.

2. To study high pressure boilers and their accessories and mountings.

3. To prepare heat balance sheet for given boiler.

4. To study the working of impulse and reaction steam turbines.

5. To find dryness fraction of steam by separating and throttling calorimeter.

6. To find power out put & efficiency of a steam turbine.

7. To find the condenser efficiencies.

8. To study and find volumetric efficiency of a reciprocating air compressor.

9. To study cooling tower and find its efficiency.

10. To find calorific value of a sample of fuel using Bomb calorimeter.

11. Calibration of Thermometers and pressure gauges.

Course Outcome (COs): At the end of the course, the student shall have practical exposure of:

1. Vapour power cycles and find and compare different cycles based on their performance parameters and efficiencies.
2. Steam boilers, their types and components.
3. Fundamentals of flow of steam through a nozzle.
4. Steam turbines and can calculate their work done and efficiencies.
5. Types and working of condensers and compressors and define their different types of efficiencies

Note:

1. At least eight experiments should be performed from the above list.

Course code	**LC-ME-214G**
Category	Professional Core courses
Course title	**Strength of Materials Lab**
Scheme and Credits	L: 0, T: 0, P: 2, **Credits**: 1
Objectives:	1. To learn the principles of mechanics of solid and various properties of materials. 2. Able to understand the concepts of stress, strain of materials and ability to interpret the data from the experiments.
Class work mark	25 Marks
Practical mark	25 Marks
Total	50 Marks
Duration of Exam	03 Hours

List of Experiments:

1. To study the Brinell hardness testing machine & perform the Brinell hardness test.
2. To study the Rockwell hardness testing machine & perform the Rockwell hardness test.
3. To study the Vickers hardness testing machine & perform the Vickers hardness test.
4. To study the Erichsen sheet metal testing machine & perform the Erichsen sheet metal test.
5. To study the Impact testing machine and perform the Impact tests (Izod & Charpy).
6. To study the Universal testing machine and perform the tensile test.
7. To perform compression & bending tests on UTM.
8. To perform the sheer test on UTM.
9. To study the torsion testing machine and perform the torsion test.

Course Outcomes (COs): At the end of the course, the student shall be able to:

1. Learn the principles of mechanics of solid and engineering.
2. Preparation of formal laboratory reports describing the results of experiments.
3. Acquire to operate basic instruments in mechanics of materials lab.
4. Able to understand the concepts of stress, strain of materials and ability to interpret the data from the experiments.

Note:

1. At least Seven experiments are to be performed in the semester.

<table>
<tr><td>Course code</td><td colspan="5">LC-ME-216G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core courses</td></tr>
<tr><td>Course title</td><td colspan="5">Fluid Mechanics Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2"></td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Objectives:</td><td colspan="5">1. Understand the techniques and concept of stability.
2. Learning continuity and Bernoulli’s equation.
3. Learn discharge measuring devices and hydraulic coefficients.
4. Knowledge of different types of pipe losses and determine the velocity profile in a pipe.</td></tr>
<tr><td>Class work mark</td><td colspan="5">25 Marks</td></tr>
<tr><td>Practical mark</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

List of Experiments:

1. To determine the coefficient of impact for vanes.
2. To determine coefficient of discharge of an orificemeter.
3. To determine the coefficient of discharge of Notch (V and Rectangular types).
4. To determine the friction factor for the pipes.
5. To determine the coefficient of discharge of venturimeter.
6. To determine the coefficient of discharge, contraction & velocity of an orifice.
7. To verify the Bernoullis Theorem.
8. To find critical Reynolds number for a pipe flow.
9. To determine the meta-centric height of a floating body.
10. To determine the minor losses due to sudden enlargement, sudden contraction and bends.
11. To show the velocity and pressure variation with radius in a forced vertex flow.
12. To verify the momentum equation.

Course Outcomes (COs): At the end of the course, the student shall be able to:

1. Understand the techniques and concept of stability.
2. Learning continuity and Bernoulli’s equation.
3. Analyse discharge measuring devices and hydraulic coefficients.
4. Knowledge of different types of pipe losses and determine the velocity profile in a pipe.

Note:

1. **At least eight experiments are to be performed in the semester.**

Course code	**LC-ME-218G**				
Category	Professional Core courses				
Course title	**Materials Lab**				
Scheme and Credits	L	T	P	**Credits**	
	0	0	2	1	
Objectives:	1. Learn the principles of materials science and engineering though lab investigation. 2. Understand the basics structure of materials and ability to interpret the data from the experiments.				
Class work mark	25 Marks				
Practical mark	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Experiments:

1. To study crystal structures of a given specimen.
2. To study crystal imperfections in a given specimen.
3. To study microstructures of metals/ alloys.
4. To prepare solidification curve for a given specimen.
5. To study heat treatment processes (hardening and tempering) of steel specimen.
6. To study microstructure of heat-treated steel.
7. To study thermo-setting of plastics.
8. To study the creep behavior of a given specimen.
9. To study the mechanism of chemical corrosion and its protection.
10. To study the properties of various types of plastics.
11. To study Bravais lattices with the help of models.
12. To study crystal structures and crystals imperfections using ball models.

Course Outcomes:

1- Learn the principles of materials science and engineering though lab investigation.

2- Prepare formal laboratory reports describing the results of experiments.

3- Operate basic instruments in materials science and engineering.

4- Understand the basics structure of materials and ability to interpret the data from the experiments.

Note:-

1. **At least eight experiments are to be performed in the semester.**

Course code	**LC-ME-220G**				
Category	Professional Core courses				
Course title	**Instrumentation Lab**				
Scheme and Credits	L	T	P	**Credits**	
	0	0	2	1	
Objectives:	1 - To understand about the applications of measurement systems. 2 - To understand about the basics and working principle of pressure, temperature and flow measurement. 3 - Identify the different variation of measurement parameter with various input conditions. 4 - To analyze the primary, secondary and tertiary measurements. 5 - To learn about the various control devices and parts of measurement systems.				
Class work mark	25 Marks				
Practical mark	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Experiments :

1. To Study various Temperature Measuring Instruments
   (a) Mercury – in glass thermometer
   (b) Thermocouple
2. To study the working of Bourdon Pressure Gauge and to check the calibration of the gauge in a dead-weight pressure gauge calibration set up.
3. To study a Linear Variable Differential Transformer (LVDT) and use it in a simple experimental set up to measure a small displacement.
4. To measure load (tensile/compressive) using load cell on a tutor.
5. To measure torque of a rotating shaft using torsion meter/strain gauge torque transducer.
6. To measure the speed of a motor shaft with the help of non-contact type pick-ups (magnetic or photoelectric).
7. To measure the stress & strain using strain gauges mounted on simply supported beam/cantilever beam.
8. To measure static/dynamic pressure of fluid in pipe/tube using pressure transducer/pressure cell.
9. To test experimental data for Normal Distribution using Chi Square test.
10. Vibration measurement.
11. To study various types of measurement Error.

Course Outcomes:

1 - To understand about the applications of measurement systems.

2 - To understand about the basics and working principle of pressure, temperature and flow measurement.

3 - Identify the different variation of measurement parameter with various input conditions.

4 - To analyze the primary, secondary and tertiary measurements.

5 - To learn about the various control devices and parts of measurement systems

Note:

1. **At least eight experiments are to be performed in the Semester.**

MC-106G : (ENVIRONMENT SCIENCE)

Theory 75 Marks Field Work 25 Marks (Practical/Field visit)

Unit-1 The Multidisciplinary nature of environment studies. Definition, scope and importance. (2 lecture)

Unit-2 Natural Resources :

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non-renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.
* Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit-3 Ecosystems :

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.

b. Grassland ecosystem.

c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit-4 Biodiversity and its conservation

* Introduction - Definition : Genetic, Species and ecosystem diversity.
* Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

(8 lectures)

Unit-5 Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.

b) Water pollution

c) Soil pollution

d) Marine pollution

e) Noise pollution

f) Thermal pollution

g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6 Social issues and the Environment:

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation, rain water harvesting, watershed management.
* Resettlement and rehabilitation of people : its problems and concerns case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.
* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution) Act.
* Water (Prevention and Control of pollution) Act.
* Wildlife Protection Act.
* Forest Conservation Act.
* Issues involved in enforcement of environmental legislation.
* Public awareness. (7 lectures)

Unit-7 Human population and the Environment.

Population growth, variation among nations.

Population explosion- Family Welfare Programme.

Environment and human health.

Human Rights.

Value Education.

HIV/AIDS.

Woman and Child Welfare

Role of Information Technology in Environment and human health.

Case Studies. (6 lectures)

Unit-8 Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems- pond, river, hill slopes, etc. (Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, WileyEastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural HistorySociety, Bombay(R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.
16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford & TBH Publ. Co. Pvt. Ltd. 345p.
17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ. House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science (TB).
20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).
21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno Science Publications (TR).
22. Wagner K.D., 1998, Environmental Management, W.B. Saunders co. Philadelphia, USA 499p.
23. Atext book environmental education G.V.S. Publishers byDr. J.P. Yadav.

(M) Magazine

(R) Reference

(TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.

Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory: 75 marks, Practical/ Field visit : 25 marks. The structure of the question paper will be :

Part- A: Short Answer Pattern	:	15marks
Part- B : EssayType with inbuilt choice	:	60marks
Part-C : Field Work (Practical)	:	25marks

Instructions for Examiners :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.

Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH (Electronics and Communication Engineering)

Common with

B.Tech (Electronics and Tele Communication)

SEMESTER 3rd & 4th

Scheme effective from 2019-20

COURSE CODE AND DEFINITIONS

Course Code	Definitios
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses

PT	Practical Training
S	Seminar

MAHARSHI DAYANAND UNIVERSITY, ROHTAK
SCHEME OF STUDIES & EXAMINATIONS
B.TECH (Electronics and Communication Engineering)
Common with
B.Tech (Electronics and Tele Communication)
SEMESTER –3rd w.e.f. 2019-20

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam	Contact Hrs./wk.
			L	T	P		Theory	Practical				
1	PCC-ECE201G	Electronic Devices	3	0	-	25	75	-	100	3	3	3
2	LC-ECE203G	Electronic Devices lab	0	0	2	25	-	25	50	1	3	2
3	PCC-CSE-221G	Data Structures	3	0	0	25	75	-	100	3	3	3
4	PCC-ECE209G	Signals and Systems	3	0	-	25	75	-	100	3	3	3
5	PCC-ECE211G	Network Theory	3	1	-	25	75	-	100	3	3	3
6	LC-ECE-212G	Network Theory Lab	0	0	2	25	-	25	50	1	3	2
7	**LC-ECE-213G**	**PCB & ELECTRONIC WORKSHOP LAB**	0	0	2	50	-	50	100	2	3	2
8	HSMC-01G	Economics for Engineers (Common with CSE)	3	0	0	25	75	-	100	3	3	3
9	*MC-106G	Environmental Science	3	0	1	25	75	-	-	-	3	4
Total									**700**	**19**		27

***MC-106G** is a mandatory non –credit course in which the students will be required passing marks in theory.

MAHARSHI DAYANAND UNIVERSITY, ROHTAK

SCHEME OF STUDIES & EXAMINATIONS
B.TECH (Electronics and Communication Engineering)
Common with
B.Tech (Electronics and Tele Communication)
SEMESTER –4th w.e.f. 2019-20

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam	Contact Hrs./wk.
			L	T	P		Theory	Practical				
1	PCC-ECE202G	Communication System	3	0	-	25	75	-	100	3	3	3
2	LC-ECE204G	Communication System lab	0	0	2	25	-	25	50	1	3	2
3	PCC-ECE206G	Analog Circuits	3	0	-	25	75	-	100	3	3	3
4	LC-ECE208G	Analog Circuits lab	0	0	2	25	-	25	50	1	3	2
5	PCC-ECE205G	Digital Electronics	3	1	-	25	75	-	100	3	3	4
6	LC-ECE207G	Digital Electronics lab	0	0	2	25	-	25	50	1	3	2
7	PCC-ECE210G	Microcontrollers	3	1	-	25	75	-	100	3	3	4
8	LC-ECE-214G	Microcontrollers Lab	0	0	2	25	-	25	50	1	3	.2
9	HSMC-02G	Organizational Behavior	3	0	0	25	75	-	100	3	3	3
10	BSC-MATH-202G	Mathematics-III (Partial differential equations and Numerical methods)	3	1	-	25	75	-	100	4	3	4
Total									**800**	**23**		29

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

PCC-ECE201G **Electronic Devices**

L	T	P	Credits		
3	0	-	03	Sessional Marks:	25
				Theory Marks :	75

Duration of Exams: 3 Hours

Course Objective: The objectives of this course are as under:

1. To provide explanation about the operation of all the important electronic devices
2. To study and understand the I/O behavior of various electronics devices to variable inputs
3. To demonstrate how electronic devices are used to design efficient electronic applications

Unit 1

Basic Semiconductor And Pn-Junction Theory: Introduction, Atomic Structure, Band Theory of Semiconductors, Covalent Bond, Metals, Insulators & Semiconductors, Effect of Temperature on Conduction, Drift Current ,Donor & Accepter Impurities in Semiconductor, Law Of Mass Action, Hall's Effect, Hall Coefficient & Mobility, Poisson and continuity equation.

Characteristics Of Diode:PN-Junction, Construction Types, Unbiased Junction, Biased Junction, Space Charge Region, Diode Characteristics & Parameters, Diode Capacitance, Diode Resistance, DC And AC Load Lines, Diode Testing, Zener And Avalanche Breakdown Diodes, Tunnel Diode, Temperature Characteristics of Diode, Reverse Recovery Time, Switching Characteristics of Diode.

Unit 2

Diode Applications: Half Wave, Full Wave Center Tapped, Full Wave Bridge(Rectification), Series Clipping Circuit, Shunt Clipping Circuit, Clamping Circuit, Bridge Voltage Doubler, Filtering Circuit Using Capacitor & Inductor.

Junction Transistor: Introduction, Construction Of Junction Transistor, Circuit Symbols, Transistor Operation, Unbiased Transistor, Operation Of Biased Transistor, Transistor Current Components, DC & AC Load Line, Operating Point, Transistor Configuration CB, CE, CC, Input/Output Characteristics, Early Effect(Base Width Modulation), Eber's-Moll-Model of Transistor, Maximum Rating of Transistor, Transistor Testing, Transistor as an Amplifier, Transistor as Oscillator.

Unit 3

Bjt Biasing: Bias Stability, Instability Due To β, Thermal Stability, Stability Factor, Fixed Biased Circuits, Effect of Emitter Resistor, Collector to Base Bias, Voltage Divide Biasing, Advantage & drawbacks of Biasing Techniques, Stability Factor calculation of Biasing Techniques, Bias Compensation by various device, Thermal Runway, Transistor Dissipation, Thermal Resistance, Condition of Thermal Stability

Small Signal Circuit: Two Port Network, Hybrid(H-Parameter)Model, Typical Values of H-Parameter Model, Conversion of CE, CB, CC Configuration to Equivalent Hybrid Model, CB Circuit Analysis, CE circuit with & without R_E analysis, CC circuit analysis, Analysis of CE, CB & CC Configuration with approximate Hybrid Model, Miller's Theorem, Dual of Miller Theorem.

Unit 4

FET: Introduction, The Junction FET, Basic Construction, Operation, P- Channel FET, N-Channel FET, High Frequency Model of FET, Low Frequency FET Amplifiers, Transfer Characteristics of FET, MOSFET, Enhancement Mode, Depletion Mode of FET, Circuit Symbol of MOSFET,V-MOSFET.

Special Semicondutor Devices: Optoelectronic Devices, Photoconductors, Photo Diode, Photo Transistor, Photo Voltaic Sensor, Photo Emission, Solar Cells, LED, LCD, Laser Diode, Schottky Diode, SCR, TRIAC, DIAC, UJT, Single Electron Transistor. Infrared LEDs, IGBT, Opto Coupler.

Text/Reference Books:

1. Basic Electronics By Debashion DE. – Pearson Education.
2. Electronics Device & Circuit, By Robert Boylestad ,Louis Nashelsky, 11th Edition, Pearson Education,2015.
3. Electronics Device Circuit By David.A.Bell -- Oxford
4. Integrated Electronics By Millman Halkias -- TMH.
5. Electronics Device &Circuit By Dharam Raj Cheruku -- Pearson Education.
6. Electronics Device &Circuit By B.P Singh and Rekha Singh 2nd Edition – Pearson Education.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the operation of all the important electronic devices
2. Understand the I/O behavior of various electronics devices to variable inputs
3. Understand the design of efficient electronic applications

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE203G Electronic Devices Lab

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

Course Objective: The objectives of this course are as under:

1. To introduce students to the characteristics of diodes, transistors, JFETs, and op-amps .
2. To provide understanding about the operation and characteristics of different configurations of BJT.
3. To provide understanding about the operation and characteristics of different special semiconductor devices.

LIST OF EXPERIMENTS:

1 Analysis & study of half wave and full wave rectifiers

2 Analysis & study of power supply filter.

3 Analysis & study of diode as a clipper and clamper.

4 Analysis & study of zener diode as a voltage regulator.

5 Analysis & study of CE amplifier for voltage, current and Power gains input, output impedances.

6 Analysis & study of CC amplifier as a buffer.

7 Analysis & study the frequency response of RC coupled amplifier.

8 Analysis & study of transistor as a constant current source in CE configuration .

9 To study characteristics of FET.

10 Analysis & study of FET common source amplifier.

11 Analysis & study of FET common drain amplifier.

12 Study and design of a DC voltage doubler.

13 To study characteristics of SCR.

14 To study characteristics of DIAC.

15 To study UJT as a relaxation oscillator.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the characteristics of diodes, transistors, JFETs, and op-amps.
2. Understand the operation and characteristics of different configurations of BJT.
3. Understand the operation and characteristics of different special semiconductor devices.

Note:-

1 Total ten experiments are to be performed in the semester.

2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

3 At least 5 experiments have to be simulated and results to be validated with experimental results.

Data Structures

Course code	PCC-CSE-221G				
Category	Professional Core Course				
Course title	**Data Structures**				
Scheme and Credits	L	T	P	Credits	
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Objectives of the course:

1. To impart the basic concepts of data structures and algorithms.
   To understand concepts about searching and sorting techniques
   To understand basic concepts about stacks, queues, lists, trees and graphs.
   To enable them to write algorithms for solving problems with the help of fundamental data structures

Unit 1:

Introduction: Basic Terminologies: Concept of Data Structure, Choice of right Data Structure, Algorithms , how to design and develop algorithm . Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, **Searching:** Linear Search and Binary Search Techniques.

Unit 2:

Stacks and Queues: Stack and its operations: Applications of Stacks: Expression Conversion and evaluation queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues.

Unit 3:

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree. Applications of Binary Trees.

Unit 4:

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Selection Sort Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods.

Suggested books:

"Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

Suggested reference books:

Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company

"How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

Course outcomes

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

PCC-ECE209G **Signals and Systems**

L	T	P	Credits		
3	0	-	3	Sessional Marks:	25
				Theory Marks `:	75
				Duration of Exams: 3 Hours	

COURSE OBJECTIVES: To bring the Continuous-time and Discrete-time concepts, types of signals and systems.

- To impart knowledge about representation, properties and applications of systems and signals.
- To impart knowledge about transforms and their applications to signals and systems.

Unit 1

Introduction To Signal: Signal Definition, Classification with examples: Continuous –Time & Discrete –Time, Continuous –valued & Discrete –valued, Analog & Digital, Deterministic & Random, One Dimensional & Multi Dimensional, Even/Symmetric & Odd/Anti symmetric signals, Causal, Non causal & Anti causal; Real & Complex, Periodic & Aperiodic, Energy & Power signals; Representation of Discrete –Time signals, Elementary Discrete Time Signals.

Introduction To Discrete-Time Systems And Their Properties: Systems & Their Representation, Independent variable transformations: Time Shifting, Time Reversal, Time Scaling, time shifting and reversal; classification of Systems: Hardware, Software & Mixed Systems; Linear & Nonlinear Systems; Static/without memory & Dynamic/ with memory Systems, Causal & Non causal System; Invertible & Noninvertible; Stable & Unstable System, Time variant & Time Invariant Systems.

Unit 2

Linear-Time Invarient (Lti) Systems And Their Advantages:LTI Systems, Discrete –time Signal representation in terms of impulses, Impulse Response of Discrete Time LTI Systems, Finite Impulse Response System, Infinite Impulse Response System, LTI Systems Properties, LTI systems representation by Constant –Coefficient Difference Equation, LTI System Characterization, Cascade & Parallel Connection of LTI Systems.

Introduction To Frequency Domain Representation: Concept of frequency for analog signals and discrete –time signals, Fourier Series Representation of Periodic Signals, I/P O/P Relationship for LTI Systems using Fourier Series, Filtering Concept. Fourier Transform representation for Discrete –Time Signals, Properties of Discrete –Time Fourier Transform, Systems Characterized by Linear Constant Coefficient Difference Equations.

Unit 3

Laplace Transform: Definition and Region of Convergence, Laplace transform applications to LTI systems, Transfer function of LTI systems, Poles and Zeros in S-plane, Stability in S-domain.

Z-Transform And Its Inverse: Introduction to Z-Transform, Region of Convergence (ROC) for Z-Transform, ROC for: Finite & Infinite Duration; Causal, Anti causal & Noncausal signals; Z-

Transform Properties, Relationship with Fourier Transform, Inverse Z-Transform, Rational Z – Transforms, Poles & Zeros of Signals & Systems, Pole Location and Time Domain behavior for Causal Signals; Applications of Z-Transform: System Function of an LTI System, Causality & Stability of LTI Systems, Pole Zero Cancellation.

Unit 4

State Variable Technique: State Space Representation of Continuous –Time LTI Systems with multi-input, multi-output; Solution of state equation for Continuous –Time Systems.
State Space Representation of Discrete –Time LTI Systems: single input single output and multiple input multiple output systems, Solution of State Equation for Discrete-time LTI Systems, Determining System function H(z).

Text Books:
1. A. V. Oppenheim, A. S. Willsky, with S. Nawab "Signals & Systems", 2nd Edition, Pearson Education, 2015.
2. S. Salivahanan, C. Gnanapriya, " Digital Signal Processing", Second Edition, McGraw Hill Education.
3. J. G. Proakis, D. G. Manolakis, "Digital Signal Processing, Principles, Algorithms, & Applications", 4th Edition, Pearson Education.

Reference Books:
1. Smarajit Ghosh,"Signal & Systems",Pearson Education.
2. Nagrath & R. Ranjan, "Signals & Systems", TMH.
3. Schaum Series, "Signals & Systems",Sue & Ranjan.
4. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th Edition, Pearson Educatio.
5. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.
6. Douglas K. Lindner, "Introduction to Signals and Systems", McGraw Hill International Edition
7. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB", TMH, 2003.

Course Outcomes:
At the end of this course students will demonstrate the ability to:
- Analyze different types of signals and systems.
- Represent continuous and discrete time signals and systems in time and frequency domain using different transforms.
- Get familiarized with the characteristics and applications of Linear Time Invariant System.
- Analyze LTI systems using Laplace/Z-Transform.

Note:
1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

PCC-ECE211G **Network Theory**

L	T	P	Credits	
3	1	0	3	Class Work : 25 Marks
				Theory : 75 Marks
				Total : 100 Marks
				Duration of Exam: 3 Hrs.

Course Objective: The objectives of this course are as under:
1. To prepare the students to have a basic knowledge in the analysis of Electric Networks
2 To solve the given circuit with various theorems and methods.
3 To analyze the various three phase circuits star and delta connections.
4 To distinguish between tie set and cut set methods for solving various circuits.
5 To design various types of filters.
6 To relate various two port parameters and transform them.

Unit I

Fundamentals of Network Analysis: Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactances, source transformation and duality**.**

Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. circuits.

Unit 2

Fourier Series: Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values.

Fourier Transform& Laplace Transform: Fourier transform and continuous spectra, three phase unbalancedcircuit and power calculation.
Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis.

Unit 3

A.C Analysis: Analysis of RC, RL, and RLC networks with and without initial conditions with Laplacetransforms evaluation of initial conditions, Behaviors of series and parallel resonant circuits.

Transient behavior: concept of complex frequency, Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations,
convolution theorem.

Unit 4

Two port network and interconnections: Characteristics and parameters of two port networks**,** Network Configurations**,** short-circuit Admittance parameters, open-circuit impedance parameters, Transmission parameters, hybrid parameters, condition for reciprocity & symmetry, Inter-relationships between parameters of two-port network sets, Inter-connection of two port networks.

Topology: Principles of network topology, graph matrices, network analysis using graph theory

Filter Analysis: Introduction to band pass, low pass, high pass and band reject filters, Analysis & design of prototype high-pass, prototype low-pass, prototype band-pass, and prototype band-reject filter.

Text Books:

1. Van, Valkenburg.; "Network Analysis", 3rd Edition, Pearson Education, 2015.
2. Sudhakar A. Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi, 1994
3. A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education
4. S.K Bhattacharya & Manpreet Singh, Network Analysis and Synthesis, Pearson Education, 2015.

Reference Books:

1. Network Theory by U.A Bakshi, V.A Bakshi, Technical Publications
2. "Fundamentals of Electric Circuit" by C.K Alexander and Sadiku.
3. A.V. Oppenheim, A.S. Willsky, with S. Nawaab "Signals & Systems"2nd Edition, Pearson Education, 2015.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.
5. Appreciate the frequency domain techniques.

Note:

Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE-212G **NETWORK THEORY LAB**

L T P	Credits- 1	Class Work marks : 25
0 0 2		Theory marks : 25
		Total marks : 50

Course Objective: The objectives of this course are as under:

1. To impart practical knowledge to the students about the basic theory concepts of network theory and familiarize them with various kits, filters and parameters used in the circuits.
2. To enable students to design and analyze various circuits using the network components (Resistor, capacitor and inductor).
3. To make students practically capable of designing various types of filters implement such filters for various high level applications and systems.

LIST OF EXPERIMENTS:

A: Simulation based

1. Introduction of circuit creation & simulation software like TINAPRO, P-Spice, Dr.-Spice/other relevant Software

2. Transient response of RC, RL circuit on any of above software.

3. To find the resonance frequency, Band width of RLC series circuit using any of above software.

4. To plot the frequency response of low pass filter and determine half-power frequency.

5. To plot the frequency response of high pass filter and determine the half-power frequency.

6. To plot the frequency response of band-pass filter and determine the band-width.

B: Hardware Based

7. To calculate and verify "Z" & “Y” parameters of a two port network.

8. To determine equivalent parameter of parallel connections of two port network and study loading effect.

9. To calculate and verify "ABCD" parameters of a two port network.

10. To synthesize a network of a given network function and verify its response.

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Implement the basic network theory concepts practically and will be able to verify filter results derived in theory.
2. Design and analyze various network and filter circuits for various practical problems.
3. Understand all the concepts and parameters of network theory.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned institution as per the scope of the syllabus.

LC-ECE-213G **PCB & ELECTRONIC WORKSHOP LAB**

L	T	P	credits	
0	0	2	2	Class Work marks : 50 Theory marks : 50 Total marks : 100

Objective: To create interest in Hardware Technology.

1. Winding shop: Step down transformer winding of less than 5VA.

2. Soldering shop: Fabrication of DC regulated power supply

3. PCB Lab: (a) Artwork & printing of a simple PCB.

(b) Etching & drilling of PCB.

4. Wiring & fitting shop: Fitting of power supply along with a meter in cabinet.

5. Testing of regulated power supply fabricated.

Experiment to be performed

1. Introduction & Hands on experience to use circuit creation & simulation software like TINAPRO , PSPICE or ORCAD etc.

2. Design a full wave centre tapped rectifier & study the effect of capacitive filter & its output on a virtual oscilloscope.

3. Design a RLC resonance circuit & verify the transient & phase response for different values of R,L &C.

4. Design a circuit for a fixed power supply.

5. Design a half adder using discrete components & verify the timing diagrams.

6. Convert the power supply circuit into PCB & simulates its 2D & 3D view.

7. PCB printing using screen printing or any other technique.

8. Etching of the above PCB.

9. UV exposure & Drilling of PCB.

10. Coating of etched PCB to protect it from oxidation.

11. Fabrication & placing of components as per above power supply circuit.

12. Testing of above circuit.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the characteristics of diodes and filter circuits.
2. Understand the operation and characteristics of different types of rectifiers.
3. Understand the operation and characteristics of power supply.

Course Name	**:**	**ECONOMICS FOR ENGINEERS**	
Course Code	**:**	**HSMC-01G**	**External marks: 75**
Credits	**:**	**2**	**Internal marks: 25**
L-T-P	**:**	**2-0-0**	**Total marks: 100**
Course Objectives:			

1. Acquaint the students to basic concepts of economics and their operational significance.

2. To stimulate the students to think systematically and objectively about contemporary economic problems

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

SYLLABUS

UNIT-1

Definition of Economics- Various definitions, types of economics- Micro and Macro Economics, nature of economic problem, Production Possibility Curve, Economic laws and their nature, Relationship between Science, Engineering, Technology and Economic Development. **Demand-** Meaning of Demand, Law of Demand, **Elasticity of Demand**- meaning, factors effecting it, its practical application and importance.

UNIT-2

Production- Meaning of Production and factors of production, Law of variable proportions, Returns to scale, Internal and external economies and diseconomies of scale. **Various concepts of cost of production-** Fixed cost, Variable cost, Money cost, Real cost, Accounting cost, Marginal cost, Opportunity cost. Shape of Average cost, Marginal cost, Total cost etc. in short run and long run.

UNIT-3

Market- Meaning of Market, Types of Market- Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly (main features). **Supply-** Supply and law of supply, Role of demand & supply in price determination and effect of changes in demand and supply on prices.

UNIT 4

Indian Economy- Nature and characteristics of Indian economy as under developed,developing and mixed economy (brief and elementary introduction), **Privatization -** meaning, merits and demerits. **Globalization of Indian economy -** merits and demerits. **Banking-** Concept of a Bank, Commercial Bank- functions, Central Bank- functions, Difference between Commercial & Central Bank.

Course Outcomes: By the end of this course the student will be able to:

1. The students will able to understand the basic concept of economics.
2. The student will able to understand the concept of production and cost.
3. The student will able to understand the concept of market.
4. The student will able to understand the concept of privatization, globalization and banks.

Suggested Books:

1. Chopra P. N., Principle of Economics, Kalyani Publishers.
2. Dewett K. K., Modern economic theory, S. Chand.
3. H. L. Ahuja., Modern economic theory, S. Chand.
4. Dutt Rudar & Sundhram K. P. M., Indian Economy.
5. Mishra S. K., Modern Micro Economics, Pragati Publications.
6. Singh Jaswinder, Managerial Economics, dreamtech press.
7. A Text Book of Economic Theory Stonier and Hague (Longman's Landon).
8. Micro Economic Theory – M.L. Jhingan (S.Chand).
9. Micro Economic Theory - H.L. Ahuja (S.Chand).
10. Modern Micro Economics : S.K. Mishra (Pragati Publications).
11. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co).
12. Jain T.R., Economics for Engineers, VK Publication.

ENVIRONMENTAL SCIENCE
MC-106G

L	T	P	Credits	
3	0	1	-	Class Work : 25 Marks
				Theory : 75 Marks
				Duration of Exam: 3 Hrs.

Unit-1

The Multidisciplinary nature of environmental studies. Definition, scope and importance. (2 lecture)

Unit-2

Natural Resources:

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non- renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.
* Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit-3

Ecosystems :

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.

b. Grassland ecosystem.

c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). (6 lectures)

Unit-4

Biodiversity and its conservation :

* Introduction - Definition : Genetic, Species and ecosystem diversity.
* Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

(8 lectures)

Unit-5

Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.

b) Water pollution

c) Soil pollution

d) Marine pollution

e) Noise pollution

f) Thermal pollution

g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6

Social issues and the Environment:

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation, rain water harvesting, watershed management.
* Resettlement and rehabilitation of people : its problems and concerns case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.
* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution) Act.
* Water (Prevention and Control of pollution) Act.
* Wildlife Protection Act.
* Forest Conservation Act.

* Issues involved in enforcement of environmental legislation.
* Public awareness.

(7 lectures)

Unit-7

Human population and the Environment :

Population growth, variation among nations. Population explosion- Family Welfare Programme. Environment and human health.
Human Rights. Value Education. HIV/AIDS.
Woman and Child Welfare

Role of Information Technology in Environment and human health.
Case Studies. (6 lectures)

Unit-8

Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems- pond, river, hill slopes, etc.
  (Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd., Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment &

Security Stockholm Env. Institute, Oxford Univ. Press, 473p.

9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).

10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.

11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.

12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.

13. Mhaskar A.K., Mayyer Hazardous, Tekchno-S cience Publications (TB).

14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB).

15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.

16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford & TBH Publ. Co. Pvt. Ltd. 345p.

17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ. House, Meerut.

18. Survey of the Environment, The Hindu (M).

19. Townsend C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science (TB).

20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).

21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno Science Publications (TR).

22. Wagner K.D., 1998, Environmental Management, W.B. Saunders co. Philadelphia, USA 499p.

23. A text book environmental education G.V.S. Publishers by Dr. J.P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.

Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory : 75 marks, Practical/ Field visit : 25 marks.
The structure of the question paper will be :

Part- A : Short Answer Pattern	:	15 marks
Part- B : Essay Type with inbuilt choice	:	60 marks

Part-C : Field Work (Practical) : 25 marks

Instructions for Examiners :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.
Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

PCC-ECE202G Communication System

L	T	P	Credits	
3	0	0	3	Class Work : 25 Marks
				Theory : 75 Marks
				Total : 100 Marks
				Duration of Exam: 3 Hrs.

Course Objective: The objectives of this course are as under:

- To introduce the students to the basics of different types of modulation techniques
- To aim at a comprehensive coverage of design of radio transmitter and receiver

Unit 1

Introduction To Communication System: Modulation, Demodulation, Radio Frequency Spectrum, Signals & their classification, Limitations & Advantages of a Communication System, Comparison of Analog & Digital Communication Systems, Historical Perspective, Modes & Medias of Communication.

Noise: Sources of Noise, External & Internal Noise, Noise Calculations, Noise Figure, Noise Figure Calculation, Noise Temperature, Noise in Communication Systems, Band Pass Noise Model, Cascaded States & its Noise Figure Calculation, Signal in presence of Noise, Pre-Emphasis & De-Emphasis, Noise Quieting Effect, Capture Effect, Noise in Modulation Systems.

Unit 2

Linear Modulation: (AM) Basic definition & derivation for Modulation & Modulation Index, Modulation & Demodulation of AM, Suppressed Carrier Modulation, Quadrature Amplitude Modulation, SSB-SC, DSB-SC, VSB Modulation & Demodulation, Comparison of various AM Systems, Generation of AM waves.

Angle Modulation:

Basic definition & derivation for Modulation & Modulation Index, Generation of FM waves, Comparison between PM & FM, Frequency Spectrum of FM, B.W. & required spectra, Types of FM, vector representation of FM, Universal Curve, Multiple FM, Demodulation of FM waves, Demodulation of PM waves, Comparison between AM & FM.

Unit 3

Transmitters & Receivers: Classification of Radio Transmitters, Basic Block Diagram of Radio Transmitter, Effect of Feedback on operation of Transmitter, Radio Telephone Transmitters, Privacy Device in Radio Telephony, FM Transmitter using Reactance Modulator, Armstrong FM Transmitter, Radio Receivers, Classification, TRF Receiver, Super Heterodyne Receiver, Image Rejection & Double Spotting, Choice of IF, Tracking & Alignment of Receivers, AGC.

Pulse Analog Modulation: Sampling theory, TDM, FDM, PAM, PWM, PPM, Modulation & Demodulation techniques of above all.

UNIT 4

Pulse Digital Modulation: Elements of Pulse Code Modulation, Noise in PCM Systems, Bandwidth of PCM Systems, Measure of Information, Channel Capacity, Channel Capacity of PCM System, Differential Pulse Code Modulation (DPCM). Delta Modulation (DM)

Digital Carrier Modulation And Demodulation Techniques: Digital Modulation Formats, Coherent Binary Modulation & Demodulation: ASK, BPSK, BFSK, Coherent Quadrature Modulation & Demodulation Techniques: QPSK, MSK.
Non Coherent BFSK, Differential PSK, M-Ary Modulation & Demodulation Techniques: M-Ary PSK, M-Ary QAM, M-Ary FSK, Synchronization: Carrier & Symbol Synchronization.

Reference Books:

1. Communication Systems — By Manoj Duhan – I. K. International
2. Electronic Communication Systems — By Kennedy – TMH
3. Communication Systems — By Singh & Sapre – TMH
4. Communication System Engineering — By John G. Proakis and Masoud Salehi, Pearson Education, 2015.
5. Analog Communication — By P. Chakarbarti – DR & Co.
6. Communication Systems — By Simon Haykins – Wiley

COURSE OUTCOMES:

- Student will be familiar with concept of modulation and various modulation techniques
- Ability to model noise in communication systems
- Familiarity with design of radio transmitter and receiver

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE204G Communication System Lab

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

COURSE OBJECTIVES:

- To provide the basic understanding about various modulation techniques.
- To analyze different characteristic parameters of these modulation techniques.

LIST OF EXPERIMENTS:

1. To study and waveform analysis of amplitude modulation and determine the modulation index of amplitude modulation.
2. To study and waveform analysis of amplitude demodulation by any method.
3. To study and waveform analysis of frequency modulation and determine the modulation index of frequency modulation.
4. To study and waveform analysis of frequency demodulation by any method.
5. To study Amplitude Shift Keying (ASK) modulation.
6. To study Frequency Shift Keying (FSK) modulation.
7. To study Phase Shift Keying (PSK) modulation.
8. To study and waveform analysis of phase modulation.
9. To study Phase demodulation.
10. To study Pulse code modulation.
11. To study Pulse amplitude modulation and demodulation.
12. To study Pulse width modulation.
13. To study Pulse position modulation.
14. To study delta modulation.
15. To deliver a seminar by each student on ADVANCE COMMUNICATION SYSTEM.

COURSE OUTCOMES:

- Students are able to analyze digital communication signals.

- Students understand the basics of PAM, QAM, PSK, FSK, and MSK.
- They can analyze noise and disturbance in modulated signals.

Note:-

1. Total ten experiments are to be performed in the semester
2. At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

PCC-ECE206G **Analog Circuits**

L	T	P	Credits		
3	0	-	03	Sessional Marks:	25
				Theory Marks:	75
				Duration of Exams:	3 Hours

Course Objective: The objectives of this course are as under:

1. To understand the characteristics of diodes and transistors
2. To design and analyze various rectifier and amplifier circuits
3. To design sinusoidal and non-sinusoidal oscillators
4. To understand the functioning of OP-AMP and design OP-AMP based circuits
5. To design ADC and DAC

Unit 1

High Frequency Analysis Of Bjt And Multistage Amplifier: Hybrid Pi Model, CE Short Circuit Gain, Frequency Response, Alpha Cut off Frequency, Gain Bandwidth Product, Emitter Follower at High Frequencies. RC Coupled Transistor Amplifier, Lower & Upper Cut off Frequency, Frequency Response curve & Bandwidth, Transformer Coupled Amplifier, Direct Coupled Amplifier, Cascode Amplifier, Darlington Pair Amplifier, Distortion In Amplifiers.

Feedback Amplifiers: Feedback concept , Transfer Gain with Feedback, General Characteristics of Negative Feedback, Advantages & disadvantages, Input And Output Resistance, Voltage Series Feedback topology, Voltage Shunt, Current Series & Current Shunt topology ,Equivalent circuit for each topology, Effects of Negative Feedback.

Unit 2

Oscillators: Introduction, Barkhausen Criterion, Oscillator with RC Feedback circuit (RC Phase Shift, Wien Bridge), Tuned Collector, Tuned Base Oscillator, LC Feedback circuits (Hartley, Colpitts), Condition for Sustained Oscillations & Frequency of Oscillations, Crystal Oscillator.

Power Amplifier: Definition, Application & Types of Power Amplifiers, Amplifier Classes of Efficiency (Class - A, B, AB, C), Push Pull Amplifiers, Distortion in Simple & Push Pull Amplifier, Complementary Push Pull Amplifier, Integrated Circuit Power Amplifier , Introduction to MOSFET & CLASS D Power Amplifier.

Unit 3

Voltage Regulators: Voltage Regulation, Basic Series Regulators, Basic Shunt Regulators, Power Supply Parameters, Basic Switching Regulators, Step up Configuration, Step down Configuration, IC Voltage Regulator, SMPS.

Integrated Circuit Fabrication Process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapour deposition, sputtering, twin-tub CMOS process.

Unit 4

Operational Amplifier Fundamentals: Block Diagram Representation, Ideal OP-AMP, OP-AMP Equivalent Circuit, Ideal Voltage Transfer Curve, Input Offset Voltage, Input Bias Current, Input Offset Current, Output Offset Voltage, Thermal Drift, Effect of Variation in Power Supply Voltages on Offset Voltage, Common Mode Configuration and CMRR, Frequency Response of OP-AMP: Open Loop Response, Close Loop Response, Input and Output Impedances, Effect of Finite Gain Bandwidth Product, Slew Rate.

Operational Amplifier Applications: Linear and non-linear applications-ADC and DAC, Multivibrators, Astable Multivibrator, Monostable Multivibrator, Bistable Multivibrator, 555 Timer, Monostable & Astable Operation with 555 Timer.

Text/Reference Books:

1. Electronics Device &Circuit By David.A. Bell - Oxford University Press.
2. Electronics Device & Circuit By Theodore F. Bogart, Jeffrey.S.Bealey,Guilermo Rico – 6th Edition, Pearson Education.
3. Electronics Device & Circuit By Robert Boylestad ,Louis Nashelsky, 11th Edition, Pearson Education, 2015.
4. Electronics Device By Floyd , 9th Edition, Pearson Education, 2015.
5. Integrated Electronics By Millman Halkias - TMH.
6. Electronic Devices & Circuits By B.P Singh and Rekha Singh, 2nd Edition, Pearson Education.
7. Electronics Device & Circuit By Sanjeev Gupta.
8. Electronics Device & Circuit By I. J. Nagrath - PHI
9. Electronic Principles By Albert Malvino.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the characteristics of diodes and transistors
2. Design and analyze various rectifier and amplifier circuits
3. Design sinusoidal and non-sinusoidal oscillators
4. Understand the functioning of OP-AMP and design OP-AMP based circuits
5. Design ADC and DAC

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE208G **Analog Circuits Lab**

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

Course Objective: The objectives of this course are as under:

- To understand the characteristics and AC analysis of RC coupled amplifier.
- To understand the operation and characteristics of different oscillators, regulators and timers.
- To understand the operation of power supply.

LIST OF EXPERIMENTS:

1 To analyze and study frequency response of RC coupled amplifier.

2 To analyze and study different types of feedback topology.

3 To analyze and study RC phase shift oscillator.

4 To analyze and study wein bridge oscillator.

5 To analyze and study three terminal IC voltage regulator.

6 To draw characteristics of a transistor.

7 To analyze and study CE amplifier and calculate its gain.

8 To analyze and study 555 timer as a square wave generator.

9 To analyze and study SMPS power supply.

10 To analyze and study working of Push-Pull amplifier.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the characteristics and AC analysis of RC coupled amplifier.
2. Understand the operation and characteristics of different oscillators, regulators and timers.
3. Understand the operation of power supply.

Note:-

1 Total ten experiments are to be performed in the semester.

2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

3 At least 5 experiments have to be simulated and results to be validated with experimental results.

PCC-ECE205G **Digital Electronics**

L	T	P	Credits			
3	1	-	3	Sessional Marks	:	25
				Theory Marks	:	75
				Duration of Exams	:	3 Hours

Course Objective: The objectives of this course are as under:

1. To provide a comprehensive introduction to digital logic design leading to the ability to understand binary codes, binary arithmetic and Boolean algebra and its relevance to digital logic design.
2. To design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder etc.
3. To design & analyze synchronous sequential logic circuits.
4. To familiarize students with basics of digital logic families.
5. To Analyze and design simple systems composed of PLDs.

Unit 1

Logic Simplification: Review of Boolean Algebra and DeMorgan's Theorem, SOP & POS forms, Canonical forms comlements of a numbers ,addition and subtractions of a comlements numbers, Realization Using Gates. Karnaugh maps up to 6 variables , Q M & VEM technique,

Unit 2

Combinational & Sequential Logic Design: Binary codes, error detection and correction code ,Code Conversion. Numericals

Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display,Half andFull Adders, Subtractors , Parallel Adders, Adder with Look Ahead Carry ,BCD Adder.

Unit 3

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, conversions of FF, Ripple and Synchronous counters, Ring and Johnson counter, UP & DOWN counter, Sequence Generator,Shift registers.

Unit 4

PLDs and Finite state machines: Concept of Programmable logic devices like PAL,PLA ,ROM ,CPLD and FPGA. Logic implementation using Programmable Devices

Introduction, Design of synchronous FSM :Serial Binary Adder Sequence detector ,Parity Bit Generator pulse train generator. Algorithmic State Machines charts :Introduction, Component of ASM chart, Introductory examples of ASM chart.

Text/Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009
2. A.Anand Kumar, "Switching Theory & Logic Design",PHI.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition ,2006.

4. D.V. Hall, “Digital Circuits and Systems”, Tata McGraw Hill, 1989.
5. Morris Mano, “Digital Design: With an Introduction to the Verilogn HDL 5th Edition, Pearson Education, 2013.
6. Morris Mano, “ Logic & Computer Fundamentals,4th Edition, Pearson Education.

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Design digital logic circuits depicting their ability to understand binary codes, binary arithmetic and Boolean algebra, its axioms and theorems.
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder.
3. Design & analyze synchronous sequential logic circuits
4. Understand and design various digital circuits using different digital logic families.
5. Analyze and design simple systems composed of PLDs.

Note:

1. The paper setter will set two questions (with or without parts) from each of four units , & a ninth compulsory question comprising of 5 to 10 sub-parts , covering the entire syllabus . The examinee will attempt 5 questions in all, alongwith the compulsory question (with all its sub-parts), selecting one question from each unit.

The use of programmable devices such as programmable calculators, phones etc. and sharing of materials during the examination are not allowed

Note:

Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE207G Digital Electronics Lab

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

Course Objective: The objectives of this course are as under:

4. To impart practical knowledge to the students about the basic theory concepts of digital electronics and familiarize them with various kits and I.C's used for digitally designing the circuits.
5. To enable students to design and analyze various combinational and sequential circuits using logic gates as well as medium scale integrated (MSI) components.
6. To make students practically capable of designing various types of counters and implement such counters for various high level applications and systems.

LIST OF EXPERIMENTS:

1 To study & design basic gates.

2 To realize and minimize five & six variables using K-Map method .

3 To verify the operation of Multiplexer & De-multiplexer.

4 To perform Half adder and Full adder

5 To perform Half Substractor and Full substractor.

6 To verify the truth table of S-R,J-K,T & D Type flip flop .

7 To study FLIP- FLOP conversion.

8 To design & verify the operation of 3 bit synchronous counter.

9 To design & verify the operation of synchronous UP/DOWN decade counter using JK flip

10 To design & verify operation of Asynchronous counter.

11 To design and implement a ckt to detect a Count Sequence.

12 Conversion of state diagram to the state table and implement it using logical ckt.

Course Outcomes: At the end of the course, students will demonstrate the ability to:

4. Implement the basic digital theory concepts practically and will be able to verify various results derived in theory.
5. Design and analyze various combinational and sequential circuits for various practical problems using basic gates and flip flops I.C's.
6. Implement LSI and MSI circuits using programmable logic devices (PLDs).

Note:-

1. Each laboratory class/section shall not be more than about 20 students.

To allow fair opportunity of practical hands on experience to each student,each experiment may either done by each student individually or in groupofnotmore than 3-4 students. Larger groups be strictly discouraged/disallowed.

PCC-ECE210G **Microcontrollers**

L	T	P	Credits	
3	0	-	03	Sessional Marks: 25
				Theory Marks: 75
				Total Marks: 100
				Duration of Exams: 3 Hours

Course Objectives: The objectives of this course are as under:

1. To make the students understand the architecture of various microprocessor.
2. To acquaint the students with the exposure of assembly language programming of Microprocessors.
3. To acquaint the students with a first-hand exposure of interfacing various peripheral devices and develop applications based on these devices.

Unit 1

Overview of microcomputer systems and their building blocks, memory interfacing, concepts of interrupts and Direct Memory Access, Architecture & Instruction set of microprocessors (8086).

Unit 2

Concepts of virtual memory, Cache memory, Architecture & Instructions set of X86 family Microprocessors (80186, 80286, 80386, 80486).

Unit 3

Enhanced features of Pentium, Pentium Pro, Pentium-II, Pentium-III, Pentium-IV, Multi-core Technology, Mobile Processor.

Unit 4

Interfacing with peripherals - Serial I/O, parallel I/O, A/D & D/A converters, PPI chip, DMA controller, Programmable Interrupt Controller, Programmable interval timer chips. Introduction to RISC processors ; ARM microcontrollers design.

Text / Reference Books:

1. D. V. Hall, Microprocessors and interfacing, Tata McGraw-Hill, 2nd Edition, 2006.
2. Ray A. K. and Burchandi, Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing, Tata McGraw Hill, 2002.
3. Brey, The Intel Microprocessors 8086- Pentium Processor, 8th Edition, Pearson Education.
4. M. A. Mazidi, J. P. Maizidi and Danny Causey, The X86 PC: Assembly Language, Design and interfacing, 5th Edition, Pearson Education, 2017.
5. Liu Yu-Chang and Gibson Glenn A., Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design, 2nd Edition, Pearson Education, 2015.
6. L. B. Das, The X86 Microprocessor (Architecture, Programming and Interfacing), 2nd Edition, Pearson Education, 2014.

7. Daniel Tabak, Advanced Microprocessor", Tata McGraw-Hill, 2nd Edition, 2012.
8. B. Ram, Fundamentals of Microprocessor and Microcomputers, Dhanpat Rai Publications, 5th edition, 2008.

Course Outcomes: At the end of this course, the students will demonstrate the ability to:

1. Do assembly language programming
2. Do interfacing design of peripherals.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

LC-ECE-214G Microcontrollers Lab

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

Course Objectives: The objectives of this course are as under:

- To introduce the students with 8086 kit.
- To acquaint them to do assembly language programming of 8086.
- To acquaint them to do assembly language programming of 8086 for interfacing of peripherals.

LIST OF EXPERIMENTS:

1. To study the architecture of 8086 microprocessor and 8086 microprocessor kit.
2. Write a program to add the contents of the memory location to the content of other memory location and store the result in 3rd memory location.
3. Write a program to add 16 bit number using 8086 instruction set.
4. Write a multiplication of two 16 bit numbers using 8086 instruction set.
5. Write a program for division of two 16 bit numbers using 8086 instruction set.
6. Write a program factorial of a number.
7. Write a Program to transfer a block of data with & without overlap.
8. Write a program to find the average of two numbers.
9. Write a Program to check whether data byte is odd or even
10. Write a program to find maximum number in the array of 10 numbers.
11. Write a program to find the sum of the first 'n' integers.
12. Write a program to generate a square wave.
13. Write a program to generate a rectangular wave.
14. Write a program to generate a triangular wave.

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Do assembly language programming of 8086.
2. Do assembly language programming of 8086 for interfacing of peripherals.

Note:

1 Total ten experiments are to be performed in the semester.

2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

<table>
<tr><td>Course code</td><td colspan="5">HSMC-02G</td></tr>
<tr><td>Course title</td><td colspan="5">ORGANIZATIONAL BEHAVIOUR</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2"></td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">CSE/ECE</td></tr>
<tr><td>Class work</td><td colspan="5">25</td></tr>
<tr><td>Exam</td><td colspan="5">75</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

The objective of this course is to expose the students to basic concepts of management and provide insights necessary to understand behavioral processes at individual, team and organizational level.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

SYLLABUS

UNIT - 1

Introduction of Management- Meaning, definitions, nature of management; Managerial levels, skills and roles in an organization; Functions of Management: Planning, Organizing, staffing, Directing & Controlling, Interrelationship of managerial functions, scope of management & Importance of management. Difference between management and administration.

UNIT - 2

Introduction of organization:- Meaning and process of Organization, Management v/s Organization; **Fundamentals of Organizational Behavior:** Concepts, evolution, importance and relationship with other Fields; Contemporary challenges and opportunities of OB. **Individual Processes and Behavior**-**Personality**- Concept, determinants and applications; **Perception-** Concept, process and applications, **Learning**- Concept (Brief Introduction) ; **Motivation-** Concept, techniques and importance

UNIT - 3

Interpersonal Processes- **Teams and Groups**- Definition of Group, Stages of group development, Types of groups, meaning of team, merits and demerits of team; difference between team and group, **Conflict-** Concept, sources, types, management of conflict; **Leadership:** Concept, function, styles & qualities of leadership. **Communication –** Meaning, process, channels of communication, importance and barriers of communication.

UNIT 4

Organizational Processes: Organizational structure - Meaning and types of organizational structure and their effect on human behavior; **Organizational culture -** Elements, types and factors affecting organizational culture. **Organizational change:** Concept, types & factors affecting organizational change, Resistance to Change.

Course Outcomes: By the end of this course the student will be able to:

1. Students will be able to apply the managerial concepts in practical life.
2. The students will be able to understand the concept of organizational behavior at individual level and interpersonal level.
3. Students will be able to understand the behavioral dynamics in organizations.
4. Students will be able to understand the organizational culture and change

Suggested Books:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management, Pearson Education Asia, New Delhi.
2. Stoner, J et. al, Management, New Delhi, PHI, New Delhi.
3. Satya Raju, Management – Text & Cases, PHI, New Delhi.
4. Kavita Singh, Organisational Behaviour: Text and cases. New Delhi: Pearson Education.
5. Pareek, Udai, Understanding Organisational Behaviour, Oxford University Press, New Delhi.
6. Robbins, S.P. & Judge, T.A., Organisational Behaviour, Prentice Hall of India, New Delhi.
7. Ghuman Karminder, Aswathappa K., Management concept practice and cases, Mc Graw Hill education.
8. Chhabra T. N., Fundamental of Management, Sun India Publications-New Delhi.

Mathematics-III (Partial differential equations and Numerical methods)

BSC-MATH-202G

Course code	BSC-MATH-202G				
Category	Basic Science Course				
Course title	Mathematics-III (Partial differential equations and Numerical methods)				
Scheme and Credits	L	T	P	Credits	Semester-IV
	3	1		4	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Unit-I

Partial Differential Equations of first order: Definition of Partial Differential Equations, First order linear partial differential equations, Solutions of first order linear partial differential equations, Charpit's method for solving first order non-linear partial differential equations

Unit-II

Partial Differential Equations of higher order: Second-order linear partial differential equations and their classification, Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method, Initial and boundary conditions, D'Alembert's solution of the wave equation, Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates, One dimensional diffusion equation and its solution by separation of variables

Unit-III

Numerical Methods 1: Solution of polynomial and transcendental equations – Bisection method, Regula-Falsi method and Newton-Raphson method, Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae, Numerical differentiation, Numerical integration, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules

Unit-IV

Numerical Methods 2: Taylor's series, Euler and modified Euler's methods, Runge-Kutta method of fourth order for solving first and second order ordinary differential equations, Finite difference solution of two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers
3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited
4. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications
5. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand and Company
6. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI

Course Outcomes

The Students will learn:

1. To solve field problems in engineering involving partial differential equations.
2. To find roots of polynomial and transcendental equations using numerical methods.
3. To conduct numerical differentiation and numerical integration.
4. To solve differential equations using numerical methods.

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH (Computer Science and Engineering)

Common with

B.Tech. (Information Technology)

&

B.Tech. (Computer Science and Information Technology)

SEMESTER 3rd & 4th

Scheme effective from 2019-20

COURSE CODE AND DEFINITIONS

Course Code	Definition
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

B.Tech. (Computer Science and Engineering)

Common with B.Tech. (Information Technology) &

B.Tech. (Computer Science and Information Technology)

Scheme of Studies/Examination w.e.f. 2019-20

Semester- 3

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	PCC-CSE-201G	Database Management Systems	3	0	0	3	3	25	75		100	3
2	PCC-CSE-203G	Data Structures & Algorithms	3	0	0	3	3	25	75		100	3
3	PCC-CSE-205G	Digital Electronics	3	0	0	3	3	25	75		100	3
4	PCC-CSE-207G	Python Programming	2	0	0	2	2	25	75		100	3
5	BSC-MATH-203G	Mathematics - III (Multivariable Calculus and Differential Equations)	2	0	0	2	2	25	75		100	3
6	HSMC-01G	Economics for Engineers	3	0	0	3	3	25	75		100	3
7	LC-CSE-209G	Database Management Systems LAB	0	0	4	4	2	25		25	50	3
8	LC-CSE-211G	Digital Electronics LAB	0	0	4	4	2	25		25	50	3
9	LC-CSE-213G	Data Structures & Algorithms LAB Using C	0	0	4	4	2	25		25	50	3
10	LC-CSE-215G	Python Programming LAB	0	0	2	2	1	25		25	50	3
						Total	23				800	

B.Tech. (Computer Science and Engineering)

Common with B.Tech. (Information Technology) &

B.Tech. (Computer Science and Information Technology)

Scheme of Studies/Examination w.e.f. 2019-20

Semester- 4

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	PCC-CSE-202G	Discrete Mathematics	3	1	0	3	4	25	75		100	3
2	PCC-CSE-204G	Computer Organization & Architecture	3	0	0	3	3	25	75		100	3
3	PCC-CSE-206G	Operating System	3	0	0	3	3	25	75		100	3
4	PCC-CSE-208G	Object Oriented Programming	3	0	0	3	3	25	75		100	3
5	HSMC-02G	Organizational Behaviour	3	0	0	3	3	25	75		100	3
6	*MC-106G	Environmental Sciences	3	0	1	4	0	-	-	-	-	3
7	PCC-CSE-210G	Web Technologies	2	0	0	2	1	25	75		100	3
8	LC-CSE-212G	Operating System LAB	0	0	4	4	2	25		25	50	3
9	LC-CSE-214G	Object Oriented Programming LAB Using C++	0	0	4	4	2	25		25	50	3
10.	LC-CSE-216G	Web Technologies Lab	0	0	2	2	1	25		25	50	3
						Total	22				750	

***MC-106G** is a mandatory non –credit course in which the students will be required passing marks in theory.

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

Database Management System

Course code	PCC-CSE-201G				
Category	Professional Core Course				
Course title	Database Management System				
Scheme and Credits	L	T	P	Credits	
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

a. To understand the different issues involved in the design and implementation of a database system.
b. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
c. To understand and use data manipulation language to query, update, and manage a database
d. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
e. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). **Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit: 2

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit: 3

Storage strategies: Indices, B-trees, hashing,

Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit: 4

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Suggested books:

“Database System Concepts”, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Suggested reference books

“Principles of Database and Knowledge – Base Systems”, Vol 1 by J. D. Ullman, Computer Science Press.

“Fundamentals of Database Systems”, 5th Edition by R. Elmasri and S. Navathe, Pearson Education

“Foundations of Databases”, Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

Course Outcomes

1. For a given query write relational algebra expressions for that query and optimize the developed expressions
2. For a given specification of the requirement, design the databases using E R method and normalization.
3. For a given specification, construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
4. For a given query optimize its execution using Query optimization algorithms
5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.
6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Data Structure & Algorithms

Course code	PCC-CSE-203G				
Category	Professional Core Course				
Course title	Data Structure & Algorithms				
Scheme and Credits	L	T	P	Credits	
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Objectives of the course:

1. To impart the basic concepts of data structures and algorithms.
   To understand concepts about searching and sorting techniques
   To understand basic concepts about stacks, queues, lists, trees and graphs.
   To enable them to write algorithms for solving problems with the help of fundamental data structures

Unit 1:

Introduction: Basic Terminologies: Concept of Data Structure, Choice of right Data Structure, Algorithms , how to design and develop algorithm , Complexity of algorithm. Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.

Unit 2:

Stacks and Queues: Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation -corresponding algorithms and complexity analysis. queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Unit 3:

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

Unit 4:

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Selection Sort Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Suggested books:

"Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

Suggested reference books:

Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company

"How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

Course outcomes

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

DIGITAL ELECTRONICS

Course code	PCC-CSE-205G				
Category	Professional Core Course				
Course title	Digital Electronics				
Scheme and Credits	L	T	P	Credits	Semester 3
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT 1:

FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes.

UNIT 2:

COMBINATIONAL DIGITALCIRCUITS

Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT 3:

SEQUENTIAL CIRCUITS AND SYSTEMS

A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC’s, asynchronous sequential counters, applications of counters.

UNIT 4:

A/D AND D/A CONVERTERS

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, Analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter,

SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES

Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Use PLDs to implement the given logical problem.

REFERENCES:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
4. Nasib Singh Gill and J B Dixit, “Digital Design and Computer Organization”, University Science Press, New Delhi

Python Programming

Course code	PCC-CSE-207G				
Category	Professional Core Course				
Course title	Python Programming				
Scheme and Credits	L	T	P	Credits	Semester 3
	2	0	0	2	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Objectives of the course:

- To impart the basic concepts of Python programming.
- To understand syntax of Python language
- To create dynamic applications in Python language.
- To implement object oriented concepts using Python language

Detailed contents:

Unit 1:

Introduction: Fundamental ideas in computer science; modern computer systems, installing Python; basic syntax, interactive shell, editing, saving, and running a script; The concept of data types; variables, assignments; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages; Control statements: if-else, loops (for, while)

Unit 2:

Strings, text files: String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers;

text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).

Unit 3:

Lists, dictionary and Design with functions: Basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding, and removing keys, accessing and replacing values; traversing dictionaries. Hiding redundancy, complexity; arguments and return values; Program structure and design. Recursive functions.

Unit 4:

Object Oriented concepts: Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modelling; persistent storage of objects, Inheritance, polymorphism, operator overloading; abstract classes; exception handling, try block.

Course outcomes

- For a given conceptual problem student will able to analyze the problem and write a program in python with basic concepts.
- For a given problem of Strings and texts, student will able to analyze the problem and write a program in python with basic concepts involving strings and texts.
- The knowledge of list and dictionary will enable student to implement in python language and analyze the same.
- Student will able to write a program using functions to implement the basic concepts of object oriented programming language

Suggested books:

“Fundamentals of Python: First Programs” Kenneth Lambert, Course Technology, Cengage Learning, 2012

Suggested reference books:

“Introduction to Computer Science Using Python: A Computational Problem-Solving Focus”, By Charles Dierbach, John Wiley & Sons, December 2012,

Mathematics-III (Multivariable Calculus and Differential Equations)

<table>
<tr><td>Course code</td><td colspan="5">BSC-MATH-203G</td></tr>
<tr><td>Category</td><td colspan="5">Basic Science Course</td></tr>
<tr><td>Course title</td><td colspan="5">Mathematics-III (Multivariable Calculus and Differential Equations)</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester 3</td></tr>
<tr><td>2</td><td>0</td><td></td><td>2</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Multivariable Differential Calculus: Limit, Continuity and Partial derivatives, Homogeneous functions, Euler's Theorem, Total derivative, Maxima, Minima and Saddle points, Lagrange's method of undetermined multipliers

Unit-II

Multivariable Integral Calculus: Double integral, Change of order of integration, Change of variables, Applications of double integral to find area enclosed by plane curves, Triple integral

Unit-III

Ordinary Differential Equations of first order: Linear and Bernoulli's equations, Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order and first degree to simple electric circuits, Newton's law of cooling, Heat flow and Orthogonal trajectories

Unit-IV

Ordinary Differential equations of second and higher order: Linear differential equations of second and higher order, Complete solution, Complementary function and Particular integral, Method of variation of parameters to find particular integral, Cauchy's and Legendre's linear equations, Simultaneous linear differential equations with constant coefficients, Applications of linear differential equations to oscillatory electric circuits

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
4. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
5. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
6. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems,Wiley India.
7. S. L. Ross, Differential Equations, Wiley India.
8. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India.
9. E. L. Ince, Ordinary Differential Equations, Dover Publications

Course Outcomes

The students will learn:

1. To deal with functions of several variables and evaluate partial derivative.
2. The mathematical tools needed in evaluating multiple integrals and their usage.
3. The effective mathematical tools for the solutions of ordinary differential equations that model physical processes.

ECONOMICS FOR ENGINEERS

<table>
<tr><td>Course code</td><td colspan="5">HSMC- 01G</td></tr>
<tr><td>Category</td><td colspan="5">Humanities/ Social Sciences/ Management</td></tr>
<tr><td>Course title</td><td colspan="5">Economics For Engineers</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2"></td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Common For All Branches</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Objectives:

1. Acquaint the students to basic concepts of economics and their operational significance.
2. To stimulate the students to think systematically and objectively about contemporary economic problems.

UNIT-1

Definition of Economics- Various definitions, types of economics- Micro and Macro Economics, nature of economic problem, Production Possibility Curve, Economic laws and their nature, Relationship between Science, Engineering, Technology and Economic Development.

Demand- Meaning of Demand, Law of Demand, Elasticity of Demand- meaning, factors effecting it, its practical application and importance,

UNIT 2

Production- Meaning of Production and factors of production, Law of variable proportions, and Returns to scale, Internal external economies and diseconomies of scale. Various concepts of cost of production- Fixed cost, Variable cost, Money cost, Real cost, Accounting cost, Marginal cost, Opportunity cost. Shape of Average cost, Marginal cost, Total cost etc. in short run and long run.

UNIT-3

Market- Meaning of Market, Types of Market- Perfect Competition, Monopoly,
Monopolistic Competition and Oligopoly (main features).

Supply- Supply and law of supply, Role of demand & supply in price determination and effect of changes in demand and supply on prices.

UNIT-4

Indian Economy- Nature and characteristics of Indian economy as under developed, developing and mixed economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalization of Indian economy - merits and demerits.

Banking- Concept of a Bank, Commercial Bank- functions, Central Bank- functions, Difference between Commercial & Central Bank.

COURSE OUTCOMES:

1. The students will able to understand the basic concept of economics.
2. The student will able to understand the concept of production and cost.
3. The student will able to understand the concept of market.
4. The student will able to understand the concept of privatization, globalization and banks.

REFERENCES:

1. Jain T.R., Economics for Engineers, VK Publication.
2. Chopra P. N., Principle of Economics, Kalyani Publishers.
3. Dewett K. K., Modern economic theory, S. Chand.
4. H. L. Ahuja., Modern economic theory, S. Chand.
5. Dutt Rudar & Sundhram K. P. M., Indian Economy.
6. Mishra S. K., Modern Micro Economics, Pragati Publications.
7. Singh Jaswinder, Managerial Economics, dreamtech press.
8. A Text Book of Economic Theory Stonier and Hague (Longman's Landon).
9. Micro Economic Theory – M.L. Jhingan (S.Chand).
10. Micro Economic Theory - H.L. Ahuja (S.Chand).
11. Modern Micro Economics : S.K. Mishra (Pragati Publications).
12. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co).

Database Management System Lab

Course code	LC-CSE-209G				
Category	Professional Core Course				
Course title	Database Management System Lab				
Scheme and Credits	L	T	P	Credits	
	0	0	4	2	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Objectives:

- Keep abreast of current developments to continue their own professional development
- To engage themselves in lifelong learning of Database management systems theories and technologies this enables them to purse higher studies.
- To interact professionally with colleagues or clients located abroad and the ability to overcome challenges that arises from geographic distance, cultural differences, and multiple languages in the context of computing.
- Develop team spirit, effective work habits, and professional attitude in written and oral forms, towards the development of database applications.

Contents:

i. Creation of a database and writing SQL queries to retrieve information from the database.
ii. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
iii. Creation of Views, Synonyms, Sequence, Indexes, Save point.
iv. Creating an Employee database to set various constraints.
v. Creating relationship between the databases.
vi. Study of PL/SQL block.
vii. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
viii. Write a PL/SQL block that handles all types of exceptions.
ix. Creation of Procedures.
x. Creation of database triggers and functions

xi. Mini project (Application Development using Oracle/ MySQL)

a) Inventory Control System

b) Material Requirement Processing.

c) Hospital Management System.

d) Railway Reservation System.

e) Personal Information System.

f) Web Based User Identification System.

g) Time Table Management System.

h) Hotel Management

Digital Electronics Lab

<table>
<tr><td>Course code</td><td colspan="5">LC-CSE-211G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Digital Electronics Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-3</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>2</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Computer Science and Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Implementation all experiments with help of Bread- Board.

1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Half Adder / Full Adder: Realization using basic and XOR gates.
3. Half Subtractor / Full Subtractor: Realization using NAND gates.
4. 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter: Realization using XOR gates.
5. 4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.
6. Multiplexer: Truth-table verification and realization of Half adder and Full adder.
7. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor.
8. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF.
9. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter.
10. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter.
11. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations.
12. DAC Operation: Study of 8-bit DAC , obtain staircase waveform.
13. ADC Operations: Study of 8-bit ADC

Data Structures and Algorithms Lab Using C

<table>
<tr><td>Course code</td><td colspan="5">LC-CSE-213G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Data Structures and Algorithms Lab Using C</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-3</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>2</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Computer Science and Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Data Structures Lab List of practical exercises, to be implemented using object-oriented approach in C++ Language.

1. Write a menu driven program that implements following operations (using separate functions) on a linear array:
    - Insert a new element at end as well as at a given position
    - Delete an element from a given whose value is given or whose position is given
    - To find the location of a given element
    - To display the elements of the linear array
2. Write a menu driven program that maintains a linear linked list whose elements are stored in on ascending order and implements the following operations (using separate functions):
    - Insert a new element
    - Delete an existing element
    - Search an element
    - Display all the elements
3. Write a program to demonstrate the use of stack (implemented using linear array) in converting arithmetic expression from infix notation to postfix notation.
4. Program to demonstrate the use of stack (implemented using linear linked lists) in evaluating arithmetic expression in postfix notation.
5. Program to demonstration the implementation of various operations on a linear queue represented using a linear array.
6. Program to demonstration the implementation of various operations on a circular queue represented using a linear array.
7. Program to demonstration the implementation of various operations on a queue represented using a linear linked list (linked queue).

8. Program to illustrate the implementation of different operations on a binary search tree.
9. Program to illustrate the traversal of graph using breadth-first search
10. Program to illustrate the traversal of graph using depth-first search.
11. Program to sort an array of integers in ascending order using bubble sort.
12. Program to sort an array of integers in ascending order using selection sort.
13. Program to sort an array of integers in ascending order using insertion sort.
14. Program to sort an array of integers in ascending order using radix sort.
15. Program to sort an array of integers in ascending order using merge sort.
16. Program to sort an array of integers in ascending order using quick sort.
17. Program to sort an array of integers in ascending order using heap sort.
18. Program to sort an array of integers in ascending order using shell sort.
19. Program to demonstrate the use of linear search to search a given element in an array.
20. Program to demonstrate the use of binary search to search a given element in a sorted array in ascending order.

Python Programming Lab

Course code	LC-CSE-215G				
Category	Professional Core Course				
Course title	Python Programming Lab				
Scheme and Credits	L	T	P	Credits	Semester-3
	0	0	2	1	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Objectives

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.

List of Programs

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

Outcome:

- Write, test, and debug simple Python programs.
- Implement Python programs with conditionals and loops

- Develop Python programs step-wise by defining functions and calling them.
- Use Python lists, tuples, dictionaries for representing compound data.
- Read and write data from/to files in Python.

Discrete Mathematics

Course code	PCC-CSE-202G				
Category	Professional Core Course				
Course title	Discrete Mathematics				
Scheme and Credits	L	T	P	Credits	Semester - 4
	3	1		4	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Sets, Relation, Function and Propositional Logic: Operations and Laws of Sets, Cartesian Products, Representation of relations, Binary Relation, Equivalence Relation, Partial Ordering Relation, POSET, Hasse Diagram, Lattices and its types, Function, Bijective functions, Inverse and Composite Function, Finite and infinite Sets, Countable and Uncountable Sets, Cantor's diagonal argument and The Power Set theorem, **S**chroeder-Bernstein theorem, Propositions, Logical operations, Conditional Statements, Tautologies, Contradictions, Logical Equivalence, The use of Quantifiers

Unit-II

Basic Counting Techniques and Recurrence Relation: Pigeon-hole principle, Permutation and Combination**,** the Division algorithm: Prime Numbers, The GCD: Euclidean Algorithm, The Fundamental Theorem of Arithmetic., Linear recurrence relation with constant coefficients, Homogenous Solutions, Particular Solutions, Total Solutions, Solving recurrence relation using generating functions

Unit-III

Algebraic Structures: Definitions and examples of Algebraic Structures with one Binary Operation: Semi Groups, Monoids, Groups; Congruence Relation and Quotient Structures, Permutation Groups, Cyclic groups, Normal Subgroups, Definitions and examples of Algebraic Structures with two Binary Operation: Rings, Integral Domain, Fields; Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

Unit-IV

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Multigraph and Weighted graph, Shortest path in Weighted graphs, Eulerian paths and circuits, Hamiltonian path and circuits, Planar Graphs, Euler's formulae, Graph Colouring, Trees, Binary trees and its traversals, Trees Sorting, Spanning tree, Minimal Spanning tree

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Satinder Bal Gupta: A Text Book of Discrete Mathematics and Structures, University Science Press, Delhi.
3. C. L. Liu and D. P. Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, Tata McGraw – Hill.
4. J.P. Tremblay and R. Manohar, Discrete mathematical structures with applications to computer science, TMG Edition, TataMcgraw-Hill
5. Discrete Mathematics, Babu Ram, Pearson Publication
6. Discrete Mathematics, Semyour Lipschutz and Marc Lipson, Schaum's outline

Course Outcomes

The students will learn

1. To solve mathematical problems based on concepts of set theory, relations, functions and lattices.
2. To express logic sentence in terms of quantifiers and logical connectives.
3. To apply basic counting techniques to solve permutation and combination problems.
4. To solve recurrence relations.
5. To classify algebraic structure of any given mathematical problem.
6. To evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
7. To develop the given problem as graph networks and solve with techniques of graph theory.

Computer Organization & Architecture

Course code	PCC-CSE-204G				
Category	Professional Core Course				
Course title	Computer Organization & Architecture				
Scheme and Credits	L	T	P	Credits	Semester-IV
	3	0	0	3	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Objectives of the course:

To expose the students to the following:

- How Computer Systems work & the basic principles
- Instruction Level Architecture and Instruction Execution
- The current state of art in memory system design
- How I/O devices are accessed and its principles.
- To provide the knowledge on Instruction Level Parallelism
- To impart the knowledge on micro programming
- Concepts of advanced pipelining techniques.

Unit 1

Data representation: Data Types, Complements, Fixed-Point Representation, Conversion of Fractions, Floating-Point Representation, Gray codes, Decimal codes, Alphanumeric codes, Error Detection Codes.

Register Transfer and Microoperations : Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

Unit 2

Basic Computer Organization and Design : Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instruction, Input-Output Instruction, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

Central Processing Unit : General Register Organization, Stack organization, Instruction Format, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC, CISC.

Unit 3

Pipelining: Basic Concepts of Pipelining, Throughput and Speedup, Pipeline Hazards.

Parallel Processors: Introduction to Parallel Processors, Concurrent access to memory and Cache Coherency.

Unit 4

Input-output Organization : I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, Privileged and Non-Privileged Instructions, Software Interrupts.

Memory organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Associative Mapping, Direct Mapping, Set-Associative Mapping, Writing into Cache, Cache Initialization, Virtual Memory.

Suggested books:

1) "Computer System Architecture", 3rd Edition by M.Morris Mano, Pearson.
2) "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
3) "Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.

Suggested reference books:

1) "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2) "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3) "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

Course outcomes :

1) Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.

2) Write assembly language program for specified microprocessor for computing

   16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).
3) Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
4) Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
5) Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology.

Operating System

Course code	PCC-CSE-206G				
Category	Professional Core Course				
Course title	Principles of Operating System				
Scheme and Credits	L	T	P	Credits	Semester-4
	3	0	0	3	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT 1:

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services.
Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. Thread: Definition, Various states, Benefits of threads, Types of threads, Multithreading.
Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non-pre-emptive, FCFS, SJF, SRTF, RR Scheduling.

UNIT 2:
Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader’s & Writer Problem, Dinning Philosopher Problem etc.
Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker’s algorithm, Deadlock detection and Recovery.

UNIT 3:

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Optimal Page Replacement and Least Recently used (LRU).

UNIT 4:

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks. Case study on UNIX and WINDOWS Operating System.

Suggested books:

- Operating System Concepts Essentials, 9th Edition by Avi Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
- Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

Suggested reference books:

- Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
- Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
- Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
- Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

Course Outcomes:

CO1: Understand the structure and architectural components of OS to analyze and design the applications to run in parallel. Moreover, students would be able to develop scheduling algorithms to optimize various parameters like CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time for research purpose.

CO2: Understand the design issues associated with Operating system (e.g. Mutual exclusion, Deadlock detection etc.) to gain insight towards developing algorithms/techniques for efficient deadlock handling.

CO3: For a given specification of memory organization, develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.

CO4: Design and implement file management system for a given specification. Identify, use and evaluate the disk management policies with respect to various performance evaluation parameters.

Object Oriented Programming

<table>
<tr><td>Course code</td><td colspan="5">PCC-CSE-208G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Object Oriented Programming</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-4</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Computer Science and Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit - I

Object-Oriented Programming Concepts: Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, messaging.

Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifiers, static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

Unit - II

Inheritance: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.

Pointers and Dynamic Memory Management: Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, this pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures.

Unit - III

Constructors and Destructors: Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initializer lists.

Operator Overloading and Type Conversion: Overloading operators, rules for overloading operators, overloading of various operators, type conversion - basic type to class type, class type to basic type, class type to another class type.

Virtual functions & Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract clasess, virtual destructors.

Unit - IV

Exception Handling: Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions.

Templates and Generic Programming: Template concepts, Function templates, class templates, illustrative examples.

TEXT BOOKS, AND/OR REFERENCE MATERIAL:

1. Bjrane Stroustrup, “C++ Programming language”,3rd edition, Pearson education Asia(1997)

2. Lafore R.”Object oriented Programming in C++”,4th Ed. Techmedia,New Delhi(2002).

3. Yashwant Kenetkar,”Let us C++”,1stEd.,Oxford University Press(2006)

4. B.A. Forouzan and R.F. Gilberg,CompilerScience,”A structured approach using C++” Cengage Learning, New Delhi.

Course code	**HSMC-02G**				
Category					
Course title	**ORGANIZATIONAL BEHAVIOUR**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**0**	0	**3**	
Branches (B. Tech.)					
Class work	25				
Exam	75				
Total	100 Marks				
Duration of Exam	03 Hours				

The objective of this course is to expose the students to basic concepts of management and provide insights necessary to understand behavioral processes at individual, team and organizational level.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

SYLLABUS

UNIT - 1

Introduction of Management- Meaning, definitions, nature of management; Managerial levels, skills and roles in an organization; Functions of Management: Planning, Organizing, staffing, Directing & Controlling, Interrelationship of managerial functions, scope of management & Importance of management. Difference between management and administration.

UNIT - 2

Introduction of organization:- Meaning and process of Organization, Management v/s Organization; **Fundamentals of Organizational Behavior:** Concepts, evolution, importance and relationship with other Fields; Contemporary challenges and opportunities of OB. **Individual Processes and Behavior**-**Personality**- Concept, determinants and applications; **Perception-** Concept, process and applications, **Learning**- Concept (Brief Introduction) ; **Motivation-** Concept, techniques and importance

UNIT - 3

Interpersonal Processes- **Teams and Groups**- Definition of Group, Stages of group development, Types of groups, meaning of team, merits and demerits of team; difference between team and group, **Conflict-** Concept, sources, types, management of conflict; **Leadership:** Concept, function, styles & qualities of leadership. **Communication –** Meaning, process, channels of communication, importance and barriers of communication.

UNIT 4

Organizational Processes: Organizational structure - Meaning and types of organizational structure and their effect on human behavior; **Organizational culture -** Elements, types and factors affecting organizational culture. **Organizational change:** Concept, types & factors affecting organizational change, Resistance to Change.

Course Outcomes: By the end of this course the student will be able to:

1. Students will be able to apply the managerial concepts in practical life.
2. The students will be able to understand the concept of organizational behavior at individual level and interpersonal level.
3. Students will be able to understand the behavioral dynamics in organizations.
4. Students will be able to understand the organizational culture and change

Suggested Books:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management, Pearson Education Asia, New Delhi.

2. Stoner, J et. al, Management, New Delhi, PHI, New Delhi.
3. Satya Raju, Management – Text & Cases, PHI, New Delhi.
4. Kavita Singh, Organisational Behaviour: Text and cases. New Delhi: Pearson Education.
5. Pareek, Udai, Understanding Organisational Behaviour, Oxford University Press, New Delhi.
6. Robbins, S.P. & Judge, T.A., Organisational Behaviour, Prentice Hall of India, New Delhi.
7. Ghuman Karminder, Aswathappa K., Management concept practice and cases, Mc Graw Hill education.
8. Chhabra T. N., Fundamental of Management, Sun India Publications-New Delhi.

Environmental Sciences

Course code	MC-106G
Category	Mandatory Course
Course title	Environmental Sciences
Scheme and Credits	L: 3, T: 0, P: 1, Credits: 0
Branches (B. Tech.)	Common For All Branches
Class work	25 Marks
Exam	75 Marks
Total	100 Marks
Duration of Exam	03 Hours

Unit-1 The Multidisciplinary nature of environmental studies. Definition, scope and importance. (2 lecture)

Unit-2 Natural Resources :

Renewable and non-renewable resources : Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non- renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.

* Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit-3 Ecosystems :

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.

b. Grassland

ecosystem. c.

Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit-4 Biodiversity and its conservation

* Introduction - Definition : Genetic, Species and ecosystem diversity.
* Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

(8 lectures)

Unit-5 Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.

b)

Water

pollution c)

Soil

pollution

d)

Marine

pollution e)

Noise

pollution

f)

Thermal

pollution g)

Nuclear

hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6 Social issues and the Environment:

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation, rain water harvesting, watershed management.
* Resettlement and rehabilitation of people : its problems and concerns case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.

* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution) Act.
* Water (Prevention and Control of pollution) Act.
* Wildlife Protection Act.
* Forest Conservation Act.
* Issues involved in enforcement of environmental legislation.
* Public awareness. (7 lectures)

Unit-7 Human population and the Environment.

Population growth, variation among nations.

Population explosion- Family Welfare Programme. Environment and human health.

Human Rights.

Value Education.

HIV/AIDS.

Woman and Child Welfare

Role of Information Technology in Environment and human health.

Case Studies. (6 lectures)

Unit-8 Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems- pond, river, hill slopes, etc. (Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.

2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).

3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.

4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).

5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.

6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.

7. Down to Earth, Centre for Science and Environment (R).

8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.

9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).

10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.

11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.

12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.

13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications (TB).

14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing

Co. (TB).

15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.

16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford & TBH Publ. Co. Pvt. Ltd. 345p.

17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ. House, Meerut.

18. Survey of the Environment, The Hindu (M).

19. Townsend C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science (TB).

20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).

21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno Science Publications (TR).

22. Wagner K.D., 1998, Environmental Management, W.B. Saunders co. Philadelphia, USA 499p.

23. A text book environmental education G.V.S. Publishers by Dr. J.P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.

Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory : 75 marks, Practical/ Field visit : 25 marks. The structure of the question paper will be :

Part- A : Short Answer Pattern : 15

marks Part- B : Essay Type with inbuilt choice :

60 marks

Part-C : Field Work (Practical) : 25

marks Instructions for Examiners :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.

Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

Web Technologies

Course code	LC-CSE-210G
Category	Professional Core Course
Course title	Web Technologies
Scheme and Credits	L: 2, T: 0, P: 0, Credits: 1
Branches (B. Tech.)	Computer Science and Engineering
Class work	25 Marks
Exam	75 Marks
Total	100 Marks
Duration of Exam	03 Hours

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Objectives of the course:

- To impart the basic concepts of Web Technologies
- To understand various client side technologies
- To create web pages
- To create dynamic applications on web through server side technologies

Detailed contents:

Unit 1:

Introduction: Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser, HTML, HTTP, SMTP, POP3, MIME, IMAP.
Web site design principles, planning the site and navigation,

Unit 2:

HTML and CSS: History of HTML, Structure of HTML Document: Text Basics, Document: Images and Multimedia, Links and webs, Document Layout, Cascading Style Sheet: 4 Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS,

Unit 3:

XML: Introduction of XML- Some current applications of XML, Features of XML, Anatomy of XML document, The XML Declaration, Element Tags- Nesting and structure, XML text and text formatting element, Table element, Mark-up Element and Attributes, Document Type Definition (DTD), types. XML Objects, Checking Validity, Understanding XLinks, XPointer, Event-driven Programming, XML Scripting.

Unit 4:

PHP: PHP Introduction, Structure of PHP, PHP Functions, AJAX with PHP, PHP Code and the Complete AJAX Example. AJAX Database, Working of AJAX with PHP, Ajax PHP Database Form, AJAX PHP MySQL Select Query.

Suggested books:

1. Steven Holzner,"HTML Black Book", Dremtech press.
2. Web Technologies, Black Book, Dreamtech Press
3. Web Applications : Concepts and Real World Design, Knuckles, Wiley-India
4. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel Pearson.

Suggested reference books:

1. Paul Deitel , Harvey Deitel, Abbey Deitel ,"Internet and world wide web – How to Program", Prentice Hall

Course outcomes

- For a given conceptual problem student will able to understand the basic process of Web Technologies and their application domains
- For a given problem the student will able to analyze the problem and select which technique is most suitable for developing a website.
- The knowledge of various techniques will enable student to implement in these dynamic techniques using various tools to make interactive web pages.
- Student will able to write a program using these technologies to implement the basic concepts of web.

Operating System Lab

Course code	LC-CSE-212G				
Category	Professional Core Course				
Course title	Operating System Lab				
Scheme and Credits	L	T	P	Credits	
	0	0	4	2	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Contents:

1 Introduction to UNIX File System.

2. File and Directory Related Commands in UNIX.

3. Essential UNIX Commands for working in UNIX environment.

4. I/O Redirection and Piping

5. Introduction to VI Editors.

6. Introduction of Processes in UNIX

7. Communication in UNIX and AWK.

8. Introduction of the concept of Shell Scripting.

9. Decision and Iterative Statements in Shell Scripting.

10. Writing the Shall Scripts for unknown problems.

Suggested Books:

1. UNIX Shell Programming by Yashavant Kanetkar.
2. UNIX Concepts and Applications by Sumitabha Das

Course Outcomes.

Co1: Understand the structure and architectural components of UNIX Operating System to analyze and design the problem. Moreover, students would be able to know the Basic Introduction of UNIX Operating System.

Co2: Basic Introduction of UNIX Commands that are used for operating the UNIX.

Co3: Introduction of Shell Scripting and VI Editor.so that the students get familiar with writing the UNIX scripts in UNIX editor.

Co4: Students will establish themselves as effective professionals by solving real problems with UNIX Shell Scripting knowledge and with attention to teamwork, critical thinking and problem solving skills by Writing Shell Scrips of unknown problems

Object Oriented Programming Lab Using C++

Course code	LC-CSE-214G				
Category	Professional Core Course				
Course title	Object Oriented Programming Lab Using C++				
Scheme and Credits	L	T	P	Credits	
	0	0	4	2	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Contents:

1. [Classes and Objects] Write a program that uses a class where the member functions are defined inside a class.
2. [Classes and Objects] Write a program that uses a class where the member functions are defined outside a class.
3. [Classes and Objects] Write a program to demonstrate the use of static data members.
4. [Classes and Objects] Write a program to demonstrate the use of const data members.
5. [Constructors and Destructors] Write a program to demonstrate the use of zero argument and parameterized constructors.
6. [Constructors and Destructors] Write a program to demonstrate the use of dynamic constructor.
7. [Constructors and Destructors] Write a program to demonstrate the use of explicit constructor.
8. [Initializer Lists] Write a program to demonstrate the use of initializer list.
9. [Operator Overloading] Write a program to demonstrate the overloading of increment and decrement operators.
10. [Operator Overloading] Write a program to demonstrate the overloading of binary arithmetic operators.
11. [Operator Overloading] Write a program to demonstrate the overloading of memory management operators.
12. [Inheritance] Write a program to demonstrate the multilevel inheritance.
13. [Inheritance] Write a program to demonstrate the multiple inheritance.
14. [Inheritance] Write a program to demonstrate the virtual derivation of a class.
15. [Polymorphism] Write a program to demonstrate the runtime polymorphism.
16. [Exception Handling] Write a program to demonstrate the exception handling.

17. [Templates and Generic Programming] Write a program to demonstrate the use of function template.

18. [Templates and Generic Programming] Write a program to demonstrate the use of class template.

Web Technologies Lab

Course code	LC-CSE-216G
Category	Professional Core Course
Course title	Web Technologies Lab
Scheme and Credits	L: 0, T: 0, P: 2, Credits: 1
Branches (B. Tech.)	Computer Science and Engineering
Class work	25 Marks
Exam	25 Marks
Total	50 Marks
Duration of Exam	03 Hours

Contents:

HTML :

1. Simple HTML using
   a. Heading elements
   b. Text Elements
   c. Logical Styles
   d. Physical Styles
   e. Ordered , Unordered and Definition list
2. Hyper Links
   a. Image Link → Link to page containing Images and Videos
   b. File Link
   c. Single Page Link
3. Using Frames
   a. Navigation Frame
   b. Floating Frame
   c. Inline Frame
4. Registration Form with Table

CSS:

Inline Style , Internal Style ,and External Style Sheets

XML :

1. Create a any catalog
2. Display the catalog created using CSS or XSL

PHP:

1. File operation
2. Regular Expression, Array, Math, String, Date functions

MC-106G : (ENVIRONMENT SCIENCE)

Theory 75 Marks   Field Work 25 Marks (Practical/Field visit)

Unit-1 The Multidisciplinary nature of environment studies. Definition, scope and importance. (2 lecture)

Unit-2 Natural Resources :

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non-renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.
* Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit-3 Ecosystems :

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.

b. Grassland ecosystem.

c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit-4 Biodiversity and its conservation

* Introduction - Definition : Genetic, Species and ecosystem diversity.
* Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

(8 lectures)

Unit-5 Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.
b) Water pollution
c) Soil pollution
d) Marine pollution
e) Noise pollution
f) Thermal pollution
g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6 Social issues and the Environment:

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation, rain water harvesting, watershed management.
* Resettlement and rehabilitation of people : its problems and concerns case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.
* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution) Act.
* Water (Prevention and Control of pollution) Act.
* Wildlife Protection Act.
* Forest Conservation Act.
* Issues involved in enforcement of environmental legislation.
* Public awareness. (7 lectures)

Unit-7 Human population and the Environment.

Population growth, variation among nations.

Population explosion- Family Welfare Programme.

Environment and human health.

Human Rights.

Value Education.

HIV/AIDS.

Woman and Child Welfare

Role of Information Technology in Environment and human health.

Case Studies. (6 lectures)

Unit-8 Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems- pond, river, hill slopes, etc. (Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, WileyEastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural HistorySociety, Bombay(R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.
16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford & TBH Publ. Co. Pvt. Ltd. 345p.
17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ. House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science (TB).
20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).
21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno Science Publications (TR).
22. Wagner K.D., 1998, Environmental Management, W.B. Saunders co. Philadelphia, USA 499p.
23. Atext book environmental education G.V.S. Publishers byDr. J.P. Yadav.

(M) Magazine

(R) Reference

(TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.

Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory: 75 marks, Practical/ Field visit : 25 marks. The structure of the question paper will be :

Part- A: Short Answer Pattern	:	15marks
Part- B : EssayType with inbuilt choice	:	60marks
Part-C : Field Work (Practical)	:	25marks

Instructions for Examiners :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.

Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

MAHARSHI DAYANAND UNIVERSITY, ROHTAK
ELETRICAL ENGINEERING
B. Tech, 2nd year (IIIrd semester) w.e.f 2019-20

S. No.	Course Code	Course Title	Teaching Schedule			Marks of Class Work	Examination Marks		Total Marks	Credits	Duration of Examination (in hours)
			L	T	P		Theory	Practical			
1.	PCC-EE-201G	Electric Circuit Analysis	3	1	0	25	75	0	100	4	3
2.	PCC-EE-203G	Electric Circuit Analysis Laboratory	0	0	2	25	0	25	50	1	-
3.	PCC-EE-205G	Analog Electronics	3	0	0	25	75	0	100	3	3
4.	PCC-EE-207G	Analog Electronics Laboratory	\ 0	0	2	25	0	25	50	1	-
5.	PCC-EE-209G	Electrical Machines-I	3	1	0	25	75	0	100	4	3
6.	PCC-EE-211G	Electrical Machines-I Laboratory	0	0	2	25	0	25	50	1	-
7.	PCC-EE-210G	Measurement and Instrumentation	3	0	0	25	75	0	100	3	3
8.	PCC-EE-212G	Measurement and Instrumentation Laboratory	0	0	2	25	0	25	50	1	-
9.	ESC-202-G	Engineering Mechanics	3	1	0	25	75	0	100	4	3
10.	MC-GES-106-G	Environmental Studies	3	0	1	25	75	0	100	0	3
Total									800	22	

L-Lecture, T-Tutorial, P-Practical

Note: The use of programmable devices such as programmable calculators etc. is not allowed during the exam. Sharing of materials will not be permitted during examination.

Electric Circuit Analysis

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-201G**		
Category	**Engineering Science Course**		
Course title	**Electric Circuit Analysis**		
Scheme	**L**	**T**	**P**
	3	**1**	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:
At the end of this course, students will demonstrate the ability to;

- Apply network theorems for the analysis of electrical circuits.
- Obtain the transient and steady-state response of electrical circuits.
- Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
- Analyze two port circuit behavior.

SECTION-A

Network Theorems (AC Circuit)
Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem. Analysis with dependent current and voltage sources. Node and Mesh Analysis. Concept of duality and dual networks.

SECTION-B

Solution of First and Second order networks (AC and DC circuits)
Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response.

SECTION-C

Sinusoidal steady state analysis

Hurwitz polynomials, positive real functions. Properties of real immittance functions, Synthesis of LC driving point immittances, Synthesis of RC driving point impedances, Synthesis of RC impedances or RL admittances, properties of RL impedances and RC admittances. Three-phase circuits. Mutual coupled circuits, Dot Convention in coupled circuits.

SECTION-D

Electrical Circuit Analysis Using Laplace Transforms

Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions. Transfer function representation. Poles and Zeros.

Two Port Network and Network Functions

Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks. Synthesis of Y21 and Z21 with R ohm terminations Network Tropology and Graph Theory.

Text / Reference Books:

1. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.
2. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.
3. W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, 2013.
4. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.
5. K. V. V. Murthy and M. S. Kamath, “Basic Circuit Analysis”, Jaico Publishers, 1999.

Electric Circuit Analysis Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**PCC-EE-203G**		
Category	**Engineering Science Course**		
Course title	**Electric Circuit Analysis** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

(iii) Group of students for practical should be 15 to 20 in number.

LIST OF EXPERIMENTS:

1. Introduction of circuit creation & simulation software like MATLAB etc.
2. Study of Transient response of RC, RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To calculate and verify "Z" & “Y” parameters and "ABCD" parameters of a two port network.
5. To determine equivalent parameter of parallel-series, cascading and parallel connections of two port network.
6. To calculate and verify Compensation theorem and Tellegen’s theorem.
7. To synthesize a network of a given network function and verify its response.
8. To calculate and verify Maximum power transfer and Reciprocity theorem.

Note: Use appropriate Software or simulation tool for experiments.

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

Analog Electronics

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-205G**		
Category	**Engineering Science Course**		
Course title	Analog Electronics (Theory)		
Scheme	**L**	**T**	**P**
	3	-	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the characteristics of transistors.
- Design and analyse various rectifier and amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Understand the functioning of OP-AMP and design OP-AMP based circuits.

Section-A

P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits. Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits

Section-B

MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency equivalent circuit.

Section-C

Operational Amplifier: Inverting and non-inverting configurations, difference amplifier, Effect of finite open loop gain and bandwidth on circuit performance, Large signal operation of op-amp. Differential Amplifier: MOS differential pair, small signal operation of the MOS differential pair, BJT differential pair, other non-ideal characteristic of the Differential amplifier (DA), DA with active load
Feedback: The general feed back structure, properties of negative feed back, the four basic feed back topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier.

Section-D

Linear applications of op-amp: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion.
Nonlinear applications of op-amp: Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector. Monoshot.

Text/References Book:

1. A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, “Introduction to Operational Amplifier theory and applications”, McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, “Microelectronics”, McGraw Hill Education, 1988.
4. P. Horowitz and W. Hill, “The Art of Electronics”, Cambridge University Press, 1989.
5. P.R. Gray, R.G. Meyer and S. Lewis, “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons, 2001.

Analog Electronics Laboratory

Class Work:	25
Exam :	25
Total :	50

Course Code	**PCC-EE-207G**		
Category	**Engineering Science Course**		
Course title	**Analog Electronics** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

(iii) Gruoup of students for practical should be 15 to 20 in number.

List of Experiments

1.To Study the following devices: (a) Analog & digital multimeters (b) Function/ Signal generators (c) Regulated d. c. power supplies (constant voltage and constant current operations) (d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.
2.To Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.
3.To Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
4. To Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.
5.To Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of Idss & Vp
6.To Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
7.To Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.
8.To Study half wave rectifier and effect of filters on wave. Also calculate theoretical & practical ripple factor.
10.To Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple Factor.
11. To plot the characteristics of MOSFET.
12. To determine the following parameters of OP-AMP.a) Input Bias Current. b) Input Offset Current.
c) Input Offset Voltage. d) CMRR

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

Electrical Machine-I

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-209G**		
Category	**Engineering Science Course**		
Course title	**Electrical Machine- I** (Theory)		
Scheme	**L**	**T**	**P**

	3	1	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concepts of magnetic circuits.
- Understand the operation of dc machines.
- Analyse the differences in operation of different dc machine configurations.
- Analyse single phase and three phase transformers circuits.

Section A

Magnetic fields and magnetic circuits

Review of magnetic circuits - MMF, flux, reluctance, inductance; review of Ampere Law and Biot Savart Law; Visualization of magnetic fields produced by a bar magnet and a current carrying coil - through air and through a combination of iron and air; influence of highly permeable materials on the magnetic flux lines.

Electromagnetic force and torque

B-H curve of magnetic materials; flux-linkage vs current characteristic of magnetic circuits; linear and nonlinear magnetic circuits; energy stored in the magnetic circuit; force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element. Examples - galvanometer coil, relay contact, lifting magnet, rotating element with eccentricity or saliency

Section B

DC machines

Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation - Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

Section C

DC machine - motoring and generation

Armature circuit equation for motoring and generation, Types of field excitations - separately excited, shunt and series. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed.V-I characteristics and torque-speed characteristics of separately excited, shunt and series motors. Speed control through armature voltage. Losses, load testing and back-to-back testing of DC machines

Section D

Transformers

Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers, Autotransformers - construction, principle, applications and comparison with two winding transformer, Magnetizing current, effect of nonlinear B-H curve of magnetic core material, harmonics in magnetization current, Phase conversion - Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers. Cooling of transformers.

Text / Reference Books:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
4. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
5. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

Electrical Machines-I Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**PCC-EE-211G**		
Category	**Engineering Science Course**		
Course title	**Electrical Machines-I** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus.

(iii) Gruoup of students for practical should be 15 to 20 in number.

LIST OF EXPERIMENTS:

1. To study conversion of 3 Phase to six phase using 3 single phase transformers..
2. To study three phase rectifiers & supply configuration . In 3 phase.
3. To perform Sumpner's Back to back test on 1-phase transformers.
4. To study Parallel operation of two 1-phase transformers.
5. To perform load test on DC shunt generator.
6. To study Speed control of DC shunt motor.
7. To study Swinburne's test of DC shunt motor.
8. To study Hopkinson's test of DC shunt M/Cs.
9. To syudy Ward Leonard method of speed control.

Note:

1. Each laboratory group shall not be more than about 20 students.

2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

Engineering Mechanics

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**ESC-202-G**		
Category	**Engineering Science Course**		
Course title	**Engineering Mechanics** (Theory)		
Scheme	**L**	**T**	**P**
	3	1	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes: At the end of this course, students will demonstrate the ability to

1. Understand the concepts of co-ordinate systems.
2. Analyse the three-dimensional motion.
3. Understand the concepts of rigid bodies.
4. Analyse the free-body diagrams of different arrangements. Analyse torsional motion and bending moment.

UNIT-I

Introduction to vectors and tensors and co-ordinate systems: Introduction to vectors and tensors and coordinate systems; Vector and tensor algebra; Symmetric and anti-symmetric tensors; Eigen values and Principal axes.
Three-dimensional Rotation: Three-dimensional rotation: Euler's theorem, Axis-angle formulation and Euler angles; Coordinate transformation of vectors and tensors.

UNIT-II

Kinematics of Rigid Body: Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problem. Centroid, Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Problems.

Kinetics of Rigid Bodies: Kinetics of rigid bodies: Angular momentum about a point; Inertia tensor: Dentition and computation, Principal moments and axes of inertia, Parallel and perpendicular axes theorems; Mass moment of inertia of symmetrical bodies, cylinder, sphere, cone etc., Area moment of inertia and Polar moment of inertia, Forces and moments; Newton-Euler's laws of rigid body motion.

UNIT-III

Free Body Diagram: Free body diagrams; Examples on modelling of typical supports and joints and discussion on the kinematic and kinetic constraints that they impose.
General Motion: Examples and problems. General planar motions. General 3-D motions. Free precession, Gyroscopes, Rolling coin.

UNIT-IV

Bending Moment: Transverse loading on beams, shear force and bending moment in beams, analysis of cantilevers, simply supported beams and overhanging beams, relationships between loading, shear force and bending moment, shear force and bending moment diagrams.
Torsional Motion: Torsion of circular shafts, derivation of torsion equation, stress and deformation in circular and hollow shafts.
Friction: Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.

Text / References:

1. Mechanics by R.C. Hibbler, Pearson Publication
2. J. L. Meriam and L. G. Kraige, "Engineering Mechanics: Dynamics", Wiley, 2011.
3. M. F. Beatty, "Principles of Engineering Mechanics", Springer Science & Business Media, 1986.

MEASUREMENT AND INSTRUMENTATION

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-210G**

Category	**Engineering Science Course**		
Course title	Measurement and Instrumentation (Theory)		
Scheme	**L**	**T**	**P**
	3	-	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

At the end of this course students will demonstrate the ability to;

- Learn about various measurement instruments for measurement of Voltage, Current, Power, Power Factor & Frequency, their construction, operating principle, limitations, etc.;
- Understand the working of energymeters and wattmeters;
- Analyse the static characteristics of instruments
- Understand the measurement of parameters & variables with the help of D.C. & A.C. bridges

Section A

UNITS STANDARDS & ERRORS: S.I. units, Absolute standards (International, Primary, Secondary & Working Standards), True Value, Errors (Gross, Systematic, Random); Static Characteristic of Instruments (Accuracy, Precision, Sensitivity, Resolution & threshold). Generalized Instrument (Block diagram), three forces in Electromechanical indicating instrument, Comparison between gravity & spring controls; Comparison of damping methods & their suitability, bearing supports, pivot-less supports (Simple & taut-band), Scale information, Instrument cases.

Electronic Devices: Block diagram and study of various stages of CRO, Block diagram and working of function generator.

Transducers : Classification and types: R, L, C. Basic schemes for the measurement of displacement, velocity, strain, pressure, liquid level & temperature.

SECTION-B

MEASURING SYSTEM FUNDAMENTALS: Classification of Instruments (Absolute & Secondary Instruments; Indicating, Recording & Integrating instruments; Based upon Principle of operation).

MEASURING INSTRUMENTS: Study of measuring instruments of PMMC types, Electrodynamic Type, Moving iron type, Induction type as Ammeter & Voltmeter (Both on AC & DC). Hot wire type instruments, Electrostatic type Instruments. Multimeter, Q-meters.

SECTION-C

WATTMETERS & ENEGRY METERS: Construction, operating principle, Torque equation, Shape of scale, Errors, Advantages & Disadvantages of Electrodynamic & Induction type Wattmeters. Single phase induction type Energy meter, Compensation & creep in energy meter.

POWER FACTOR & FREQUENCY METERS: Construction, operation, principle, torque equation, advantages & disadvantages and errors of Single phase power factor meters (Electrody namic & Moving Iron types) & Frequency meters (Electrical Resonance Type, Ferrodynamic Type & Electrodynamic types).

SECTION-D

LOW & HIGH RESISTANCE MEASUREMENTS: Limitations of Wheatstone bridge; Kelvin's double bridge method, Difficulties in high resistance measurements, Measurement of high resistance by direct deflection, loss of charge method, Megohm bridge & Meggar.

A.C. BRIDGES: General balance equation of AC bridges. Circuit diagram, phasor diagram, advantages & disadvantages and applications of Maxwell's Inductance Bridge, Maxwell's inductance-capacitance Bridge, Hays Bridge, Anderson Bridge, Owens Bridge, De-Sauty's Bridge, Schering & Weins bridges, Shielding & earthing.

TEXT BOOK:
1. A course in Electrical & Electronics Measurements & Instrumentation: A.K.Sawhney; Dhanpat Rai
2. Measurements & Instrumentation by J.S. Saini; New Age Pub., N. Delhi

3. Morris - Electronic Measurements & Instrumentation, Elsevier
REFERENCE BOOKS: 1. Electrical Measurments by E.W. Golding
2. Electronic & Elect. Measurment & Instrumention by J.B.Gupta; Kataria & Sons.
3. Electronic Instrumentation & Measurment Technique, W.D.Cooper & A.D. Helfrick.
4. Measuring Systems by E.O. Doeblin; TMH.

Measurement and Instrumentation Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**PCC-EE-212G**		
Category	**Engineering Science Course**		
Course title	**Measurement and Instrumentation** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:
(i) At least 10 experiments are to be performed by students in the semester.
(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

LIST OF EXPERIMENTS

1. To Study construction of different types of meters & study how to connect them in a circuit..
2. To calibrate a voltmeter & an ammeter using a potentiometer.
3. To study the working of a electronic energy meter (LCD/Digital display type).
4. To measure power & p.f. by 3-ammeter & 3 Voltmeter methods.
5. To study star to delta & delta to star in a Three phase system for balanced & unbalanced load.
6. To measure power & p.f in 3-phase circuit by 2-wattmeter method.
7. To measure capacitance by De Sauty's bridge.

8. To measure inductance by Maxwell’s bridge.
9. To measure frequency by Wien’s bridge.
10. Determination of unknown inductance & Q factor by Hays Bridge.
11. To Measure resistance using Wheatstone bridge /Post office box.
12. To measure low resistance by Kelvin’s double bridge. 14. To measure high resistance by loss of charge/Leakage method.
13. Study blocks wise construction of an analog oscilloscope & Function generator.
14. Determine output characteristics of a LVDT and Measure displacement using LVDT
15. Study characteristics of temperature transducer like Thermocouple, Thermistor & RTD with implementation of a small project using signal conditioning circuits like instrumentation amplifier.
16. Measurement of Strain using Strain Guage.
17. To study differential pressure transducer & signal conditioning of output signal.
18. Measurement of liquid level using capacitive transducer.
19. Study of Distance measurement using ultrasonic transducer.

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

Environmental Studies

Objective: To provide the basic knowledge in Environmental Sciences to students of Engineering. It will guide the students living in a historic transitional period of burgeoning awareness of the conflict between human activities and environmental constraints to help and save the fragile and endangered planet with the natural resources already overexploited.

Course code: MC-GES-106-G

Environmental Studies (Semester 1)							
Lecture	Tutorial	Practical/Field visit	Credit	Theory	Field visit	Total	Time
3	0	1	-	75	25	100	3Hrs

MC-ENV : (ENVIRONMENTAL SCIENCE)

Objective: To provide the basic knowledge in Environmental Sciences to students of Engineering. It will guide the students living in a historic transitional period of burgeoning awareness of the conflict between human activities and environmental constraints to help and save the fragile and endangered planet with the natural resources already overexploited.

Course code: MC-GES-106-G

Environmental Studies (Semester 1)							
Lecture	Tutorial	Practical/Field visit	Credit	Theory	Field visit	Total	Time
3	0	1	-	75	25	100	3Hrs

Theory 75 Marks Field Work 25 Marks (Practical/Field visit)

Unit-1 The Multidisciplinary nature of environmental studies. Definition, scope and importance. (2 lecture)

Unit-2 Natural Resources :

Renewable and non-renewable resources : Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non- renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.
* Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit-3 Ecosystems :

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.

b. Grassland ecosystem. c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit-4 Biodiversity and its conservation

* Introduction - Definition : Genetic, Species and ecosystem diversity.
* Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.

* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

(8 lectures)

Unit-5 Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.

b) Water pollution c) Soil pollution

d) Marine pollution e) Noise pollution

f) Thermal pollution g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6 Social issues and the Environment:

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation, rain water harvesting, watershed management.
* Resettlement and rehabilitation of people : its problems and concerns case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.

* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution) Act.
* Water (Prevention and Control of pollution) Act.
* Wildlife Protection Act.
* Forest Conservation Act.
* Issues involved in enforcement of environmental legislation.
* Public awareness. (7 lectures)

Unit-7 Human population and the Environment.

Population growth, variation among nations. Population explosion- Family Welfare Programme. Environment and human health.

Human Rights. Value Education. HIV/AIDS.

Woman and Child Welfare

Role of Information Technology in Environment and human health.

Case Studies. (6 lectures)

Unit-8 Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems- pond, river, hill slopes, etc. (Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing

Co. (TB).

15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.

16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford & TBH Publ. Co. Pvt. Ltd. 345p.

17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ. House, Meerut.

18. Survey of the Environment, The Hindu (M).

19. Townsend C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science (TB).

20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).

21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno Science Publications (TR).

22. Wagner K.D., 1998, Environmental Management, W.B. Saunders co. Philadelphia, USA 499p.

23. A text book environmental education G.V.S. Publishers by Dr. J.P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations. Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory : 75 marks, Practical/ Field visit : 25 marks. The structure of the question paper will be :

Part- A : Short Answer Pattern : 15 marks Part- B : Essay Type with inbuilt choice : 60 mark

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.

Part-B : Eight

essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

MAHARSHI DAYANAND UNIVERSITY, ROHTAK
ELECTRICAL ENGINEERING
B. Tech, 2nd year (IVth semester) w.e.f 2019-20

S. No.	Course Code	Course Title	Teaching Schedule			Marks of Class Work	Examination Marks		Total Marks	Credits	Duration of Examination (in hours)
			L	T	P		Theory	Practical			
1.	PCC-EE-202G	Digital Electronics	3	0	0	25	75	0	100	3	3
2.	PCC-EE-204G	Digital Electronics Laboratory	0	0	2	25	0	25	50	1	-
3.	PCC-EE-206G	Electrical Machines-II	3	1	0	25	75	0	100	4	3
4.	PCC-EE-208G	Electrical Machines-II Laboratory	0	0	2	25	0	25	50	1	-
5.	PCC-EE-210G	Transmission and Distribution	3	0	0	25	75	0	100	3	3
6.	PCC-EE-212G	Transmission and Distribution Laboratory	0	0	2	25	0	25	50	1	-
7.	PCC-EE-214G	Signals and Systems	3	0	0	25	75	0	100	3	3
8.	PCC-EE-216G	Electromagnetic Fields	3	1	0	25	75	0	100	4	3
9.	BSC-MATH-204G	Mathematics-III (Probability and Statistics)	3	1	0	25	75	0	100	4	3
10.		Indian Constitution	3	0	0	25	75	0	100	0	3
11.	BSC-BIO-201G	Biology-I	2	1	0	25	75	0	100	3	3
	TOTAL								850	27	

L-Lecture, T-Tutorial, P-Practical

Mandatory Course	Course Code	Course Title
		Indian Constitution
		Essence of Indian Traditional Knowledge

Digital Electronics

Note: The use of programmable devices such as programmable calculators etc. is not allowed during the exam. Sharing of materials will not be permitted during examination.

Theory :	75
Class Work :	25
Duration of Examination	3H

Course Code	**PCC-EE-202G**		
Category	**Engineering Science Course**		
Course title	**Digital Electronics** (Theory)		
Scheme	**L**	**T**	**P**
	3	-	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

- Understand working of logic families and logic gates.
- Design and implement Combinational and Sequential logiccircuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- Be able to use PLDs to implement the given logical problem.

SECTION-A

Fundamentals of Digital Systems and logic families:
Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples ofICgates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-statelogic.

SECTION-B

Combinational Digital Circuits:
Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De- Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

SECTION-C

Sequential circuits and systems:
A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, Master Slave J- K, T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

SECTION-D

A/D and D/A Converters:
Introduction to Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, sample and hold circuit, Introduction to analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter.

Semiconductor memories and Programmable logic devices:
Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic.

Text/Reference books:
1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

Digital Electronics Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**PCC-EE-204G**		
Category	**Engineering Science Course**		
Course title	**Digital Electronics** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

LIST OF EXPERIMENTS

1. To study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. To design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops.
6. To study FLIP-FLOP conversion.
7. To verify the operation of bi-directional shift register.
8. To design & verify the operation of 3-bit synchronous counter.
9. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
10. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
11. To design a 4 bit shift register and verify its operation.

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

ELECTRICAL MACHINES-II

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-206G**		
Category	**Engineering Science Course**		
Course title	**Electrical Machines-II** (Theory)		
Scheme	**L**	**T**	**P**
	3	1	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

1. Understand the concepts of rotating magnetic fields.
2. Understand the operation of ac machines.
3. Analyse performance characteristics of ac machines.
4. Impart knowledge on construction, principle of operation and performance of ac machine.
5. Prepare the students to have a basic knowledge about motoring, generating and braking mode of ac machines

UNIT-I

Poly-phase Induction Motor: Constructional features, Principal of operation, production of rotating magnetic field, induction motor action, torque production, testing, development of equivalent circuit, performance characteristics, circle diagram, starting methods, double cage and deep bar motors.

UNIT-II

Poly-phase Induction Motor: Methods of speed control - stator voltage control, stator resistance control, frequency control, rotor resistance control, slip power recovery control

Induction Generator: Principle of operation, types and applications.

Single Phase Induction motors: Double revolving field theory, cross field theory, different types of single phase induction motors, circuit model of single phase induction motor.

UNIT-III

Synchronous Generator: Principle, construction of cylindrical rotor and salient pole machines,winding, EMF equation, Armature reaction, testing, model of the machine, regulation – synchronous reactance method, Potier triangle method. Output power equation, power angle curve.

UNIT-IV

Three Phase Synchronous Generators: Transient and sub-transient reactance, synchronization, parallel operation.

Synchronous Motor: Principles of synchronous motor, power angle curve, V-curve, starting, damper winding, synchronous condenser, applications.

TEXT/ REFERENCE BOOKS:

1. Principle of Electrical Machines, V K Mehta, Rohit Mehta, S Chand
2. Electric Machines ,Ashfaq Hussain, Dhanpat Rai
3. Electric Machines: I.J.Nagrath and D.P. Kothari, TMH, New Delhi.
4. Generalized theory of Electrical Machines: P.S. Bhimbra(Khanna Pub.)
5.Electric Machinery, Fitzgerald and Kingsley, MGH.

Electrical Machines-II Laboratory

Class Work:	25
Exam :	25
Total :	50

Course Code	**PCC-EE-208G**		
Category	**Engineering Science Course**		
Course title	**Electrical Machines-II** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

LIST OF EXPERIMENTS:

1. To perform the open circuit test and block rotor test on 3 phase induction motor and draw the circle diagram.
2. To study the speed control of induction motor by rotor resistance control.
3. To conduct the load test to determine the performance characteristics of the I.M.
4. To compute the torque v/s speed characteristics for various stator voltages.
5. To perform the open circuit test and block rotor test on single-phase induction motor and determine equivalent circuit parameters.
6. To perform O.C. test on synchronous generator and determine the full load regulation of a three phase synchronous generator by synchronous impedance method.
7. To Study and Measure Synchronous Impedance and Short circuit ratio of Synchronous Generator .
8. Study of Power (Load) sharing between two Three Phase alternators in parallel operation Condition.

9. To plot V- Curve of synchronous motor.
10. Synchronization of two Three Phase Alternators by
a) Synchroscope Method
b) Three dark lamp Method
c) Two bright one dark lamp Method
11. Determination of sequence impedances of synchronous machine for various stator voltages.

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

TRANSMISSION AND DISTRIBUTION

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	PCC- EE-210G		
Category	**Engineering Science Course**		
Course title	Transmission and distribution (Theory)		
Scheme	**L**	**T**	**P**
	3		**-**

Course Outcomes:
At the end of the course, students will demonstrate the ability to:

1. Understand the basic laws of Transmission and Distribution
2. Knowledge about the Structure and present-Day Scenario of a power system.
3. Analyses of transmission and distribution line parameters.
4. Understand mechanical design of transmission line with skin effect and proximity effect.
5. Understand the various cables and insulators gradings as well as ratings.
6. To know the performance of transmission line.

.

SECTION A

INTRODUCTION: Evolution of Power Systems and Present-Day Scenario. Structure of a power system, Bulk Power Grids and Micro-grids, indoor and outdoor substations, equipment for substations, layout, auxiliary supply.
DISTRIBUTION SYSTEMS: Radial, ring mains and network distribution system, comparison of various types of ac and dc systems.

SECTION B

TRANSMISSION LINES: Calculation of line parameters, Ferranti effect, proximity effect. PERFORMANCE OF LINES: models of short, medium and long transmission lines, performance of transmission lines, circle diagram, capacity of synchronous condenser, tuned lines, voltage control.

SECTION C

MECHANICAL DESIGN: Sag and stress calculations, effect of ice and wind, dampers. INSULATORS: Types, insulating materials, voltage distribution over insulator string, equalizer ring.

SECTION D

CABLES: Types of LV and HV cables, grading of cables, capacitance, ratings. CORONA: Phenomenon, critical voltage, power loss, reduction in losses, radio-interference, HVDC transmission – types of links, advantages and limitations.

TEXT BOOKS:

1. Power System Engg: I.J.Nagrath and D.P.Kothari (TMH)
2. Electrical Power Systems: C. L. Wadhwa (New Age International Pvt Ltd)
3. Grainger and W. D. Stevenson, “Power System Analysis”, McGraw Hill Education, 1994.

REF. BOOKS:

1. Elements of power system analysis: W.D.Stevenson (MGH)
2. Electric Power System: B.M.Weedy, John Wiley & Sons.
3. Transmission & Distribution of Electrical Engineering: H.Cotton.
4. Transmission & Distribution of Electrical Engineering: Westing House & Oxford Univ. Press, New Delhi.

Transmission and Distribution Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**PCC-EE-212G**		
Category	**Engineering Science Course**		
Course title	**Transmission and Distribution** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

LIST OF EXPERIMENTS:

1. To study the Power System blocks in MATLAB.
2. To design short and long transmission line using MATLAB.
3. To study and calculate the transmission line parameters.
4. To study the corona loss in power distribution system.

5. To study the proximity and skin effect.
6. To find ABCD parameters of a model of transmission line.
7. To study performance of a transmission line under no load condition & under load at different power factors.
8. To observe the Ferranti effect in a model of transmission line.
9. To study performance characteristics of typical DC distribution system in radial & ring main configuration.
10. To study mechanical design of transmission line.

Mathematics-III

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**BSC-MATH-204G**		
Category	**Basic Science Course**		
Course title	Mathematics-III (Numerical methods, Probability and Statistics)		
Scheme	**L**	**T**	**P**
	3	**1**	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

The students will learn:

1. To find roots of polynomial and transcendental equations using numerical methods.
2. To conduct numerical differentiation and numerical integration.
3. To solve differential equations using numerical methods.
4. To formulate and solve problems involving random variables.
5. To apply statistical methods for analysing experimental data.

Unit-I

Numerical Methods 1: Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method, Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae, Numerical integration, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules

Unit-II

Numerical Methods 2: Taylor's series, Euler and modified Euler's methods, Runge-Kutta method of fourth order for solving first and second order ordinary differential equations, Finite difference solution of two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation

Unit-III

Probability: Probability spaces, Conditional probability, Bayes' theorem, Discrete random variables, Bernoulli distribution, Binomial distribution, Poisson distribution, Poisson approximation to the Binomial distribution, Expectation of discrete random variables, Moments, Variance of a sum, Correlation coefficient, Continuous random variables and their properties, Distribution functions and Densities, Normal, Exponential and Gamma densities

Unit-IV

Sampling: Measures of central tendency, Moments, Skewness and Kurtosis, Testing of hypothesis, Test of significance, Large sample test for single proportion, Difference of proportions, Tests for single mean, Difference of means and Difference of standard deviations, Test for ratio of variances, Chi-square test for goodness of fit and Independence of attributes

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
2. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand and Company
3. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall
5. S. Ross, A First Course in Probability, Pearson Education India
6. W. Feller, An Introduction to Probability Theory and its Applications, Wiley India

Signals and Systems

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-214G**		
Category	**Engineering Science Course**		
Course title	**Signals and Systems** (Theory)		
Scheme	**L**	**T**	**P**
	3	**0**	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes :

On completion of the course, student will able to

1. Understand mathematical description and representation of continuous and discrete time signals and systems.
2. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.
3. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
4. Understand the limitations of Fourier transform and need for Laplace transform
5. Understand the basic concept of various signals and system
6. To understand the new tool in Z transform and numerical ability to analyze the circuit in Z domain.

SECTION-A

Signals: Definition, types of signals and their representations: continuous-time, discrete-time, periodic, non-periodic, even, odd, energy, power, deterministic, random, one-dimensional, multi-dimensional, Shifting and scaling operations, Linear Time Invariant and Causal systems; commonly used signals (in continuous-time as well as in discrete-time): unit impulse, unit step, unit ramp (and their inter-relationships), exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals (including transformations of independent variables).

SECTION-B

Fourier Transforms (FT):(i) Definition, conditions of existence of FT, properties, magnitude and phase spectra, Some important FT theorems, Parseval's theorem, Inverse FT, relation between LT and FT(ii) Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT, Sampling theorem, Applications of Fourier Transform.

SECTION-C

Time and frequency domain analysis of systems, Analysis of first order and second order systems, continuous-time (CT) system analysis using LT, system functions of CT systems, poles and zeros, block diagram representations; discrete-time system functions, block diagram representation, illustration of the concepts of system bandwidth and rise time through the analysis of a first order CT low pass filter

SECTION-D

Laplace-Transform (LT) and Z-transform (ZT): (i) One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC) (ii) One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping .

Text/ Reference Books:

1. 'Signal and Systems' I J NAGRATH, R. RANJAN & Sharan, 2009 Edn., TMH, New Delhi
2. V. Oppenheim, A.S. Willsky and S. Hamid Nawab, 'Signals & System',PEARSON Education, Second Edition, 2003.
3. Signals & System by A Anand Kumar, Third edition PHI.
4. Schaume Series on Signals & Systems, HSU & RANJAN, TMH,India

Electromagnetic Fields

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-216G**		
Category	**Engineering Science Course**		
Course title	**Electromagnetic Fields** (Theory)		
Scheme	**L**	**T**	**P**
	3	1	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:
At the end of the course, students will demonstrate the ability to:

7. Understand the basic laws of electromagnetism.
8. Obtain the electric and magnetic fields for simple configurations under static conditions.
9. Analyse time varying electric and magnetic fields.
10. Understand Maxwell's equation in different forms and different media. To understand the propagation of EM waves.

SECTION - A

Review of Vector Calculus
Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus differentiation, partial differentiation ,integration, vector operator del, gradient ,divergence and Curl; integral theorems of vectors. Conversion of a vector from one coordinate system to another.

SECTION - B

Static Electric Field

Coulomb’s law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

Conductors, Dielectrics and Capacitance

Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Capacitance of a two wire line, Poisson’s equation, Laplace’s equation, Solution of Laplace and Poisson’s equation, Application of Laplace’s and Poisson’s equations.

SECTION – C

Static Magnetic Fields

Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors.

Magnetic Forces, Materials and Inductance

Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic circuits, inductances and mutual inductances.

SECTION – D

Time Varying Fields and Maxwell’s Equations

Faraday’s law for Electromagnetic induction, Displacement current, Point form of Maxwell’s equation, Integral form of Maxwell’s equations, Motional Electromotive forces. Boundary Conditions.

Electromagnetic Waves

Derivation of Wave Equation, Uniform Plane Waves, Maxwell’s equation in Phasor form, Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors, Skin effect. Poynting theorem.

Text / References Books:

1. M. N. O. Sadiku, “Elements of Electromagnetics”, Oxford University Publication, 2014.
2. A. Pramanik, “Electromagnetism - Theory and applications”, PHI Learning Pvt. Ltd, New Delhi, 2009.
3. A. Pramanik, “Electromagnetism-Problems with solution”, Prentice Hall India, 2012.
4. G. W. Carter, “The electromagnetic field in its engineering aspects”, Longmans, 1954.
5. W. J. Duffin, “Electricity and Magnetism”, McGraw Hill Publication, 1980.
6. W. J. Duffin, “Advanced Electricity and Magnetism”, McGraw Hill, 1968.
7. G. Cullwick, “The Fundamentals of Electromagnetism”, Cambridge UniversityPress, 1966.
8. B. D. Popovic, “Introductory Engineering Electromagnetics”, Addison-Wesley Educational Publishers, International Edition, 1971.
9. W. Hayt, “Engineering Electromagnetics”, McGraw Hill Education, 2012.

Course code	BSC-BIO-201G			
Category	Basic Science Course			
Course title	Biology For Engineers			
Scheme and Credits	L	T	P	Credits
	2	1		3
Branches (B. Tech.)	Common For All Branches			
Class work	25 Marks			
Exam	75 Marks			
Total	100 Marks			
Duration of Exam	03 Hours			

Note: Examiner will set nine questions in total. Each question carries equal marks. Question one will be compulsory and from all units and remaining eight questions of equal marks by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course Objectives

To convey that Biology is as an important scientific discipline.

To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine

To convey that "Genetics is to biology what Newton's laws are to Physical Sciences"

To study the biomolecules that are basis of life.

To understand the tools used in modern genetic

engineering and its role.
To understand the role of biotechnology in different fields.

UNIT-I

Introduction to living world: Concept and definition of Biology; Aspect of biology. Need to study biology. Characteristic features of living organisms; Cell theory, Structure of Prokaryotic and Eukaryotic cell. Distinguish between animal and plant cell. Concept of single celled organisms, Types of microbes and their important properties. Economic importance of microbes.
Genetics : Mendel's laws of inheritance, Concept of allele. Concepts of recessiveness and dominance . Gene interaction.
Cell division- Mitosis and Meiosis. Evidence of nucleic acid as a genetic material. Concept of genetic code, Central Dogma.

UNIT-II

Introduction to Biomolecules: Definition, structure and important functions of carbohydrates (glucose, fructose, disaccharides, starch and cellulose), lipids (phospholipid, cholesterol), Amino acids
Proteins- structure and function. Primary secondary, tertiary and quaternary structure.
Nucleic acid- Structure of DNA and RNA, types of RNA, Watson and Crick model of DNA

UNIT-III

Introduction to Genetic Engineering: Concept of genetic engineering. Tools used in recombinant DNA Technology. Restriction enzymes and DNA modifying enzymes, ligases. Gene cloning; plasmid vector. Transgenic plants and animals

UNIT-IV

Applications of Biotechnology: Applications of biotechnology in Agriculture, Medicine, Environment (sewage treatment), enzyme technology.
Course Outcomes
After studying the course, the student will be able to:
Understand about living organisms, type of cells and microbes.
Identify DNA as a genetic material in the molecular basis of information transfer.
Get knowledge that all forms of life have the same building

blocks and yet the manifestations are as diverse as one can imagine.
Highlight the concepts of genetic engineering and application or sustainable development.
Understand the impact of biotechnology on ennironment, health agriculture and industry.

References:

1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons
3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers
6) https://onlinecourses.nptel.ac.in/noc18_bt23 by K. Suraishkumar and Madhulika Dixit
7) Campbell, NA and Reece JB, Biology, International edition, 7th edition or later, Benjamin Cummings, New York (2007 or later)
8) Karp, G, Cell and Molecular Biology: Concepts and Experiments, 7th edition, Wiley, New York (2013)

CONSTITUTION OF INDIA

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code			
Category	**Engineering Science Course**		
Course title	**Constitution of India** (Theory)		
Scheme	**L**	**T**	**P**
	3	**-**	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

CONSTITUTION OF INDIA– BASIC FEATURES AND FUNDAMENTAL PRINCIPLES

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950.

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

COURSE CONTENT

1. Meaning of the constitution law and constitutionalism.
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of the Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of the Fundamental Duties and its legal status.
6. The Directive Principles of State Policy – Its importance and implementation.

7. Federal structure and distribution of legislative and financial powers between the Union and the States.
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

REFERENCES:

1. The Constitutional Law Of India 9th Edition, by Pandey. J. N.
2. The Constitution of India by P.M.Bakshi
3. Constitution Law of India by Narender Kumar
4. Bare Act by P. M. Bakshi

Essence of Indian Knowledge Tradition

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code			
Category	**Engineering Science Course**		
Course title	**Essence of India Knowledge Tradition** (Theory)		
Scheme	**L**	**T**	**P**
	3	**-**	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 1.5 marks from all units and remaining eight questions have to be set by taking two Questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Course objective

The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technologicaladvancements and societal disruptions. Part-I focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

Course Contents

- Basic structure of Indian Knowledge System: अष्टादशविद्या ४वेद,४उपवेद (आयुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थापत्य आदि) ६वेदांग (शिक्षा, कल्प, निरुक्त, व्याकरण, ज्योतिष, छंद) ४ उपाड्ग (धर्मशास्त्र, मीमांसा, पुराण, तर्कशास्त्र)
- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case studies

References

- V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, BharatiyaVidyaBhavan, Mumbai. 5th Edition,2014
- Swami Jitatmanand, *Modern Physics and Vedant*, BharatiyaVidyaBhavan
- Swami Jitatmanand, *Holistic Science and Vedant*, BharatiyaVidyaBhavan
- Fritzof Capra, *Tao ofPhysics*
- Fritzof Capra, *The Wave oflife*
- VN Jha (Eng. Trans.), *Tarkasangraha of Annam Bhatta*, International Chinmay Foundation, Velliarnad,Arnakulam
- *Yoga Sutra of Patanjali*, Ramakrishna Mission,Kolkata
- GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanamwith VyasaBhashya*, VidyanidhiPrakashan, Delhi2016
- RN Jha, *Science of Consciousness Psychotherapyand Yoga Practices*, VidyanidhiPrakashan, Delhi2016
- P B Sharma (English translation), *ShodashangHridayan*

Course code	BSC-BIO-201G				
Category	Basic Science Course				
Course title	**Biology For Engineers**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	2	**1**		**3**	
Branches (B. Tech.)	**Common For All Branches**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives

To convey that Biology is as an important scientific discipline.

To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine
To convey that "Genetics is to biology what Newton's laws are to Physical Sciences"

To study the biomolecules that are basis of life.
To understand the tools used in modern genetic engineering and its role.
To understand the role of biotechnology in different fields.

UNIT – I

Introduction to living world: Concept and definition of Biology; Aspect of biology. Need to study biology. Characteristic features of living organisms; Cell theory, Structure of Prokaryotic and Eukaryotic cell. Distinguish between animal and plant cell. Concept of single celled organisms, Types of microbes and their important properties. Economic importance of microbes.

Genetics : Mendel's laws of inheritance, Concept of allele. Concepts of recessiveness and dominance . Gene interaction.
Cell division- Mitosis and Meiosis. Evidence of nucleic acid as a genetic material. Concept of genetic code, Central Dogma.

UNIT – II

Introduction to Biomolecules: Definition, structure and important functions of carbohydrates (glucose, fructose, disaccharides, starch and cellulose), lipids (phospholipid, cholesterol), Amino acids

Proteins- structure and function. Primary secondary, tertiary and quaternary structure.

Nucleic acid- Structure of DNA and RNA, types of RNA, Watson and Crick model of DNA

UNIT – III

Introduction to Genetic Engineering: Concept of genetic engineering. Tools used in recombinant DNA Technology. Restriction enzymes and DNA modifying enzymes, ligases. Gene cloning; plasmid vector. Transgenic plants and animals

UNIT – IV

Applications of Biotechnology: Applications of biotechnology in Agriculture, Medicine, Environment (sewage treatment), enzyme technology.

Course Outcomes

Students will be able to understand about living organisms, prokaryotic cell and eukaryotic cell.
Students will be able to understand structure and function of various biomolecules
Students will be able to understand gene structure, DNA replication, genetic engineering and application for sustainable development
Students will be able to understand the scope of biotechnology in field of environment, health, agriculture and industry.

References:

1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons
3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

6) https://onlinecourses.nptel.ac.in/noc18_bt23 by K. Suraishkumar and Madhulika Dixit

7) Campbell, NA and Reece JB, Biology, International edition, 7th edition or later, Benjamin Cummings, New York (2007 or later)
8) Karp, G, Cell and Molecular Biology: Concepts and Experiments, 7th edition, Wiley, New York (2013)

Course code	ESC-BT-203G				
Category	Engineering Science Course				
Course title	**Thermodynamics of Bioprocesses**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-III**
	3	**1**		**4**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives:

1. To have understanding of basic concepts of thermodynamics
2. To get aware of heat, enthalpy, internal energy, work, energy and power etc.
3. To gain knowledge about laws of thermodynamics
4. To have understanding of energy balances in biological systems

UNIT-I

Introduction and basic concepts Scope and limitations of thermodynamics, Force, pressure and energy, Equilibrium state and the phase rule, Temperature and Zeroth law of thermodynamics, Heat reservoirs and heat engines, reversible and irreversible processes.

UNIT-II

First and second law of Thermodynamics, activity coefficients and phase equilibrium, Biological systems as open , non-equilibrium systems, failure of classical (closed equilibrium).

UNIT-III

Third law of thermodynamics : Concept of entropy production , constitutive equations, Gibbs free energy-theory Effect of solutes on boiling points and freezing points, Ionic solutions, Equilibrium constant

UNIT-IV

Thermodynamics of coupled Biochemical reactions , cells as non equilibrium, Thermodynamics of passive and active transport , Prigogine – Curie law , Thermo analysis of oxidative phosphorylation, Gibbs free energy- application, Biological clocks.

Course outcomes

1. Students will be familiar with basic concepts of thermodynamics
2. They will be able to understand and apply the laws of thermodynamics.
3. They will be able to analyze energy flows in a biological system.
4. They will be able to understand Gibbs free energy and calculate obtainable work for biological systems.

Text and Reference Books:

1. Kinetics & Thermodynamics in Biochemistry : Bray & White.
2. Biophysical Chemistry Vol. I : Edsall & Wyman.
3. Non equilibrium Thermodynamics in Biophysics : Katchalasky & Curran.
4. Physical Biochemistry : Van Holde .
5. Biological Thermodynamics – D.T. Haynie (Cambridge University Press)
6. A textbook of Chemical Engineering Thermodynamics – K. V. Narayanan (Prentice Hall of India)
7. Introduction to Chemical Engineering Thermodynamics – Smith, Van Ness, Abbott (TMH)
8. Chemical, Biochemical and Engineering Thermodynamics – Stanley I. and Sandler (Wiley India Edition)

Course code	PCC-BT-205G				
Category	Professional Core Course				
Course title	**Biochemistry**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-III**
	3			**3**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives

Understanding of water and its properties, pH, pKa etc.
Understanding of amino acids proteins and carbohydrates.
Understanding of lipids, nucleic acids, vitamins and their properties.
Understanding of bioenergetics and metabolism of biomolecules.

UNIT-I

Introduction to Biochemistry: Physical properties of water and their role in biology. Concepts of pH, ionic strength and buffers . Structure of atoms, molecules and chemical bonds.

Forces that stabilize biomolecules: Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc. Hasselbach Hendersson equation and its implications.

UNIT-II

Composition, Structure and Function of Biomolecules: Amino acids, proteins, nucleic acids, carbohydrates, lipids and vitamins.

Conformation of Nucleic acids: Structural characteristics of A, B and Z-DNA. 3D structure of t-RNA, micro-RNA ,ribozymes and riboswitches

UNIT-III

Protein Structure: Structural characteristics of alpha-helix, beta-sheet and -turn. Ramachandran plot. Protein domains and domain architecture. Quaternary structure of proteins. Protein denaturation and renaturation

Enzymology: Principles of catalysis, enzymes. Types of enzymatic reaction mechanisms, Michaelis-Menten kinetics. Competitive, Non-competitive and Un-competitive inhibition.

Allostery, isozymes

Unit-IV

Bioenergetics and Metabolism: Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, group transfer, and biological energy transducers.

Metabolism of lipids, synthesis of triacylglycerols, biosynthesis of fatty acids, fatty acid oxidation. Amino acids Metabolism, amino acid synthesis, biological nitrogen fixation, amino acid catabolism.

Course Outcomes

- Students will be able to understand physio chemical properties of water, bonds and buffers.
- Students will be able to understand structure of amino acids, proteins, carbohydrates, lipids, nucleic acids and vitamins.
- Student will be able to understand about, structure of nucleic acids and protein.
- Students will be able to understand concept of bioenergetics and metabolism of biomolecules.

List of Text / Reference Books:

1. A.L. Lehninger, D.L. Nelson, M.M. Cox, “Principles of Biochemistry”, 3rd Edn.,worth Publishers, 2000.

2. L. Stryer, J.M. Berg, J.L. Tymoezko, “Biochemistry”, 5th Edition, W.H. Freeman andCo., 2002.

3. Harper’s Biochemistry, 25th edition, by R.K. Murray, P.A Hayes, D.K. Granner, P.A.Mayes and V.W. Rodwell (2000). Prentice Hall International.

4. Fundamentals of Biochemistry by Donald Voet and Judith G Voet (1999), JohnWiley & sons, NY

5. Biochemistry, 4th edition, by G. Zubay (1998). Wm.C. Brown Publishers.

6. Biochemistry, 2nd edition, by Laurence A. Moran, K.G. Scrimgeour, H.R. Horton,R.S.Ochs and J. David Rawn (1994), Neil Patterson Publishers Prentice Hall.

Course code	PCC-BT-207G				
Category	Professional Core Course				
Course title	**Cell Biology**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-III**
	3			**3**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT- I

Cell: An introduction, Cell Theory, classification of organisms by cell structure, compartmentalization of eukaryotic cells, cell fractionation.

Cell membrane and permeability: Chemical components of biological membranes, organization and fluidity of membrane components, the membrane as a dynamic entity and membrane transport.

Cell Wall: Chemical composition and structure of cell wall

UNIT- II

Cytoskeleton: Structure and functions of microtubules, microfilaments, intermediate filaments.

Structure and Functions of Cellular Organelles: Endoplasmic Reticulum, Golgi complex, Lysosomes, Vacuoles and Microbodies, Ribosomes, Mitochondria, Chloroplast.

UNIT- III

Nucleus: Structure, cell-cycle and regulation of cell cycle.

Extracellular matrix: Composition, molecules that mediate cell adhesion, membrane receptors for extracellular matrix macromolecules, cell signaling.

UNIT- IV

Muscle contraction: Different muscle types in the body, Structure of muscle, structural proteins of muscles, energetics and regulation of muscle contraction.

Neurons and neurotransmission: Resting potential, action potential, synaptic transmission, neurotransmitters, and the generation of action potential by sensory stimuli and mechanism of nerve-impulses.

Course Outcomes :

CO1- Students will learn basic principles of cell biology especially the structure and functions of Biological Membranes

CO2 - Students will come to know about various cellular organelles and their integrated functioning.

CO3 - This unit will enable the students to learn the concept of inhibition and activation of biological phenomenon by simple methods.

CO4 - Students will be able to gain knowledge of different factors affecting the normal functioning of muscular and nervous system.

Text / References Books:

1. Cell Biology: Organelle structure and function, Sadava, D E.(2004) Panima pub., New Delhi.
2. Molecular Biology of cell, 4th ed. Alberts, Bruce (*et. al)(2002)* Garland Science Publishing, New York..
3. Cell Biology- Smith and Wood by Chapman and Hall.
4. Cell and Molecular Biology, 8th ed. Robertis, EDP De and Robertis, EMF De (2002) Lippincot Williams and Wilkins Pvt. Ltd.,(International Student Edition) Philadelphia.
5. Molecular Cell Biology 4th ed. Lodish, Harvey and .Baltimore, D(2000) W.H. freeman & Co. New York

Course code	PCC-BT 209 G				
Category	Professional Core Courses				
Course title	**Genetics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-III**
	3	**0**	**0**	**3**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives:

In this course, emphasis is placed on the molecular basis of heredity, chromosome structure, patterns of Mendelian and non-Mendelian inheritance, principles of population, evolutionary and quantitative genetics.

UNIT-I

Classical and Non-Classical Genetics.

Introduction, History, Classical and molecular, Genetics , Mendel's Laws of inheritance and its applications, Monohybrid and Dihybrid Crosses, Types of dominance, Test cross and back cross, common gene interactions: Complementary genes, Supplementary genes, Cumulative genes, Duplicate genes, Inhibiting genes, Lethal genes, Penetrance Expressivity, Plieotropy, Atavism, Modifiers, Qualitative and Quantitative characters, Physical basis of heredity., genetic basis of continuous phenotypic variety, Analysis of genetic data.

UNIT-II

Chromosomes:

General Features of chromosomes: Morphology, Chemical composition, Structure and functions, Chromosomal aberrations: Structural and Numerical changes, The chromosomal theory of inheritance, Sex determination, Sex influenced characters, sex limited inheritance.

Organization of chromosomes:
Chromosome organization and molecular structure, The structure of bacterial chromosomes, the structure of Eukaryotic Chromosome Special chromosomes: Lampbrush Chromosomes, Polytene Chromosomes, and Accessory Chromosomes, euchromatin, heterochromatin, Repetitive and non repetitive DNA.
Linkage, Crossing Over and Recombination: Linkage, Crossing Over, Recombination in Chromosomes, Chromosome mapping, Genetic mapping: Gene mapping from two point and three point test cross, mapping by tetrad analysis, Complementation.

UNIT-III

Cytoplasmic Inheritance: Cytoplasmic inheritance in Eukaryotes, Maternal Inheritance, Cytoplasmic Inheritance by Cell Organelles, Cytoplasmic Inheritance by Endosymbionts, Cytoplasmic inheritance in haploids, cytoplasmic inheritance in Prokaryotes.
Mutation: Characteristics, Classification and Molecular basis, Physical Mutagens and Chemical Mutagens, Detections of Mutation, Directed Mutagenesis, Application of Mutation, Mechanism of DNA repair.

UNIT-IV

Population Genetics: Gene frequency, Genotype Frequency, Gene pool, Hardy- Weinberg law, Random Union of gametes, Random mating among Genotypes, Factors affecting gene frequencies : Migration, Mutation, Natural Selection, Random Drift and Founder's Principle, Inbreeding and Outbreeding.
Inheritance of Quantitative Characters: Quantitative and Qualitative Character, Inheritance of Quantitative Characters, Multiple factor hypothesis, Analysis of quantitative data: Mean, Range, Variance, Standard Deviation, Coefficient of Variation, Effect of Environment on Quantitative characters. Cause of Variations.
Genetic And Man: Human Genetics: Introduction to human Genome, genetic Studies: Genetic Diseases, Blood Groups, Disputed Parentage, Histocompatibility, Immune response, Linkage Studies, Somatic Cell Hybridization, Antibodies and Antigens Variability, Cytogenetics, Evolutionary Genetics.

Course Outcomes:

On completion of this course, students will have the knowledge and skills to:

Recognize and describe genetic phenomena and demonstrate knowledge of important genetic principles.

Describe the structure and functions of chromosomes

Understand and explain the phenomenon of cytoplasmic inheritance and mutations

Explain the key concepts in population, evolutionary and quantitative genetics including: the basis of genetic variation; heritability; Hardy-Weinberg Equilibrium; roles of migration, mutation.

List of Text / Reference Books:
1. Principles of Genetics by Gardner published by John Wiley & Sons.
2. Genetics: Analysis and Principles by Robert J. Brooker, 3rd Edition published by MC Graw Hill Science.

3. Genetic by M.W Strickberger Published by Prentice Hall College Division.
4. Genetic: Analysis of genes and genomes by Daniel Harti, 7th Edition published by jones and Bartlet.
5. Genetic by P.J Russel, 5th Edition published by Addison Wesley Longman, Inc. California.
6. Concept of Genetics by William S. Klug, Michael Charlotte Spencer and Michael A , Palladino, 9th Edition published by Benjamin Cumming.
7. Genetics by Benjamin Pierce, 3rd Edition Published by W.H. Freeman.
8. Essential of Genetics: A genomic perspective by Daniel L Harti and Elizabeth W.

Course code	**HSMC-211G**				
Category	Humanities and Social Science Including Management Courses				
Course title	**ENGLISH III**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester- III**
	3	**0**	**0**	**3**	
Branches (B. Tech.)	**BIO TECH**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Objective

The course aims at developing the desired language (English) skills of students of engineering and technology so that they become proficient in communication to excel in their professional lives. The course aims at developing competence for report writing with a focus on its complex writing techniques and procedures.

Course Content

UNIT I

Communication Process Types and Levels, Scopes and significance, Technical and Tools of Effective communication

UNIT II

Speaking files and Personality Development Oral Presentation, Body Language, Voice Modulation, Negotiation, Group Discussion, Interview techniques

UNIT III

Advanced Technical Writing Job Application, CV writing, Business Letters, Memos, Minutes, Notices, Report Writing and structure, Blog writing.

UNIT IV

Communication and Media Recent Developments in Media, Context of Communication

SUGGESTED READING

1. Borowick, Jerome. N. *Technical Communication and its Applications*. New Delhi: PHI, 2000
2. Guffey, Mary Ellen. *Business Communication: Process & Product*. USA: South western College Publishing, 2000.
3. Kumar, Sanjay and Pushp Lata. *Communication Skills*. Delhi: OUP, 2011

Environmental Sciences

Course code	MC-106G				
Category	Mandatory Course				
Course title	Environmental Sciences				
Scheme and Credits	L	T	P	Credits	
	3	0	1	0	
Branches (B. Tech.)	Common For All Branches				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit-1 The Multidisciplinary nature of environmental studies. Definition, scope and importance. (2 lecture)

Unit-2 Natural Resources :

Renewable and non-renewable resources : Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non- renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.

* Equitable use of resources for sustainable lifestyles.

(8 lectures)

(8 lectures)

Unit-3 Ecosystems :

* * Producers, consumers and decomposers.
* * Energy flow in the ecosystem.
* * Ecological succession.
* * Food chains, food webs and ecological pyramids.
* * Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.

b. Grassland

ecosystem. c.

Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit-4 Biodiversity and its conservation

* * Introduction - Definition : Genetic, Species and ecosystem diversity.
* * Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
* * Biodiversity at global, National and local levels.
* * India as a mega-diversity nation.
* * Hot-spots of biodiversity.
* * Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
* * Endangered and endemic species of India.
* * Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

Unit-5 Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.

b) Water pollution c) Soil pollution

d) Marine pollution e) Noise pollution

f) Thermal pollution g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6 Social issues and the Environment:

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation, rain water harvesting, watershed management.
* Resettlement and rehabilitation of people : its problems and concerns case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.
* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution) Act.
* Water (Prevention and Control of pollution) Act.
* Wildlife Protection Act.
* Forest Conservation Act.
* Issues involved in enforcement of environmental legislation.
* Public awareness.

(7 lectures)

Unit-7 Human population and the Environment.

Population growth, variation among nations. Population explosion- Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Woman and Child Welfare Role of Information Technology in Environment and human health.

Case Studies. (6 lectures)

Unit-8 Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems- pond, river, hill slopes, etc. (Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing

Co. (TB).

15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders
Co. USA, 574p.

16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford
& TBH Publ. Co. Pvt. Ltd. 345p.

17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ.
House, Meerut.

18. Survey of the Environment, The Hindu (M).

19. Townsend C., Harper J. and Michael Begon. Essentials of
Ecology, Blackwell Science (TB).

20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).

21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno
Science Publications (TR).

22. Wagner K.D., 1998, Environmental Management, W.B.
Saunders co. Philadelphia, USA 499p.

23. A text book environmental education G.V.S. Publishers by Dr.
J.P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.

Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory : 75 marks, Practical/ Field visit : 25 marks. The structure of the question paper will be :

Part- A : Short Answer Pattern	:	15 marks Part- B : Essay Type
with inbuilt choice	:	60 marks Part-C : Field Work
(Practical)	:	25 marks Instructions for

Examiners :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.

Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

Course code	LC-BT-213G				
Category	Professional Core Course				
Course title	**Biochemistry Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-III**
			3	**1.5**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

LIST OF EXPERIMENTS/PRACTICALS

1. To adjust the pH of solution.
2. To prepare buffer solution using Hasselbach Hendersson equation.
3. Biochemical test for proteins.
4. Biochemical test for carbohydrates.
5. Biochemical test for lipids.
6. To check the activity of enzyme.
7. Chromatographic analysis of biomolecules (Column/TLC/Paper).
8. HPLC analysis of biomolecules.
9. Separation of biomolecules by size exclusion chromatography.

Course Outcome

Students will be able to
Prepare different type of buffers.
Carry out biochemical tests for different biomolecules
Learn about separation techniques or biomolecules
Learn about characterization of enzymes.

TEXT / REFERENCES BOOKS

1. Principles and Techniques of Biochemistry and Molecular Biology by K.Wilson and J.Walker Cambridge University Press
2. Introductory Practical Biochemistry Randhir Singh and SK Sawhney Alpha Science International Ltd

Course code	LC-BT-215G				
Category	Professional Core Course				
Course title	**Cell Biology Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-III**
			3	**1.5**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

LIST OF EXPERIMENTS:

1. Study of different types of microscopes.
2. To study and observe the structure of prokaryotic cell
3. To study and observe the structure of eukaryotic cell
4. To prepare temporary stained mounts of onion root tip to study mitotic cell division
5. To prepare temporary stained mounts of Polytene chromosomes.
6. To prepare temporary stained mounts of insect gonads/flower bud.
7. To study cell membrane properties.
8. Fluorescence labeling of cellular organelles.
9. Study of Drosophila as a model organism and its life-cycle.
10. Isolation of DNA.

Course Outcomes :

CO1 - Students will be able to operate compound microscope
CO2 - Preparation of temporary and permanent slides will be known by students.
CO3 - Students will come to know about the procedure of isolation of different organelles of the cell by means of techniques of Centrifugation on the basis of density gradient.
CO4 - Students will learn Techniques of DNA extraction

Reference books:

1. Principles and techniques of Practical Biochemistry: K. Wilson and J. Walker (1994), Cambridge University Press, Cambridge.

2. Introductory practical Biochemistry by S.K. Sawhney and Randhir Singh (2000), Narosa Publishing House, New Delhi.
3. An introduction to Practical Biochemistry by David T. Plummer (1988), McGraw- Hill, Book company, UK.

Course code	PCC-BT-202G				
Category	Professional Core Course				
Course title	**Microbiology**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-IV**
	3			**3**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Instructions for setting of paper: Nine questions are to be set in total. First question will be short answer question covering whole syllabus and will be compulsory to attempt. Next eight questions will comprise of two questions each from the four sections. Student will be required to attempt four questions selecting one from each section. Each question will be of 15 marks.

Course Objectives

To convey that Microbiology is an important a scientific discipline.

To learn the Microbial diversity and systems of classification.

The fundamental principles of microbial nutrition, growth and control.

UNIT-I

Introduction to Microbiology: Importance and brief history of microbiology. Members of microbial world- General characteristics of Archaebacteria, Eubacteria. Algae, Fungi and Protozoa. Scope and relevance of microbiology, the future of microbiology.

Microbial Cell Structure and Function: Overview of prokaryotes and eukaryotes. The prokaryotic cell, size, shape and arrangement of bacterial cells. Structure and chemical composition of prokaryotic cell. Bacterial endospore.

Viruses:Introduction and general characteristics, the bacteriophages, Structure and life cycle of virus (Lytic and Lysogenic)

UNIT-II

Microbial taxonomy, systems of classification, microbial phylogenetic groups, Bergey's manual; Criteria for classification including molecular approaches.
Microscopic Techniques: The light microscopy, electron microscopy, preparation and staining of specimens, simple stains, differential and special stains.

UNIT-III

Microbial Nutrition: Microbial nutrient requirements, Classification of microorganisms on nutritional basis. Uptake of nutrients by cell. Culture media, types of media. Preservation techniques for microbial cultures.

Microbial Growth: Bacterial Modes of cell division and process of sporulation. Growth curve (log, exponential, stationary and cell death), mathematical expression of growth, diauxic growth, synchronous and continuous growth, methods of growth measurement, effects of environmental factors on growth: temperature, pH, water availability and oxygen.

UNIT-IV

Microbial Control: Basic principle of microbial control, selection of microbial control method, use of Physical and Chemical method in microbial control.
Microbial Metabolism: An overview of Metabolism, Carbohydrate catabolism: glycolysis, alternate to glycolysis-ED pathway, pentose phosphate pathway; cellular respiration: aerobic and anaerobic; fermentation, photosynthesis; overview of lipid and protein metabolism.

Course Outcomes

Students would be able to explain the basic of microbiology, relevance, microbial diversity and details of prokaryotic cell.
Students would be able to understand classification of microorganisms and techniques of microscopy.
Students would be having familiarization about microbial nutrition, preservation and growth.
Students would be able to appreciate microbial control techniques, microbial metabolism and photosynthesis.

List of Text / References Books:

1. Jeffery C. Pommerville. Alcamo's Fundamentals of Microbiology (Tenth Edition). Jones and Bartlett Student edition.

2. Gerard J. Tortora, Berdell R. Funke, Christine L. Case. Pearson - Microbiology: An Introduction. Benjamin Cummings.

3. Lansing M. Prescott, John P. Harley and Donald A. Klein. Microbiology. Mc Graw Hill companies.

4. Microbiology, Pelczar. M.J , Chan E.C.S, Kreig N.R, 5th edition (2007)

5. Biology, Raven and Jhonson, 6 th edition (2001)

Course code	PCC-BT-204G				
Category	Professional Core Course				
Course title	**Molecular Biology**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-IV**
	3			**3**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Instructions for setting of paper: Nine questions are to be set in total. First question will be short answer question covering whole syllabus and will be compulsory to attempt. Next eight questions will comprise of two questions each from the four sections. Student will be required to attempt four questions selecting one from each section. Each question will be of 15 marks.

Course Objectives

To convey the importance of molecules of life and their processes.

To convey the role of central dogma related processes in practical applications.

UNIT-I

DNA: Introduction, structure, properties: physical and chemical, biological significance of double strand, DNA bending, DNA super coiling, cruciform and ZDNA structure, DNA Triplex, Denaturation and renaturation of DNA-Tm values and cot curves analysis, C-value paradox, Repetitive and non-repetitive DNA and its relevance to plants and animals, inverted and tandem repeats. Gene, split genes, housekeeping genes.

Genome organization:Genome organization in eukaryotes and prokaryotes, euchromatin and heterochromatin,DNA protein interactions, packaging in nucleosomes, Meiosis, mitosis and practical applications.

UNIT-II

DNA Replication: Origin of replication, DNA polymerase, mechanism of DNA replication in prokaryotes and eukaryotes, DNA replication models, DNA damage, mutations, DNA repair and practical applications.

Transcription: Mechanism in prokaryotes and eukaryotes, RNA polymerase, sigma factor, regulation of transcription, transcriptional factors, post transcriptional processing (5' and capping and 3' polyadenylation), Zinc finger motifs, helix loop helix, leucine Zippers. RNA splicing: Intron and exon, splicing mechanism for mRNA,tRNA, spliceosome, lariat formation, Ribozymes, cis splicing and trans splicing, practical application of transcription.

UNIT-III

Translation: Genetic code, Wobble hypothesis, Component of protein synthesis, ribosomes, tRNA, mRNA, rRNA, mechanism of protein synthesis, regulation of protein synthesis, post transitional modification, chaperones, transport and degradation of proteins and practical applications of translation.

Gene Regulation: Operon model, Regulation of gene expression in prokaryotes and eukaryotes; Lactose and Tryptophan operon, inducible and repressible systems; positive and negative control.

Applications of gene regulations in diseases, control and evolution.

UNIT-IV

Transposons: The dynamic genome: Mobile genetic elements in prokaryotes-insertion sequences, composite and non-compositetransposons, replicative and conservative transposition, retrotransposon, eukaryotic jumping genes and practical applications.

Introduction to stem cells and cellular differentiation; RNA interference, epigenetic regulation of genes (DNA methylation and histone modifications), oncogenes, tumour suppressor genes and apoptosis, oncogenes and cancer. Genome editing tools, CRISPR, applications, future prospective and drawbacks.

Course Outcomes

Students will be able to understand and apply the principles of basic molecular biology in real life applications.

List of Text/ Reference Books:

1. DNA Structure and Function by Richard.
2. Genes by Lewin.
3. Molecular Cell Biology by Alberts and Watson.
4. The Cell-AMolecular Approach by Cooper.
5. Cell and Molecular Biology byRobertis.

Course code	PCC-BT 206 G				
Category	Professional Core Courses				
Course title	**Immunology**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester- IV**
	3	**0**	**0**	**3**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Instructions for setting of paper: Nine questions are to be set in total. First question will be short answer question covering whole syllabus and will be compulsory to attempt. Next eight questions will comprise of two questions each from the four sections. Student will be required to attempt four questions selecting one from each section. Each question will be of 15 marks.

Course Objectives:

In this course, emphasis will be on :

- The structural features of the components of the immune system and their functions.
- Understanding the mechanisms involved in immune system development and responsiveness.
- To understand about how immunologists think and work.

UNIT-I

Basic Immunology : Types of immunity: innate and acquired: cells and organs of immune system B-Lymphocytes and T- Lymphocytes, Primary and secondary lymphoid organs, humoral and cell mediated immune response.

UNIT-II

Immune System : Antigens, immunoglobulins : structure and function, antigenic determinants : Isotype, allotype & idiotype; Monoclonal Ab , Hybridoma techonology Organization and expression of immunoglobulin genes, Generation of Ab. Diversity, class switching , and Ab. Engg.

UNIT-III

Generation of B-Cell and T-Cell Responses : Major histocompatibility complex , Peptide binding by class I and class II molecules , Ag. Processing presentation, T-Cell receptor ,T-cell maturation , activation & differtiation, Positive & negative selection, • ignaling pathways.
Immunological Techniques : ELISA , Radio immunoassay , immuno-precipitin reactions.

UNIT-IV

Immune Effector Responses : Cytokines properties , The complement system, Role of T- helper cells in cytokine production , cell mediated effector responses.
Immune system in Health & Disease : Hypersensitive reaction, auto immunity, and immune response to infectious disease, tumor immunity, tissue and organ transplant , vaccines & peptide vaccines.

Course Outcomes:
After completing the course, students will know :

Types of immunity and its importance and relevance in our daily life

Antigens, immunoglobulin's structure, function and organization

Major histo-compatibility complex and its importance in transplantation

Autoimmune disease and Hypersensitive reaction and vaccines.

TEXT / REFERENCE BOOKS
1. **Kuby,s Immunology** 4th edition) R.A. Goldsby ,T. J. Kindt, B.A. Osborne, W.H.Freeman & company, New.York.
2. **Essential Immunology** (10th edition), Ivon Roitt, Peter Delves, Blackswell, Scientific Publications. Oxford.
3. **Fundanental of immunology** . Paul W.E.(Eds) Raven press ,New York.
4.**Immunology** by Presscot .

Course code	ESC-BT-208G				
Category	Engineering Science Courses				
Course title	**Bioprocess Engineering**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-IV**
	3	**0**		**3**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives

Understanding of basic principles of bioprocesses, mass transfer, heat transfer and fluid mechanics.
Understanding basic principles of sterilization.
Understanding fundamental of downstream processing of fermented products

UNIT – I

Introduction to Bioprocess Engineering: Overview of Bioprocess including upstream and downstream processing. Bioprocess development: An interdisciplinary challenge. Steps in bioprocess development, Role of bioprocess engineering in biotechnology.
Introduction to Engineering calculation: Physical variables, dimensions and units, dimensionally homogeneous and non-homogeneous equations, Concept of materials balance, types of material

balance,mass balance in steady and unsteady state, elemental balance ,electron balance and energy balance, Enthalpy calculations.

UNIT-II

Fermentation: Bioreactor- general characteristics , components, and types of bioreactors**.**
Formulation of fermentation medium, factors influencing the choice of various carbon and nitrogen sources.
Sterilization: Thermal death kinectics of microorganisms, Batch sterilization- design aspects, del factors during heating and cooling, methods for evaluating del factors, Continuous sterilization, sterilization of gases and liquids by filtration.

UNIT – III

Rheology of Fermentation Fluids: Nature of fluids and their classification, Bernoulli's equation.boundary layer concept, flow through pipes, Newtonian and non Newtonian fluids, mixing in fermentation broth.
Microbial Growth Kinetics: Growth kinetics in batch culture, effect of substrate concentration in batch culture, growth yield coefficient, heat generation during microbial growth, fed batch culture, continuous culture and continuous growth kinetics

UNIT-IV

Transport Phenomena in Bioprocess: Mass Transfer- molecular diffusion, role of diffusion in bioprocessing, film theory. Convective mass transfer; liquid solid mass transfer, liquid liquid mass transfer, Gas-Liquid mass transfer. Oxygen uptake in cell cultures, factors affecting oxygen transfer in fermentations.
Heat Transfer- Basic concept of heat transfer in bioreactor, Principle and mechanism of Heat transfer by Conduction, Convection, and Radiation. Process equipment for heat transfer, double pipe heat exchanger, shell and tube heat exchangers, condensers.

Course Outcomes

After studying the course, the student will be able to:

- Students will be able to understand basic principles and role of bioprocess engineering in biotechnology, mass and energy principles involved in bioprocesses.
- Students will be able to understand fermentation, sterilization of bioprocess equipments, materials, downstream processing of fermented
- Students will be able to understand role of fluid mechanics and microbial growth kinetics during bioprocesses
- Students will be get familiar with mass and heat transfer in bioprocess engineering.

References:

1. Bioprocess Engineering Principles, PM Doran, Academic Press, Elsevier
2. Bioprocess engineering Basic concepts M.A Shuler, Fikiret Kargi, PHI, India
3. Introduction to Biochemical Engineering D G Rao Second edition
4. Biochemical Engineering Fundamentals James E. Bailey, David F. Ollis Mc Graw Hill Education

Course code	**BSC-BS 210G**				
Category	Basic Science Course				
Course title	**Biostatistics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-IV**
	3	**1**		**4**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25				
Exam	75				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives

Understanding the fundamental of statistics.
Understanding the types of data, data collection and data representation
Understanding the measure of central tendency
Understanding the principles of probability
Understanding the principles of correlation and regression

UNIT – I

Introduction to Biostatistics: Definition, types of data and Application, data collection, random and non random, Data representations, Bar, Histogram, Frequency Polygon, frequency curve, relative frequency curve, pie chart (with merits and demerits).
Descriptive Statistics: Introduction to basic quantities methods, Measure of central tendency, mean , mode, median, Harmonic mean, Geometrical mean, Partitions, measure of dispersion, Range, Quartile deviation, mean deviation, standard deviation and, coefficient of variation.

UNIT – II

Probability Distributions: Introduction to probability and types of probability with applications in biostatistics. Probability theorems (addition, multiplication), independent events, Baye's theorem. Probability Distributions, properties and application of binomial, poisson and Normal distributions.

UNIT – III

Sampling:Introduction to sampling, Types of sampling, errors, standard error, confidence limits, large sample test, single probability test, deference of probability, single mean difference of mean difference of standard deviation. Student's t-distribution test (applications only), F-test, Chi-square test of goodness of fit.

UNIT – IV

Correlation and regression: Introduction, definition and types to correlation, properties, covariance and methods of studying correlation. Karl Pearson's Coefficient of Correlation, Rank Correlation methods. Properties of regression, Introduction to regression lines, regression coefficients, properties of regression. Advantages and disadvantages of Correlation and regression.

Course Outcomes

Students will be able to understand the fundamental of statistics such as data, data collection and representation of data
Students will be able to understand the concepts of mean, median and mode.
Students will be able to understand the principles of probability and probability theorems
Students will be able to understand the study of correlation, regression and coefficients

References books:

1Biostastics, K Balaji, AVS Raghavaiah, KN Jayavera. I.K. International publishing House Pvt. Ltd, New Delhi

2. An Introduction to Biostastics, N Gurumani, MJP Publisher

3. Principles and Application of Biostastics, B. Antonosamy, PS Premkumar, S Christopher, Elsevier

<table>
<tr><td>Course code</td><td colspan="5">HSMC-02G</td></tr>
<tr><td>Category</td><td colspan="5">Humanities and Social Sciences</td></tr>
<tr><td>Course title</td><td colspan="5">ORGANIZATIONAL BEHAVIOUR</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2"></td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5"></td></tr>
<tr><td>Class work</td><td colspan="5">25</td></tr>
<tr><td>Exam</td><td colspan="5">75</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

The objective of this course is to expose the students to basic concepts of management and provide insights necessary to understand behavioral processes at individual, team and organizational level.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

SYLLABUS

UNIT - 1

Introduction of Management- Meaning, definitions, nature of management; Managerial levels, skills and roles in an organization; Functions of Management: Planning, Organizing, staffing, Directing & Controlling, Interrelationship of managerial functions, scope of management & Importance of management. Difference between management and administration.

UNIT - 2

Introduction of organization:- Meaning and process of Organization, Management v/s Organization; **Fundamentals of Organizational Behavior:** Concepts, evolution, importance and relationship with other Fields; Contemporary challenges and opportunities of OB. **Individual Processes and Behavior**-**Personality**- Concept, determinants and applications; **Perception-** Concept, process and applications, **Learning**- Concept (Brief Introduction) ; **Motivation-** Concept, techniques and importance

UNIT - 3

Interpersonal Processes- **Teams and Groups**- Definition of Group, Stages of group development, Types of groups, meaning of team, merits and demerits of team; difference between team and group, **Conflict-** Concept, sources, types, management of conflict; **Leadership:** Concept, function, styles & qualities of leadership. **Communication –** Meaning, process, channels of communication, importance and barriers of communication.

UNIT 4

Organizational Processes: Organizational structure - Meaning and types of organizational structure and their effect on human behavior; **Organizational culture -** Elements, types and factors affecting organizational culture. **Organizational change:** Concept, types & factors affecting organizational change, Resistance to Change.

Course Outcomes: By the end of this course the student will be able to:

1. Students will be able to apply the managerial concepts in practical life.
2. The students will be able to understand the concept of organizational behavior at individual level and interpersonal level.
3. Students will be able to understand the behavioral dynamics in organizations.
4. Students will be able to understand the organizational culture and change

Suggested Books:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management, Pearson Education Asia, New Delhi.

2. Stoner, J et. al, Management, New Delhi, PHI, New Delhi.
3. Satya Raju, Management – Text & Cases, PHI, New Delhi.
4. Kavita Singh, Organisational Behaviour: Text and cases. New Delhi: Pearson Education.
5. Pareek, Udai, Understanding Organisational Behaviour, Oxford University Press, New Delhi.
6. Robbins, S.P. & Judge, T.A., Organisational Behaviour, Prentice Hall of India, New Delhi.
7. Ghuman Karminder, Aswathappa K., Management concept practice and cases, Mc Graw Hill education.
8. Chhabra T. N., Fundamental of Management, Sun India Publications- New Delhi.

Course code	LC-BT-212G				
Category	Professional Core Course				
Course title	**Microbiology Lab.**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-IV**
			3	**1.5**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

LIST OF EXPERIMENTS/PRACTICALS

1. Microscopy: Different parts of compound microscope and its use.
2. Morphology study of microorganisms using permanent slides.
3. Preparation of culture media.
4. Sterilization techniques used in microbiology laboratory.
5. Isolation and enumeration of microorganisms from soil.
6. Pure culture techniques – Streak plate, Pour plate, Spread plate
7. Sub culturing of isolate to get pure culture.
8. Preparation of bacterial smear and simple staining.
9. Gram staining of bacterial culture.
10. Measurement of bacterial growth using turbidity method.
11. Effect of temperature on microbial growth.
12. Effect of pH on bacterial growth. Biochemical tests useful in bacterial taxonomy.
13. Milk Microbiology –Standard Plate Count.

Course Outcome

Students will be able to

- Students get familiarity with principle of simple and compound microscopes and their application for morphological study of microorganisms.
- Students would learn the techniques of smear preparation, simple staining and Gram staining of microbial cultures.
- Students would be able to prepare liquid and solidified media by using the sterilization technique.
- Students would be able to enumerate microbes and isolate the pure culture of microorganisms from the soil and water.

TEXT / REFERENCES BOOKS

1. Experiment in Microbiology, Plant pathology,Tissue Culture & Mushroom production technology: Aneja K.R, .2001, 3RD Edition, New Age International

Publishers, New Delhi.
2. Microbiology –A Lab manual, Cappuccino J. & Sheeman N, 2000, 4th Edition, Addison Wesley California .

Course code	LC-BT-214G				
Category	Professional Core Course				
Course title	**Molecular biology Lab.**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-IV**
			3	**1.5**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

LIST OF EXPERIMENTS/PRACTICALS (Any ten)

1. Isolation of Prokaryotic genomic DNA
2. Isolation of Prokaryotic plasmid DNA
3. Isolation of DNA from Eukaryotes
4. mt-DNA/Y-Chromosome isolation
5. Isolation of DNA from saliva/blood/different tissues/dried blood/hair
6. RNA/s isolation
7. Simultaneous extraction of RNA, DNA and proteins
8. Purification of DNA/RNA/Protein
9. Molecular weight characterization of a given DNA/Protein
10. Electrophoresis/AgroseGel Extraction/SDS/PAGE of DNA/Protein.
11. Polymerase Chain Reaction/PCR
12. Blotting Techniques
13. RAPID
14. RFLP

Course Outcome:

Students will be able to isolate, identify, purify and amplify the molecules of life.

Students will be able to apply the theoretical knowledge of molecular biology for practical applications.

List of References/ Suggestive Books.

1. Molecular Cloning-a laboratory manual by Sambrook and Russell.
2. Cell and Molecular Biology: Concepts and Experiments by Karp.

3. Genomes by Brown.
4. Molecular Cell Biology by Alberts and Watson.

NOTE: A College must offer 70% of the above listed experiment. The remaining 30% experiment may be modified by college according to facilities available.

Course code	LC-BT-216G				
Category	Professional Core Courses				
Course title	**Immunology Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-IV**
	0	**0**	**3**	**1.5**	
Branches (B. Tech.)	**Biotechnology Engineering**				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Objectives:

To acquire knowledge on immunological techniques

To train in various techniques involving antigen and antibody reactions

LIST OF EXPERIMENTS:

1. Double diffusion, Immuno-electrophoresis and Radial Immuno diffusion.

2. Rocket electrophoresis

3. Antibody titre by ELISA method.

4. ELISA for detection of antigens and antibodies-DOT ELISA

5. Sandwich ELISA

6. Blood group mapping

7. Separation of leucocytes by dextran method

8. Separation of mononuclear cells by Ficoll-Hypaque

9. Preparation of antigens from pathogens and parasites

10. Slide and tube agglutination reaction

11. Complement fixation test.

12. Immunofluorescence technique

13. Lymphoproliferation by mitogen / antigen induced

14. SDS-PAGE, Immunoblotting, Dot blot assays

Course Outcomes:

Students will be able to perform diagnostics assays involving antigen-antibody reaction.
Students will be able to learn the preparation of antigen.
Students will be able to learn the immuno-diffusion & immuno-precipitation
Students will be able to learn ELISA test and SDS-PAGE.

REFERENCES:

1. Rose et al., Manual of Clinical laboratory Immunology, 6th Ed ASM Publications, 2002.

2. Lefkovis and Pernis. Immunological methods. Academic Press, 1978.

3. Hudson L. and Hay F.C. Practical Immunology. Black Well publishers, 1989

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION
B.Tech (Biotechnology) Scheme effective from 2019-20
SEMESTER 3rd

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	BSC-BIO-201G	Biology For Engineers	2	1	0	3	3	25	75		100	3
2	ESC-BT-203G	Thermodynamicsof Bioprocesses	3	1	0	4	4	25	75		100	3
3	PCC-BT 205 G	Biochemistry	3	0	0	3	3	25	75		100	3
4	PCC-BT 207 G	Cell Biology	3	0	0	3	3	25	75		100	3
5	PCC-BT 209 G	Genetics	3	0	0	3	3	25	75		100	3
6	HSMC-211G	English-III	3	0	0	3	3	25	75		100	3
7	*MC -106G	Environment Science	3	0	1	4	0	25	75	-	-	3
8	LC-BT 213 G	Biochemistry Lab.	0	0	3	3	1.5	25		25	50	3
9	LC-BT 215 G	Cell Biology Lab	0	0	3	3	1.5	25		25	50	3
Total							22				700	

MC-106G is a mandatory non –credit course in which the students will be required passing marks in theory.

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION
B.Tech (Biotechnology) Scheme effective from 2019-20
SEMESTER 4TH

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	PCC-BT 202 G	Microbiology	3	0	0	3	3	25	75		100	3
2	PCC-BT 204 G	Molecular Biology	3	0	0	3	3	25	75		100	3
3	PCC-BT 206 G	Immunology	3	0	0	3	3	25	75		100	3
4	ESC-BT-208G	Bioprocess Engineering	3	0	0	3	3	25	75		100	3
5	BSC-BS 210 G	Biostatistics	3	1	0	4	4	25	75		100	3
6	HSMC-02G	Organizational Behaviour	3	0	0	3	3	25	75		100	3
7	LC-BT 212 G	Microbiology Lab.		0	3	3	1.5	25		25	50	3
8	LC-BT 214 G	Molecular Biology Lab.	0	0	3	3	1.5	25		25	50	3
9	LC-BT 216 G	Immunology Lab	0	0	3	3	1.5	25		25	50	3
						Total	23.5				750	

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION effective from 2019-20
Bachelor of Technology (Fashion and Apparel Engineering)
Third Semester

Sr No.	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Class work	Theory	Practical	Total	
1	BSC–MATH–201G	Applied Statistics and Operation Research	3	0	0	3	3	25	75		100	3
2	PCC–TT/TC/FAE–201G	Introduction to Textile Industrial Practices	3	0	0	3	3	25	75		100	3
3	PCC–TT/TC/FAE–202G	Textile Raw Materials	3	0	0	3	3	25	75		100	3
4	PCC-TC/FAE-203G	Yarn Formation	3	0	0	3	3	25	75		100	3
5	PCC-FAE-205G	Traditional Indian Textiles and Embroideries	3	0	0	3	3	25	75		100	3
6	PCC-FAE-206G	Apparel Production-I	3	0	0	3	3	25	75		100	3
7	LC-TT/TC/FAE-201G	Textile Industrial Survey	0	0	2	2	1	25		25	50	3
8	LC-TT/TC/FAE-202G	Fibre Microscopy & Identification	0	0	2	2	1	25		25	50	3
9	LC-TC/FAE-203G	Yarn Formation Lab	0	0	2	2	1	25		25	50	3
10	LC-FAE-204G	Traditional Indian Textiles and Embroideries Lab	0	0	2	2	1	25		25	50	3
11	*MC–105G	Indian Constitution	0	0	2	2	0	50				
						TOTAL CREDITS	**22**				**800**	

*MC 105G is a mandatory non credit course in which the student will be required passing marks in class work.

BSC–MATH–201G Applied Statistics & Operation Research

<table>
<tr><td>Course code</td><td colspan="5">BSC–MATH–201G</td></tr>
<tr><td>Category</td><td colspan="5">Basic Science Course</td></tr>
<tr><td>Course title</td><td colspan="5">Applied Statistics & Operation Research</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–III</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Technology, Textile Chemistry, Fashion & Apparel Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Mathematics and Statistics

Course Objectives:

- To develop statistical and probability based skills amongst the students
- To make the students learn basic tools of Operations Research used in solving managerial problems

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Basic Statistics:
Measures of Central tendency, Dispersion, moments, skewness and Kurtosis (definition, properties and associated numerical only); Correlation, Karl Pearson's coefficient of correlation, rank correlation, line's of regression and curve fitting (linear and parabolic)

UNIT II

Probability and Probability Distributions:
Concept of probability, additive and multiplicative laws of probability (Statements and associated numerical only);
Random variate: Mathematical expectation, theorems on expectation, discrete and continuous probability distributions (definition and problems only); Univariate Binomial, Poisson and Normal distributions (properties and applications)

UNIT III

Sampling & Testing of hypothesis
Population and sample, types of sampling, sampling distribution of means and proportions (definition only)
Definition of statistical hypothesis, null hypothesis, type I and type II errors and level of significance.
Tests of significance for large and small samples (discussion) problem based on χ^2 test for goodness of fit, t-test, F-test and Analysis of variance (one way and two way classifications)

UNIT IV

Operations Research
Linear programming problem (formulation and solution by graphical approach only); Transportation problem including time minimizing problems, Basic Assignment problem, sequencing problems (n jobs, 2 machines and n jobs, m machine problems);
Project scheduling by PERT/CPM: Definition of network, critical path, floats, finding of critical path and floats.

Reading List

Title	**Author**
Mathematical Statistics	Ray and Sharma
Business Statistics	Gupta & Gupta
Theory and problems of probability and Statistics	Murray P Spiegel
Operation Research	P.K. Gupta, Manmohan
Operations Research for Management	Gupta & Sharma
Higher Engineering Mathematics	B.S. Grewal

Course Outcomes:
After completion of the course, students will have the knowledge of:
- basic statistical parameters of measures of central tendency, dispersion, correlation, regression etc
- the concept of probability and probability distributions
- the concept of testing of hypothesis based upon sampling
- the concept of linear programming, transportation, assignment, sequencing problems as well as PERT/CPM

PCC–TT/TC/FAE–201G Introduction to Textile Industrial Practices

Course code	**PCC–TT/TC/FAE–201G**				
Category	Professional Core Course				
Course title	Introduction to Textile Industrial Practices				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- To familiarize the students with different sectors of textile industry
- To make students learn about processes involved in yarn and fabric formation
- Understanding sequence of fabric chemical processing and garment designing processes
- Calculations pertaining to yarn numbering systems

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Introduction to different sectors of textile industry (organized as well as unorgnanized) including sectors based on technology such as Handloom, Powerloom, Garment, Cotton, Silk, Wool, Jute and Synthetics etc., Global Scenerio of these sectors: Number of units, size etc
Idea of Research and technology support to Textile Industry by Government
Agencies; Strengths and weaknesses of Indian Textile Industry

UNIT-II

Brief outline of Ginning, Sequence of operations for conversion of natural and manmade fibers into yarn viz Opening and Cleaning, drawing, combing, roving and different spinning processes. Introduction to doubling and winding;
Introduction to passage of material through weaving preparatory and fabric formation processes viz, weaving, knitting and nonwoven by flow charts and their objectives. Calculations pertaining to yarn numbering systems

UNIT-III

Introduction to various textile chemical processes, General sequence used for chemical processing of textile materials viz fibre, yarn, fabric and garments. Brief outlines of various preparatory processes such as singeing, desizing, scouring, bleaching, mercerizing, etc., Overview of colouration processes viz dyeing and printing of textile materials, Introduction to different mechanical and chemical finishing processes. Basic idea of garment and knit processing processes.

UNIT-IV

Sequence of operations for converting fabric to garment, Importance of Design; Introduction to fashion and retailing of readymade garments, Branding, Awareness of treams and accessories, Different sectors of garment manufacturing units, export houses, buying houses. Brief idea of garment imports/exports of different countries

Title	**Author**
Cotton Spinning	K Ganesh & A R Garde
Cotton Yarn Weaving	RN Kanungi & AR Garde
Principles of Weaving	Marks & Robinson
Textiles Fibre to Fabric	Corbmann
Fundamental Principles of Textile Processing	V A Shenai
Technology of Clothing Manufacture	Carr & Latham

Course Outcomes:

At the end of the course, the students will:

- be familiar with all the processes of textile industry
- have the knowledge of global scenerio of different sectors of textile

PCC–TT/TC/FAE–202G Textile Raw Materials

Course code	**PCC–TT/TC/FAE–202G**				
Category	Professional Core Course				
Course title	Textile Raw Materials				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- To provide basic knowledge of terms used in textiles
- To familiarize the students with details of raw materials used in textile industry
- To make students learn about natural and man made fibre details

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

General definitions and important terminologies related to textiles; Classification of fibres; Essential and desirable properties of textile fibres and their role in final products; Advantages and disadvantages of natural and manmade fibres;
Cotton: Geographical distribution, structure and properties (physical and chemical); Different varieties including organic as well as Bt cotton and their properties; Applications.

UNIT-II

Bast and leaf fibres such as jute, hemp, sisal and ramie etc: Geographical distribution, extraction, properties and their uses.
Varieties of natural silk, rearing of silk worm, properties and uses of various types of silk; silk reeling, throwing and weighing.

UNIT-III

Varieties, sorting and grading of wool, chemical and physical properties of wool, processes involved in the removal of impurities from raw wool, numbering systems of woollen and worsted yarns. General principles of manufacturing of man made fibres.

UNIT-IV

Brief outline of the manufacturing processes of important man-made fibres, viz. rayons (Viscose andAcetate), polynosic, tencel, nylons, polyester, acrylics, polypropylene, polyolefins, polyacrylonitrile and some technical speciality fibres like spandex/lycra etc (only flow charts); their Important physical and chemical properties and applications.

Reading List

Title	**Author**
Handbook of Textile Fibres	J Gordon Cook
Textile Fibres	HVS Murthy
Manufactured Fibre Technology	V B Gupta & V K Kothari

Course Outcomes:

At the end of the course, the students will be:

- familiar with different types of natural and man made fibres
- having the knowledge of physical and chemical properties of natural and man made fibres
- able to explore the applications of different types of natural and man made fibres

PCC–TC/FAE–203G Yarn Formation

Course code	**PCC–TC/FAE–203G**				
Category	Professional Core Course				
Course title	Yarn Formation				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Chemistry, Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:

- To familiarize the students with objectives of initial stages of yarn formation viz. Ginning, Mixing and Blending, Blowroom and Card, Drawing-in, Combing and Roving
- To make the students understand basic mechanisms involved in different stages of yarn formation viz..Ring frame, Open-end spinning, DREF spinning, Air-Jet spinning
- To make the students learn about plying, twisting, sewing thread, Yarn quality, Yarn Numbering Systems, etc.
- To make students learn calculations related to various stages of yarn formation viz. Blowroom and Card, Draw frame, Roving, ring frame and yarn numbering

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Brief introduction of the subject; Objectives of ginning; Mixing and Blending: Objectives. Introduction to various preparatory processes involved in the production of yarn viz. opening and cleaning (blow room and card), drawing (draw frame), combing (comber) and rove formation (speed frame) with the objectives of each process.

UNIT II

Introduction to different processes involved in the production of yarn viz. conventional (ring spinning) and unconventional (rotor, air-jet and friction spinning etc) with the objectives of each. Properties and end uses of different types of yarns such as ring spun, rotor spun, friction spun and air-jet spun etc.

UNIT III

Objectives of plying and twisting of spun and filament yarns; Objectives and process description of reeling; Brief description of fancy yarns: ply cable yarn; core spun yarn, sewing threads, slub yarn, grindle, mélange yarns etc.

UNIT IV

Essential properties of a sewing thread. Concept of yarn quality and its importance, Yarn numbering systems and calculations pertaining to conversions,

Title	**Author**
Cotton Ginning, Textile Progress Vol.24 No.2 I	Doraiswamy, P Chellamani
Spun Yarn Technology, Vol I& II	A Venkatasubramani
Short Staple Spinning Volume-I, II, III & IV	W Klein
Spinning of Manmade & Blends on Cotton Systems	KR Salhotra
Technology of Carding	R Chattopadhyay
Manufactured Fibre Technology	V B Gupta & V K Kothari
Spun Yarn Technology	Eric Oxtoby

Course Outcomes

At the end of the course, the students will:

- have the knowledge of Ginning, Mixing and Blending, the initial processes of yarn formation;
- have learnt the principle and working of different machines of Yarn formation
- be familiar with the Ply yarn, Yarn Twist, sewing thread, Yarn Quality, Yarn Numbering System;
- be able to calculate various parameters like draft, production and efficiency related to different machines of yarn formation as well as conversion factors of different yarn numbering systems.

PCC–FAE–205G Traditional Indian Textiles and Embroideries

<table>
<tr><td>Course code</td><td colspan="5">PCC–FAE–205G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Traditional Indian Textiles and Embroideries</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–III</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branch</td><td colspan="5">Fashion and Apparel Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subjects of Physics and Mathematics

Course Objectives:
The course is designed to make the students understand the:

- concepts of Traditional Indian textiles and motifs/designs involved in producing such fabrics
- types of embroidery stitches, techniques and machines used in textile surface ornamentations
- various Indian traditional textiles and embroideries of different states with special reference to raw materials, embroidery threads, colours, stitch types, motifs and production processes
- traditional textiles and embroideries of the western and asian countries

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Introduction to the subject; Study of Indian traditional textiles such as woven textiles: Baluchar, Jamdani, Brocades, Ikat, Patola; Resist dyed textiles as Bandhani; Painted textiles as Kalamkari, Madhubani and Warli textiles; Printed textiles as block printed, bagroo and dabu.

UNIT II

Introduction to embroidery techniques; Types of embroidery techniques; Study of various types of basic embroidery stitches as stem stitch, chain stitch, herringbone stitch, cross stitch etc.; Textile surface ornamentation by beads, appliqué and ribbons; Functional changes and value addition due to embroidery.

UNIT III

Study of Indian traditional textiles and embroideries of different states with special reference to raw materials, embroidery threads, colours, stitch types, motifs and production processes used such as Chikankari, Phulkari, Chamba Rumal, Kasuti, Kanthas, Kasida, Sindhi, Kutch and Kathiawar

UNIT IV

Study of traditional textiles and embroideries of the western and asian countries as European textiles, Ikat textiles of Indonesia and Malaysia, Chinese textiles, American textiles and Japanese textiles. Advancements in embroidery techniques, embroidery machines with advanced features.

Reading List

Title	Author
Ethnic Embroidery of India", Honesty Publications	Usha Shrikant Vandana
Embroidery Basics", Barson's Educational Series Incorp,	Barnden Betty
Traditional India Textile, Thames & Hudson, 1998	Gillow
Complete Guide to Needle work	Readers Digest
The Dictionary of Needle work	Sophia Cauteild and Blanche
Embroidery	Arora's

Course Outcomes:

After completion of the course, students will be able to:

- understand the fundamentals of Indian traditional textiles
- understand the embroidery techniques, stitches, machine and production processes of traditional Indian textiles and embroideries
- comprehend the various Indian traditional textiles of different states
- understands the traditional textiles and embroideries of Asian and Western countries

PCC–FAE–206G Apparel Production–I

Course code	**PCC–FAE–206G**				
Category	Professional Core Course				
Course title	Apparel Production-I				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:

The course is designed for the students to learn:

- basic concepts of apparel production countries and present scenario;
- types of cutting, spreading devices and their functions;
- types of fabrics, marker planning and making;
- types of pattern and pattern lay out, etc.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Introduction to apparel industry, its components and unique features, Objectives of clothing, Fashion pipeline and significance, History of globalisation of textile and apparel industry industries including global textile trade battle, reasons of import, MFA, Getting around the quota, Off-shoring process. Introduction to fabric types -Border design, Diagonal design / Diagonal print, Diagonal weave, Irregular design, Knit, Large print, Light reflecting, coated, pile etc, Anthropometry: Introduction, Steps and techniques involved in surveying, Sizing system

UNIT II

Initial preparation of textile materials, Basics and requirements of marker planning, calculation; Influence of textile properties on marker-making, Techniques for marker-planning manual and computer aided marker-planning, Reproduction of the marker, Types of pattern –Drafted pattern, Draped pattern, Graded pattern, Commercial pattern, Production pattern etc, Tracing and marking Terminology - Chalked marking, chalked thread, color coding etc.

UNIT III

Spreading: principle and requirement of spreading process, manual spreading of textile: characteristics, process modes, disadvantages. Automatic spreading: spreading machine and parts, control, semi and fully automated, tubular knit spreader, automated fabric fault registration, spreading modes; Different Spreading tables and features, etc. Lest trends and automation in spreading process;

UNIT IV

Requirements of cutting, Manual cutting process : notches and cloth marking drills, Aids and devices for cutting- Band knife, clamp, click press, electrical cloth notcher, Straight knife cutter, Circular knife, portable rotary knife cutter, Band Knife, Automated cutting: Computer integrated, laser-cutting, plasma cutting, ultrasonic cutting system, fusing cut textile components, final work operation. Computer integrated spreading, marking and cutting devices. Manual marker-making, spreading and cutting of striped and check, piles, motifs, border fabrics

Reading List

Title	**Author**
Clothing Technology	Carr and Latham
Apparel Industry Magazine	World Clothing Manufacturer

Course Outcomes:

After completion of the course, students will have the knowledge of:

- different types of cutting devices and their working principles
- spreading mechanism and working of different spreading devicess
- marker planning, marker making, patterns and pattern lay outs

LC–TT/TC/FAE–201G Textile Industrial Survey

Course code	**LC–TT/TC/FAE–201G**				
Category	Professional Core Course				
Course title	Textile Industrial Survey				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- The course is designed to make students learn writing reports of survey/practical visits to textile industrial units

Contents:

Study and survey of textile industries spread over India as well as Global areas specifically in nearby places, through practical visits and internet facilities; Preparation of report of the survey and highlight salient features of specific sectors involved like spinning, weaving, knitting, process house, garment manufacturing, Label manufacturing, export and buying houses etc

Course Outcomes:

- At the end of this course the students will be able to survey and prepare the reports of any Industrial unit specifically in textile fields

LC–TT/TC/FAE–202G Fibre Microscopy & Identification

Course code	**LC–TT/TC/FAE–202G**				
Category	Professional Core Course				
Course title	Fibre Microscopy & Identification				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Textile Raw Materials **Course Objectives:**

The Lab course is designed to make students learn

- identification of textile fibres and filaments
- identify the burning behaviour, microscopical structure and chemical solubility of different textile fibres
- blend analysis

Contents

Principle of microscopy, Microscopic identification of fibres, preparation and mounting of specimen for longitudinal view, Cross-section cutting. Microtomy - cork method, metal plate method, Hardy's Microtome, Mountants and reagents for fibre microscopy; Identification of fibres through burning as well as solubility tests. Standard schemes of analysis of homogenous fibre blends by physical and chemical methods; Qualitative and quantitative determination of components; Preparation of reagents used for chemical analysis.

Reading List

Title	**Author**
Hand book of textile fibres	J Gordan Cook
Textile Fibres	HVS Murthy

Course Outcomes:

After completion of the course, students will have the knowledge of:

- the burning tests, microscopic tests and solubility tests for identification of the textile fibers
- cemistry involved in various practical tests
- various tests for analysis of blends of two or more fibres

LC–TC/FAE–203G Yarn Formation Lab

<table>
<tr><td>Course code</td><td colspan="5">LC–TC/FAE–203G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Yarn Formation</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–III</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Branch</td><td colspan="5">Fashion and Apparel Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Yarn formation

Course Objectives:

- This Lab course is designed to impart first-hand experience of handling different yarn formation machineries as a bridge between theory and practice.

Contents

Discussion and demonstration of the various machines and of manufacturing processes involved in converting fibres to yarn viz. mixing, blending, opening, cleaning, carding, drawing, combing, rove formation, spinning, doubling etc.; Introduction to unconventional spinning machines/processes; Rotor spinning, Air-jet spinning and Friction spinning etc.; Simple Calculations pertaining to these machines/processes

List of Experiments:

1. To study the objectives of Blow room, mixing and blending. Draw the flow of material through blowroom line and discuss the functions of each machine and its parts
2. To study the objectives of CARDING machine. Draw the flow of material through a card and label various parts. Also discuss the functions of each parts
3. To study the objectives of COMBING machine. Draw the flow of material through a combing and label various parts. Also discuss the functions of each parts
4. To study the objectives of DRAW FRAME. Draw the flow of material through a draw frame and label various parts. Also discuss the functions of each parts
5. To study the objectives of SPEED FRAME. Draw the flow of material through a SPEED frame and label various parts. Also discuss the functions of each parts

6. To study the objectives of RING FRAME. Draw the flow of material through a RING frame and label parts. Also discuss the functions of each part
7. To study the objectives of MODERN SPINNING MACHINES. Draw the flow of material through the various machines and label different parts. Also discuss the functions of each machines and its parts
8. To study the objectives of WINDING machine. Draw the flow of material through Winding machine and discuss the functions of each machine and its parts.
9. Draw the flow of material through Ring-doubler and discuss the functions of each machine and its parts.
10. To study the objectives of TFO. Draw the flow of material through TFO machine and discuss the functions of each parts

Course Outcomes:
At the end of this course the students will be able to:

- understand the blowroom line, mixing, blending and sequence of machines in the blowroom line;
- understand carding, draw frame, combing, speed frame, ring frame for processing different materials;
- understand winding, ring doubler, TFO, different types of Tensioners and Yarn clearers, packages, drums for processing different materials.

LC–FAE–204G Traditional Indian Textiles and Embroideries Lab

Course code	**LC–FAE–204G**				
Category	Professional Core Course				
Course title	Traditional Indian Textiles and Embroideries Lab				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basics of Physics, Chemistry, Math, Textile Raw material, Yarn formation and Traditional Indian Textiles and Embroideries (Theory)

Course Objectives:

- This Lab course is designed to impart first-hand experience of making Traditional Indian Textiles and embroideries. It also helps students practically understand the various stitches and embroidery techniques, traditional block prints, etc.

Contents:

Introduction to traditional textiles and embroidery work; Requirements of embroidery work; Tools and aids for traditional textiles and embroidery work. Sample preparation of different basic embroidery stitches such as stem stitch, chain stitch, herringbone stitch, cross stitch, open chain stitch, satin stitch, blanket stitch, button hole stitch etc. Preparation of atleast one end- article using basic embroidery stitches. Sample preparation of embroidereies of different states as mentioned with respective references to material, colour, thread, stitches and motifs: Chikankari, Phulkari, Kantha, Kashida, Kasuti, Sindh, Kutch, Chamba Rumal, Patch work, Appliqué. Learning the production techniques of traditional textiles as block printing, tie-dye, painted etc; Learning the machine embroidery techniques with the sample development.

List of Experiments

1. Study of Tools and aids for Traditional Textiles and embroidery work
2. Learning the production techniques of traditional textiles as block printing, tie-dye, painted etc.
3. Practice of different basic embroidery stitches

4. Preparation of atleast one end- article using basic embroidery stitches.

5. Sample preparation of embroidereies of different states as mentioned with respective references to material, colour, thread, stitches and motifs

6. Learning the machine embroidery techniques with the sample development.

- Learn traditional textiles of India practically
- Have practical exposure about embroidery stitches and techniques
- Learn the embroideries of different states of India

CONSTITUTION OF INDIA

Class Work : 50

Course Code	MC-105G		
Category	**Mandatory Course**		
Course title	**Constitution of India** (Theory)		
Scheme	L	T	P
	0	0	2

CONSTITUTION OF INDIA– BASIC FEATURES AND FUNDAMENTAL PRINCIPLES

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950.

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

COURSE CONTENTS

1. Meaning of the constitution law and constitutionalism.
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of the Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of the Fundamental Duties and its legal status.
6. The Directive Principles of State Policy – Its importance and implementation.
7. Federal structure and distribution of legislative and financial powers between the Union and the States.
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

REFERENCES:

1. The Constitutional Law Of India 9th Edition, by Pandey. J. N.
2. The Constitution of India by P.M.Bakshi
3. Constitution Law of India by Narender Kumar
4. Bare Act by P. M. Bakshi

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION effective from 2019-20
Bachelor of Technology (Fashion and Apparel Engineering)
Fourth Semester

Sr No.	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Class work	Theory	Practical	Total	
1	HSMC–EIE–201G	Entrepreneurial and Industrial Engineering	3	0	0	3	3	25	75		100	3
2	ESC–TT/TC/FAE–201G	Computer Aided Textile Designing	3	0	0	3	3	25	75		100	3
3	PCC–TC/FAE–204 G	Fabric Formation	3	0	0	3	3	25	75		100	3
4	PCC–FAE–207 G	Apparel Merchandising	3	0	0	3	3	25	75		100	3
5	PCC–FAE–208 G	Colour and Design Concepts	3	0	0	3	3	25	75		100	3
6	PCC–FAE–209 G	Apparel Production-II	3	0	0	3	3	25	75		100	3
7	ESC–TT/TC/ FAE –202G	Computer Aided Textile Designing Lab	0	0	2	2	1	25		25	50	3
8	LC–TC/FAE–204G	Fabric Formation Lab	0	0	2	2	1	25		25	50	3
9	LC–FAE–205G	Colour and Design Lab	0	0	2	2	1	25		25	50	3
10	LC–FAE–206G	Garment Manufacturing Lab	0	0	2	2	1	25		25	50	3
11	*MC–108G	Essence of Indian Knowledge Tradition	0	0	2	2	0	50				
	TOTAL CREDITS						**22**				**800**	

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

*MC- 108G is a mandatory non credit course in which the student will be required passing marks in class work.

HSMC–EIE–201G Entrepreneurial and Industrial Engineeering

<table>
<tr><td>Course code</td><td colspan="5">HSMC–EIE–201G</td></tr>
<tr><td>Category</td><td colspan="5">Humanities and Social science including Management courses</td></tr>
<tr><td>Course title</td><td colspan="5">Entrepreneurial and Industrial Engineeering</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–IV</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Technology, Textile Chemistry, Fashion & Apparel Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic concepts of Social Sciences

Course Objectives:

The course is designed to make the students understand the:

- concepts of Entrepreneurship and Entrepreneurial Skills;
- ways of preparation of project reports, their components and feasibility studies
- principles of management;
- concepts of Industrial Engineering.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Entrepreneurship: Meaning and concept, role of entrepreneurship in economic development & new economic reforms, Entrepreneurial Skills, decision process, Facors influencing entrepreneurship; Business Opportunity Identification; Preparing a Business Plan and projet reports, Significance, components and feasibility studies of business plans/project reports, Importance of new venture financing, sources of financing

UNIT II

Industrial Parks (Meaning, features with examples); Special Economic Zone (Meaning, features with examples); Financial institutions and agencies, MSME, Small Scale Industries, Introduction to SIDBI, IDBI, IFCI and various Governement agencies like NABARD etc, Carry on Business (COB) licence, Environmental Clearance, Introduction to various industrial hazards like fire, mechanical and electrical etc, Introduction to safety rules for prevention of accidents, National Small Industries Corporation Rules and regulations for exemption from income tax, excise clearance etc., Claiming of draw back in export business.

UNIT III

Productivity – importance, concepts and measurements, Work study, Method study, micro - motion study, Production planning and control- Importance of planning - job, batch and mass production-Introduction and need for a new product, Functions of production control at macro and micro levels - Routing , Scheduling, dispatching and follow up etc. Ergonomics and its importance

UNIT IV

Introduction to Industrial Engineering - Evolution of modern Concepts in Industrial Engineering - Functions of Industrial Engineering, application of Industrial Engineering. Facility location factors and evaluation of alternate locations, Types of plant layout and their evaluation, Assembly line balancing, Materials handling systems, Inventory Control, inventory control techniques. Job evaluation, merit rating, incentive schemes, and wage administration, Quality control and Inspection.

Reading List

Title	Author
Project Feasibility Analysis	Cliffon, Davis S & Fyfie, David E
Environment & Entrepreneur	A N Desai
Environment & Entrepreneur	P F Drucker
Planning a Small Scale Industry: A Guide to Entrepreneurs	R Jain
Developing Entrepreneurship-A Handbook Learning System	Pareek, Udai and Venkateswara Rao
Motion and Time study	Ralph M Barnes
Engineered work Measurement	Weldon, ELBS, Marvin E Mundel
Work Study and Ergonomics	S Dalela and Sourabh
Introduction to Work Study	ILO
Work Study	Ralph & Barnes

Course Outcomes

At the end of the Course, the students will be able to:

- Take the right decisions to optimize resources utilization by improving productivity of the Materials, Machines, Money, Methods, Manpower and Management effectively;
- find alternative best productive methodsreducing time, improving human efficiency and minimising waste;
- understand the functions and applications of Industrial Engineering.

ESC–TT/TC/FAE–201G Computer Aided Textile Designing

Course code	**ESC–TT/TC/FAE–201G**				
Category	Professional Core Course				
Course title	Computer Aided Textile Designing				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry, Mathematics and Computer

Course Objectives:

- To introduce computer softwares and hardwares related to textile designing;
- To make students learn basic tools and designing techniques used in textile and Apparel sectors;
- To make students understand applications of CAD for colour and weave designs.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Fundamentals of CAD: Definition, History, Hardware and Software requirements of CAD, Design Process, Application areas of computer aided design and manufacturing in textile and apparel industry, Introduction to Computer Graphics, Raster and Vector Graphics features.

UNIT II

Hardware in CAD: Introduction, Design workstation, Graphics terminal, input and output devices, central processing unit and secondary storage. Arrangement of figures - unit-repeating design, the drop device, drops reverse designs, system of distribution with reference to diamond base, ogee base, and rectangular base lines. Construction of designs from incomplete repeat, classification of borders patterns, all over patterns and types

UNIT III

Selection tools in adobe Photoshop: selection by shape, colour and mask, Colour specification tools, Image adjustment modes, layer blending modes and their options. Different brush tools and their dynamics options, Colour fill: Paint and gradiant, Clone tool, colour modification via dodge, burn, colour replacement, mixer etc. Layer masking, Texture mapping, Filter applications for fancy effects, layer functions, working with displacement maps, texture maps. Basic vector shape drawing tools, shape editing via anchor points etc.

UNIT IV

Introduction to Corel Draw Interface Tool Box, Working with shape drawing tools for lines, rectangles, squares, circles, ellipses, polygons, starts and spirals etc. Object transformations as rotation, scaling etc. freely and for specific dimensions, Selecting Objects, reshaping, duplicating, grouping, trimming, locking and unlocking, aligning objects. Introduction to curves, nodes and segments; Drawing freehand tools; Drawing and selecting closed curves and nodes, adding, removing and joining nodes. Bezier tool, drawing curve and straight line with bezier tools, Colour fill and options

Reading List

Title	**Author**
Computer Aided Design & Manufacturing	Mikcle P Groover, Emory W.Zimmers Jr
Computer Graphics Principles & Practices	James D Foley, Andeies Van Da Shvan K Feiner. John F Hughes
Computer Graphics	Donald Mearn & M Pauline, Baker
"Watsons Textile Design and Colour"	Grosiciki, Newnes Buttersworth, 1988

Course Outcomes:

After completion of the course students will:

- be familiar with computer fundamentals for Computer Aided Designing
- have the knowledge of computer softwares and basic tools for textile designing
- know the elements and principles of design and their applications in textile designing through CAD

PCC–TC/FAE–204G Fabric Formation

Course code	**PCC–TC/FAE–204G**				
Category	Professional Core Course				
Course title	Fabric Formation				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Chemistry, Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:
The course is designed to make students learn:

- the basic concepts of fabric forming processes
- various manufacturing systems of woven fabrics
- processes involved during manufacturing of woven fabrics , their defects and remedial measures

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Introduction to Clothing Science, Factors involved in the study of clothing; General functional description of clothing; Classification of various types of Cloths, Fabrics according to end uses, manufacturing processes, raw material, etc. Introduction to various fabric manufacturing methods, conversion of yarn into fabric with flow charts, Introduction of warp and weft preparatory processes. Winding: Objectives, types of packages, Flow of material on a winding machine, Brief idea about different devices in a winding machine. Warping: Objectives of warping, Direct and sectional warping

UNIT II

Sizing: Objectives of sizing. Various sizing ingredients; Drawing-In: Objectives and flow of material in these operations. Pirn winding, Shuttle Looms: Definition of handloom, plain loom, and automatic loom. , General passage of material through loom, description of important parts of a loom, basic loom mechanisms; primary, secondary and auxiliary motions.

UNIT III

Brief introduction and overview to Shuttleless looms; their advantages over shuttle looms. Terms used for all woven fabrics, Ways to Distinguish Warp & Filling Yarns, Fabric properties-dimensional/structural, mechanical properties related to performance and durability, aesthetic properties. Functional and comfort related fabric properties Fabric quality attributes, Influence of fibres, yarn characteristics and fabric construction parameter on fabric properties. .

UNIT IV

Fabric defects; classification, reasons, point rate system for cloth grading, drawbacks of point system, fabric inspection. Introduction about followings; Knitted fabrics, narrow fabrics, briefing about dobby and jacquard, some standard fabrics, introduction to non woven fabrics, Fabrics from yarns; braids, nets, laces, Composite Fabrics; coated fabrics, laminated fabrics, bonded fabrics and tufted fabrics.

.

Reading List

Title	**Author**
Principles of Weaving	Marks & Robinson
Cotton Yarn weaving	ATIRA
Textile Science	Cobmann
NCUTE's Manual	
Weaving: Conversion of Yarn to Fabric	P R Lord and M H Mohamed

Course Outcomes:

After completion of the course, students will:

- have the knowledge of essential requirements for fabric forming processes
- be familiar with different techniques of fabric production systems
- have the knowledge of raw materials used, size ingredients for producing woven fabrics;
- be familiar with the fabric defects, remedial measures, and other types of fabrics

PCC–FAE–207G Apparel Merchandising

Course code	**PCC–FAE–207G**				
Category	Professional Core Course				
Course title	Apparel Merchandising				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Yarn Manufacture–I

Course Objectives:

- To familiarize the students about the organizational structure of apparel industry, Apparel merchandising, Fashion forecasting, etc.
- To make the students understand basic concept of retailing and wholesaling, pricing strategies, pricing components etc.
- Understand Product line planning, steps involved in product line planning, etc.
- Understand budgeting, dollar and unit planning, economic order quantity, etc.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Overview of apparel Industry; Organizational structure of apparel Industry; Job responsibilities of various constituencies, Interactive relations between various apparel departments; Uniqueness of apparel business, Apparel merchandising: Concept and definition. Various business interactions in the apparel supply chain. Different components and activities of merchandising–line planning, line development and line presentation. Fashion forecasting and its importance; Factors influencing fashion movement, Job responsibilities of a merchandiser in an apparel industry, Essential qualifications of a merchandiser, Merits and demerits of merchandising career.

UNIT II

Concept of retailing and wholesaling; Classification of retailers and wholesalers; Decision making in retailing; Pricing considerations and pricing strategies; Factors affecting pricing strategies; Setting up and changing of retail pricing; Pricing terminology; Pricing components and pricing strategies adopted by apparel organizations; Methods of disposition of unsold apparel merchandise.

UNIT III

Product line planning; Importance of line planning; Different steps involved in product line planning; Different approaches of merchandise planning: Traditional and contemporary line planning. Relative merits and demerits of different line planning approach; Concept of assortment planning; Product line development: concept, stages and types; Product Line presentation and its importance at different levels of supply chain; Visual merchandising-concept, significance and components.

UNIT IV

Budgeting – Concept and definition; Importance of budgeting process; Classification of budgets; Various steps and aspects involved in budgeting process; Dollar and unit planning & control systems; Inventory value planning; Integrated dollar and unit planning; Concept and calculations of reorder point and economic order quantity at apparel retail level.

Reading List

Title	Author
Apparel Merchandising	Martin Kunj
Fashion Merchandising and Marketing	Cynthia R. Easterling and Marian H.Jernigan
Fashion: From Concept to Consumer	Gini Stephens Fring

Course Outcomes

At the end of the course, the students will:

- have the detailed knowledge including the function of Merchandiser;
- have learnt the basic concept of retailing and wholesaling, pricing strategies, pricing components etc.
- Understand Product line planning, Visual merchandising
- be able to know the budgeting, dollar and unit planning

PCC–FAE–208G Colour and Design Concepts

Course code	**PCC–FAE–208G**				
Category	Professional Core Course				
Course title	Colour and Design Concepts				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:

The course is designed to make the students aware of:

- basic concepts of Colour and specifications of colour, colour theories, colour wheels
- colour contrasts, elements of design
- composition of designs, symmetry of designs
- patterns, border designs

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Colour – Concept and specifications of colour, Light and colour phenomenon, Colour theories as light theory, pigment and Brewster colour theory. Introduction to Colour quantification systems as Munsell, Ostwald, Natural, CIE. Modification of colours as formation of tint, shades and coloured grays etc. Colour intensity charts, Psychological effects of colour as warm and cool colours, Concept of colour harmony, its type and different effects

UNIT II

Colour combination techniques: monochromatic, complementary etc. and their effects in garment designing, Colour contrast in garments as low, medium and high , Colour contrast and types, Application of colour combination and harmony in designing of clothing/fabric. Colour forecasting,

UNIT III

Design process, craftsmanship in designing; Elements and principle of design and applications in garment designing, Types oif design elements and efferct in apparel designing, Introduction to types of motifs: Geometrical and conventional, Symmetry – principle, concepts perspectives and its application, Placement of motifs, horizontal, vertical and glide directions

UNIT IV

Simple Weave and colour effects, Compound colour and weave effects – stripe colour and weave effect, Check colour and weave effect, Special colour and weave effect, figured colour and weave effect. Classification of border patterns: types and details of all over patterns. Border types and styles in traditional Indian textiles

Reading List

Title	**Author**
Watson's Textile Design and colour	Grosciki
Colour mixing Bible	Watson – Guptill Publication
Colour: right from the start	Watson – Guptill Publication

Course Outcomes:

After completion of the course, students will be able to:

- understand the basic concepts of knitting and its types
- identify and understand the role of different knitting elements
- comprehend the major knitted fabric structures, their properties and production
- understand the geometry of knitted structure and its relevance

PCC–FAE–209G Apparel Production-II

Course code	**PCC–FAE–209G**				
Category	Professional Core Course				
Course title	Apparel Production-II				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:
The course is designed to make the students understand:

- basic concepts of post cutting operations, stitch forming mechanisms
- different types of sewing needles, sewing threads
- different types of seams and stitches

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

An overview of post cutting room operations – ticketing, bundling, material handling from cutting room to sewing room; General introduction of sewing room operations; An overview of history, evolution and modernization in sewing machineries. Description of components & functions of SNLS Sewing machine, Stitch formation mechanism, Drop feed mechanism of SNLS. Relative merits & demerits of SNLS machine and associated feed mechanism.

UNIT II

Factors affecting sewing performance, selection criteria for sewing machine needle & sewing threads; Needles – Types of needles for Textile and Non textile materials, Hand and Sewing machine needles, Metallurgy and Shapes of Needles, Needle cutting Index, Mechanical damage to fabric by needle heating & remedial measures. Sewing Threads – Influence of sewing thread selection & properties on seam performance & garment serviceability; Fibre types, twist direction & plying, thread composition & construction – staple, continuous, core-spun, air-entangled, texturised. Thread packages – classification based on thread constructions, machine types & end usages Metric & cotton ticket numbering system, sewing thread cost evaluation. Sewing Problems- Problems related to stitch formation- missed stitches, skipped stitches, and variable stitch density. Damage to fabric along the stitch line, Seam pucker due to sewing thread, fabric properties inaccurate pattern cutting.

UNIT III

Seam Classifications- Notations, distinguishing factors and applications, Terminologies – Seam Allowance, Seam Let out, Extended Seam Allowances, Exposed and enclosed seams, Inside and Outside Curved Seams, Stitched and Fused Seams, Stitched and Glued Seams. Seam Finishes – Definition and Requirement, Types of Seam Finishes – Book Seam Finish, Net Bound Seam Finish, Single ply bound seam finish, Double stitched seam finish, Glued seam finish, pinked seam finish.

UNIT IV

Stitch types & classifications- designation, appearance & application areas; Distinction between hand & machine stitches – appearance, method of construction & end usage. Overview of different hand stitches like – Back stitch, half back stitch, Modified back stitch, Blanket stitch, Blind stitch, Button hole stitch. Overview of different machine stitches like Machine stitches - Lettuce edging, Zigzag stitch, Over edge stitch, Purl edging, Picot edging, Safety Stitch, Scallop over edge, Shirring stitch, Elasticised shirring.

Reading List

Title	**Author**
Clothing Technology	Carr and Latham
Apparel manufacturing handbook	Jacob Solinger

Course Outcomes:

After completion of the course, students will:

- have the knowledge of sewing machines, sewing needles and sewing threads
- be able to identify seams and stitches and their appearance, applications and properties,

ESC–TT/TC/FAE –202 G Computer Aided Textile Designing Lab

Course code	**ESC–TT/TC/FAE–202 G**				
Category	Engineering Science Course				
Course title	Computer Aided Textile Designing				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry, Mathematics and Computer

Course Objectives:

- This Lab course is designed to impart first-hand experience of handling CAD softwares for Textile Designing thus serving as a bridge between theory and practice.

Contents:

Warp and Weft Colour Pattern designing using Elements of design and Principles of designs, like line, dot, print etc.; Types of lines and their application in designing; Types of dots as polka dot, etc. General idea about weave and colour effect; Composition of designs–by Geometric ornamentation by the conventional treatment of natural and artificial forms and by the adoption and reproduction of earlier designs; Geometric ornamentation, construction of symmetrical figures, Reversing inclined figures; Practical Application of Elements of Design and Principles of design using CAD.

Weave designing using Arrangement of figures- unit-repeating design, the drop device, drops reverse designs, sateen system of distribution (with reference to half drop, diamond base, ogee base, rectangular base lines). Construction of designs from incomplete repeat; Border designing: Study of pattern–historical precedents. Symmetry–principle concepts, perspectives and its application, classification of motifs, border patterns, all over patterns; CAD practical application in Weave designs, arrangement of figures, Border designing and Motif and repeat making.

List of Experiments:

1. To study different selection option tools in Adobe Photoshope
2. To study imge adjustment modes and tools in graphic designing software
3. To study different image transformation tools

4. To create motif vector by print designing

5. To crete shade cards of above designed print

6. To create textile patterns for designed prints

7. To study different colour modification tools

8. To drape designed fabric patterns on apparels and fashion accessories

9. To design fashion show ramp using previously designed apparels and accessories

10. To design technical and graphical parameters of yarn

11. To develop fabric using above designed yarn as per the desired weave parameters

Course Outcomes:
The students will be able to practically handle:

- elements and principles design using CAD systems;
- arrangement of figures and motifs using various methods
- geometrical ornamentation
- placement of patterns in symmetric and asymmetric way;
- creation of Border designs.

LC–TC/FAE–204G Fabric Formation Lab

Course code	**LC–TC/FAE–204G**				
Category	Professional Core Course				
Course title	Fabric Formation Lab				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Chemistry, Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:

- This Lab course is designed to impart first-hand experience of fabric formation techniques, demonstration of working principles of winding, warping, drawing-in and weaving thus serving as a bridge between theory and practice.

Contents

Basic principles of woven fabric analysis: estimation of data for cloth reproduction, Identification of yarns and materials used in their construction. Weave analysis, Sett, Cover factor, Count and weight calculations for simple and compound woven structures, Specifications of standard woven fabric.

Discussion and Demonstration of various machines and of manufacturing processes involved in converting yarns to fabric winding, warping, sizing, Drawing-in, weaving by Hand looms, Plain Looms; Automatic Shuttle Looms, Shuttleless Looms and Knitting, Passage of material through them and brief study of their essential components and mechanisms; Simple production and efficiency calculations pertaining to these processes.

List of Experiments:

- Study of Winding Process
- Study of Warping Process
- Study of Slasher Sizing
- Study of Drawing-in Process
- Study of Pirn Winding Process
- Introduction to Shuttle Loom
- Study of Conventional Shedding Mechanisms
- Study of Shuttle Picking Mechanisms

- Study of Crank Beat-up Mechanism in Shuttle loom
- Analyse different types of weave designs
- Analyse different constructional parameters of woven fabrics like yarn linear density, end and picks per unit length, fabric cover, fabric areal density

Course Outcomes:

After completion of the course, students will be able to:

- correlate between theory and practice of the concept of weaving preparatory methods
- visualise the layout and structure of weaving preparatory machines along with their primary components
- visualise the mechanisms of primary motions of shuttle weaving machines and comprehend their settings
- develop practical skills relevant to industrial practices.
- recognise different types of weave designs
- analyse different constructional parameters of woven fabrics like yarn linear density, end and picks per unit length, fabric cover, fabric areal density

LC–FAE–205G Colour and Design Lab

Course code	**LC–FAE–205G**				
Category	Professional Core Course				
Course title	Colour and Design Lab				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:

- This Lab course is designed to impart first-hand experience of colour illusions, warm and colour effects, floral, geometrical designs, colour and weave effects. It also helps students practically understand in-depth working of placement of figures and motifs

Contents:

Specification of color with hue, value and chroma; color combinations according to pigment theory of colour.Arrangement of the primary, secondary and intermediate colours in the Brewster's theory. Colour illusions, warm and cool colour effects, Modification of pigment colour with formation of tint, shades and coloured graysetc, Colour and gray intensity charts; Types of lines, dots and curves and their effects; Designing of floral, geometrical, abstract and border designs; Enlargement and reduction of designs; Simple Weave and colour effects. Compound colour and weave effects – stripe colour and weave effect, Check colour and weave effect, Special colour and weave effect, figured colour and weave effect. Placement of figures and motifs – half drop, double ½ drop, diamond base, ogee base, rectangular, horizontal, vertical,

List of Experiments:

1. **Specification and modification of pigment colour**
    - To understand specifiction of colour
    - To develop tins and shades of colour
    - To develop varying values of chroma
    - Mixing of different coloured tones

2. **Development of gray and coloured intensity charts.**
    - Developemt of gray intensity chart
    - Development of colour pallete including varying values

3. **To study effect of colour illusion**
    - Colour filling with warm and cool colours to create illusion

4. **Motif designing following different colour combination schemes**
    - To design motif using monochromatic colour scheme
    - To design motif using complementry (split, double split, triadic) colour scheme
    - To design motof using natural colour system

5. **To study geometrical ornamrntation of figures**
    - Placement of repeats according to bi / tri and tetra symmetry

6. **To study placement of figures and motifs on different bases**
    - Arrangeement of figures on diamond ,ogee, satin and rectangular base

7. **To study colour design effects through weaving**
    - Simple Weave and colour effects.
    - Compound colour and weave effects
    - Special colour and weave effect
    - Figured colour and weave effect.

Course Outcomes:

The students will be able to practically handle:

- elements and Principles design using CAD systems;
- arrangement of figures and motifs in various methods
- geometrical ornamentation
- placement of Patterns in symmetry and asymmetry way;
- creation of Border designing.

LC–FAE–206G Garment Manufacturing Lab

<table>
<tr><td>Course code</td><td colspan="5">LC–FAE–206G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Garment Manufacturing Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–IV</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Branch</td><td colspan="5">Fashion and Apparel Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:

- This Lab course is designed to impart first-hand experience of the recognition of different aids, tools and equipment for cutting, sewing techniques, practice of using sewing needles, sewing threads and embroidery threads. This skill will help the students for production and planning of garments as well as utility of trims and accessories.

Contents:

Introduction to different aids, tools and equipments for cutting and their applications as well; Preparation of different types of pattern and pattern layout; Selection for different types of needle according to stitching components;

Selection procedure for different types of sewing and embroidery threads; Utility of different Aids and tools for Garment Construction, Basting Operation; Study of sewing machineries, Different tools and Work aids, Application of different trims and components. Study of Fusing and pressing machine procedure

List of Experiments:

1. To recognise the different aids, tools and equipment for cutting and sewing
2. To prepare different patterns and practice of pattern lay outs
3. To select different types of sewing needles and sewing threads for stitching purposes
4. To practice utility of different aids and tools for garment construction
5. To practice on Basting operations
6. To study of different sewing machines

7. To study on application of trims and accessories

8. To study of fusing and pressing machine

Course Outcomes:
After completion of the course, students will be able to:

- recognise different types of tools, aids and equipment
- prepare different patterns and practice of pattern lay outs
- develop practical skills relevant to garment construction, etc.

MC–108G Essence of Indian Knowledge Tradition

Course code	**MC-108G**
Category	Mandatory Course
Course title	Essence of Indian Knowledge Tradition
Scheme and Credits	L: 0, T: 0, P: 2, Credits: 0 — Semester–IV
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering
Class work	50 Marks
Exam	00 Marks
Total	50 Marks
Duration of Exam	00 Hours

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

The course is designed to impart the following:

Course objective

The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technologicaladvancements and societal disruptions. Part-I focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

Course Contents

- Basic structure of Indian Knowledge System: अष्टादशविद्या ४वेद,४उपवेद (आयुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थापत्य आदि) ६वेदांग (शिक्षा, कल्प, निरुक्त, व्याकरण, ज्योतिष, छंद) ४ उपाङ्ग (धर्मशास्त्र, मीमांसा, पुराण, तर्कशास्त्र)
- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case studies

MAHARSHI DAYANAND UNIVERSITY, ROHTAK
B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)
IIIrd semester w.e.f 2019-20

S. No.	Course Code	Course Title	Teaching Schedule			Marks of Class Work	Examination Marks		Total Marks	Credits	Duration of Examination (in hours)
			L	T	P		Theory	Practical			
1.	PCC-EE-201G	Electric Circuit Analysis	3	1	0	25	75	0	100	4	3
2.	LC- EE-203G	Electric Circuit Analysis Laboratory	0	0	2	25	0	25	50	1	3
3.	PCC-EE-205G	Analog Electronics	3	0	0	25	75	0	100	3	3
4.	LC- EE-207G	Analog Electronics Laboratory	\ 0	0	2	25	0	25	50	1	3
5.	PCC-EE-209G	Electrical Machines-I	3	1	0	25	75	0	100	4	3
6.	LC- EE-211G	Electrical Machines-I Laboratory	0	0	2	25	0	25	50	1	3
7.	PCC-EE-210G	Power Electronics	3	0	0	25	75	0	100	3	3
8.	LC- EE-212G	Power Electronics Laboratory	0	0	2	25	0	25	50	1	3
9.	ESC-202-G	Engineering Mechanics	3	1	0	25	75	0	100	4	3
10.	*MC-106-G	Environmental Science	3	0	1	25	75	0	-	0	3
Total									700	22	

***MC-106G** is a mandatory non –credit course in which the students will be required passing marks in theory.

Electric Circuit Analysis

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-201G**		
Category	**Engineering Science Course**		
Course title	**Electric Circuit Analysis**		
Scheme	**L**	**T**	**P**
	3	**1**	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Outcomes:
At the end of this course, students will demonstrate the ability to;

- Apply network theorems for the analysis of electrical circuits.
- Obtain the transient and steady-state response of electrical circuits.
- Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
- Analyze two port circuit behavior.

SECTION-A

Network Theorems (AC Circuit)

Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem. Analysis with dependent current and voltage sources. Node and Mesh Analysis. Concept of duality and dual networks.

SECTION-B

Solution of First and Second order networks (AC and DC circuits)

Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response.

SECTION-C

Sinusoidal steady state analysis

Hurwitz polynomials, positive real functions. Properties of real immittance functions, Synthesis of LC driving point immittances, Synthesis of RC driving point impedances, Synthesis of RC impedances or RL admittances, properties of RL impedances and RC admittances. Three-phase circuits. Mutual coupled circuits, Dot Convention in coupled circuits.

SECTION-D

Electrical Circuit Analysis Using Laplace Transforms

Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions. Transfer function representation. Poles and Zeros.

Two Port Network and Network Functions

Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks. Synthesis of Y21 and Z21 with R ohm terminations Network Tropology and Graph Theory.

Text / Reference Books:

1. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.
2. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.
3. W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, 2013.
4. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.
5. K. V. V. Murthy and M. S. Kamath, “Basic Circuit Analysis”, Jaico Publishers, 1999.

Electric Circuit Analysis Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**LC-EE-203G**		
Category	**Engineering Science Course**		
Course title	**Electric Circuit Analysis** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.
(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus
(iii) Group of students for practical should be 15 to 20 in number.

LIST OF EXPERIMENTS:

1. Introduction of circuit creation & simulation software like MATLAB etc.
2. Study of Transient response of RC, RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To calculate and verify "Z" & "Y" parameters and "ABCD" parameters of a two port network.
5. To determine equivalent parameter of parallel-series, cascading and parallel connections of two port network.
6. To calculate and verify Compensation theorem and Tellegen's theorem.
7. To synthesize a network of a given network function and verify its response.
8. To calculate and verify Maximum power transfer and Reciprocity theorem.

Note: Use appropriate Software or simulation tool for experiments.

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

Analog Electronics

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-205G**		
Category	**Engineering Science Course**		
Course title	Analog Electronics (Theory)		
Scheme	**L**	**T**	**P**
	3	-	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the characteristics of transistors.
- Design and analyse various rectifier and amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- Understand the functioning of OP-AMP and design OP-AMP based circuits.

Section-A

P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits. Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits

Section-B

MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency equivalent circuit.

Section-C

Operational Amplifier: Inverting and non-inverting configurations, difference amplifier, Effect of finite open loop gain and bandwidth on circuit performance, Large signal operation of op-amp. Differential Amplifier: MOS differential pair, small signal operation of the MOS differential pair, BJT differential pair, other non-ideal characteristic of the Differential amplifier (DA), DA with active load

Feedback: The general feed back structure, properties of negative feed back, the four basic feed back topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier.

Section-D

Linear applications of op-amp: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion.
Nonlinear applications of op-amp: Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector. Monoshot.

Text/References Book:

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
5. P.R. Gray, R.G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.

Analog Electronics Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**LC-EE-207G**		
Category	**Engineering Science Course**		
Course title	**Analog Electronics** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

(iii) Gruoup of students for practical should be 15 to 20 in number.

List of Experiments

1.To Study the following devices: (a) Analog & digital multimeters (b) Function/ Signal generators (c) Regulated d. c. power supplies (constant voltage and constant current operations) (d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.

2.To Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.

3.To Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.

4. To Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.

5.To Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of Idss & Vp

6.To Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.

7.To Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.

8.To Study half wave rectifier and effect of filters on wave. Also calculate theoretical & practical ripple factor.
10.To Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple Factor.
11. To plot the characteristics of MOSFET.
12. To determine the following parameters of OP-AMP.a) Input Bias Current. b) Input Offset Current.
c) Input Offset Voltage. d) CMRR

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

Electrical Machine-I

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-209G**		
Category	**Engineering Science Course**		
Course title	**Electrical Machine- I** (Theory)		
Scheme	**L**	**T**	**P**
	3	1	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concepts of magnetic circuits.
- Understand the operation of dc machines.
- Analyse the differences in operation of different dc machine configurations.
- Analyse single phase and three phase transformers circuits.

Section A

Magnetic fields and magnetic circuits

Review of magnetic circuits - MMF, flux, reluctance, inductance; review of Ampere Law and Biot Savart Law; Visualization of magnetic fields produced by a bar magnet and a current carrying coil - through air and through a combination of iron and air; influence of highly permeable materials on the magnetic flux lines.

Electromagnetic force and torque

B-H curve of magnetic materials; flux-linkage vs current characteristic of magnetic circuits; linear and nonlinear magnetic circuits; energy stored in the magnetic circuit; force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element. Examples - galvanometer coil, relay contact, lifting magnet, rotating element with eccentricity or saliency

Section B

DC machines

Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation - Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

Section C

DC machine - motoring and generation

Armature circuit equation for motoring and generation, Types of field excitations - separately excited, shunt and series. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed.V-I characteristics and torque-speed characteristics of separately excited, shunt and series motors. Speed control through armature voltage. Losses, load testing and back-to-back testing of DC machines

Section D

Transformers

Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers, Autotransformers - construction, principle, applications and comparison with two winding transformer, Magnetizing current, effect of nonlinear B-H curve of magnetic core material, harmonics in magnetization current, Phase conversion - Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers. Cooling of transformers.

Text / Reference Books:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004.
3. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.
4. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
5. I. J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.

Electrical Machines-I Laboratory

Class Work:	25
Exam :	25
Total :	50

Course Code	**LC-EE-211G**		
Category	**Engineering Science Course**		
Course title	**Electrical Machines-I** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus.

(iii) Gruoup of students for practical should be 15 to 20 in number.

LIST OF EXPERIMENTS:
1. To study conversion of 3 Phase to six phase using 3 single phase transformers..
2. To study three phase rectifiers & supply configuration . In 3 phase.
3. To perform Sumpner's Back to back test on 1-phase transformers.
4. To study Parallel operation of two 1-phase transformers.
5. To perform load test on DC shunt generator.
6. To study Speed control of DC shunt motor.
7. To study Swinburne's test of DC shunt motor.
8. To study Hopkinson's test of DC shunt M/Cs.
9. To syudy Ward Leonard method of speed control.

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

Engineering Mechanics

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**ESC-202-G**		
Category	**Engineering Science Course**		
Course title	**Engineering Mechanics** (Theory)		
Scheme	**L**	**T**	**P**
	3	1	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes: At the end of this course, students will demonstrate the ability to

1. Understand the concepts of co-ordinate systems.
2. Analyse the three-dimensional motion.
3. Understand the concepts of rigid bodies.
4. Analyse the free-body diagrams of different arrangements. Analyse torsional motion and bending moment.

UNIT-I

Introduction to vectors and tensors and co-ordinate systems: Introduction to vectors and tensors and coordinate systems; Vector and tensor algebra; Symmetric and anti-symmetric tensors; Eigen values and Principal axes.
Three-dimensional Rotation: Three-dimensional rotation: Euler's theorem, Axis-angle formulation and Euler angles; Coordinate transformation of vectors and tensors.

UNIT-II

Kinematics of Rigid Body: Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problem. Centroid, Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Problems.

Kinetics of Rigid Bodies: Kinetics of rigid bodies: Angular momentum about a point; Inertia tensor: Dentition and computation, Principal moments and axes of inertia, Parallel and perpendicular axes theorems; Mass moment of inertia of symmetrical bodies, cylinder, sphere, cone etc., Area moment of inertia and Polar moment of inertia, Forces and moments; Newton-Euler's laws of rigid body motion.

UNIT-III

Free Body Diagram: Free body diagrams; Examples on modelling of typical supports and joints and discussion on the kinematic and kinetic constraints that they impose.
General Motion: Examples and problems. General planar motions. General 3-D motions. Free precession, Gyroscopes, Rolling coin.

UNIT-IV

Bending Moment: Transverse loading on beams, shear force and bending moment in beams, analysis of cantilevers, simply supported beams and overhanging beams, relationships between loading, shear force and bending moment, shear force and bending moment diagrams.
Torsional Motion: Torsion of circular shafts, derivation of torsion equatio , stress and deformation in circular and hollow shafts.
Friction: Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.

Text / References:

1. Mechanics by R.C. Hibbler, Pearson Publication
2. J. L. Meriam and L. G. Kraige, "Engineering Mechanics: Dynamics", Wiley, 2011.

3. M. F. Beattv. “Principles of Engineering Mechanics” . Springer Science & Business Media. 1986.

POWER ELECTRONICS

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-210G**		
Category	**Engineering Science Course**		
Course title	Power Electronics (Theory)		
Scheme	**L**	**T**	**P**
	3	-	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

At the end of this course students will demonstrate the ability to;

- Understand the differences between signal level and power level devices.
- Analyse controlled rectifier circuits.
- Analyse the operation of DC-DC choppers.
- Analyse the operation of voltage source inverters.

SECTION-A

Power switching devices

Diode, Thyristor, MOSFET, IGBT: I-V Characteristics; Protections, series and parallel connections, Firing circuit for thyristor; Voltage and current commutation of a thyristor; pulse transformer and opto-coupler.

AC REGULATORS: Types of regulator, equation of load current, calculation of extinction angle, output voltage equation, harmonics in load voltage.

SECTION-B

Thyristor rectifiers

Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R- load and highly inductive load; Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Input and output wave shape and power factor.

DC-DC buck converter

Elementary chopper with an active switch and diode, concepts of duty ratio and average voltage, power circuit of a buck converter, analysis and waveforms at steady state, duty ratio control of output voltage.

SECTION-C

DC-DC boost converter

Power circuit of a boost converter, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

Single-phase voltage source inverter

Power circuit of single-phase voltage source inverter, switch states and instantaneous output voltage, square wave operation of the inverter, concept of average voltage over a switching cycle, bipolar sinusoidal modulation and unipolar sinusoidal modulation, modulation index and output voltage

SECTION-D

Three-phase voltage source inverter

Power circuit of a three-phase voltage source inverter, switch states, instantaneous output voltages, average output voltages over a sub-cycle, three-phase sinusoidal modulation.

CYCLOCONVERTERS : Basic principle of frequency conversion, types of cycloconverter, non-circulating and circulating types of cycloconverters

Text/References Books:-

1. M. H. Rashid, "*Power electronics: circuits, devices, and applications*", Pearson Education India, 2009.
2. N. Mohan and T. M. Undeland, "Power Electronics: Converters, Applications and Design", John Wiley & Sons, 2007.
3. R. W. Erickson and D. Maksimovic, "Fundamentals of Power Electronics", Springer Science & Business Media, 2007.
4. L. Umanand, "Power Electronics: Essentials and Applications", Wiley India, 2009.

Power Electronics Laboratory

Class Work:	25
Exam :	25
Total :	50

Course Code	**LC-EE-212G**		
Category	**Engineering Science Course**		
Course title	**Power Electronics** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

LIST OF EXPERIMENTS

1. To Study Static Characteristics of Power Diode and Thyristor and to study reverse recovery of Power Diode & Thyristor.
2. To Study Characteristics of IGBT &MOSFET.

3. To study R, RC and UJT firing Circuit .
4. To Study of Pulse transformer & optocoupler technique
5. To Study of SCR Communication Technique Class A-E.
6.To Study of AC voltage Regulator .
7. To control speed of small motor using Single Phase Half wave & Full wave fully controlled Converter
8. To control speed of a small DC motor using MOSFET based Chopper with output voltage control technique
9.To Study of Mc Murray - Bed ford Half & Full Bridge Inverter
10. To control speed of small AC induction motor using Single Phase non circulating type bridge by frequency conversion.
11.To Study single phase cycloconverter.

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

Environmental Studies

Objective: To provide the basic knowledge in Environmental Sciences to students of Engineering. It will guide the students living in a historic transitional period of burgeoning awareness of the conflict between human activities and environmental constraints to help and save the fragile and endangered planet with the natural resources already overexploited.

Course code: MC-106G

Environmental Studies (Semester 1)							
Lecture	Tutorial	Practical/Field visit	Credit	Theory	Field visit	Total	Time
3	0	1	-	75	25	100	3Hrs

MC-ENV : (ENVIRONMENTAL SCIENCE)

Objective: To provide the basic knowledge in Environmental Sciences to students of Engineering. It will guide the students living in a historic transitional period of burgeoning awareness of the conflict between human activities and environmental constraints to help and save the fragile and endangered planet with the natural resources already overexploited.

Course code: MC-GES-106-G

Environmental Studies (Semester 1)							
Lecture	Tutorial	Practical/Field visit	Credit	Theory	Field visit	Total	Time
3	0	1	-	75	25	100	3Hrs

Theory 75 Marks Field Work 25 Marks (Practical/Field visit)

Unit-1 The Multidisciplinary nature of environmental studies. Definition, scope and importance. (2 lecture)

Unit-2 Natural Resources :

Renewable and non-renewable resources : Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non- renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.
* Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit-3 Ecosystems :

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.

b. Grassland ecosystem. c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit-4 Biodiversity and its conservation

* Introduction - Definition : Genetic, Species and ecosystem diversity.
* Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.

* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

(8 lectures)

Unit-5 Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.

b) Water pollution c) Soil pollution

d) Marine pollution e) Noise pollution

f) Thermal pollution g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6 Social issues and the Environment:

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation, rain water harvesting, watershed management.
* Resettlement and rehabilitation of people : its problems and concerns case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.

* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution) Act.
* Water (Prevention and Control of pollution) Act.
* Wildlife Protection Act.
* Forest Conservation Act.
* Issues involved in enforcement of environmental legislation.
* Public awareness. (7 lectures)

Unit-7 Human population and the Environment.

Population growth, variation among nations. Population explosion- Family Welfare Programme. Environment and human health.

Human Rights. Value Education. HIV/AIDS.

Woman and Child Welfare

Role of Information Technology in Environment and human health.

Case Studies. (6 lectures)

Unit-8 Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems- pond, river, hill slopes, etc. (Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing

Co. (TB).

15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.

16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford & TBH Publ. Co. Pvt. Ltd. 345p.

17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ. House, Meerut.

18. Survey of the Environment, The Hindu (M).

19. Townsend C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science (TB).

20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).

21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno Science Publications (TR).

22. Wagner K.D., 1998, Environmental Management, W.B. Saunders co. Philadelphia, USA 499p.

23. A text book environmental education G.V.S. Publishers by Dr. J.P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations. Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory : 75 marks, Practical/ Field visit : 25 marks. The structure of the question paper will be :

Part- A : Short Answer

Pattern	:	15 marks Part- B : Essay Type with inbuilt
choice	:	60 marks Part-C : Field Work
(Practical)	:	25 marks Instructions for Examiners :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.

Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

MAHARSHI DAYANAND UNIVERSITY, ROHTAK
B.TECH (ELECTRICAL AND ELECTRONICS ENGINEERING)
IVth semester w.e.f 2019-20

S. No.	Course Code	Course Title	Teaching Schedule			Marks of Class Work	Examination Marks		Total Marks	Credits	Duration of Examination (in hours)
			L	T	P		Theory	Practical			
1.	PCC-EE-202G	Digital Electronics	3	0	0	25	75	0	100	3	3
2.	LC- EE-204G	Digital Electronics Laboratory	0	0	2	25	0	25	50	1	3
3.	PCC-EE-206G	Electrical Machines-II	3	1	0	25	75	0	100	4	3
4.	LC- EE-208G	Electrical Machines-II Laboratory	0	0	2	25	0	25	50	1	3
5.	PCC-EE-210G	Transmission and Distribution	3	0	0	25	75	0	100	3	3
6.	LC- EE-212G	Transmission and Distribution Laboratory	0	0	2	25	0	25	50	1	3
7.	PCC-EE-214G	Signals and Systems	3	0	0	25	75	0	100	3	3
8.	PCC-EE-216G	Electromagnetic Fields	3	1	0	25	75	0	100	4	3
9.	BSC-MATH-204G	Mathematics-III (Probability and Statistics)	3	1	0	25	75	0	100	4	3
10.	*MC-105G	Indian Constitution	0	0	2	50				2	-
11.	BSC-BIO-201G	Biology-I	2	1	0	25	75	0	100	3	3
	TOTAL								850	27	

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

*MC- 105G is a mandatory non credit course in which the student will be required passing marks

Digital Electronics

Theory :	75
Class Work :	25
Duration of Examination	3H

Note: The use of programmable devices such as programmable calculators etc. is not allowed during the exam. Sharing of materials will not be permitted during examination.

Course Code	**PCC-EE-202G**		
Category	**Engineering Science Course**		
Course title	**Digital Electronics** (Theory)		
Scheme	**L**	**T**	**P**
	3	-	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

- Understand working of logic families and logic gates.
- Design and implement Combinational and Sequential logiccircuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- Be able to use PLDs to implement the given logical problem.

SECTION-A

Fundamentals of Digital Systems and logic families:

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples ofICgates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-statelogic.

SECTION-B

Combinational Digital Circuits:

Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De- Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

SECTION-C

Sequential circuits and systems:

A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, Master Slave J- K, T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC’s, asynchronous sequential counters, applications of counters.

SECTION-D

A/D and D/A Converters:

Introduction to Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, sample and hold circuit, Introduction to analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter.

Semiconductor memories and Programmable logic devices:

Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic.

Text/Reference books:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

Digital Electronics Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**LC-EE-204G**		
Category	**Engineering Science Course**		
Course title	**Digital Electronics** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

LIST OF EXPERIMENTS

1. To study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. To design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops.
6. To study FLIP-FLOP conversion.
7. To verify the operation of bi-directional shift register.
8. To design & verify the operation of 3-bit synchronous counter.
9. To design and verify the operation of synchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
10. To design and verify the operation of asynchronous UP/DOWN decade counter using J K flip-flops & drive a seven-segment display using the same.
11. To design a 4 bit shift register and verify its operation.

Note:

1. Each laboratory group shall not be more than about 20 students.

2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

ELECTRICAL MACHINES-II

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-206G**		
Category	**Engineering Science Course**		
Course title	**Electrical Machines-II** (Theory)		
Scheme	**L**	**T**	**P**
	3	1	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

1. Understand the concepts of rotating magnetic fields.
2. Understand the operation of ac machines.
3. Analyse performance characteristics of ac machines.
4. Impart knowledge on construction, principle of operation and performance of ac machine.
5. Prepare the students to have a basic knowledge about motoring, generating and braking mode of ac machines

UNIT-I

Poly-phase Induction Motor: Constructional features, Principal of operation, production of rotating magnetic field, induction motor action, torque production, testing, development of equivalent circuit, performance characteristics, circle diagram, starting methods, double cage and deep bar motors.

UNIT-II

Poly-phase Induction Motor: Methods of speed control - stator voltage control, stator resistance control, frequency control, rotor resistance control, slip power recovery control

Induction Generator: Principle of operation, types and applications.
Single Phase Induction motors: Double revolving field theory, cross field theory, different types of single phase induction motors, circuit model of single phase induction motor.

UNIT-III

Synchronous Generator: Principle, construction of cylindrical rotor and salient pole machines,winding, EMF equation, Armature reaction, testing, model of the machine, regulation – synchronous reactance method, Potier triangle method. Output power equation, power angle curve.

UNIT-IV

Three Phase Synchronous Generators: Transient and sub-transient reactance, synchronization, parallel operation.
Synchronous Motor: Principles of synchronous motor, power angle curve, V-curve, starting, damper winding, synchronous condenser, applications.

TEXT/ REFERENCE BOOKS:

1. Principle of Electrical Machines, V K Mehta, Rohit Mehta, S Chand
2. Electric Machines ,Ashfaq Hussain, Dhanpat Rai
3. Electric Machines: I.J.Nagrath and D.P. Kothari, TMH, New Delhi.
4. Generalized theory of Electrical Machines: P.S. Bhimbra(Khanna Pub.)
5.Electric Machinery, Fitzgerald and Kingsley, MGH.

Electrical Machines-II Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**LC-EE-208G**		
Category	**Engineering Science Course**		
Course title	**Electrical Machines-II** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

LIST OF EXPERIMENTS:

1. To perform the open circuit test and block rotor test on 3 phase induction motor and draw the circle diagram.
2. To study the speed control of induction motor by rotor resistance control.
3. To conduct the load test to determine the performance characteristics of the I.M.
4. To compute the torque v/s speed characteristics for various stator voltages.
5. To perform the open circuit test and block rotor test on single-phase induction motor and determine equivalent circuit parameters.
6. To perform O.C. test on synchronous generator and determine the full load regulation of a three phase synchronous generator by synchronous impedance method.
7. To Study and Measure Synchronous Impedance and Short circuit ratio of Synchronous Generator .
8. Study of Power (Load) sharing between two Three Phase alternators in parallel operation Condition.
9. To plot V- Curve of synchronous motor.
10. Synchronization of two Three Phase Alternators by

a) Synchroscope Method
b) Three dark lamp Method
c) Two bright one dark lamp Method

11. Determination of sequence impedances of synchronous machine for various stator voltages.

Note:

1. Each laboratory group shall not be more than about 20 students.
2. To allow fair opportunity of practical hands on experience to each student, each experiment may either done by each student individually or in group of not more than 3-4 students. Larger groups be strictly discouraged/disallowed.

TRANSMISSION AND DISTRIBUTION

Theory : 75
Class Work : 25
Total : 100
Duration of Exam : 3 Hrs.

Course Code	PCC- EE-210G		
Category	**Engineering Science Course**		
Course title	Transmission and distribution (Theory)		
Scheme	**L**	**T**	**P**
	3		**-**

Course Outcomes:
At the end of the course, students will demonstrate the ability to:

1. Understand the basic laws of Transmission and Distribution
2. Knowledge about the Structure and present-Day Scenario of a power system.
3. Analyses of transmission and distribution line parameters.
4. Understand mechanical design of transmission line with skin effect and proximity effect.
5. Understand the various cables and insulators gradings as well as ratings.
6. To know the performance of transmission line.

.

SECTION A

INTRODUCTION: Evolution of Power Systems and Present-Day Scenario. Structure of a power system, Bulk Power Grids and Micro-grids, indoor and outdoor substations, equipment for substations, layout, auxiliary supply.
DISTRIBUTION SYSTEMS: Radial, ring mains and network distribution system, comparison of various types of ac and dc systems.

SECTION B

TRANSMISSION LINES: Calculation of line parameters, Ferranti effect, proximity effect. PERFORMANCE OF LINES: models of short, medium and long transmission lines, performance of transmission lines, circle diagram, capacity of synchronous condenser, tuned lines, voltage control.

SECTION C

MECHANICAL DESIGN: Sag and stress calculations, effect of ice and wind, dampers. INSULATORS: Types, insulating materials, voltage distribution over insulator string, equalizer ring.

SECTION D

CABLES: Types of LV and HV cables, grading of cables, capacitance, ratings. CORONA: Phenomenon, critical voltage, power loss, reduction in losses, radio-interference, HVDC transmission – types of links, advantages and limitations.

TEXT BOOKS:

1. Power System Engg: I.J.Nagrath and D.P.Kothari (TMH)
2. Electrical Power Systems: C. L. Wadhwa (New Age International Pvt Ltd)
3. Grainger and W. D. Stevenson, “Power System Analysis”, McGraw Hill Education, 1994.

REF. BOOKS:

1. Elements of power system analysis: W.D.Stevenson (MGH)
2. Electric Power System: B.M.Weedy, John Wiley & Sons.
3. Transmission & Distribution of Electrical Engineering: H.Cotton.
4. Transmission & Distribution of Electrical Engineering: Westing House & Oxford Univ. Press, New Delhi.

Transmission and Distribution Laboratory

Class Work: 25
Exam : 25
Total : 50

Course Code	**LC-EE-212G**		
Category	**Engineering Science Course**		
Course title	**Transmission and Distribution** (Laboratory)		
Scheme	**L**	**T**	**P**
	-	**-**	**2**

Notes:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

LIST OF EXPERIMENTS:

1. To study the Power System blocks in MATLAB.
2. To design short and long transmission line using MATLAB.
3. To study and calculate the transmission line parameters.
4. To study the corona loss in power distribution system.
5. To study the proximity and skin effect.
6. To find ABCD parameters of a model of transmission line.
7. To study performance of a transmission line under no load condition & under load at different power factors.
8. To observe the Ferranti effect in a model of transmission line.
9. To study performance characteristics of typical DC distribution system in radial & ring main configuration.

10. To study mechanical design of transmission line.

Mathematics-III

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**BSC-MATH-204G**		
Category	**Basic Science Course**		
Course title	Mathematics-III (Numerical methods, Probability and Statistics)		
Scheme	**L**	**T**	**P**
	3	**1**	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:

The students will learn:

1. To find roots of polynomial and transcendental equations using numerical methods.
2. To conduct numerical differentiation and numerical integration.
3. To solve differential equations using numerical methods.
4. To formulate and solve problems involving random variables.
5. To apply statistical methods for analysing experimental data.

Unit-I

Numerical Methods 1: Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method, Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae, Numerical integration, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules

Unit-II

Numerical Methods 2: Taylor's series, Euler and modified Euler's methods, Runge-Kutta method of fourth order for solving first and second order ordinary differential equations, Finite difference solution of two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation

Unit-III

Probability: Probability spaces, Conditional probability, Bayes' theorem, Discrete random variables, Bernoulli distribution, Binomial distribution, Poisson distribution, Poisson approximation to the Binomial distribution, Expectation of discrete random variables, Moments, Variance of a sum, Correlation coefficient, Continuous random variables and their properties, Distribution functions and Densities, Normal, Exponential and Gamma densities

Unit-IV

Sampling: Measures of central tendency, Moments, Skewness and Kurtosis, Testing of hypothesis, Test of significance, Large sample test for single proportion, Difference of proportions, Tests for single mean, Difference of means and Difference of standard deviations, Test for ratio of variances, Chi-square test for goodness of fit and Independence of attributes

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
2. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand and Company
3. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall
5. S. Ross, A First Course in Probability, Pearson Education India
6. W. Feller, An Introduction to Probability Theory and its Applications, Wiley India

Signals and Systems

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-214G**		
Category	**Engineering Science Course**		
Course title	**Signals and Systems** (Theory)		
Scheme	**L**	**T**	**P**
	3	**0**	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes :

On completion of the course, student will able to

1. Understand mathematical description and representation of continuous and discrete time signals and systems.
2. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.
3. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
4. Understand the limitations of Fourier transform and need for Laplace transform
5. Understand the basic concept of various signals and system
6. To understand the new tool in Z transform and numerical ability to analyze the circuit in Z domain.

SECTION-A

Signals: Definition, types of signals and their representations: continuous-time, discrete-time, periodic, non-periodic, even, odd, energy, power, deterministic, random, one-dimensional, multi-dimensional, Shifting and scaling operations, Linear Time Invariant and Causal systems; commonly used signals (in continuous-time as well as in discrete-time): unit impulse, unit step, unit ramp (and their inter-relationships), exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals (including transformations of independent variables).

SECTION-B

Fourier Transforms (FT):(i) Definition, conditions of existence of FT, properties, magnitude and phase spectra, Some important FT theorems, Parseval's theorem, Inverse FT, relation between LT and FT(ii) Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT, Sampling theorem, Applications of Fourier Transform.

SECTION-C

Time and frequency domain analysis of systems, Analysis of first order and second order systems, continuous-time (CT) system analysis using LT, system functions of CT systems, poles and zeros, block diagram representations; discrete-time system functions, block diagram representation, illustration of the concepts of system bandwidth and rise time through the analysis of a first order CT low pass filter

SECTION-D

Laplace-Transform (LT) and Z-transform (ZT): (i) One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC) (ii) One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping .

Text/ Reference Books:

1. 'Signal and Systems' I J NAGRATH, R. RANJAN & Sharan, 2009 Edn., TMH, New Delhi
2. V. Oppenheim, A.S. Willsky and S. Hamid Nawab, 'Signals & System',PEARSON Education, Second Edition, 2003.
3. Signals & System by A Anand Kumar, Third edition PHI.
4. Schaume Series on Signals & Systems, HSU & RANJAN, TMH,India

Electromagnetic Fields

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**PCC-EE-216G**		
Category	**Engineering Science Course**		
Course title	**Electromagnetic Fields** (Theory)		
Scheme	**L**	**T**	**P**
	3	1	**-**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students five questions in total, first being compulsory and selecting one from each Unit.

Course Outcomes:
At the end of the course, students will demonstrate the ability to:

7. Understand the basic laws of electromagnetism.
8. Obtain the electric and magnetic fields for simple configurations under static conditions.
9. Analyse time varying electric and magnetic fields.
10. Understand Maxwell's equation in different forms and different media. To understand the propagation of EM waves.

SECTION - A

Review of Vector Calculus
Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus differentiation, partial differentiation ,integration, vector operator del, gradient ,divergence and Curl; integral theorems of vectors. Conversion of a vector from one coordinate system to another.

SECTION - B

Static Electric Field
Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.
Conductors, Dielectrics and Capacitance
Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Capacitance of a two wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation, Application of Laplace's and Poisson's equations.

SECTION – C

Static Magnetic Fields
Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors.
Magnetic Forces, Materials and Inductance
Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic circuits, inductances and mutual inductances.

SECTION – D

Time Varying Fields and Maxwell's Equations
Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces. Boundary Conditions. **Electromagnetic Waves**
Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors, Skin effect. Poynting theorem.

Text / References Books:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.
3. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
4. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
5. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
6. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
7. G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge UniversityPress, 1966.
8. B. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers, International Edition, 1971.
9. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.

Course code	BSC-BIO-201G				
Category	Basic Science Course				
Course title	Biology-i				
Scheme and Credits	L	T	P	Credits	
	2	1		3	
Branches (B. Tech.)	Common For All Branches				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Course Objectives

To convey that Biology is as an important scientific discipline.

To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine

To convey that "Genetics is to biology what Newton's laws are to Physical Sciences"

To study the biomolecules that are basis of life.

To understand the tools used in modern genetic engineering and its role.

To understand the role of biotechnology in different fields.

UNIT-I

Introduction to living world: Concept and definition of Biology; Aspect of biology. Need to study biology. Characteristic features of living organisms; Cell theory, Structure of Prokaryotic and Eukaryotic cell. Distinguish between animal and plant cell. Concept of single celled organisms, Types of microbes and their important properties. Economic importance of microbes.

Genetics : Mendel’s laws of inheritance, Concept of allele. Concepts of recessiveness and dominance . Gene interaction.

Cell division- Mitosis and Meiosis. Evidence of nucleic acid as a genetic material. Concept of genetic code, Central Dogma.

UNIT-II

Introduction to Biomolecules: Definition, structure and important functions of carbohydrates (glucose, fructose, disaccharides, starch and cellulose), lipids (phospholipid, cholesterol), Amino acids

Proteins- structure and function. Primary secondary, tertiary and quaternary structure.

Nucleic acid- Structure of DNA and RNA, types of RNA, Watson and Crick model of DNA

UNIT-III

Introduction to Genetic Engineering: Concept of genetic engineering. Tools used in recombinant DNA Technology. Restriction enzymes and DNA modifying enzymes, ligases. Gene cloning; plasmid vector. Transgenic plants and animals

UNIT-IV

Applications of Biotechnology: Applications of biotechnology in Agriculture, Medicine, Environment (sewage treatment), enzyme technology.

Course Outcomes

After studying the course, the student will be able to:

Understand about living organisms, type of cells and microbes.

Identify DNA as a genetic material in the molecular basis of information transfer.

Get knowledge that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine.

Highlight the concepts of genetic engineering and application or sustainable development.

Understand the impact of biotechnology on ennironment, health agriculture and industry.

References:

1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M,

L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B.
Pearson Education Ltd
2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H.
John Wiley and Sons
3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman
and Company
4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and
company, Distributed by Satish Kumar Jain for CBS Publisher
5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C.
Brown Publishers
6) https://onlinecourses.nptel.ac.in/noc18_bt23 by K. Suraishkumar and Madhulika Dixit
7) Campbell, NA and Reece JB, Biology, International edition, 7th edition or later, Benjamin Cummings, New York (2007 or later)
8) Karp, G, Cell and Molecular Biology: Concepts and Experiments, 7th edition, Wiley, New York (2013)

CONSTITUTION OF INDIA

Theory :
Class Work : 50
Total : 50
Duration of Exam :

Course Code	MC-105G		
Category	**Engineering Science Course**		
Course title	**Constitution of India** (Theory)		
Scheme	**L**	**T**	**P**
	0	**0**	2

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

CONSTITUTION OF INDIA– BASIC FEATURES AND FUNDAMENTAL PRINCIPLES

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950.

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

COURSE CONTENTS

1. Meaning of the constitution law and constitutionalism.
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of the Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of the Fundamental Duties and its legal status.
6. The Directive Principles of State Policy – Its importance and implementation.
7. Federal structure and distribution of legislative and financial powers between the Union and the States.
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

REFERENCES:

1. The Constitutional Law Of India 9th Edition, by Pandey. J. N.
2. The Constitution of India by P.M.Bakshi
3. Constitution Law of India by Narender Kumar
4. Bare Act by P. M. Bakshi

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH(TEXTILE CHEMISTRY)

SEMESTER 3RD AND 4TH

Scheme effective from 2019-20

COURSE CODE AND DEFINITIONS

Course Code	Definition
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION effective from 2019-20
Bachelor of Technology (Textile Chemistry)
Third Semester

Sr No.	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Class work	Theory	Practical	Total	
1	BSC-MATH-201G	Applied Statistics & Operation Research	3	0	0	3	3	25	75		100	3
2	BSC-TC-202G	Physical & Organic Chemistry	3	0	0	3	3	25	75		100	3
3	ESC-TC-203G	Polymer Science & Technology	3	0	0	3	3	25	75		100	3
4	PCC-TT/TC/FAE-201G	Introduction to Textile Industrial Practices	3	0	0	3	3	25	75		100	3
5	PCC-TT/TC/FAE-202G	Textile Raw Materials	3	0	0	3	3	25	75		100	3
6	PCC-TC/FAE-203G	Yarn Formation	3	0	0	3	3	25	75		100	3
7	LC-TT/TC/FAE-201G	Textile Industrial Survey	0	0	2	2	1	25		25	50	3
8	LC-TT/TC/FAE-202G	Fibre Microscopy & Identification	0	0	2	2	1	25		25	50	3
9	LC-TC/FAE-203G	Yarn Formation Lab	0	0	2	2	1	25		25	50	3
10	BSC-TC-203G	Qualitative Analysis of Organic Compounds	0	0	2	2	1	25		25	50	3
11	*MC-105G	Indian Constitution	0	0	2	2	0	50				
	TOTAL CREDITS						**22**				**800**	

*MC- 105G is a mandatory non credit course in which the student will be required passing marks

BSC–MATH–201G Applied Statistics & Operation Research

Course code	**BSC–MATH–201G**				
Category	Basic Science Course				
Course title	Applied Statistics & Operation Research				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Mathematics and Statistics

Course Objectives:

- To develop statistical and probability based skills amongst the students
- To make the students learn basic tools of Operations Research used in solving managerial problems

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Basic Statistics:
Measures of Central tendency, Dispersion, moments, skewness and Kurtosis (definition, properties and associated numerical only); Correlation, Karl Pearson's coefficient of correlation, rank correlation, line's of regression and curve fitting (linear and parabolic)

UNIT II

Probability and Probability Distributions:
Concept of probability, additive and multiplicative laws of probability (Statements and associated numerical only);
Random variate: Mathematical expectation, theorems on expectation, discrete and continuous probability distributions (definition and problems only); Univariate Binomial, Poisson and Normal distributions (properties and applications)

UNIT III

Sampling & Testing of hypothesis
Population and sample, types of sampling, sampling distribution of means and proportions (definition only)
Definition of statistical hypothesis, null hypothesis, type I and type II errors and level of significance.
Tests of significance for large and small samples (discussion) problem based on χ^2 test for goodness of fit, t-test, F-test and Analysis of variance (one way and two way classifications)

UNIT IV

Operations Research
Linear programming problem (formulation and solution by graphical approach only); Transportation problem including time minimizing problems, Basic Assignment problem, sequencing problems (n jobs, 2 machines and n jobs, m machine problems);
Project scheduling by PERT/CPM: Definition of network, critical path, floats, finding of critical path and floats.

Reading List

Title	**Author**
Mathematical Statistics	Ray and Sharma
Business Statistics	Gupta & Gupta
Theory and problems of probability and Statistics	Murray P Spiegel
Operation Research	P.K. Gupta, Manmohan
Operations Research for Management	Gupta & Sharma
Higher Engineering Mathematics	B.S. Grewal

Course Outcomes:
After completion of the course, students will have the knowledge of:

- basic statistical parameters of measures of central tendency, dispersion, correlation, regression etc
- the concept of probability and probability distributions
- the concept of testing of hypothesis based upon sampling
- the concept of linear programming, transportation, assignment, sequencing problems as well as PERT/CPM

BSC–TC–202G Physical & Organic Chemistry

Course code	**BSC–TC–202G**				
Category	Basic Science Course				
Course title	Physical & Organic Chemistry				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Elementary idea of chemistry

Course Objectives:
The course is designed to impart the following:
- Basic concepts of physical chemistry- colloids
- Knowledge of pH
- Basic concepts of Kinetics
- Fundamentals of organic chemistry reactions
- Basic knowledge of stereochemistry and it is used to understand the structure of chemical compounds.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Stereochemistry: Isomerism and their classification, Structural, geometrical and optical isomerism; E, Z & R, S nomenclature. Basic concept of organic molecules: Introduction, Inductive effect, Mesomeric effect, Electrometric effect, Hyper-conjugation, Resonance, Effect of these factors on the physical and chemical properties of substance.

UNIT-II

Homolytic and heterolytic fission of a covalent bond; Preparation, classification, structure and stability of Free radical carbocation, carbanions and carbine; Electrophile and nucleophile;

Organic Reactions and mechanism: Substitution Reactions, Types, Addition reactions, Types, Elimination reactions, Types and Rearrangement reactions; Directive influence of functional group in mono-substantiated benzene;

UNIT-III

Carbohydrates: Introduction, Classification. Properties, structure of Cellulose, Glycogen. Chemical Kinetics: Rate of reaction. Definition of rate of reaction according to the law of mass action and rate law, Molecular reaction, order of reaction, Types of order of reaction; Derivation of rate constant for first order and second order reaction. Methods of determination of order of reaction and numericals related to them.

UNIT-IV

Colloidal Chemistry: Classification of particles i.e. colloids, crystalloids, suspension, Colloids Classification, preparation, purification and properties; Gels and emulsions; Application of Colloids.

pH of solution, Buffer Solution, Henderson's Equation and Numerical related to them. pH measurement by indicator and electrometric methods. Control and utility of pH in textile wet processing.

Reading List

Title	**Author**
Principles of Physical Chemistry	Puri Sharma & Pathania
Text Book of Physical Chemistry	Samuel Glastone
Organic Chemistry (Vol I, II)	IL Finar
Organic Chemistry	Singh & Mukherjee
Organic Chemistry	O P Aggarwal

Course Outcomes

The students will learn:

- To use colloids in Textile chemical processing.
- To control the rates of reaction in chemical processing.
- The effective use of pH.

ESC–TC–203G Polymer Science & Technology

Course code	**ESC–TC–203G**				
Category	Engineering Science Course				
Course title	Polymer Science & Technology				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic knowledge of physics and chemistry

Course Objectives:
The course is designed to impart the following:

- Introduction to polymer technology that explores synthesis and physical properties of polymers
- To understand the various polymerization reactions

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Terms and definitions: Scope of polymer chemistry, plastics, fibres and rubbers; Basic determinants of polymers, Structure and property correlation; Chemistry of important monomers; Basic concepts of high polymers; Classification of polymerization reaction (addition, condensation) - their mechanism and kinetics with special reference to polyesters; polyamides; Co-polymerization and Rubber elasticity.

UNIT-II

Techniques of polymerization (bulk, emulsion, solution, suspension etc); Concept of amorphous and crystalline polymer; Concept and determination of glass transition temperature; Thermal effect of polymers; Polymer viscosities and their determination; DSC, DTA, TGA. Visco-elastic and elastic properties of polymers;

UNIT-III

Chemistry of cellulosic and other related polymers; Chemistry of degradation products of cellulose and their determination; The action of physical conditions and chemicals on cellulosics; Chemistry of regenerated polymers like Viscose, polynosic and HWM rayon; Preparation of cellulose acetate;

UNIT-IV

Chemistry of polyamides and polyaramides - Kevlar, Nomex; Chemistry of protein polymers- wool and Silk; Chemistry of polyester and polyacrylonitriles; the effect of physical and chemical conditions on these polymers;

Reading List

Title	**Author**
Organic Chemistry of Synthetic High Polymers	Robert W Lenz
Text Book of Polymer Science	Fred W Billmeyer
Polymer Science & Technology of Plastics & Rubber	P Ghosh

Course Outcomes

The students will learn:

- Analyze different mechanisms of polymer formation and use this information in the synthesis of different polymers.
- Distinguish between absolute and relative methods for molecular weight determination.
- Use of structure property correlation for end use of textile polymer.
- Process steps of polymerisation reactions to produce various textile polymers.

PCC–TT/TC/FAE–201G Introduction to Textile Industrial Practices

<table>
<tr><td>Course code</td><td colspan="5">PCC–TT/TC/FAE–201G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Introduction to Textile Industrial Practices</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–III</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Technology, Textile Chemistry, Fashion & Apparel Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:

- To familiarize the students with different sectors of textile industry
- To make students learn about processes involved in yarn and fabric formation
- Understanding sequence of fabric chemical processing and garment designing processes
- Calculations pertaining to yarn numbering systems

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Introduction to different sectors of textile industry (organized as well as unorgnanized) including sectors based on technology such as Handloom, Powerloom, Garment, Cotton, Silk, Wool, Jute and Synthetics etc., Global Scenerio of these sectors: Number of units, size etc

Idea of Research and technology support to Textile Industry by Government Agencies;

Strengths and weaknesses of Indian Textile Industry

UNIT-II

Brief outline of Ginning, Sequence of operations for conversion of natural and manmade fibers into yarn viz Opening and Cleaning, drawing, combing, roving and different spinning processes. Introduction to doubling and winding;

Introduction to passage of material through weaving preparatory and fabric formation processes viz, weaving, knitting and nonwoven by flow charts and their objectives. Calculations pertaining to yarn numbering systems

UNIT-III

Introduction to various textile chemical processes, General sequence used for chemical processing of textile materials viz fibre, yarn, fabric and garments. Brief outlines of various preparatory processes such as singeing, desizing, scouring, bleaching, mercerizing, etc., Overview of colouration processes viz dyeing and printing of textile materials, Introduction to different mechanical and chemical finishing processes. Basic idea of garment and knit processing processes.

UNIT-IV

Sequence of operations for converting fabric to garment, Importance of Design; Introduction to fashion and retailing of readymade garments, Branding, Awareness of treams and accessories, Different sectors of garment manufacturing units, export houses, buying houses. Brief idea of garment imports/exports of different countries

Reading List

Title	Author
Cotton Spinning	K Ganesh & A R Garde
Cotton Yarn Weaving	RN Kanungi & AR Garde
Principles of Weaving	Marks & Robinson
Textiles Fibre to Fabric	Corbmann
Fundamental Principles of Textile Processing	V A Shenai
Technology of Clothing Manufacture	Carr & Latham

Course Outcomes:

At the end of the course, the students will:

- be familiar with all the processes of textile industry
- have the knowledge of global scenerio of different sectors of textile

PCC–TT/TC/FAE–202G Textile Raw Materials

Course code	**PCC–TT/TC/FAE–202G**				
Category	Professional Core Course				
Course title	Textile Raw Materials				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- To provide basic knowledge of terms used in textiles
- To familiarize the students with details of raw materials used in textile industry
- To make students learn about natural and man made fibre details

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

General definitions and important terminologies related to textiles; Classification of fibres; Essential and desirable properties of textile fibres and their role in final products; Advantages and disadvantages of natural and manmade fibres;
Cotton: Geographical distribution, structure and properties (physical and chemical); Different varieties including organic as well as Bt cotton and their properties; Applications.

UNIT-II

Bast and leaf fibres such as jute, hemp, sisal and ramie etc: Geographical distribution, extraction, properties and their uses.
Varieties of natural silk, rearing of silk worm, properties and uses of various types of silk; silk reeling, throwing and weighing.

UNIT-III

Varieties, sorting and grading of wool, chemical and physical properties of wool, processes involved in the removal of impurities from raw wool, numbering systems of woollen and worsted yarns. General principles of manufacturing of man made fibres.

UNIT-IV

Brief outline of the manufacturing processes of important man-made fibres, viz. rayons (Viscose andAcetate), polynosic, tencel, nylons, polyester, acrylics, polypropylene, polyolefins, polyacrylonitrile and some technical speciality fibres like spandex/lycra etc (only flow charts); their Important physical and chemical properties and applications.

Reading List

Title	**Author**
Textile Fibres	HVS Murthy
Manmade Fibres	RW Moncrieff
Manufactured Fibre Technology	V B Gupta & V K Kothari

Course Outcomes:

At the end of the course, the students will be:

- familiar with different types of natural and man made fibres
- having the knowledge of physical and chemical properties of natural and man made fibres
- able to explore the applications of different types of natural and man made fibres

PCC–TC/FAE–203G Yarn Formation

Course code	**PCC–TC/FAE–203G**				
Category	Professional Core Course				
Course title	Yarn Formation				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:

- To familiarize the students with objectives of initial stages of yarn formation viz. Ginning, Mixing and Blending, Blowroom and Card, Drawing-in, Combing and Roving
- To make the students understand basic mechanisms involved in different stages of yarn formation viz..Ring frame, Open-end spinning, DREF spinning, Air-Jet spinning
- To make the students learn about plying, twisting, sewing thread, Yarn quality, Yarn Numbering Systems, etc.
- To make students learn calculations related to various stages of yarn formation viz. Blowroom and Card, Draw frame, Roving, ring frame and yarn numbering

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Brief introduction of the subject; Objectives of ginning; Mixing and Blending: Objectives. Introduction to various preparatory processes involved in the production of yarn viz. opening and cleaning (blow room and card), drawing (draw frame), combing (comber) and rove formation (speed frame) with the objectives of each process.

UNIT II

Introduction to different processes involved in the production of yarn viz. conventional (ring spinning) and unconventional (rotor, air-jet and friction spinning etc) with the objectives of each. Properties and end uses of different types of yarns such as ring spun, rotor spun, friction spun and air-jet spun etc.

UNIT III

Objectives of plying and twisting of spun and filament yarns; Objectives and process description of reeling; Brief description of fancy yarns: ply cable yarn; core spun yarn, sewing threads, slub yarn, grindle, mélange yarns etc.

UNIT IV

Essential properties of a sewing thread. Concept of yarn quality and its importance, Yarn numbering systems and calculations pertaining to conversions,

Title	**Author**
Cotton Ginning, Textile Progress Vol.24 No.2 I	Doraiswamy, P Chellamani
Spun Yarn Technology, Vol I& II	A Venkatasubramani
Short Staple Spinning Volume-I, II, III & IV	W Klein
Spinning of Manmade & Blends on Cotton Systems	KR Salhotra
Technology of Carding	R Chattopadhyay
Manufactured Fibre Technology	V B Gupta & V K Kothari
Spun Yarn Technology	Eric Oxtoby

Course Outcomes

At the end of the course, the students will:

- have the knowledge of Ginning, Mixing and Blending, the initial processes of yarn formation;
- have learnt the principle and working of different machines of Yarn formation
- be familiar with the Ply yarn, Yarn Twist, sewing thread, Yarn Quality, Yarn Numbering System;
- be able to calculate various parameters like draft, production and efficiency related to different machines of yarn formation as well as conversion factors of different yarn numbering systems.

LC–TT/TC/FAE–201G Textile Industrial Survey

<table>
<tr><td>Course code</td><td colspan="5">LC–TT/TC/FAE–201G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Textile Industrial Survey</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–III</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Technology, Textile Chemistry, Fashion & Apparel Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- The course is designed to make students learn writing reports of survey/practical visits to textile industrial units

Contents:

Study and survey of textile industries spread over India as well as Global areas specifically in nearby places, through practical visits and internet facilities; Preparation of report of the survey and highlight salient features of specific sectors involved like spinning, weaving, knitting, process house, garment manufacturing, Label manufacturing, export and buying houses etc

Course Outcomes:

- At the end of this course the students will be able to survey and prepare the reports of any Industrial unit specifically in textile fields

LC–TT/TC/FAE–202G Fibre Microscopy & Identification

Course code	**LC–TT/TC/FAE–202G**				
Category	Professional Core Course				
Course title	Fibre Microscopy & Identification				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Textile Raw Materials **Course Objectives:**

The Lab course is designed to make students learn

- identification of textile fibres and filaments
- identify the burning behavior, microscopically structure and chemical solubility of different textile fibres
- blend analysis

Contents:

Principle of microscopy, Microscopic identification of fibres, preparation and mounting of specimen for longitudinal view, Cross-section cutting. Microtomy - cork method, metal plate method, Hardy's Microtome, Mountants and reagents for fibre microscopy; Identification of fibres through burning as well as solubility tests. Standard schemes of analysis of homogenous fibre blends by physical and chemical methods; Qualitative and quantitative determination of components; Preparation of reagents used for chemical analysis.

Reading List

Title	**Author**
Hand book of textile fibres	J Gordan Cook
Textile Fibres	HVS Murthy

Course Outcomes:

After completion of the course, students will have the knowledge of:

- the burning tests, microscopic tests and solubility tests for identification of the textile fibers
- chemistry involved in various practical tests
- various tests for analysis of blends of two or more fibres

LC–TC/FAE–203G Yarn Formation Lab

Course code	**LC–TC/FAE–203G**				
Category	Professional Core Course				
Course title	Yarn Formation Lab				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Yarn formation

Course Objectives:

- This Lab course is designed to impart first-hand experience of handling different yarn formation machineries as a bridge between theory and practice.

Contents

Discussion and demonstration of the various machines and of manufacturing processes involved in converting fibres to yarn viz. mixing, blending, opening, cleaning, carding, drawing, combing, rove formation, spinning, doubling etc.; Introduction to unconventional spinning machines/processes; Rotor spinning, Air-jet spinning and Friction spinning etc.; Simple Calculations pertaining to these machines/processes

List of Experiments:

1. To study the objectives of Blow room, mixing and blending. Draw the flow of material through blowroom line and discuss the functions of each machine and its parts

2. To study the objectives of CARDING machine. Draw the flow of material through a card and label various parts. Also discuss the functions of each parts

3. To study the objectives of COMBING machine. Draw the flow of material through a combing and label various parts. Also discuss the functions of each parts

4. To study the objectives of DRAW FRAME. Draw the flow of material through a draw frame and label various parts. Also discuss the functions of each parts

5. To study the objectives of SPEED FRAME. Draw the flow of material through a SPEED frame and label various parts. Also discuss the functions of each parts

6. To study the objectives of RING FRAME. Draw the flow of material through a RING frame and label parts. Also discuss the functions of each parts

7. To study the objectives of MODERN SPINNING MACHINES. Draw the flow of material through the various machines and label different parts. Also discuss the functions of each machines and its parts

8. To study the objectives of WINDING machine. Draw the flow of material through Winding machine and discuss the functions of each machine and its parts

9. Draw the flow of material through Ring-doubler and discuss the functions of each machine and its parts.

10. To study the objectives of TFO. Draw the flow of material through TFO machine and discuss the functions of each parts

Course Outcomes:
At the end of this course the students will be able to:

- understand the blowroom line, mixing, blending and sequence of machines in the blowroom line;
- understand carding, draw frame, combing, speed frame, ring frame for processing different materials;
- understand winding, ring doubler, TFO, different types of Tensioners and Yarn clearers, packages, drums for processing different materials.

BSC–TC–203G Qualitative Analysis of Organic Compounds

<table>
<tr><td>Course code</td><td colspan="5">BSC–TC–203G</td></tr>
<tr><td>Category</td><td colspan="5">Basic Science Course</td></tr>
<tr><td>Course title</td><td colspan="5">Qualitative Analysis of Organic Compounds</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–III</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Chemistry</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subject Chemistry and Physical & Organic Chemistry **Course Objectives:**

The Lab course is designed to make students learn

- the identification of extra elements in organic compounds.
- the identification of various functional groups in organic compounds.
- the formation of derivatives of organic compounds.

Contents:

Detection of extra elements (i.e. Nitrogen, Sulphur & Halogenes and functional groups (i.e. Carboxyl, Phenolic, Alcoholic, Aldehydic, Ketonic, Esteric, Amides, Amines, Anilides, Thioamides, Nitro, Carbohydrate and hydrocarbons Test for Aromaticity of unsaturation in organic compounds. Determination of melting and boiling point of the organic compounds; Formation of derivatives of organic compounds; Determination of melting / boiling point of the derivatives

Course Outcomes:

- Students will have the knowledge of analysis of various basic organic compounds and their derivatives.
- They understand the determination of melting and boiling points of organic compounds and their derivatives.

CONSTITUTION OF INDIA

Class Work : 50

Course Code	MC-105G		
Category	**Mandatory Course**		
Course title	**Constitution of India** (Theory)		
Scheme	**L**	**T**	**P**
	0	0	2

CONSTITUTION OF INDIA– BASIC FEATURES AND FUNDAMENTAL PRINCIPLES

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950.

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

COURSE CONTENTS

1. Meaning of the constitution law and constitutionalism.
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of the Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of the Fundamental Duties and its legal status.
6. The Directive Principles of State Policy – Its importance and implementation.
7. Federal structure and distribution of legislative and financial powers between the Union and the States.
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

REFERENCES:

1. The Constitutional Law Of India 9th Edition, by Pandey. J. N.
2. The Constitution of India by P.M.Bakshi
3. Constitution Law of India by Narender Kumar
4. Bare Act by P. M. Bakshi

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION effective from 2019-20
Bachelor of Technology (Textile Chemistry)
Fourth Semester

Sr No.	Course Code	Course Title	Hours per week L	T	P	Total Contact hrs/week	Credit	Examination Schedule (Marks) Class work	Theory	Practical	Total	Duration of Exam (Hours)
1	HSMC-EIE-201G	Entrepreneurial and Industrial Engineering	3	0	0	3	3	25	75		100	3
2	ESC-TT/TC/FAE-201G	Computer Aided Textile Designing	3	0	0	3	3	25	75		100	3
3	ESC-TC-204G	Unit Organic Process & Chemical Engineering	3	0	0	3	3	25	75		100	3
4	PCC-TT/TC-206G	Man-Made Fibre Production	3	0	0	3	3	25	75		100	3
5	PCC-TC/FAE-204G	Fabric Formation	3	0	0	3	3	25	75		100	3
6	PCC-TC-205G	Preparatory Wet Processing	3	0	0	3	3	25	75		100	3
7	ESC-TT/TC/FAE -202G	Computer Aided Textile Designing Lab	0	0	2	2	1	25		25	50	3
8	LC-TC/FAE-204G	Fabric Formation Lab	0	0	2	2	1	25		25	50	3
9	LC-TC-205G	Preparatory Wet processing Lab	0	0	2	2	1	25		25	50	3
10	LC-TC-206G	Analytical Chemistry Lab	0	0	2	2	1	25		25	50	3
11	*MC-108G	Essence of Indian Knowledge Tradition	0	0	2	2	0	50				
	TOTAL CREDITS						22				800	

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.
*MC- 108G is a mandatory non credit course in which the student will be required passing marks

HSMC–EIE–201G Entrepreneurial and Industrial Engineering

<table>
<tr><td>Course code</td><td colspan="5">HSMC–EIE–201G</td></tr>
<tr><td>Category</td><td colspan="5">Humanities and Social science including Management courses</td></tr>
<tr><td>Course title</td><td colspan="5">ENTREPRENEURIAL AND INDUSTRIAL ENGINEERING</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–IV</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Chemistry</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic concepts of Social Sciences

Course Objectives:
The course is designed to make the students understand the:
- concepts of Entrepreneurship and Entrepreneurial Skills;
- ways of preparation of project reports, their components and feasibility studies
- principles of management;
- concepts of Industrial Engineering.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Entrepreneurship: Meaning and concept, role of entrepreneurship in economic development & new economic reforms, Entrepreneurial Skills, decision process, Facors influencing entr epreneurship; Business Opportunity Identification; Preparing a Business Plan and projet reports, Significance, components and feasibility studies of business plans/project reports, Importance of new venture financing, sources of financing

UNIT II

Industrial Parks (Meaning, features with examples); Special Economic Zone (Meaning, features with examples); Financial institutions and agencies, MSME, Small Scale Industries, Introduction to SIDBI, IDBI, IFCI and various Governement agencies like NABARD etc, Carry on Business (COB) licence, Environmental Clearance, Introduction to various industrial hazards like fire, mechanical and electrical etc, Introduction to safety rules for prevention of accidents, National Small Industries Corporation Rules and regulations for exemption from income tax, excise clearance etc., Claiming of draw back in export business.

UNIT III

Productivity – importance, concepts and measurements, Work study, Method study, micro -motion study, Production planning and control- Importance of planning - job, batch and mass production- Introduction and need for a new product, Functions of production control at macro and micro levels - Routing , Scheduling, dispatching and follow up etc. Ergonomics and its importance

UNIT IV

Introduction to Industrial Engineering - Evolution of modern Concepts in Industrial Engineering - Functions of Industrial Engineering, application of Industrial Engineering. Facility location factors and evaluation of alternate locations, Types of plant layout and their evaluation, Assembly line balancing, Materials handling systems, Inventory Control, inventory control techniques. Job evaluation, merit rating, incentive schemes, and wage administration, Quality control and Inspection.

Reading List

Title	**Author**
Project Feasibility Analysis	Cliffon, Davis S & Fyfie, David E
Environment & Entrepreneur	A N Desai
Environment & Entrepreneur	P F Drucker
Planning a Small Scale Industry: A Guide to Entrepreneurs	R Jain
Developing Entrepreneurship-A Handbook Learning System	Pareek, Udai and Venkateswara Rao
Motion and Time study	Ralph M Barnes
Engineered work Measurement	Weldon, ELBS, Marvin E Mundel
Work Study and Ergonomics	S Dalela and Sourabh
Introduction to Work Study	ILO
Work Study	Ralph & Barnes

Course Outcomes

At the end of the Course, the students will be able to:

- Take the right decisions to optimize resources utilization by improving productivity of the Materials, Machines, Money, Methods, Manpower and Management effectively;
- find alternative best productive methodsreducing time, improving human efficiency and minimising waste;
- understand the functions and applications of Industrial Engineering.

ESC–TT/TC/FAE–201G Computer Aided Textile Designing

Course code	**ESC–TT/TC/FAE–201G**				
Category	Professional Core Course				
Course title	Computer Aided Textile Designing				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry, Mathematics and Computer **Course Objectives:**

- To introduce computer softwares and hardwares related to textile designing;
- To make students learn basic tools and designing techniques used in textile and Apparel sectors;
- To make students understand applications of CAD for colour and weave designs.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Fundamentals of CAD: Definition, History, Hardware and Software requirements of CAD, Design Process, Application areas of computer aided design and manufacturing in textile and apparel industry, Introduction to Computer Graphics, Raster and Vector Graphics features.

UNIT II

Hardware in CAD: Introduction, Design workstation, Graphics terminal, input and output devices, central processing unit and secondary storage. Arrangement of figures - unit-repeating design, the drop device, drops reverse designs, system of distribution with reference to diamond base, ogee base, and rectangular base lines. Construction of designs from incomplete repeat, classification of borders patterns, all over patterns and types

UNIT III

Selection tools in adobe Photoshop: selection by shape, colour and mask, Colour specification tools, Image adjustment modes, layer blending modes and their options. Different brush tools and their dynamics options, Colour fill: Paint and gradiant, Clone tool, colour modification via dodge, burn, colour replacement, mixer etc. Layer masking, Texture mapping, Filter applications for fancy effects, layer functions, working with displacement maps, texture maps. Basic vector shape drawing tools, shape editing via anchor points etc.

UNIT IV

Introduction to Corel Draw Interface Tool Box, Working with shape drawing tools for lines, rectangles, squares, circles, ellipses, polygons, starts and spirals etc. Object transformations as rotation, scaling etc. freely and for specific dimensions, Selecting Objects, reshaping, duplicating, grouping, trimming, locking and unlocking, aligning objects. Introduction to curves, nodes and segments; Drawing freehand tools; Drawing and selecting closed curves and nodes, adding, removing and joining nodes. Bezier tool, drawing curve and straight line with bezier tools, Colour fill and options

Reading List

Title	**Author**
Computer Aided Design & Manufacturing	Mikcle P Groover, Emory W.Zimmers Jr
Computer Graphics Principles & Practices	James D Foley, Andeies Van Da Shvan K Feiner. John F Hughes
Computer Graphics	Donald Mearn & M Pauline, Baker
"Watsons Textile Design and Colour"	Grosiciki, Newnes Buttersworth, 1988

Course Outcomes:

After completion of the course students will:

- be familiar with computer fundamentals for Computer Aided Designing
- have the knowledge of computer softwares and basic tools for textile designing
- know the elements and principles of design and their applications in textile designing through CAD

ESC–TC–204 G Unit Organic Process & Chemical Engineering

Course code	**ESC–TC–204 G**				
Category	Professional Core Course				
Course title	Unit Organic Process & Chemical Engineering				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic knowledge of physics, chemistry and mathematics

Course Objectives:
The course is designed to impart the following:

- Understand the concept of unit organic processes.
- Industrial use of substitution reactions.
- Elementary idea of unit operations of chemical engineering

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Definition of unit process and unit operation; Study of following unit organic processes with one or two methods of manufacture with flow sheet for each process; Nitration, sulphonation, oxidation, halogenation, alkylation; Diazotization and coupling; Manufacture of dye intermediates based on above processes.

UNIT-II

Definition and scope of chemical engineering, Unit operations of chemical engineering, material balance and molecular units, mole fractions, Gas laws, simple calculations based on these laws. Corrosion and material of construction

UNIT-III

Mechanical separation: Introduction to screens and screening equipment. Size reduction: Crushing and grinding machinery; Introduction to theory of size reduction, power consumption. Drying: Classification of dryers and various types of dryers used in chemical process industry; Equilibrium moisture content, bound, unbound and free water; Evaporation: Evaporator types and their description.

UNIT-IV

Simple treatment of fluid flow, heat transfer, heat exchangers. Distillation: Terms and definitions and differential distillation; Industrial hazards in chemical industry;

Reading List

Title	**Author**
Unit Processes in Organic Syntheses	R H Groggins
Chemistry of Synthetic dyes	K Venkataraman
Introduction to Chemical Engineering	WL Badger
A Text Book of Engineering Chemistry	MM Uppal
A Glimpse on the Chemical Technology of Textile Fibres	RR Chakraborty

Course Outcomes

The students will learn:

- To use unit organic process for production of intermediates and dyes.
- Effective use of various unit operations of chemical engineering in textile processing.
- Working of dryers, heat exchangers and evaporator.

PCC–TT/TC–206 G Man–Made Fibre Production

Course code	**PCC–TT/TC–206 G**				
Category	Professional Core Course				
Course title	Man–Made Fibre Production				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics
Course Objectives:
The course is designed to make students learn:
- the basic concepts of fibre forming polymers
- various manufacturing systems of man made fibres
- processes and chemical reactions involved during manufacturing of typical fibres

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

General definitions related to man-made/manufactured fibres. Introduction to manufacturing processes of these fibres. Study of various spinning systems: melt, wet & dry spinning – basic principles. Brief details of spinning head, spinneret, quench chamber, drying chamber & coagulation bath. Spin finish applications.

UNIT II

Regenerated fibres: Viscose rayon – detailed manufacturing process with reactions at each stage. Polynosics, Super high wet modulus rayons, Brief manufacturing processes of Lyocell and Tencel fibres.

UNIT III

Polyacrylonitrile: Addition of comonomers, continuous suspension, polymerization techniques; Solution spinning techniques; Coagulation bath variables; Macrovoid generation and their remedies; Effect of spinning variables on structure and properties of gel and final fibres.
Polypropylene: Polymerisation techniques (suspension & gas phase), Superactive catalysts and their composition; major drawbacks and their possible remedies; Spinning of filaments.

UNIT IV

Polyethylene terephthalate: Polymerisation techniques (batch & continuous), side reactions, degradation reactions – their control, Production of filament yarns and staple fibres, Brief description of manufacturing technique of high tenacity polyethylene terephthalate.
Nylon 6 & nylon 66: Polymerisation techniques in VK tube (batch & continuous) along with side reactions, Integrated continuous process for nylon 66, Filament spinning technique.

Reading List

Manmade fibres	RW Moncrieff
Manufactured Fibre Technology	V. B. Gupta and V.K. Kothari
Production of Synthetic Fibres	A.A. Vaidya

Course Outcomes:
After completion of the course, students will:
- have the knowledge of essential requirements for fibre forming polymers
- be familiar with different techniques of fibre production systems
- have the knowledge of raw materials used for producing different man made fibres;
- be familiar with the chemical reactions occcuring during the manufacture of typical fibres

PCC–TC/FAE–204G Fabric Formation

<table>
<tr><td>Course code</td><td colspan="5">PCC–TC/FAE–204G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Fabric Formation</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–IV</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Chemistry, Fashion and Apparel Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:
The course is designed to make students learn:
- the basic concepts of fabric forming processes
- various manufacturing systems of woven fabrics
- processes involved during manufacturing of woven fabrics , their defects and remedial measures

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Introduction to Clothing Science, Factors involved in the study of clothing; General functional description of clothing; Classification of various types of Cloths, Fabrics according to end uses, manufacturing processes, raw material, etc. Introduction to various fabric manufacturing methods, conversion of yarn into fabric with flow charts, Introduction of warp and weft preparatory processes. Winding: Objectives, types of packages, Flow of material on a winding machine, Brief idea about different devices in a winding machine. Warping: Objectives of warping, Direct and sectional warping

UNIT II

Sizing: Objectives of sizing. Various sizing ingredients; Drawing-In: Objectives and flow of material in these operations. Pirn winding, Shuttle Looms: Definition of handloom, plain loom, and automatic loom. , General passage of material through loom, description of important parts of a loom, basic loom mechanisms; primary, secondary and auxiliary motions.

UNIT III

Brief introduction and overview to Shuttleless looms; their advantages over shuttle looms. Terms used for all woven fabrics, Ways to Distinguish Warp & Filling Yarns, Fabric properties- dimensional/structural, mechanical properties related to performance and durability, aesthetic properties. Functional and comfort related fabric properties Fabric quality attributes, Influence of fibres, yarn characteristics and fabric construction parameter on fabric properties. .

UNIT IV

Fabric defects; classification, reasons, point rate system for cloth grading, drawbacks of point system, fabric inspection. Introduction about followings; Knitted fabrics, narrow fabrics, briefing about dobby and jacquard, some standard fabrics, introduction to non woven fabrics, Fabrics from yarns; braids, nets, laces, Composite Fabrics; coated fabrics, laminated fabrics, bonded fabrics and tufted fabrics. .

Reading List

Title	**Author**
Principles of Weaving	Marks & Robinson
Cotton Yarn weaving	ATIRA
Textile Science	Cobmann
NCUTE's Manual	
Weaving: Conversion of Yarn to Fabric	P R Lord and M H Mohamed

Course Outcomes:

After completion of the course, students will:

- have the knowledge of essential requirements for fabric forming processes
- be familiar with different techniques of fabric production systems
- have the knowledge of raw materials used, size ingredients for producing woven fabrics;
- be familiar with the fabric defects, remedial measures, and other types of fabrics

PCC–TC–205 G Preparatory Wet Processing

<table>
<tr><td>Course code</td><td colspan="5">PCC–TC–205 G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Preparatory Wet Processing</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–IV</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Chemistry</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Knowledge of Introduction to Textile Processes

Course Objectives:
The course is designed to impart the following:

- Concept of preparatory wet processing of cotton and synthetic textiles
- Overview of various machines involved in prep oratory wet processes

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Impurities in fibres and greige fabrics (Cotton, Wool, Silk and Synthetic fibre) Preparatory sequences required for their removal; Chemistry and technology of singeing, desizing, scouring and bleaching of natural and man-made fibre fabrics and their blends;

UNIT-II

Machines used for batch wise and continuous scouring and bleaching; Mechanism of bleaching by various bleaching agents such as bleaching powder, sodium hypochlorite, hydrogen peroxide, sodium chlorite etc.

UNIT-III

Combined preparatory processes and energy conservation; Faults in scouring and bleaching and their prevention; Methods used for determination of degradation during scouring and bleaching;

Determination of oxi-cellulose and hydrocellulose; Determination of efficiency of various preparatory processes;

UNIT-IV

Physical and chemical aspects of mercerization, Efficiency of mercerization, Machines for yarn and fabric mercerization, hot mercerization and Liquid ammonia treatment.

Reading List

Title	Author
Chemical Technology in Pretreatment processes of Textiles	S R Karmarkar
Textile Scouring and Bleaching	E R Trotman
Technology of Bleaching & Mercerizing	VA Shenai

Course Outcomes:

- To understand preparatory wet processing of cotton fabric.
- To understand the chemistry involved in the various chemical pre-treatment of textiles.
- To know the concept of Pre-treatments with relevant machines and procedure.

ESC–TT/TC/FAE –202 G Computer Aided Textile Designing Lab

Course code	**ESC–TT/TC/FAE–202 G**				
Category	Engineering Science Course				
Course title	Computer Aided Textile Designing				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry, Mathematics and Computer **Course Objectives:**

- This Lab course is designed to impart first-hand experience of handling CAD softwares for Textile Designing thus serving as a bridge between theory and practice.

Contents:

Warp and Weft Colour Pattern designing using Elements of design and Principles of designs, like line, dot, print etc.; Types of lines and their application in designing; Types of dots as polka dot, etc. General idea about weave and colour effect; Composition of designs–by Geometric ornamentation by the conventional treatment of natural and artificial forms and by the adoption and reproduction of earlier designs; Geometric ornamentation, construction of symmetrical figures, Reversing inclined figures; Practical Application of Elements of Design and Principles of design using CAD.

Weave designing using Arrangement of figures- unit-repeating design, the drop device, drops reverse designs, sateen system of distribution (with reference to half drop, diamond base, ogee base, rectangular base lines). Construction of designs from incomplete repeat; Border designing: Study of pattern–historical precedents. Symmetry–principle concepts, perspectives and its application, classification of motifs, border patterns, all over patterns; CAD practical application in Weave designs, arrangement of figures, Border designing and Motif and repeat making.

List of Experiments:

1. To study different selection option tools in Adobe Photoshope
2. To study imge adjustment modes and tools in graphic designing software

3. To study different image transformation tools

4. To create motif vector by print designing

5. To crete shade cards of above designed print

6. To create textile patterns for designed prints

7. To study different colour modification tools

8. To drape designed fabric patterns on apparels and fashion accessories

9. To design fashion show ramp using previously designed apparels and accessories

10. To design technical and graphical parameters of yarn

11. To develop fabric using above designed yarn as per the desired weave parameters

Course Outcomes:

The students will be able to practically handle:

- elements and principles design using CAD systems;
- arrangement of figures and motifs using various methods
- geometrical ornamentation
- placement of patterns in symmetric and asymmetric way;
- creation of Border designs.

LC–TC/FAE–204G Fabric Formation Lab

Course code	**LC–TC/FAE–204G**				
Category	Professional Core Course				
Course title	Fabric Formation Lab				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Chemistry, Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics

Course Objectives:

- This Lab course is designed to impart first-hand experience of fabric formation techniques, demonstration of working principles of winding, warping, drawing-in and weaving thus serving as a bridge between theory and practice.

Contents

Basic principles of woven fabric analysis: estimation of data for cloth reproduction, Identification of yarns and materials used in their construction. Weave analysis, Sett, Cover factor, Count and weight calculations for simple and compound woven structures, Specifications of standard woven fabric.

Discussion and Demonstration of various machines and of manufacturing processes involved in converting yarns to fabric winding, warping, sizing, Drawing-in, weaving by Hand looms, Plain Looms; Automatic Shuttle Looms, Shuttleless Looms and Knitting, Passage of material through them and brief study of their essential components and mechanisms; Simple production and efficiency calculations pertaining to these processes.

List of Experiments:

- Study of Winding Process
- Study of Warping Process
- Study of Slasher Sizing
- Study of Drawing-in Process
- Study of Pirn Winding Process
- Introduction to Shuttle Loom
- Study of Conventional Shedding Mechanisms

- Study of Shuttle Picking Mechanisms
- Study of Crank Beat-up Mechanism in Shuttle loom
- Analyse different types of weave designs
- Analyse different constructional parameters of woven fabrics like yarn linear density, end and picks per unit length, fabric cover, fabric areal density

Course Outcomes:

After completion of the course, students will be able to:

- correlate between theory and practice of the concept of weaving preparatory methods
- visualise the layout and structure of weaving preparatory machines along with their primary components
- visualise the mechanisms of primary motions of shuttle weaving machines and comprehend their settings
- develop practical skills relevant to industrial practices.
- recognise different types of weave designs
- analyse different constructional parameters of woven fabrics like yarn linear density, end and picks per unit length, fabric cover, fabric areal density

LC–TC–205 G Preparatory Wet Processing Lab

Course code	**LC–TC–205 G**				
Category	Laboratory Course (Professional Core Course)				
Course title	Preparatory Wet Processing Lab				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Preparatory wet processing

Course Objectives:

- This Lab course is designed to impart first-hand experience of cotton fabric pretreatments employed in chemical processing thus serving as a bridge between theory and practice.

Contents

Desizing of cotton by enzymatic and oxidative method; Scouring by caustic soda boil and enzymatic scouring; Bleaching using Sodium hypochlorite and hydrogen peroxide and assessment process of bleaching process; Two stage and single stage preparatory processes; Scouring and bleaching of wool; Degumming and bleaching of silk; Scouring and bleaching of polyester and blends; Mercerization of cotton by various methods.

Course Outcomes:

- To understand basic concept of preparatory wet processing treatments of cotton fabric.
- Single stage and combined pre-treatment processes for cotton textiles.
- Different types of bleaching methods for cotton rich textiles with their evaluation.
- Basic pretreatments of woolen textiles.
- Degumming and other pre-treatments for silk materials.

LC–TC–206 G Analytical Chemistry Lab

Course code	**LC–TC–206 G**				
Category	Laboratory Course (Professional Core Course)				
Course title	Analytical Chemistry Lab				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Chemistry				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Polymer science & Technology

Course Objectives:

- This Lab course is designed to estimate the various commercial used chemicals in textile chemical processing.
- Degradation products of cellulosic polymers to understand damages in cotton textiles

Contents:

Brief concept pH; principle of pH measurement and use of pH meter; Estimations from dye intermediates based on idometric titrations; Estimation of available chlorine in hypochlorite bath and peroxide content in hydrogen peroxide bath; Analysis of free formaldehyde;
Determination of copper number; methylene number and carboxyl group in degraded cellulose; determination of barium activity number;

Course Outcomes:

- To understand significance of pH in wet processing.
- To understand the various types of degradations in cellulosic polymers.
- To estimate the commercial used reducing and oxidizing agents in textile chemical processing.

MC–108G Essence of Indian Knowledge Tradition

Course code	**MC-108G**				
Category	Mandatory Course				
Course title	Essence of Indian Knowledge Tradition				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	0	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	50 Marks				
Exam	00 Marks				
Total	50 Marks				
Duration of Exam	00 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

The course is designed to impart the following:

Course objective

The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technologicaladvancements and societal disruptions. Part-I focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

Course Contents

– Basic structure of Indian Knowledge System: अष्टादशविद्या ४वेद,४उपवेद (आयुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थापत्य आदि) ६वेदांग (शिक्षा, कल्प, निरुक्त, व्याकरण, ज्योतिष, छंद) ४ उपाङ्ग (धर्मशास्त्र, मीमांसा, पुराण, तर्कशास्त्र)

– Modern Science and Indian Knowledge System

Yoga and Holistic Health care

Case studies

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION effective from 2019-20
Bachelor of Technology (Textile Technology)
Third Semester

Sr No.	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Class work	Theory	Practical	Total	
1	HSMC-EIE-201G	Entrepreneurial and Industrial Engineeering	3	0	0	3	3	25	75		100	3
2	PCC-TT/TC/FAE-201G	Introduction to Textile Industrial Practices	3	0	0	3	3	25	75		100	3
3	PCC-TT/TC/FAE-202G	Textile Raw Materials	3	0	0	3	3	25	75		100	3
4	PCC-TT-203G	Yarn Manufacture–I	3	0	0	3	3	25	75		100	3
5	PCC-TT-204G	Weaving Preparation	3	0	0	3	3	25	75		100	3
6	PCC-TT-205G	Fabric Manufacture–I	3	0	0	3	3	25	75		100	3
7	LC-TT/TC/FAE-201G	Textile Industrial Survey	0	0	2	2	1	25		25	50	3
8	LC-TT/TC/FAE-202G	Fibre Microscopy & Identification	0	0	2	2	1	25		25	50	3
9	LC-TT-203G	Spinning Lab–I	0	0	2	2	1	25		25	50	3
10	LC-TT-204G	Weaving Lab–I	0	0	2	2	1	25		25	50	3
11	*MC-105G	Indian Constitution	0	0	2	2	0	50	-			
Total							22				800	

*MC- 105G is a mandatory non credit course in which the student will be required passing marks

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION effective from 2019-20
Bachelor of Technology (Textile Technology)
Fourth Semester

Sr No.	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Class work	Theory	Practical	Total	
1	BSC-MATH-201G	Applied Statistics & Operation Research	3	0	0	3	3	25	75		100	3
2	ESC-TT/TC/FAE-201G	Computer Aided Textile Designing	2	0	2	3	3	25	75		100	3
3	PCC-TT/TC-206 G	Man-Made Fibre Production	3	0	0	3	3	25	75		100	3
4	PCC-TT-207 G	Yarn Manufacture–II	3	0	0	3	3	25	75		100	3
5	PCC-TT-208 G	Fabric Manufacture–II	3	0	0	3	3	25	75		100	3
6	PCC-TT-209 G	Fabric Structure	3	0	0	3	3	25	75		100	3
7	ESC-TT/TC/FAE -202G	Computer Aided Textile Designing Lab	0	0	2	2	1	25		25	50	3
8	LC-TT-205G	Spinning Lab–II	0	0	2	2	1	25		25	50	3
9	LC-TT-206G	Weaving Lab–II	0	0	2	2	1	25		25	50	3
10	LC-TT-207G	Fabric Analysis Lab	0	0	2	2	1	25		25	50	3
11	*MC-108G	Essence of Indian Knowledge Tradition	0	0	2	2	0	50	-			
		Total					22				800	

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

*MC- 108G is a mandatory non credit course in which the student will be required passing marks

HSMC–EIE–201G Entrepreneurial and Industrial Engineeering

Course code	HSMC–EIE–201G				
Category	Humanities and Social science including Management courses				
Course title	Entrepreneurial and Industrial Engineeering				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic concepts of Social Sciences

Course Objectives:
The course is designed to make the students understand the:
- concepts of Entrepreneurship and Entrepreneurial Skills;
- ways of preparation of project reports, their components and feasibility studies
- principles of management;
- concepts of Industrial Engineering.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Entrepreneurship: Meaning and concept, role of entrepreneurship in economic development & new economic reforms, Entrepreneurial Skills, decision process, Facors influencing entrepreneurship; Business Opportunity Identification; Preparing a Business Plan and projet reports, Significance, components and feasibility studies of business plans/project reports, Importance of new venture financing, sources of financing

UNIT II

Industrial Parks (Meaning, features with examples); Special Economic Zone (Meaning, features with examples); Financial institutions and agencies, MSME, Small Scale Industries, Introduction to SIDBI, IDBI, IFCI and various Governement agencies like NABARD etc, Carry on Business (COB) licence, Environmental Clearance, Introduction to various industrial hazards like fire, mechanical and electrical etc, Introduction to safety rules for prevention of accidents, National

Small Industries Corporation Rules and regulations for exemption from income tax, excise clearance etc., Claiming of draw back in export business.

UNIT III

Productivity – importance, concepts and measurements, Work study, Method study, micro -motion study, Production planning and control- Importance of planning - job, batch and mass production- Introduction and need for a new product, Functions of production control at macro and micro levels - Routing , Scheduling, dispatching and follow up etc. Ergonomics and its importance

UNIT IV

Introduction to Industrial Engineering - Evolution of modern Concepts in Industrial Engineering - Functions of Industrial Engineering, application of Industrial Engineering. Facility location factors and evaluation of alternate locations, Types of plant layout and their evaluation, Assembly line balancing, Materials handling systems, Inventory Control, inventory control techniques. Job evaluation, merit rating, incentive schemes, and wage administration, Quality control and Inspection.

Reading List

Title	**Author**
Project Feasibility Analysis	Cliffon, Davis S & Fyfie, David E
Environment & Entrepreneur	A N Desai
Environment & Entrepreneur	P F Drucker
Planning a Small Scale Industry: A Guide to Entrepreneurs	R Jain
Developing Entrepreneurship-A Handbook Learning System	Pareek, Udai and Venkateswara Rao
Motion and Time study	Ralph M Barnes
Engineered work Measurement	Weldon, ELBS, Marvin E Mundel
Work Study and Ergonomics	S Dalela and Sourabh
Introduction to Work Study	ILO
Work Study	Ralph & Barnes

Course Outcomes

At the end of the Course, the students will be able to:

- Take the right decisions to optimize resources utilization by improving productivity of the Materials, Machines, Money, Methods, Manpower and Management effectively;
- find alternative best productive methodsreducing time, improving human efficiency and minimising waste;
- understand the functions and applications of Industrial Engineering.

PCC–TT/TC/FAE–201G Introduction to Textile Industrial Practices

<table>
<tr><td>Course code</td><td colspan="5">PCC–TT/TC/FAE–201G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Introduction to Textile Industrial Practices</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–III</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Technology, Textile Chemistry, Fashion & Apparel Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- To familiarize the students with different sectors of textile industry
- To make students learn about processes involved in yarn and fabric formation
- Understanding sequence of fabric chemical processing and garment designing processes
- Calculations pertaining to yarn numbering systems

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Introduction to different sectors of textile industry (organized as well as unorgnanized) including sectors based on technology such as Handloom, Powerloom, Garment, Cotton, Silk, Wool, Jute and Synthetics etc., Global Scenerio of these sectors: Number of units, size etc
Idea of Research and technology support to Textile Industry by Government
Agencies; Strengths and weaknesses of Indian Textile Industry

UNIT-II

Brief outline of Ginning, Sequence of operations for conversion of natural and manmade fibers into yarn viz Opening and Cleaning, drawing, combing, roving and different spinning processes. Introduction to doubling and winding;
Introduction to passage of material through weaving preparatory and fabric formation processes viz, weaving, knitting and nonwoven by flow charts and their objectives. Calculations pertaining to yarn numbering systems

UNIT-III

Introduction to various textile chemical processes, General sequence used for chemical processing of textile materials viz fibre, yarn, fabric and garments. Brief outlines of various preparatory processes such as singeing, desizing, scouring, bleaching, mercerizing, etc., Overview of colouration processes viz dyeing and printing of textile materials, Introduction to different mechanical and chemical finishing processes. Basic idea of garment and knit processing processes.

UNIT-IV

Sequence of operations for converting fabric to garment, Importance of Design; Introduction to fashion and retailing of readymade garments, Branding, Awareness of treams and accessories, Different sectors of garment manufacturing units, export houses, buying houses. Brief idea of garment imports/exports of different countries

Reading List

Title	**Author**
Cotton Spinning	K Ganesh & A R Garde
Cotton Yarn Weaving	RN Kanungi & AR Garde
Principles of Weaving	Marks & Robinson
Textiles Fibre to Fabric	Corbmann
Fundamental Principles of Textile Processing	V A Shenai
Technology of Clothing Manufacture	Carr & Latham

Course Outcomes:

At the end of the course, the students will be able to:

- take the right decisions to optimize resources utilization by improving productivity of the Materials, Machines, Money, Methods, Manpower and Management effectively;
- find alternative best productive methodsreducing time, improving human efficiency and minimising waste;
- understand the functions and applications of Industrial Engineering.

PCC–TT/TC/FAE–202G Textile Raw Materials

Course code	**PCC–TT/TC/FAE–202G**				
Category	Professional Core Course				
Course title	Textile Raw Materials				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- To provide basic knowledge of terms used in textiles
- To familiarize the students with details of raw materials used in textile industry
- To make students learn about natural and man made fibre details

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

General definitions and important terminologies related to textiles; Classification of fibres; Essential and desirable properties of textile fibres and their role in final products; Advantages and disadvantages of natural and manmade fibres;
Cotton: Geographical distribution, structure and properties (physical and chemical); Different varieties including organic as well as Bt cotton and their properties; Applications.

UNIT-II

Bast and leaf fibres such as jute, hemp, sisal and ramie etc: Geographical distribution, extraction, properties and their uses.
Varieties of natural silk, rearing of silk worm, properties and uses of various types of silk; silk reeling, throwing and weighing.

UNIT-III

Varieties, sorting and grading of wool, chemical and physical properties of wool, processes involved in the removal of impurities from raw wool, numbering systems of woollen and worsted yarns. General principles of manufacturing of man made fibres.

UNIT-IV

Brief outline of the manufacturing processes of important man-made fibres, viz. rayons (Viscose andAcetate), polynosic, tencel, nylons, polyester, acrylics, polypropylene, polyolefins, polyacrylonitrile and some technical speciality fibres like spandex/lycra etc (only flow charts); their Important physical and chemical properties and applications.

Reading List

Title	**Author**
Handbook of Textile Fibres	J Gordon Cook
Textile Fibres	HVS Murthy
Manufactured Fibre Technology	V B Gupta & V K Kothari

Course Outcomes:

At the end of the course, the students will be:

- familiar with different types of natural and man made fibres
- having the knowledge of physical and chemical properties of natural and man made fibres
- able to explore the applications of different types of natural and man made fibres

PCC–TT–203G Yarn Manufacture–I

Course code	**PCC–TT–203G**				
Category	Professional Core Course				
Course title	Yarn Manufacture–I				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- To familiarize the students with objectives of initial stages of yarn formation viz. Ginning, Mixing and Blending
- To make the students understand basic mechanisms involved in preparatory stages of yarn formation viz. Blowroom and Card
- To make students learn calculations related to preparatory stages of yarn formation viz. Blowroom and Card

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Brief introduction of the subject; Objectives of ginning, Pre-ginning and post-ginning operations and their significance, description and working of knife roller, McCarthy and saw gin; cotton contamination

Mixing and Blending: Objectives; Different methods along with advantages and disadvantages; Selection of cottons for particular mixing: different methods and principles involved; Tinting; Application of additional spin finish; function and levels;

UNIT II

Blowroom: Objectives; Components and accessories; Various types of openers, cleaners and mixers, their construction and working; Piano feed regulating motion; Design of cone drums; Lap forming mechanism; Selection of blow room lines for different cotton mixings and man-made fibres; Production and efficiency levels attainable, related calculations

UNIT III

Performance assessment of Blow room, Lap rejection, causes of lap defects and their remedies, Modern developments in blow room.
Carding: Objectives; Introduction to roller and clearer card; Principles of carding, stripping and brushing action; Design and construction of various parts and machine as a whole; Different zones of a carding machine; Design criteria for a high production card; Calculations related to a carding machine

UNIT IV

Analysis of carding forces; Mechanics of neps and hooks formation and their control; Carding of micro denier and dyed fibres; flexible and metallic card clothing; Design of wire points for processing different materials; Auto levelling at card; Performance assessment of a Card; Grinding of wire points: purpose, types and frequency; Modern developments in carding;

Reading List

Title	**Author**
Cotton Ginning, Textile Progress Vol.24 No.2 I	Doraiswamy, P Chellamani
Spun Yarn Technology, Vol I& II	A Venkatasubramani
Short Staple Spinning Volume-I, II, III & IV	W Klein
Spinning of Manmade & Blends on Cotton Systems	KR Salhotra
Technology of Carding	R Chattopadhyay

Course Outcomes

At the end of the course, the students will:

- have the knowledge of Ginning, Mixing and Blending, the initial processes of yarn formation;
- have learnt the principle and working of different machines of blowroom;
- be familiar with the working of carding machine along with the functions of its parts;
- be able to calculate various parameters like draft, production and efficiency related to Blowroom and card.

PCC–TT–204G Weaving Preparation

<table>
<tr><td>Course code</td><td colspan="5">PCC–TT–204G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Weaving Preparation</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–III</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Technology</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subjects of Physics and Mathematics **Course Objectives:**

The course is designed to make the students understand the:

- concepts of yarn linear density and yarn faults
- types of packages used in textile operations
- types and mechanism of winding, warping and sizing machines
- related production calculations

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Introduction to the subject; Winding: Process description, Objectives, types of winding, (Random & Precision), their principle and comparison.

Devices used on winding machines: Tensioners-Objective, principle, types, performance assessment; Clearers-Objectives, types, their principle, performance assessment; other devices with their objectives.

UNIT II

Yarn faults and their classification systems, Phenomenon of patterning and Anti patterning methods. Knots and splices; Brief idea of types of Splicers and their principle. Definitions of wind, Traverse Ratio, Coil angle, wind angle, Net winding Rate, gain and their related calculations. General calculations for efficiency and production, package faults in winding, modern developments in winding.

Pirn winding: Objective and process description in brief.

UNIT III

Warping: Process description, objectives, Direct and sectional warping, principle of working, relative merits and demerits, application area. Components of warping machines with objectives; types of creel, steps of section formation, Differences between warpers' and weavers' beam. Package faults, modern developments in warping. Calculations pertaining to direct and sectional warping including production and efficiency

Sizing: Process description and objectives of sizing. Passage of material through a Slasher Sizing machine

UNIT IV

Different zones of slasher sizing machine: creel, size box and its components, drying zone and head stock and their details. Size box controls, Sizing parameters: definition and relation, Sizing ingredients and their types; Size recipe for common yarns like cotton, polyester, viscose, nylon, acrylic. Factors affecting size add on. Package faults in sizing. Calculations related to production and efficiency. Developments in Slasher sizing machine; Other sizing techniques like HPS, Single end sizing, foam sizing, sinter roller sizing, and cold sizing

Leasing, Drawing-in and tying in: Objectives and process description.

Reading List

Title	**Author**
Fundamentals of Yarn Winding	Milind Koranne, Woodhead India Publications
Weaving: Conversion of Yarn to Fabric	R Lord, M H Mohamed, Woodhead Publishing
Yarn Winding	NCUTE Publication
Weaving: Technology and Operations	Ormerod
Yarn Preparation for Handloom weaving	B K Behera
Textile Mathematics Vol. III	JE Booth
Textile Sizing	B C Goswami, R D Anandjiwala, D Hall
Sizing: Materials, Methods, Machines	Ajgaonkar, Talukdar, Wadekar
Sizing	J B Smith

Course Outcomes:

After completion of the course, students will be able to:

- understand the fundamentals of yarn laying on a package
- understand the mathematical relations for better package production of winding and warping packages
- comprehend the mechanism and working different weaving preparatory methods adopted for efficient weaving
- understands the production calculations at different stages

PCC–TT–205G Fabric Manufacture–I

Course code	**PCC–TT–205G**				
Category	Professional Core Course				
Course title	Fabric Manufacture–I				
Scheme and Credits	L	T	P	Credits	Semester–III
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

The course is designed for the students to learn:

- basic concepts of woven fabric formation;
- types of looms, different motions in a loom;
- types and mechanism of primary, secondary and auxiliary motions in shuttle looms;
- related production calculations.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Brief introduction to the subject; Classification of looms: Plain loom, automatic shuttle loom and shuttle-less looms. Definitions of primary, secondary and auxiliary motions of a loom

Shedding motion on the loom: Tappet shedding: types of tappet shedding (positive and Negative), Negative tappet shedding – relative throw of cams, Heald shaft reversing motion.

Dobby Shedding: Negative Dobby shedding – mechanism of Keighley dobby, preparation of pattern chain for it.

Jacquard shedding: Mechanism of single lift-single cylinder, Double lift-single cylinder, Double lift-Double cylinder. Jacquard harness: different harness ties, e.g. Straight, Pointed and Border Tie, card punching for Jacquard.

UNIT II

Types of shed-Bottom closed, Semi-open, Center closed and open-sheds, their advantages and uses, comparison of Tappet, Dobby and Jacquard shedding.

Picking motion on the loom: Types of picking: conventional picking mechanisms: over-pick and under-pick, shuttle checking, checking devices, Calculations for power requirement for picking, shuttle flight time.
Study of picking mechanism as simple elastic system, nominal and actual picker displacement curves, Shuttle retardation curve during checking
Beat-up motion on the loom: Sley motion, Factors affecting sley motion, Sley eccentricity and its effects, Kinematics of loom sley in normal conditions. Loom timings for shedding, picking and beat-up motions.

UNIT III

Cloth control: Take-up motion – Objective, types, Five and seven-wheel take-up mechanisms, their comparison. Changes in Pick density, change places, expression for Pick density, Calculation of periodicity in pick variation due to faulty teeth or wheel eccentricity, Shirley take-up.
Temples - Function, types. Warp control: Objective, types. Let-off mechanisms (negative friction type, Bartlett let-off).
Warp stop motion: Objective, types. Mechanical and electrical warp stop motion.

UNIT IV

Weft stop motion: Objective, types, side weft fork and center weft fork motion.
Warp protector motion: Objective, types, Loose Reed, Fast Reed warp protector motion.
Automatic pirn change mechanism: Objective, feeler and types of feeler, change mechanism.
Bobbin loader and loom winder.
Weft mixing and weft patterning: four-box motion, pick at will.
Loom drive; rpm, efficiency and production calculations

Reading List

Title	**Author**
Principles of Weaving	R Marks & ATC Robinson
Weaving: Conversion of yarn to Fabric	Lord and Mohammed
Weaving: Technology & Operations	Ormerod
Weaving: Machines, Mechanisms, Management	Ajgaonkar et al
Woven Fabric Production – I, II	NCUTE Publications
Weaving Mechanism, I & II	NN Banerjee

Course Outcomes:
After completion of the course, students will have the knowledge of:
- different loom types and their motions
- mechanism and working of different motions in shuttle looms
- calculating the production of looms

LC–TT/TC/FAE–201G Textile Industrial Survey

Course code	**LC–TT/TC/FAE–201G**				
Category	Professional Core Course				
Course title	Textile Industrial Survey				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- The course is designed to make students learn writing reports of survey/practical visits to textile industrial units

Contents:

Study and survey of textile industries spread over India as well as Global areas specifically in nearby places, through practical visits and internet facilities; Preparation of report of the survey and highlight salient features of specific sectors involved like spinning, weaving, knitting, process house, garment manufacturing, Label manufacturing, export and buying houses etc

Course Outcomes:

- At the end of this course the students will be able to survey and prepare the reports of any Industrial unit specifically in textile fields

LC–TT/TC/FAE–202G Fibre Microscopy & Identification

Course code	LC–TT/TC/FAE–202G				
Category	Professional Core Course				
Course title	Fibre Microscopy & Identification				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Textile Raw Materials **Course Objectives:**

The Lab course is designed to make students learn

- identification of textile fibres and filaments
- identify the burning behaviour, microscopical structure and chemical solubility of different textile fibres
- blend analysis

Contents

Principle of microscopy, Microscopic identification of fibres, preparation and mounting of specimen for longitudinal view, Cross-section cutting. Microtomy - cork method, metal plate method, Hardy's Microtome, Mountants and reagents for fibre microscopy; Identification of fibres through burning as well as solubility tests. Standard schemes of analysis of homogenous fibre blends by physical and chemical methods; Qualitative and quantitative determination of components; Preparation of reagents used for chemical analysis.

Reading List

Title	Author
Hand book of textile fibres	J Gordan Cook
Textile Fibres	HVS Murthy

Course Outcomes:

After completion of the course, students will have the knowledge of:

- the burning tests, microscopic tests and solubility tests for identification of the textile fibers
- cemistry involved in various practical tests
- various tests for analysis of blends of two or more fibres

LC–TT–203G Spinning Lab–I

Course code	**LC–TT–203G**				
Category	Professional Core Course				
Course title	Spinning Lab–I				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Technology				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Yarn Manufacture-I **Course Objectives:**

- This Lab course is designed to impart first-hand experience of handling blowroom and carding machines thus serving as a bridge between theory and practice.

Contents

Practice in handling and operation of blow room, study of constructional details of machinery in blow room, Calculating speeds of different machine parts, Blow/inch of Kirschner beater, Production calculation of blow room, various control points and change places, Practice in checking of the quality of lap.

Familiarity with carding machine, constructional details, change places and speed calculation of a carding machine, Effect of various machine parameters in production and quality of sliver, checking the quality of sliver, Finding out individual draft and total draft in carding machine. Flat speed and its impact, Study of coiling mechanism, coils/layer. Setting points according to type of material.

List of Experiments:

1. Draw the flow of material through Lakshmi Rieter (LR) blowroom line and discuss the functions of each machine.

2. Draw the flow of material through Mixing Bale Opener (MBO). Also draw its gearing diagram and calculate the speeds of different parts.

3. Draw the flow of material through ERM cleaner. Also draw its gearing diagram and calculate the speeds of different parts.

4. **4.** Draw the flow of material through Kirschner Beater. Draw the gearing diagram of Scutcher and calculate
    - Speed of different parts of the machine;
    - Draft between different calendar rollers;
    - Draft between calendar roller and shell roller;
    - Production of blowroom line by assuming suitable data.

5. **5.** To study the objectives of CARDING machine. Draw the flow of material through a card and label various parts.

6. **6.** To study the following aspects of an existing card in the lab:
    - Gearing plan;
    - Calculation of rotational and surface speeds of different rollers;
    - Calculation of zonal drafts and total drafts between different rollers;
    - Calculation of actual draft from mechanical draft and waste%;
    - Draft constant and production constant using different methods;
    - Calculation of production assuming suitable data
    - Calculation of sliver coils per layer in the can;
    - Different change places

Course Outcomes:
At the end of this course the students will be able to:
- understand the blowroom line and sequence of machines in the blowroom line;
- practically handle and set the blowroom line for processing different materials;
- practically handle and set a card for processing different materials.

LC–TT–204G Weaving Lab–I

Course code	**PCC–TT–204G**				
Category	Professional Core Course				
Course title	Weaving Lab–I				
Scheme and Credits	L	T	P	Credits	Semester–III
	0	0	2	1	
Branch	Textile Technology				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basics of Physics, Chemistry, Math, Weaving Preparation and Fabric Manufacture-I **Course Objectives:**

- This Lab course is designed to impart first-hand experience of weaving preparatory machines and their settings. It also helps students practically understand the primary motions of shuttle loom.

Contents:

Study of winding, warping, slasher sizing: primary components and their functioning, operation, settings, related calculations, production, efficiency, package types, faults and their remedies.
Drawing-in process: Process description, drafting/denting plans Pirn winding: objective and functioning in brief.
Introduction to loom and its primary parts, passage of material through it.
Study of shedding (negative cam, dobby, jacquard), picking and beat-up mechanisms in shuttle looms: construction, working and related calculation/settings.

List of Experiments

1. Study of Winding Process
2. Study of Warping Process
3. Study of Slasher Sizing
4. Study of Drawing-in Process
5. Study of Pirn Winding Process
6. Introduction to Shuttle Loom
7. Study of Conventional Shedding Mechanisms
8. Study of Shuttle Picking Mechanisms
9. Study of Crank Beat-up Mechanism in Shuttle loom

Course Outcomes:
After completion of the course, students will be able to:

- correlate between theory and practice of the concept of weaving preparatory methods
- visualise the layout and structure of weaving preparatory machines along with their primary components
- visualise the mechanisms of primary motions of shuttle weaving machines and comprehend their settings
- develop practical skills relevant to industrial practices.

CONSTITUTION OF INDIA

Class Work : 50

Course Code	MC-105G		
Category	**Engineering Science Course**		
Course title	**Constitution of India** (Theory)		
Scheme	**L**	**T**	**P**
	0	0	2

CONSTITUTION OF INDIA– BASIC FEATURES AND FUNDAMENTAL PRINCIPLES

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950.

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

COURSE CONTENTS

1. Meaning of the constitution law and constitutionalism.
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of the Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of the Fundamental Duties and its legal status.
6. The Directive Principles of State Policy – Its importance and implementation.
7. Federal structure and distribution of legislative and financial powers between the Union and the States.
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

REFERENCES:

1. The Constitutional Law Of India 9th Edition, by Pandey. J. N.
2. The Constitution of India by P.M.Bakshi
3. Constitution Law of India by Narender Kumar
4. Bare Act by P. M. Bakshi

BSC–MATH–201G Applied Statistics & Operation Research

Course code	**BSC–MATH–201G**				
Category	Basic Science Course				
Course title	Applied Statistics & Operation Research				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Mathematics and Statistics

Course Objectives:

- To develop statistical and probability based skills amongst the students
- To make the students learn basic tools of Operations Research used in solving managerial problems

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Basic Statistics:
Measures of Central tendency, Dispersion, moments, skewness and Kurtosis (definition, properties and associated numerical only); Correlation, Karl Pearson's coefficient of correlation, rank correlation, line's of regressionand curve fitting (linear and parabolic)

UNIT II

Probability and Probability Distributions:
Concept of probability, additive and multiplicative laws of probability (Statements and associated numerical only);
Random variate: Mathematical expectation, theorems on expectation, discrete and continuous probability distributions (definition and problems only); Univariate Binomial, Poisson and Normal distributions (properties and applications)

UNIT III

Sampling & Testing of hypothesis

Population and sample, types of sampling, sampling distribution of means and proportions (definition only)

Definition of statistical hypothesis, null hypothesis, type I and type II errors and level of significance. Tests of significance for large and small samples (discussion) problem based on χ^2 test for goodness of fit, t-test, F-test and Analysis of variance (one way and two way classifications)

UNIT IV

Operations Research

Linear programming problem (formulation and solution by graphical approach only); Transportation problem including time minimizing problems, Basic Assignment problem, sequencing problems (n jobs, 2 machines and n jobs, m machine problems);

Project scheduling by PERT/CPM: Definition of network, critical path, floats, finding of critical path and floats.

Reading List

Title	Author
Mathematical Statistics	Ray and Sharma
Business Statistics	Gupta & Gupta
Theory and problems of probability and Statistics	Murray P Spiegel
Operation Research	P.K. Gupta, Manmohan
Operations Research for Management	Gupta & Sharma
Higher Engineering Mathematics	B.S. Grewal

Course Outcomes:

After completion of the course, students will have the knowledge of:

- basic statistical parameters of measures of central tendency, dispersion, correlation, regression etc
- the concept of probability and probability distributions
- the concept of testing of hypothesis based upon sampling
- the concept of linear programming, transportation, assignment, sequencing problems as well as PERT/CPM

ESC–TT/TC/FAE–201G Computer Aided Textile Designing

Course code	**ESC–TT/TC/FAE–201G**				
Category	Professional Core Course				
Course title	Computer Aided Textile Designing				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry, Mathematics and Computer **Course Objectives:**

- To introduce computer softwares and hardwares related to textile designing;
- To make students learn basic tools and designing techniques used in textile and Apparel sectors;
- To make students understand applications of CAD for colour and weave designs.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Fundamentals of CAD: Definition, History, Hardware and Software requirements of CAD, Design Process, Application areas of computer aided design and manufacturing in textile and apparel industry, Introduction to Computer Graphics, Raster and Vector Graphics features.

UNIT II

Hardware in CAD: Introduction, Design workstation, Graphics terminal, input and output devices, central processing unit and secondary storage. Arrangement of figures - unit-repeating design, the drop device, drops reverse designs, system of distribution with reference to diamond base, ogee base, and rectangular base lines. Construction of designs from incomplete repeat, classification of borders patterns, all over patterns and types

UNIT III

Selection tools in adobe Photoshop: selection by shape, colour and mask, Colour specification tools, Image adjustment modes, layer blending modes and their options. Different brush tools and their dynamics options, Colour fill: Paint and gradiant, Clone tool, colour modification via dodge, burn, colour replacement, mixer etc. Layer masking, Texture mapping, Filter applications for fancy effects, layer functions, working with displacement maps, texture maps. Basic vector shape drawing tools, shape editing via anchor points etc.

UNIT IV

Introduction to Corel Draw Interface Tool Box, Working with shape drawing tools for lines, rectangles, squares, circles, ellipses, polygons, starts and spirals etc. Object transformations as rotation, scaling etc. freely and for specific dimensions, Selecting Objects, reshaping, duplicating, grouping, trimming, locking and unlocking, aligning objects. Introduction to curves, nodes and segments; Drawing freehand tools; Drawing and selecting closed curves and nodes, adding, removing and joining nodes. Bezier tool, drawing curve and straight line with bezier tools, Colour fill and options

Reading List

Title	**Author**
Computer Aided Design & Manufacturing	Mikcle P Groover, Emory W.Zimmers Jr
Computer Graphics Principles & Practices	James D Foley, Andeies Van Da Shvan K Feiner. John F Hughes
Computer Graphics	Donald Mearn & M Pauline, Baker
“Watsons Textile Design and Colour”	Grosiciki, Newnes Buttersworth, 1988

Course Outcomes:
After completion of the course students will:
- be familiar with computer fundamentals for Computer Aided Designing
- have the knowledge of computer softwares and basic tools for textile designing
- know the elements and principles of design and their applications in textile designing through CAD

PCC–TT/TC–206 G Man–Made Fibre Production

Course code	**PCC–TT/TC–206 G**				
Category	Professional Core Course				
Course title	Man–Made Fibre Production				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

The course is designed to make students learn:

- the basic concepts of fibre forming polymers
- various manufacturing systems of man made fibres
- processes and chemical reactions involved during manufacturing of typical fibres

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

General definitions related to man-made/manufactured fibres. Introduction to manufacturing processes of these fibres. Study of various spinning systems: melt, wet & dry spinning – basic principles. Brief details of spinning head, spinneret, quench chamber, drying chamber & coagulation bath. Spin finish applications.

UNIT II

Regenerated fibres: Viscose rayon – detailed manufacturing process with reactions at each stage. Polynosics, Super high wet modulus rayons, Brief manufacturing processes of Lyocell and Tencel fibres.

UNIT III

Polyacrylonitrile: Addition of comonomers, continuous suspension, polymerization techniques; Solution spinning techniques; Coagulation bath variables; Macrovoid generation and their remedies; Effect of spinning variables on structure and properties of gel and final fibres.
Polypropylene: Polymerisation techniques (suspension & gas phase), Superactive catalysts and their composition; major drawbacks and their possible remedies; Spinning of filaments.

UNIT IV

Polyethylene terephthalate: Polymerisation techniques (batch & continuous), side reactions, degradation reactions – their control, Production of filament yarns and staple fibres, Brief description of manufacturing technique of high tenacity polyethylene terephthalate.
Nylon 6 & nylon 66: Polymerisation techniques in VK tube (batch & continuous) along with side reactions, Integrated continuous process for nylon 66, Filament spinning technique.

Reading List

Manmade fibres	RW Moncrieff
Manufactured Fibre Technology	V. B. Gupta and V.K. Kothari
Production of Synthetic Fibres	A.A. Vaidya

Course Outcomes:
After completion of the course, students will:

- have the knowledge of essential requirements for fibre forming polymers
- be familiar with different techniques of fibre production systems
- have the knowledge of raw materials used for producing different man made fibres;
- be familiar with the chemical reactions occcuring during the manufacture of typical fibres

PCC–TT–207 G Yarn Manufacture–II

Course code	**PCC–TT–207 G**				
Category	Professional Core Course				
Course title	Yarn Manufacture–II				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics, Yarn Manufacture–I

Course Objectives:

- To familiarize the students with objectives of intermediate preparatory stages of yarn formation viz. draw frame, sliver lapper, ribbon lapper and comber
- To make the students understand basic mechanisms involved in intermediate preparatory stages of yarn formation viz. draw frame, sliver lapper, ribbon lapper and comber
- To make students learn calculations related to intermediate preparatory stages of yarn formation viz. draw frame, sliver lapper, ribbon lapper and comber

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Objectives of draw frame, Principle of roller drafting and weighting in draw frame, Concept of Ideal drafting and drafting wave, drafting forces, drafting roller arrangements, doubling, blending and hooks removal at draw frame, coiling systems. Principle of roller setting, Processing of cotton and man-made fibre on draw frame, Auto-levelling, Roller lapping–reasons and remedies, Performance assessment of Draw frame, Calculation related to draw frame, modern developments in draw frame.

UNIT II

Objectives of lap preparation, system of lap preparation, study of sliver lapper, ribbon lapper and super lapper machines, Modern concept of lap preparation, Configuration of fibre feed and its effect on quality of product;

Objectives of Combing, noil percentage and fractionation efficiency of comber, Different types of comber, detailed study of the Nasmith type comber, Timing diagram for combing operation.

UNIT III

Timing and setting of comber for different classes of cotton, control of noil percentage, Type of feed, Influence of type of feed on noil extraction and cleanliness of sliver, Performance assessment of Combing, Calculations related to combing, Recent developments in combing,
Speed Frame: Objectives of speed frame, conventional and modern roving processes, Mechanism of drafting, twisting and winding.

UNIT IV

Basic principle of designing of cone drum, Differential motions, Building motions, their objects and types, Roving tension, coil spacing, drafting systems, common defects in roving packages, their causes and remedies, Processing of man-made fibres on speed frame, Performance assessment of Speed frame, Calculations related to speed frame, Recent developments in speed frame.

Reading List

Title	**Author**
Spun Yarn Technology, Vol I& II	A Venkatasubramani
Short Staple Spinning Vol I, II, III & IV	W Klein
Spinning of Manmade & Blends on Cotton System	KR Salhotra
Manual of cotton spinning (Drawframes, Combers and speedframes)	Frank Charnley
Cotton Spinning	WS Taggart
Cotton Drawing & Roving	GR Merrill

Course Outcomes

At the end of the course, the students will:

- have the detailed knowledge including the function of each part of draw frame, sliver lapper, ribbon lapper, comber and speed frame the intermediate preparatory stages of yarn formation for processing different materials;
- have learnt the principle and working of draw frame, sliver lapper, ribbon lapper, comber and speed frame
- be able to calculate various parameters like draft, noils, production and efficiency related to draw frame, sliver lapper, ribbon lapper, comber and speed frame.

PCC–TT–208 G Fabric Manufacture–II

Course code	**PCC–TT–208 G**				
Category	Professional Core Course				
Course title	Fabric Manufacture–II				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

The course is designed to make the students aware of:

- basic concepts of knitting and knitted fabrics
- types of knitting and their application areas
- different knitting elements and their types and functioning
- different knitted fabric structures, notations, production and properties
- knitted fabric geometry and related calculations

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Definitions of Knitting and Knitted fabrics: stitch, differences between woven and knitted fabrics; Classification of knitting; differences between weft and warp knitting, characteristics of weft knit and warp knit structures.

Weft Knitting: Classification of weft knitting machines. General description of weft knitting machines viz. Flat and Circular, primary knitting elements, types of Knitting Needles (Latch, bearded and compound), their knitting cycle, comparison and use.

UNIT II

Knit, Tuck and Float Stitches, their formation in machine, properties and applications. Basic weft knitted structures (Plain, Rib, Interlock and Purl) and their properties. Description of machines: Non sinker and sinker single jersey, Rib and Interlock double jersey and Purl knitting machine along with knitting cycle, design of cams.

UNIT III

Warp Knitting: Classification of warp knitting machines. Description and knitting cycle of Raschel and Tricot machines, Prominent structures like Tricot, Lock knit, Reverse Lock knit, Satin, Sharkskin and their uses.
Patterning: Patterning Devices and their mechanism: multi-cam track, pattern wheel jacquard, pattern cylinder and electronic jacquard.

UNIT IV

Knitted Fabric Geometry and calculations: Tight and distorted knitted structure geometry. Derivations of formulae and calculations for fabric width, Tightness factor, Stitch density, Areal density, Fabric cover and knitting machine production.
State of Knitted fabrics: Dry, Wet and Finished relaxed;
Characteristics of yarns used for knitting.
Major Knitted fabric faults, their causes and remedies.
Developments in knitting technology

Reading List

Title	**Author**
Knitting Technology	Ajgaonkar
Warp Knitting Production	S Ray, Melliand
Knitting Technology	David J Spencer
Circular Knitting	C Iyer, B Mammel and W Schach

Course Outcomes:
After completion of the course, students will be able to:

- understand the basic concepts of knitting and its types
- identify and understand the role of different knitting elements
- comprehend the major knitted fabric structures, their properties and production
- understand the geometry of knitted structure and its relevance

PCC–TT–209 G Fabric Structure

Course code	**PCC–TT–209 G**				
Category	Professional Core Course				
Course title	Fabric Structure				
Scheme and Credits	L	T	P	Credits	Semester–IV
	3	0	0	3	
Branch	Textile Technology				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

The course is designed to make the students understand:

- basic concepts of fabric structure and weave design
- different types of basic weave designs and their derivatives
- different types of decorative weaves

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Basic Concepts: Importance of fabric structure, Classification of fabrics, Notation of Weave, drafting plan, peg plan and denting.
Simple Weaves: plain weave and its derivatives, ornamentation;

UNIT II

Twill weave and its derivatives, ornamentation, effect of twist on prominence of twill lines, Sateen and Satin and their extensions; Crepe weave, diamond weave;

UNIT III

Mockleno, Cork-screw, honey comb, huck-a-back, Bedford cords, welt and pique fabrics;

UNIT IV

Decorative Weaves: Extra warp and weft figuring Backed cloth, Double cloth, treble and multiply belting structures.
Draft, peg plan and denting plan for all simple and decorative weaves, Particulars of common varieties of these fabrics.

Reading List

Title	**Author**
Textile Design and Colour	W Watson
Watson’s Advanced Textile Design	W Watson
Grammer of Textile Design	H Nisbet
Woven Cloth Construction	Marks and Robinson

Course Outcomes:

After completion of the course, students will:

- have the knwledge of fabric structure and weave designs
- be able to identify and design different types of elementary and decorative weaves along with drafting, denting and peg plans

ESC–TT/TC/FAE –202 G Computer Aided Textile Designing Lab

Course code	**ESC–TT/TC/FAE–202 G**				
Category	Engineering Science Course				
Course title	Computer Aided Textile Designing				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry, Mathematics and Computer **Course Objectives:**

- This Lab course is designed to impart first-hand experience of handling CAD softwares for Textile Designing thus serving as a bridge between theory and practice.

Contents:

Warp and Weft Colour Pattern designing using Elements of design and Principles of designs, like line, dot, print etc.; Types of lines and their application in designing; Types of dots as polka dot, etc. General idea about weave and colour effect; Composition of designs–by Geometric ornamentation by the conventional treatment of natural and artificial forms and by the adoption and reproduction of earlier designs; Geometric ornamentation, construction of symmetrical figures, Reversing inclined figures; Practical Application of Elements of Design and Principles of design using CAD.

Weave designing using Arrangement of figures- unit-repeating design, the drop device, drops reverse designs, sateen system of distribution (with reference to half drop, diamond base, ogee base, rectangular base lines). Construction of designs from incomplete repeat; Border designing: Study of pattern–historical precedents. Symmetry–principle concepts, perspectives and its application, classification of motifs, border patterns, all over patterns; CAD practical application in Weave designs, arrangement of figures, Border designing and Motif and repeat making.

List of Experiments:

1. To study different selection option tools in Adobe Photoshope

2. To study imge adjustment modes and tools in graphic designing software

3. To study different image transformation tools

4. To create motif vector by print designing

5. To crete shade cards of above designed print

6. To create textile patterns for designed prints

7. To study different colour modification tools

8. To drape designed fabric patterns on apparels and fashion accessories

9. To design fashion show ramp using previously designed apparels and accessories

10. To design technical and graphical parameters of yarn

11. To develop fabric using above designed yarn as per the desired weave parameters

Course Outcomes:
The students will be able to practically handle:

- elements and principles design using CAD systems;
- arrangement of figures and motifs using various methods
- geometrical ornamentation
- placement of patterns in symmetric and asymmetric way;
- creation of Border designs.

LC–TT–205G Spinning Lab–II

<table>
<tr><td>Course code</td><td colspan="5">LC–TT–205 G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Spinning Lab–II</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester–IV</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Branch</td><td colspan="5">Textile Technology</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- This Lab course is designed to impart first-hand experience of handling draw frame, Lap former, Comber and Simplex machines thus serving as a bridge between theory and practice.

Contents

Practice in handling, operation, setting and gauging draw frame, Lap former, comber and simplex.
Study of constructional details of machines: various control and change places etc.
Practice in checking the quality of comber lap, sliver and waste analysis, common fault and remedies, Calculations pertaining to gearing, speeds, constant, draft and production etc.

List of Experiments:

1. To study the following aspects of a draw frame in the Lab:

- Objectives and flow of material mentioning the name of each part;
- Gearing plan;
- Calculation of Rotational and Surface speed of different rollers;
- Calculation of Individual Draft and total draft between different rollers;
- Calculation of Draft constant, Break draft constant, and production constant;
- Calculation of Production;
- Different change places.

2. To study the following aspects of a Lapformer in the Lab:

- Objectives and flow of material mentioning the name of each part;
- Gearing plan;

- Calculation of Rotational and Surface speed of different rollers;
- Calculation of Individual Draft and total draft between different rollers;
- Calculation of Draft constant and production constant;
- Calculation of Production;
- Different change places.

3. To study the following aspects of a Comber in the Lab:

- Objectives and flow of material mentioning the name of each part;
- Gearing plan;
- Calculation of Rotational and Surface speed of different rollers;
- Calculation of Individual Draft and total draft between different rollers;
- Calculation of Draft constant and production constant;
- Calculation of Production;
- Different change places;
- Different setting and gauges.

4. To study the following aspects of a Simplex Machine in the Lab:

- Objectives and flow of material through the machine mentioning the name of each part;
- Gearing plan;
- Calculation of Surface speed and draft ratio of drafting system;
- Calculation of Draft constant, Break draft constant, Twist constant and production constant;
- Calculation of Bobbin speed at its minimum and maximum diameter;
- Calculation of Spindle speed, bobbin rail speed and other parts speeds;
- Calculation of Coils per inch and production calculation;
- Building motion principle with neat and clean diagram;
- Different change places.

Course Outcomes:
The students will be able to practically handle:

- Draw frame and set it for processing different fibres;
- Lapformer and set it for different materials;
- Comber and set it for processing different varieties of cotton;
- Simplex and set it for processing different materials.

LC–TT–206G Weaving Lab–II

Course code	**LC–TT–206 G**				
Category	Professional Core Course				
Course title	Weaving Lab–II				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Technology				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- This Lab course is designed to impart first-hand experience of features, layout, secondary and auxiliary mechanisms of shuttle looms and their settings. It also helps students practically understand in-depth working of basics of knitting operations in flat and circular knitting machines

Contents:

Study of construction, working and related calculation/settings of secondary and auxiliary motions in shuttle looms (negative let-off, 5 & 7 wheel take-up, warp protector, warp and weft stop, automatic pirn change);

Study of weft knitting process: Specifications, path of yarn, construction, operation of circular and flat bed weft knitting machines, primary knitting elements and their working, yarn feed, stop motions, patterning possibilities. Weft knitted fabric sample preparation.

List of Experiments:

1. Study of Five and Seven Wheel take-up mechanism
2. Study of negative and Cimmco Let-off mechanism
3. Study of Fast Reed Warp protector motion in shuttle looms
4. Study of Loose Reed Warp protector motion in shuttle looms
5. Study of Warp Stop motion (Mechanical Vibrator Bar type) in shuttle looms
6. Study of Weft Stop motion (side weft fork type) in shuttle looms
7. Study of Multiple Box motion (4×1 Cowburn & Peck's Drop Box type) for weft patterning in shuttle looms
8. Study of automatic pirn change mechanism in shuttle looms

9. Study of Weft Knitting process, principle of weft knitted loop formation, basic weft knitting cam structure and specification of different knitting machineries in the workshop
10. Study of Flat Bed (Single Bed) Weft knitting machine
11. Study of Flat Bed (Double Bed) Weft knitting machine
12. Study of Circular Bed Weft knitting machineries
13. To produce different fabrics on flat double bed weft knitting machine and study their properties

Course Outcomes:
After completion of the course, students will be able to:

- Correlate between theory and practice of the concept of shuttle looms
- Visualise the mechanisms of secondary and auxiliary motions of shuttle weaving machines and comprehend their settings
- Correlate between theory and practice of the concept of knitting machines
- Visualise the mechanisms of knitting machines and comprehend their settings
- Develop practical skills relevant to industrial practice

LC–TT–207G Fabric Analysis Lab

Course code	**LC–TT–207 G**				
Category	Professional Core Course				
Course title	Fabric Analysis Lab				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	1	
Branch	Textile Technology				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

- This Lab course is designed to impart first-hand experience of the recognition of constructional parameters of woven fabrics from a fabric swatch. This skill will help the students for production and planning of woven fabrics as well as quality control of fabric.

Contents:

Basic principles involved in analysis of woven fabric and estimation of data for cloth reproduction. Identification of materials, type of yarns used in their construction, weave analysis, sett and cover factor. Warp Count, Weft Count and weight calculations for simple and compound woven structures, Specifications for standard woven fabrics.

List of Experiments:

1. To analyse the constructional parameters of plain woven fabrics
2. To analyse the constructional parameters of derivatives of plain designs
3. To analyse the constructional parameters of various types twill designs
4. To analyse the constructional parameters of satin and sateen designs
5. To analyse the constructional parameters of Bedford cords and honey combs designs
6. To analyse the constructional parameters of double cloths

Course Outcomes:

After completion of the course, students will be able to:

- able recognise different types of weave designs
- able to analyse different constructional parameters of woven fabrics like yarn linear density, end and picks per unit length, fabric cover, fabric areal density
- develop practical skills relevant to fabric quality control

MC–108G Essence of Indian Knowledge Tradition

Course code	**MC-108G**				
Category	Mandatatory Course				
Course title	Essence of Indian Knowledge Tradition				
Scheme and Credits	L	T	P	Credits	Semester–IV
	0	0	2	0	
Branch	Textile Technology, Textile Chemistry, Fashion & Apparel Engineering				
Class work	50 Marks				
Exam	00 Marks				
Total	50 Marks				
Duration of Exam	00 Hours				

Pre–requisites: Basic Science subjects of Physics, Chemistry and Mathematics **Course Objectives:**

The course is designed to impart the following:

Course objective

The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technologicaladvancements and societal disruptions. Part-I focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

Course Contents

– Basic structure of Indian Knowledge System: अष्टादशविद्या ४वेद,४उपवेद (आगुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थापत्य आदि) ६वेदांग (शिक्षा, कल्प, निरुक्त, व्याकरण, ज्योतिष, छंद) ४ उपाड्ग (धर्मशास्त्र, मीमांसा, पुराण, तर्कशास्त्र)

– Modern Science and Indian Knowledge System

Yoga and Holistic Health care

Case studies

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH(FIRE TECHNOLOGY AND SAFETY)

SEMESTER 3rd AND 4th

Scheme effective from 2019-20

COURSE CODE AND DEFINITIONS

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar
TH	Theory
Pr	Practical

MAHARSHI DAYANAND UNIVERSITY, ROHTAK

Scheme of Examination for Semester III (Second Year)

B.TECH (FIRE TECHNOLOGY AND SAFETY) w.e.f. 2019-20

SN	Category	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Mark of Class work	TH	Pr	Total	
1	Basic Science Course	BSC-FT-201G	Mathematics-III	3	1	0	4	4	25	75		100	3
2	Professional Core Courses	PCC-FT-203G	Basics of Fire Science	3	0	0	3	3	25	75		100	3
3	Professional Core Courses	PCC-FT-205G	Fire Service Hydraulics-I	3	1	0	4	4	25	75		100	3
4	Engineering Science Course	ESC-FT-207G	Basics of Thermal Engineering	3	1	0	4	4	25	75		100	3
5	Professional Core Courses	PCC-FT-209G	Automobile Safety	3	1	0	4	4	25	75		100	3
6	Professional Core Courses	PCC-FT-211G	Fire Protection Workshop	0	0	2	2	1	25		25	50	3
7	Professional Core Courses	PCC-FT-213G	Automobile Safety Lab	0	0	2	2	1	25		25	50	3
8	Engineering Science Course	ESC-FT-215G	Basics Thermal Engineering Lab	0	0	2	2	1	25		25	50	3
9	Training	PT-FT-217 G	Fire Ground Operation-I	0	0	2	2	1	25		25	50	3
							TOTAL CREDIT	**23**				**700**	

<table>
<tr><td>Course code</td><td colspan="5">BSC-FT- 201G</td></tr>
<tr><td>Category</td><td colspan="5">Basic Science courses</td></tr>
<tr><td>Course title</td><td colspan="5">Mathematics- III</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-III</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">• To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering.
• To provide an overview of Numerical methods, Laplace Transform and Linear Programming to Fire Engineers</td></tr>
<tr><td>Course Outcomes:</td><td colspan="5">By the end of this course the student will be able to:
• To solve field problems in engineering involving partial differential equations
• To find roots of polynomial and transcendental equations using numerical methods and conduct numerical integration
• To deal with the Laplace transform, Linear Programming and their applications</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

SECTION-A

Partial Differential Equations: First order linear partial differential equations, First order non-linear partial differential equations, Charpit's method, Second order linear partial differential equations and their classifications, Method of separation of variables and its applications to wave equation, One dimensional heat equations and Two dimensional heat flow (steady state solutions only)

SECTION-B

Numerical Methods: Solution of Polynomial and Transcendental equations – Bisection method, Regula-Falsi method and Newton-Raphson method, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae, Numerical integration, Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

SECTION-C

Transform Calculus: Laplace Transforms and its Applications: Laplace transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Multiplication by , Division by t, Evaluation of integrals by Laplace transforms, Laplace transform of unit step function, Unit impulse function and Periodic function, Inverse transforms, Convolution theorem, Application to linear differential equations.

SECTION-D

Linear Programming: Linear programming problems formulation, solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.

Suggested Readings:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers
4. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand and Company
5. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI.
6. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
7. C. L. Liu, Elements of Discrete Mathematics, Tata McGraw-Hill.
8. K. H. Rosen, Discrete Mathematics and its Applications, Tata McGraw-Hill.
9. J. L. Hein, Discrete Structures, Logic and Computability, Jones and Bartlett.

<table>
<tr><td>Course code</td><td colspan="5">BSC-FT-203 G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Basics of Fire Science</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-III</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">• To study the basic of fire and combustion.
• To familiarize with the smoke, its characteristics, control and management.
• To know about detectors and fire alarm systems as per relevant standards (ISI).
• To know about different fire extinguishers, extinguishing media and fire protection equipments.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="5">On successful completion of this course students will be able to
• Demonstrate knowledge of fire, its cause and phases of fire.
• Prepare the emergency evacuation plan and can help occupants in emergency evacuating process.
• Apply suitable extinguishing media after identification of class of fire.
• Explain the methods of smoke management.</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Section-A

Introduction: Temperature, heat, specific heat, latent heat, ignition, types of ignition, sources, combustion, types of combustion- rapid, spontaneous, explosion, elements of fire, flash point, fire point, causes of fire, fire propagation (phases of fire), fire load, burning regimes estimates, fire plume, extreme fire behavior, reasons for major spread of fire, precautions against ignition, spontaneous ignition and combustion, range of inflammability.

Section-B

Product of Combustion: Flame, smoke, fire gases, toxicity of smoke, exposure to fire effluents, effect of fire effluents, quantitative analysis of fire effluents, acceptance criteria for life safety, volume of smoke, quality of smoke, visibility and obstruction, density of smoke, smoke movement.

Smoke Control and Management: Smoke control during building design, design principle of smoke management, method of smoke management, pressurization of protected escape routes, actual design of smoke control pressurization system, calculation of discharge rate of air blowers, effective leakage area, smoke extractors.

Section- C

Classification of buildings based on occupancy, Fire zone, Classification of Fire, Fire Extinguishers and other fire protection equipments for different occupancy classification as per NBC, Sprinkler System, Total Flooding System, Foam System, Fire Investigation, Fire Training and Education, Fire Safety Audits, Risk Assessment, Fire insurance.

Section-D

Classification of type of constructions according to fire resistance, General fire safety requirements applicable to all individual occupancies, Sitting of detectors as per relevant standards (ISI), Selection and planning of alarm system as per relevant standards (ISI), General requirements and guidelines for the installation of fire detection and alarm system in buildings of different occupancy classification.

Emergency- Emergency Evacuation, Process of Emergency evacuation, Evacuation plan, Means of Escape.

Suggested Readings

1. Fire Safety in Buildings by V K Jain, New Age publishers, New Delhi
2. Principles of Fire Safety Engineering – A. K. Das (PHI Publishers).
3. Fundamentals of Fire Safety in Building Design by Dr. Than Singh Sharma, Aayush Publications, New Delhi
4. Handbook of Fire Technology by R.S.Gupta, Orient Longman Pvt. Ltd., Kolkata
5. Manual of Fire Safety by N. Sesha Prakash, CBS Publishers & Distributors Pvt. Ltd.
6. National Building Code (NBC) Part-4 Life and Safety (Latest Edition)

Course code	**PCC-FT-205 G**				
Category	Professional Core Courses				
Course title	**Fire Service Hydraulics-I**				
Scheme and Credits	L	T	P	**Credits**	Semester-III
	3	1	0	4	
Course Objectives:	• To be familiar with different types of tanks and to measure the capacity of tanks. • To know about fluid pressure and its effects • To understand the Kinematics and Dynamics of fluids				
Course Outcomes:	On successful completion of this course students will be able to • Determine the capacity of various types of tanks under various conditions. • Evaluate the effect on the pressure due to shape, size of container, weight, external force and directions. • Apply Bernoulli's equation for different elements like Venturimeter, Orificemeter and Pitot tube.				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Section-A

Measurements: Units of Measurements, System of measurements, Capacity of tanks, rectangular tank and square tank with flat base and sloping base, circular, spherical tank, elliptical tank, time of filling and emptying a tank.
Basics of Hydraulics: Concept of fluid and flow, properties of fluids, density, specific gravity, pressure, relative density, vapour density, types of fluids, ideal and real fluids, continuum concept, Newtonian and non-Newtonian fluids, use of water in fire service.

Section-B

Hydrostatics: Concept of pressure, Pressure head, Pascal's law, effect of shape and size of container on pressure, effect of specific weight on pressure, effect of external force on pressure in a vessel, direction of pressure in a vessel, Basic equation of fluid statics, Pressure variation in compressible and incompressible fluids, forces on submerged plane surfaces and curved surfaces, Fluid pressure and its measurement (Manometer and Bourdon pressure gauge).
Buoyancy: Stability of floating and submerged bodies, oscillation of floating bodies.

Section-C

Kinematics of fluid flow: Types of flow, steady and unsteady, uniform and non uniform, laminar and turbulent, Eulerian and Lagrangian description of fluid flow, stream line, path line, streak line, flow rate and continuity equation, one and two dimensional flow, velocity and acceleration at a point, Differential equation of continuity in cylindrical and polar coordinates, rotation, vorticity and circulation, stream and potential functions, flow net, Problems.

Section-D

Dynamics of fluid flow: Concept of system and control volume, one dimensional method for flow analysis, Euler's equation of motion, derivation of Bernoulli's equation for incompressible flow and its application (Venturimeter, Orifice meter, Pitot tube), kinetic and momentum correction factors, Impulse momentum relationship and its applications, Problems.

Suggested Readings

1. Hydraulics and Fluid Mechanics : P.N.Modi, Dr. S.M. Seth
2. Hydraulic Mechanics and Hydraulics Machines : Dr. J.Lal
3. Manual of Fireman ship Book No.4
4. Fire-Fighting Hydraulics : Purington
5. Fire Service Hydraulics by Dr. G.C. Mishra

Course code	**ESC-FT-207 G**				
Category	Engineering Science courses				
Course title	**Basics of Thermal Engineering**				
Scheme and Credits	L	T	P	**Credits**	Semester-III
	3	1	0	4	
Course Objectives:	• To familiarize with the basic concepts of thermodynamics, psychometric process and chart. • To study the different modes of heat transfer, ventilation system and heat control. • To study the basic concepts of Steam Power Generation, IC engines and calculation of different powers.				
Course Outcomes:	On successful completion of this course students will be able to • Applied thermodynamics laws in engineering application. • Explain the modes of heat transfer. • Explain the ventilation and different air conditioning terms. • Determine the efficiency of boilers and their selection.				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Section-A

Thermodynamics: Introduction, thermodynamic equilibrium, properties, state, process, cycle, path, temperature, pressure, work, heat, energy, laws of thermodynamics, gas laws, entropy, enthalpy, Carnot cycle, properties of pure substance.
Heat Transfer: Introduction, modes of heat transfer, thermal conductivity, thermal insulation, Planck's law, Stefan Boltzmann law, total emissive power, concept of black body, grey body, absorption, reflection and transmission of radiation, heat exchangers.

Section-B

Ventilation and Heat control: Purpose and effects of ventilation and heat control, thermal environment and measurement, types of ventilation, consideration for ventilation, control of heat exposures, testing and maintenance of ventilation systems.
Refrigeration: Psychometric process and charts, DBT, WBT, DPT, Sensible heat factor, Cooling towers.

Section-C

Steam Generation and Powers: Introduction, classification of boilers, selection of a boiler, essentials of a good boiler, boiler mountings and accessories, boiler efficiency, heat losses in a boiler plant.
Draught: Definition, classification, chimney height and diameter, discharge efficiency loss.

Section-D

IC Engines: classification of IC engine, indicator diagram, ignition system, brake power, horse power, indicated power, brake mean effective pressure, engine efficiency, testing of IC engines, heat balance sheet.
Fuels and combustion: Introduction, classification of fuels- solid, liquid, gas, basic chemistry, air fuel ratio, volumetric and weight analysis, calorific values.

Suggested Readings

1. Thermodynamics: An Engineering Approach by Yunus A Cengel and Michael A Boles, McGraw Hill Education
2. Engineering Thermodynamics by Dr. P.K.Nag, TMH Publication
3. Engineering Thermodynamics by Dr. C.P.Arora, TMH Publication
4. Internal Combustion Engines – V. Ganesan, TMH Publication
5. Heat Transfer – J.P. Holman, John Wiley & Sons, New York.

Course code	**PCC-FT-209 G**				
Category	Professional Core Courses				
Course title	**Automobile Safety**				
Scheme and Credits	L	T	P	**Credits**	Semester-III
	3	1	0	4	
Course Objectives:	• To familiarize with Automobile and transmission system. • To study different components of automobiles and their mechanism. • To understand construction and working of fire vehicles.				
Course Outcomes:	On successful completion of this course students will be able to • Identify the different parts of automobile. • Understand the process of combustion in S.I. & C.I. engines. • Demonstrate knowledge of operation and maintenance of transmission system. • Explain the construction and operation of fire fighting vehicles.				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Section-A

Introduction: Automobile, Types of Automobile, various system in automobiles, Engine Classification, construction, details of Engine Components, Combustion in S.I. Engines, Combustion in C.I. Engines, Study of fuel system components, Function of carburetors, construction details, diesel fuel feed systems, Carburetion and mass distribution of mixture, supercharging, fuel injection and injection sections.

Section-B

Transmission System: Components of transmission system, PTO.
Clutch: Types, Construction, Operation and Fault finding of clutches.
Gear Box: Types of Gear box, Functions of gear box, operation and maintenance of gear box.
Differential: Necessity, Construction of differential systems, Axles, Types and Application.
Brakes: Types, Construction and Operation of Hydraulic, Pneumatic Brake Systems, Maintenance of Brakes.

Section-C

Suspension: Necessity, Types, Construction and operation, Shock absorber, Coil springs, Independent suspension.
Steering System: Constructional details, Types of steering gear box, Steering geometry, Caster, Camber, King pin inclination, Effect of steering geometry on directional stability, Power steering.
Electrical System: Ignition Systems, Magnet Ignition, Battery Ignition, Electronic Ignition, Merits and Demerits, Working, Self Starter, Dynamo voltage regulator, Battery construction, operation and maintenance, pollution, Air-pollution, Euro norms, Pollution Control techniques.
Lubricating System: Types, Components, Lubricating oil, Cooling System.

Section-D

Fire fighting vehicles
Fire bikes: Construction & Operation of Fire bikes.

Tenders: Construction & operation of fire tenders and trucks.
Fire Boats: Construction & Operation of Fire boats & other Water borne applications
Rules and regulations: CMV Rules regarding safety devices for Drivers, Passengers, Rules & regulations of RTO; Laboratory testing of vehicles; Road testing of vehicles. Automobile safety devices.

Suggested Readings:

1. Automobile chassis and body construction, Operation and Maintenance by Wills H. Crouse.
2. Automobile Machines – Principles and Operations by W.H. Crouse.
3. Automobile Engine overhaul by A.W. Judge and Sir Issac Pitman.
4. Automobile Electrical Maintenances by A.W. Judge and Sir Issac Pitman.
5. Automobile Engineering by R.B. Gupta
6. Central Motor Vehicles (First Amendment) Rules, 2015 - India.

Course code	**PCC-FT-211 G**				
Category	Professional Core Courses				
Course title	**Fire Protection Workshop**				
Scheme and Credits	L	T	P	**Credits**	Semester-III
	0	0	2	1	
Class work	25 Marks				
Practical	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Experiment

1. To determine the flashpoint and fire point of different fuels using Pensky-Marten apparatus.
2. To study different types of fire and its elements.
3. To study different types of extinguishing media.
4. To study different causes and phases of fire.
5. To study fire detection system.
6. To study different types of sprinkler system.
7. To study product of combustion.
8. To study different types of occupancies as per National Building Code of India(Latest Edition).
9. To study structural integrity under fire using standard methods of NFPA.
10. To study different types of hose fittings and their application.

Course code	**PCC-FT-213 G**				
Category	Professional Core Courses				
Course title	**Automobile Safety Lab**				
Scheme and Credits	L	T	P	**Credits**	Semester-III
	0	0	2	1	
Class work	25 Marks				
Practical	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Experiment

1. To study working principles and operation of Automotive Engine Systems & Sub Systems.
2. To study working principles and operation of the Fuels supply systems:
3. To study of working principles and operation of Automotive Clutches.
4. To study of working principles and operation of the Automotive Transmission systems.
5. To study of working principles and operation of the Automotive Drive Lines & Differentials.
6. To study of working principles and operation of the Automotive Suspension Systems.
7. To study of working principles and operation of the Automotive Steering Systems.
8. To study of working principles and operation of the Automotive Tyres & wheels.
9. To study of working principles and operation of the Automotive Brake systems.
10. To study of working principles and operation of Automotive Emission / Pollution control systems.

<table>
<tr><td>Course code</td><td colspan="5">ESC-FT-215 G</td></tr>
<tr><td>Category</td><td colspan="5">Engineering Science courses</td></tr>
<tr><td>Course title</td><td colspan="5">Basic Thermal Engineering Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-III</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Practical</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

List of Experiment

1. To study working of 2 stroke and 4 stroke diesel engines.
2. To study working of 2 stroke and 4 stroke petrol engines.
3. To study different types of fuels along with their flash point, fire point and calorific values.
4. To study different modes of heat transfer.
5. To study the concept of black body and white body.
6. To study heat transfer through powder.
7. To study heat transfer through metal rods.
8. To study Fire tube boilers and Water tube boilers.
9. To find the indicated horse power (IHP) on multi-cylinder petrol engine/diesel engine by Morse Test.
10. To study different types of cooling towers.

Course code	**PT-FT-217 G**				
Category	Training				
Course title	**Fire Ground Operation-I**				
Scheme and Credits	L	T	P	**Credits**	Semester-III
	0	0	2	1	
Class work	25 Marks				
Practical	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Experiments

1. To study the history of drills.
2. To study the aim, principle, instruction method of drill.
3. To perform the positions of attention, stand at ease, stand easy, sizing, right dress, dismiss, step forward/backward march and side step.
4. To perform the position of march and pace, turning by numbers, mark time, the halt, marching in squad, quick march and the halt (on the move).
5. To perform the position of right (or left)- turn, changing direction by wheeling and changing steps on the march, forming file from single file and forming single file from file.
6. To study the tricks of parade inspection, how and whom to salute and perform the position of saluting.

MAHARSHI DAYANAND UNIVERSITY, ROHTAK

Scheme of Examination for Semester IV (Second Year)

B.TECH (FIRE TECHNOLOGY AND SAFETY) w.e.f. 2019-20

SN	Category	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Marks of Class work	TH	Pr	Total	
1	Humanities and Social science including Management courses	HSMC-FT-202G	Principles of Management & Organisation Behaviour	3	0	0	3	3	25	75		100	3
2	Engineering Science Course	ESC-FT-204G	Basics of Safety Engineering	3	0	0	3	3	25	75		100	3
3	Professional Core Courses	PCC-FT-206G	First Aid & Paramedics	3	1	0	4	4	25	75		100	3
4	Professional Core Courses	PCC-FT-208G	Fire Service Hydraulics-II	3	1	0	4	4	25	75		100	3
5	Professional Core Courses	PCC-FT-210G	Safety in Construction	3	1	0	4	4	25	75		100	3
6	Professional Core Courses	PCC-FT-212G	First Aid & Paramedics Lab	0	0	2	2	1	25		25	50	3
7	Professional Core Courses	PCC-FT-214G	Fire Service Hydraulics Lab	0	0	2	2	1	25		25	50	3
8	Training	PT -FT-216 G	Fire Ground Operation-II	0	0	2	2	1	25		25	50	3
9	Mandatory Course	*MC-106 G	Environmental Science	3	0	1			25	75			4
TOTAL CREDIT								**21**				**650**	

Abbreviations: TH- Theory , PR- Practical

***MC-106 G** is a mandatory non –credit course in which the students will be required passing marks in theory.

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

Course code	**HSMC-FT-202 G**				
Category	Humanities and Social Science including Management courses				
Course title	**Principles of Management and Organizational Behavior**				
Scheme and Credits	L	T	P	**Credits**	Semester-IV
	3	0	0	3	
Course Objectives:	• To make the students familiar with the basic concepts of management and organizational behavior along with their application for managing people at work. • To understand the management concepts, applications of concepts in practical aspects of business and development of managerial skills.				
Course Outcomes:	On successful completion of this course students will be able to • Acquire knowledge of key principles of management and apply this knowledge to a real organizational setting. • Diagnose problems, make effective decisions, influence others, optimize cross-functional teams and design reward systems.				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Section-A

Management: Introduction to Management concepts, Meaning and Characteristics of Management, Importance of Management, Development of Management thoughts, Principles of Management, Personnel Management, Functions of Personnel Management, Manpower Planning, Process of Manpower Planning.

Section-B

Planning: Introduction, Organizing and Organizational Structure, Steps in Planning Process, Scope and Limitations, Short Range and Long Range Planning, Flexibility in Planning, Characteristics of a sound Plan, Management by Objectives (MBO), Policies and Strategies, Scope and Formulation .

Decision Making: Techniques and Processes, Steps in Problem Solving and Decision Making, Bounded Rationality and Influences on Decision Making, Group Problem Solving and Decision Making.

Section-C

Organizing: Organization Structure and Design, Authority and Responsibility Relationships, Delegation of Authority and Decentralisation, Interdepartmental Coordination.

Organizational Behavior: Introduction, Historical development and basic concepts, understanding a social system, Establishing working relationships, Attitude, Perception, Personality and Individual Differences, Job Performance, Values, Attitudes and Beliefs, Stress Management,
Communication: Types, Process, Barriers, Making Communication Effective.

Section-D

Leadership: Leadership and Organizational Development, Supervision and Participation, Interpersonal and Communication problems within the organizations, Group Dynamics, Leadership, Styles, Approaches, Power and Politics.
Motivation: Human needs and motivating employees. Interpreting motivational models of Maslow, Herzberg, Vroom and Mc Clelland, Job satisfaction and work performance, Appraising and Rewarding Performance.

Suggested Books:

1. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.
2. Organizational Behaviour by Stephen P. Robbins & Seema Sanghi- Pearson
3. Organizational Behaviour by L.M. Prasad-S Chand & sons
4. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla. (Kalyani Publishers)
5. Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)
6. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)

<table>
<tr><td>Course code</td><td colspan="5">ESC-FT-204 G</td></tr>
<tr><td>Category</td><td colspan="5">Engineering Science Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Basics of Safety Engineering</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-IV</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">• To familiarise with the safety methodology, education and training for an organisation and environment.
• To know the different types of accident and its preventive methods.
• To study the rules of safety and safety management system.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="5">On successful completion of this course students will be able to
• Apply the safety methods in an organisation where hazard will take place.
• Understand the different types of accident and give the solution to minimise it.
• Provide training and education regarding safety.
• Review and evaluate safety management performance.</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Section-A

Safety: Introduction to safety, need for integration of health and environment safety, safety and productivity, fundamental of safety, important points for consideration of safety, general instructions for safety.

Safety Organization: Objectives, types and functions, safety committee, need, types, advantages, safety audits, types of audit, audit methodology, non conformity report, audit checklist and report, Safety in design and operations, inherent, engineered safety.

Section-B

Accident: Introduction, types of accidents, causes of accidents, principle of accident prevention, accident investigation, process of investigation, reporting, analysis, technique, Mort capital, multi event sequencing-TOR, theories of accident, onsite and offsite emergency response plan, cost of accident.

Section-C

Safety Education and Training: Importance, various training methods, effectiveness of training, behavior oriented training, communication, purpose, barrier to communication, creating awareness, domestic safety and training.
Monitoring Safety Performance: Frequency rate, severity rate, incidence rate, activity rate, and safety “t” score, Safety surveys, Job Safety Analysis (JSA).

Section-D

Guiding principles of safety management to prevent accidents, role of all stakeholders, role of industry, management, labour, role of public authorities.

Safety Rules: Safety rules for industries (including management and labour) safety culture, safety policy, safety management system, safety reporting. Review and evaluation of safety management performance, collective responsibility of all nations.

Suggested Readings

1. Fundamentals of Industrial Safety & Health- K.U.Mistry, Siddharth Prakashan.
2. Safety Management- R.K. Mishra- AITBS Publishers.
3. N.V. Krishnan, Safety Management in Industry, Jaico Publishing House, 1997
4. Ronald P. Blake, Industrial Safety:, Prentice Hall, New Delhi, 1973
5. David L. Goetsch, Occupational Safety and health, Prentice Hall
6. Ted S. Ferry, Modern Accident Investigation and Analysis, John Wiley & Sons
7. Fire Safety in Buildings by V K Jain, New Age publishers, New Delhi
8. Fundamentals of Fire Safety in Building Design by Dr. Than Singh Sharma, Aayush Publications, New Delhi

<table>
<tr><td>Course code</td><td colspan="5">PCC-FT-206 G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">First Aid & Paramedics</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-IV</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">• To understand the basics of the first Aid.
• To study human body and its various system like respiratory, circulatory, digestive and musculoskeletal system.
• To familiarize with different medical conditions.
• To understand different types of causalities handling and lifting techniques.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="5">On successful completion of this course students will be able to
• Understand the first Aid and role of first Aid.
• Explain about human body system.
• Provide first Aid to any causality under different medical conditions.
• To handle different causality and to explain different lifting techniques.</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Section-A

First Aid: Introduction, Principles of first aid, First aid and resuscitation, Training in first aid, General rules of first aid, Role of first aider, Sequence of action on arrival at scene, First aid kit, Vital signs- A, B, C (Airway, Breathing, Circulation), Action in emergency, CPR, Artificial respiration.

Section-B

Human Body: Study of human body and its various systems such as Musculoskeletal system, Respiratory system, Circulatory system, Digestive system etc.
Wounds: Wounds and cases of wounds, Bleeding and its types, Control of bleeding.
Injuries: Injuries, First Aid for various injuries, Head injuries, Chest injuries, Eye injuries and Blindness.

Section-C

Medical Conditions: Angina, Heart attack, Stroke, Diabetes mellitus, Hyperglycemia, Hypoglycemia, Seizures in adults and children, Fever meningitis, Fainting, Allergy, Headache, Migraine, Sore throat, Earache and toothache, Abdominal pain, Vomiting and diarrhea, Child birth, Electric shock, Burn and its types, Rule of nine, Poisoning and its types, Bites-frost bite, Snake bite, Dog bite, Insect bite, Drowning and choking, Unconsciousness, Protection of body from winter dryness.

Section-D

Fractures: First aid for fractures or broken bones, Joints and its types, Bandages and slings, Handling of casualties, lifting technique and equipments, Stretcher and its types, Ambulance, installation and use in casualties transportation, Dealing with minor illness.

Accidents: Accidents and its types, Accident reporting, Investigation and record keeping, Study of human casualty including medical history checking, Making of diagnosis report based on symptoms as narrated by the casualties and signs as observed by the paramedic, Checking.

Suggested Readings:

1. Manual of first aid to the injured: St. John Ambulance Association.
2. First aid text book: American National Red Cross
3. Manual of First aid instruction: US Bureau of Mines
4. V.V. Yudenich, Accident First Aid, Mir Publishers, Moscow

Course code	**PCC-FT-208 G**				
Category	Professional Core Courses				
Course title	**Fire Service Hydraulics-II**				
Scheme and Credits	L	T	P	**Credits**	Semester-IV
	3	1	0	4	
Course Objectives:	• To familiarize with water supply and hydrant system. • To determine the impact of jet on different types of vanes. • To determine the discharge through pipes and different fire fighting hoses. • To understand the construction and working of different types of pump. • To know about sprinkler and its applications.				
Course Outcomes:	On successful completion of this course students will be able to • Use water in fire protection service. • Calculate the discharge in various components. • Understand the functioning of pumps and primers. • To use sprinkler in fire protection services.				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Section-A

Water Supply & Hydrant System: Use of water in fire protection service, Properties of water, density, specific volume, specific gravity, latent heat of vaporization, viscosity, kinematics viscosity, Water supply analysis, types of water supply, hydrants, types of hydrant, hydrant gear and characteristics, inspection and testing of hydrants.

Impact of Free Jets: Impulse – momentum principle, jet impingement on a stationary flat plate, inclined plate and a hinged plate, at the center of a stationary vane, on a moving flat plate, inclined plate, a moving vane and a series of vanes, Jet striking tangentially at the tip of a stationary vane and moving vane(s), jet propulsion of ships.

Section-B

Flow through Pipes and Fire Fighting Hoses: Flow measurement through pipes or ducts, through reservoirs, orifice, mouthpiece, through open channels, discharge over notches (triangular, rectangular, trapezoidal only), discharge from nozzles, hoses of different diameters, purpose and design of branch and nozzles, discharge coefficient, Hagen Poiseuille formula, equation for pipe flow, friction charts and their uses, loses in pipes and fittings, Water power, Brake power and efficiency.

Section-C

Pumps and Primers: Introduction, types of pumps, Ejector pumps, Reciprocating pump- principle, construction, working, Centrifugal pump- principle, construction and working, Jockey pump- construction and its working, Vehicle mounted fire pumps, Portable pump, Selection of pumps, maintenance and servicing of pumps, advantages and disadvantages, Terms- Duty point, Multistage, guide vanes, Pump operation and distribution of water on fire ground, pump power and efficiency, primers and their types.

Section-D

Sprinkler System Demand: Simple- side fed tree, interaction between flow and pressure in an operating sprinkler systems, mathematical relationship on basis of sprinkler system calculations, pressure balancing in performing head calculations foe a simple- side fed tree sprinkler system, hydraulics of water supplies for automatic sprinkler system.

Suggested Readings

1. Hydraulics and Fluid Mechanics : P.N.Modi, Dr. S.M. Seth
2. Pump Selection and application: Tyler C. Riches.
3. Pump Operators, Handbook: I.S. University of Science and Technology.
4. Fire Pumps and Hydraulics: I.E. Ditts and T.M. Harris.
5. Hydraulic Mechanics and Hydraulics Mchines : Dr. J.Lal
6. Manual of Fireman ship Book No.4
7. Fire-fighting Hydraulics : Purington
8. Fire Service Hydraulics by Dr. G.C. Mishra

<table>
<tr><td>Course code</td><td colspan="5">PCC-FT-210 G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Safety in Construction</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-IV</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">• To introduce the safety issues in construction industry.
• To familiarize with the needs of safety in material handling and equipment.
• To study the Contract Labour Act and Central Rules in the Welfare and health provisions.
• To study safety provisions in different constructions.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="5">On successful completion of this course students will be able to
• Understand different safety issues in construction industry and during construction operations.
• To know about safety in the use of construction equipments.
• To know about Contract Labour Act and Central Rules.</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Section-A

Introduction to Construction Industry: Safety issues in construction, Human factors in construction safety management, Roles of various groups in ensuring safety in construction industry, Framing, contract conditions on safety, related matters, Relevance of ergonomics in construction safety.

Section-B

Safety in Various Construction Operations: Excavation, under water works, under pinning & shoring Ladders and Scaffolds, Tunneling, Blasting, Demolition, Pneumatic caissons, confined Space Temporary Structures. Indian Standards on construction safety, National Building Code Provisions on construction safety.

Section-C

Safety in Material Handling and Equipments: Safety in storage & stacking of construction materials, Safety in the use of construction equipments, Vehicles, Cranes, Tower Cranes, Lifting gears, Hoists & Lifts, Wire Ropes, Pulley blocks, Mixers, Conveyors, Pneumatic and hydraulic tools in construction, Temporary power supply.

Section-D

Contract Labour (R&A) Act and Central Rules: Definitions, Registration of Establishments, Licensing of Contractors, Welfare and Health provisions in the Act and the Rules, Penalties, Rules regarding wages. Building & Other Construction Workers (RE & CS) Act, 1996 and Central Rules, 1998: Applicability, Administration, Registration, Welfare Board & Welfare Fund, Training of Building workers, General Safety, Health & Welfare provisions, Penalties.

Suggested Readings

1. Construction Safety Management by K.N. Vaid.
2. Construction Safety Handbook by V.J. Davies and K. Tomasin.
3. Construction Safety, Security & Loss Prevention, James B. Fullman.
4. Modern Methods of Material Handling by L Linger.
5. Handbook of Temporary Structures in Construction by R.T. Ratay.
6. National Building Code of India, 2016 by BIS
7. Relevant Indian Standards published by BIS
8. Contract Labour Act and Central Rules
9. Building and Other Construction Workers (RE &CS) Act, 1996 and Central Rules.

Course code	**PCC-FT-212 G**				
Category	Professional Core Courses				
Course title	**First Aid and Paramedics Lab**				
Scheme and Credits	L	T	P	**Credits**	Semester-IV
	0	0	2	1	
Class work	25 Marks				
Practical	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Experiment

1. To study the first aid kit.
2. To study Respiratory, Circulation and Nervous System.
3. To study Digestive and Excretory System.
4. To study and perform different techniques of Respiration (CPR).
5. To study various types of Bandages and Slings.
6. To study maintenance of various charts related to casualties.
7. To study of stretchers and its types.
8. To practice Handling of casualties, lifting and carrying.
9. To study different types of medical conditions.
10. To study accidents, investigations and reporting and record keeping.

Course code	**PCC-FT-214 G**				
Category	Professional Core Courses				
Course title	**Fire Service Hydraulics Lab**				
Scheme and Credits	L	T	P	**Credits**	Semester-IV
	0	0	2	1	
Class work	25 Marks				
Practical	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Experiment

1. Measurement of pressure head by employing single and double column manometer.
2. To verify the Bernoulli's Theorem and to determine coefficient of discharge of an orifice meter and a Venturimeter.
3. To determine the coefficient of discharge of Notch (V and Rectangular types).
4. To determine the friction factor for the pipes.
5. To study the constructional details and working of a Centrifugal Pump.
6. To study the constructional details and working of a Reciprocating Pump.
7. To study the constructional details and working of a Jockey Pump.
8. To study the different types of Sprinklers and their working.
9. To study Jet impact on flat and curved surfaces.
10. To determine the minor losses due to sudden enlargement, sudden contraction and bends.

Course code	**PT-FT-216 G**				
Category	Training				
Course title	**Fire Ground Operations -II**				
Scheme and Credits	L	T	P	**Credits**	Semester-IV
	0	0	2	1	
Class work	25 Marks				
Practical	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Drills based on the following

Saluting:

- Saluting with letter
- Saluting without letter
- Left direction saluting on marching position
- Right direction saluting on marching position
- Slow running march

Reporting procedure:

- Taking and Giving Charge

Hose drills:

- Lifting of hose
- Lowering of hose
- Laying of hose
- Rolling of hose

Hydrant drills:

- Hydrant drill (Three men)
- Hydrant drill (Four men)
- Make one line from two line (using collecting breeching)
- Make two line from one line (using dividing breeching)
- Connect three lines to a single output (using collecting head)

<table>
<tr><td>Course code</td><td colspan="5">MC-106G</td></tr>
<tr><td>Category</td><td colspan="5">Mandatory Course</td></tr>
<tr><td>Course title</td><td colspan="5">Environmental Sciences</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-IV</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Common For All Branches</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Unit-1 (2 lectures)

The Multidisciplinary nature of environmental studies. Definition scope and importance.

Unit-2 Natural Resources: (8 lectures)

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and over-exploitation: deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer pesticide problems, Water logging, salinity, case studies.

e) Energy resources: Growing energy needs; renewable and non- renewable energy sources, use of alternate energy sources, case studies.

f) Land resources: Land as are source, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.
* Equitable use of resources for sustainable life styles

Unit-3 Ecosystems: (6 lectures)

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.

* Ecological succession.
* Food chains, food web sand ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system:

a. Forest ecosystem.
b. Grass land ecosystem.
c. Desert ecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-4 Bio diversity and its conservation (8 lectures)

* Introduction-Definition: Genetic, Species and ecosystem diversity.
* Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity: habitat loss, poaching of wild life, man-wild life conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Unit-5 Environmental pollution: (8 lectures)

Definition, causes, effects and control measures of:

a) Air pollution
b) Water pollution
c) Soil pollution
d) Marine pollution
e) Noise pollution
f) Thermal pollution
g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management: floods, earthquake, cyclone and landslides.

Unit-6 Social issues and the Environment: (7 lectures)

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation ,rain water harvesting, watershed management.
* Resettlement and rehabilitation of people: its problems and concerns case studies.

* Environmental ethics: Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Waste land reclamation.
* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution)Act.
* Water (Prevention and Control of pollution)Act.
* Wild life Protection Act.
* Forest Conservation Act.
* Issues involved in enforcement of environmental legislation.
* Public awareness.

Unit-7 Human population and the Environment. (6 lectures)

Population growth ,variation among nations. Population explosion-Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Woman and Child Welfare Role of Information Technology in Environment and human health. Case Studies.

Unit-8 Field Work: (Field work equal to10 lecture hours)

* Visit to a local area to document environmental assets- river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems-pond, river, hills lopes, etc.

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach,The Biodiversity of India, MA pin Publishing Pvt. Ltd. Ahmedabad- 380013,India,E mail:mapin@icenet.net(R).
3. Brunner R.C.1989, Hazardous Waste Incineration, Mc. Graw Hill Inc.480p.
4. Clark R. S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W. P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub.House, Mumbai 1196p.
6. De A. K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R). Gleick, H.P.,1993.
8. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stock holm Env. Institute, OxfordUniv.Press,473p.

9. Hawkins R. E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay(R).Heywood, V.H. & Watson, R.T.1995.
10. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav,H&Bhosale,V.M.1995.EnvironmentalProtection and Laws. Himalaya Pub.House, Delhi 284p.
12. Mackinney, M. L.&Schoch, RM 1996, Environmental Science systems & Solutions,Web enhanced edition 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications(TB).
14. Miller T.G. Jr. Environmental Science, Wads worth Publishing Co.(TB).
15. Odum, E.P.1971, Fundamentals of Ecology. W. B.Saunders Co.USA,574p.
16. Rao M.N.& Datta, A.K.1987 Waste Water Treatment. Oxford &TBH Publ.Co.Pvt.Ltd.345p.
17. Sharma, B.K. 2001,Environmental Chemistry, Goal Publ.House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Towns end C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science(TB).
20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards,Vol.I and II Enviro Media(R).
21. Tridevi R. K.and P. K. Goal, Introduction to air pollution, Techno Science Publications(TR).
22. Wagner K.D.,1998,Environmental Management,W.B. Saundersco.Philadelphia,USA499p.
23. A text book environmental education G. V. S. Publishers by Dr. J. P. Yadav.

(M) Magazine (R) Reference (TB) Textbook

The scheme of the paper will be under:

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.
The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.
Exam. Pattern: In case of awarding the marks, the paper will carry 100 marks.

Theory: 75marks,
Practical/ Field visit:25marks.

The structure of the question paper will be:
Part-A: Short Answer Pattern : 15 marks
Part-B:Essay Type with inbuilt choice : 60 marks
Part-C:Field Work (Practical) : 25 marks
Instructions for Examiners:
Part-A:Question No.1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.
Part-B: Eight essay type questions (within built choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15marks.
The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH(PRINTING TECHNOLOGY)

SEMESTER 3RD AND 4TH

Scheme effective from 2019-20

COURSE CODE AND DEFINITIONS

Course Code	Definition
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

B. TECH (PRINTING TECHNOLOGY)

3rd Sem. w.e.f. 2019-20

Subject Code	Course Title	Teaching Schedule			Marks of Class Work	Examination Marks		Total	Credit	Duration of Exam (Hours)
		L	T	P Total		Theory	Practical			
HSMC-201-G	Fundamentals of Management	3	-	-	25	75	-	100	3	3
BSC-PTG - 201-G	Basic Sciences for Printing	3	1	-	25	75	-	100	4	3
PCC-PTG-203-G	Content Management	3	-	-	25	75	-	100	3	3
PCC-PTG - 205-G	Basic of Printing Processes	3	1	-	25	75	-	100	4	3
PCC-PTG - 207-G	Graphic Design in Printing	3	-	-	25	75	-	100	3	3
PCC-PTG - 209-G	Computer Technology In Printing	3	-	-	25	75	-	100	3	3
LC-PTG - 211-G	Basic Sciences for Printing Lab	-	-	2	25	-	25	50	1	3
LC--PTG 213-G	Basic of Printing Processes Lab	-	-	2	25	-	25	50	1	3
LC-PTG - 215-G	Graphic Design in Printing Lab	-	-	2	25	-	25	50	1	3
LC-PTG - 217-G	Computer Technology in Printing Lab		-	2	25	-	25	50	1	3
	Total							**800**	**24**	

B. TECH (PRINTING TECHNOLOGY)

4th Sem. w.e.f. 2019-20

Subject Code	Course Title	Teaching Schedule			Marks of Class Work	Examination Marks		Total	Credit	Duration of Exam (Hours)
		L	T	P		Theory	Practical			
*MC-106G	Environmental Studies	3	-	1	25	75	-	-		3
PCC-PTG-202-G	Sciences of Printing Materials	3	-	-	25	75	-	100	3	3
PCC-PTG-204-G	Technology of Flexography	3	-	-	25	75	-	100	3	3
PCC-PTG-206-G	Technology of Screen Printing	3	-	-	25	75	-	100	3	3
PCC-PTG-208-G	Digital Typesetting and E-Publishing	3	-	-	25	75	-	100	3	3
PCC-PTG-210-G	Imaging Techniques in Printing	3	-	-	25	75	-	100	3	3
LC-PTG-212-G	Technology of Flexography Lab	-	-	2	25	-	25	50	1	3
LC-PTG -214-G	Technology of Screen Printing Lab	-	-	2	25	-	25	50	1	3
LC-PTG -216-G	Digital Typesetting and E-Publishing Lab	-	-	2	25	-	25	50	1	3
LC-PTG -218-G	Imaging Techniques in Printing Lab		-	2	25	-	25	50	1	3
LC-PTG -222-G	Skills & Innovation Lab.	-	-	2	25	-	25	50	1	
S-PTG -220-G	Seminar-I		02		50	-	-	50	1	3
	Total							**800**	**21**	

***MC-106G** is a mandatory non –credit course in which the students will be required passing marks in theory.

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

FUNDAMENTALS OF MANAGEMENT

Course Code: HSMC-201G Course Credits: 0.0 Mode: Lecture (L) and Tutorial (T) Type: Compulsory Contact Hours: 3 hours (L) + 0 hour (T) per week. Examination Duration: 03 hours.	**Course Assessment Methods (Internal: 30; External: 70)** Two minor test each of 20marks, class performance measured through percentage of lecture attended (4 marks), assignments, quiz etc. (6 marks) and end semester examination of 70 marks. \\ For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus; it will contain seven short answer type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives:

- To enhance knowledge skills and attitude to Management.
- To understand management and its relationship with organisation.

UNIT-I

Concept of Management: Definitions, Characteristics, Significance, Practical Implications; Management Vs. Administration; Management- Art, Science and Profession; Development of Management Thoughts; Managerial Functions.

UNIT-II

Concept of Human Resource Management: Human resource planning; Recruitment, Selection, Training and Development, Compensation; Concept of Marketing Management: Objectives and functions of Marketing, Marketing Research, Advertising, Consumer Behavior.

UNIT-III

Concept of Production Management, Production Planning and Control, Material management, Inventory Control, Factory location and Production Layout.

UNIT-IV

Concept of Financial Management, Capital Structure and various Sources of Finance, Working Capital, Short term and long term finances, Capital Budgeting.

Course outcomes:

To develop the basic understanding of the concept of management and functions of management.
The students will come to know about Human Resource management and Marketing management functions of management.
Students will come to know about the production activities of any manufacturing organisations.
To know that how finances are arranged and disbursed for all the activities of business organisations.

Text & Reference Books

1. Principles and Practices of Management: R. S. Gupta, B. D. Sharma, N. S. Bhalla; Kalyani Publishers.
2. Organisation and Management: R. D. Aggarwal; Tata McGraw Hill.
3. Marketing Management: S. A. Sherlikar; Himalaya Publishing House.
4. Financial Management: I.M. Pandey; Vikas Publishing House.
5. Production Management: B. S. Goel; Himalaya Publishing House.

BASIC SCIENCES FOR PRINTING

General Course Information	
Course Code: BSC-201G Course Credit: 3.5	**Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks.
Contact Hours: 4/week, (L-T-P:3-1-0) Mode: Lectures and Tutorials Examination Duration: 3 Hours	For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Course Objective: To give the students comprehensive knowledge of science related print applications in various printing processes and equipment's used in the industry.

UNIT-I

pH and Conductivity Printing– Definition of pH, Method of determining pH, Importance of pH in Printing & Packaging, pH of paper & Ink, role of pH control in printing & packaging applications. Conductivity, Fountain Solution & Conductivity, Define conductivity? Need of conductivity measuring conductivity, Application of Conductivity in Printing.

Impact of Environmental Condition in Printing and Packaging : Humidity – Definition, Relative Humidity, Measurement, Control by air conditioning, Role of Relative Humidity in Printing & Packaging, Effect of Relative Humidity in packaging operations. Green Printing, VOC gases, its impacts, Use of chemicals in Printing and its environmental impact.

UNIT-II

Chemistry of Photography & Light Sensitive Materials - Introduction to photo-chemistry, Light Sensitive Material, Types of LSM, Constituents of LSM, Properties. Diazo compounds and its role in image creations.

UNIT-III

Understanding Colour : Fundamental of colours, Light, Source of Colour, Primary Colours, Secondary Colours, Additive Colours, Subtractive Colour, Spectral Transmission Curves. Introduction to Colour Measurement.

Surface Chemistry - Surface tension, Contact angles, Capillary Action, Interfacial Tension, Hydrophobic & Hydrophilic, Water and Ink Interaction, Emulsification of Ink.Role of Emulsification in Printing.Viscosity.Importance of Viscosity in Printing.

Effect of light in printing and Packaging - Effect of light on different film and plate coating, Adhesives & Ink-films, Light fastness, Print Characteristics, effect of light on different poly films / Substrates.

UNIT-IV

Polymers and Printing : Monomer, Polymer, Types of Plastics – Thermo-sets & Thermoplastics. Introduction to Natural Polymers, Cellulose Derivatives, Synthetic Polymers, Polythene, Polypropylene, Polyvinyl Plastics.

Optics & Optical Instruments- Reflection, Transmission, Importance of observer angle in viewing print, Optical illusion in viewing colour, Opacity, Density, Visual Angle, Angular Magnification, Magnifying Glass, Microscopes, safe Light Condition, Introduction to Photographic Cameras and Contact printer, Introduction to Densitometer and Spectro-densitometer. Measuring color, International standards for color evaluation, Delta E and its importance.

Colloids in printing &Packaging - Introduction, Kinds, Properties, Absorption and adsorption, Selective Adsorption, Application in printing and packaging.

Fountain Solution -Introduction, Composition and functions. Role of fountain solution in Printing.

Course Outcomes:

This course will enable the students to work with

1. Knowledge of printing related science.
2. Knowledge of pressroom environment, chemical, optical effects in printing.
3. Knowledge of Optics, Color etc.
4. Knowledge to find out the reasons for Printing Problems in the press floor.

Text & Reference Books:

1. Optics by BrijLal and Subrahmaniam
2. Optics by Ajay Ghatak
3. Engineering Chemistry by Jain and Jain
4. Science and Technology of printing material by Parkashshetty.
5. Hand Book of Print Media – by H.Kippan.

CONTENT MANAGEMENT

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td rowspan="2">Course Code: PCC-203G

Course Credit: 3.0

Contact Hours: 3/week, (L-T-P:3-0-0)

Mode: Lectures and Tutorials

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks.</td></tr>
<tr><td>For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.</td></tr>
</table>

Course Objective : To give the students comprehensive knowledge of content management and its various aspects applicable in Printing industry.

UNIT-I

Definition, Purpose, Use of Content management in Printing and Packaging industry.

Scope - A content management system is a set of automated processes that may support the following features

- Import and creation of documents and multimedia material
- Identification of all key users and their roles
- The ability to assign roles and responsibilities to different instances of content categories or types
- Definition of workflow tasks often coupled with messaging so that content managers are alerted to changes in content
- The ability to track and manage multiple versions of a single instance of content
- The ability to publish the content to a repository to support access
- The ability to personalize content based on a set of rules

UNIT-II

Stages of any content management system (Creation, Editing, Publishing/Delivery, Update/version control, Removal),

Roles and responsibilities of Creator, Editor, Publisher, Administrator, Consumer

Version control and its importance

Multichannel delivery,

Governance Structures- Definition, purpose, types of governance structures and their advantages/disadvantages

UNIT-III

Tagging – Definition, Purpose, Problem with conventional content organizing system (Folders, Sub folder, directories) , Classification scheme of tagging (Taxonomy, Ontology).Metadata – Definition, Purpose, Type, Structures, Use, Metadata Publishing,

Data warehouse – Definition, History, Types, Design Methods

UNIT-IV

Content Management System –

Definition, purpose, Salient features, Components- Software & Hardware, Types as per source- Open, Proprietary

Types as per delivery –
Single Source Publishing(SSP) - Separate outputs, Rights-based login, Dynamic filtering
Multi source Publishing(MSP) -

Types as per content – Mobile CMS, Web CMS, Enterprise CMS, Component CMS,
Digital Asset management system, Document Management System, e. Publishing.

Practice Work-Software, Word Press, Joomla, Drupal, Role of Markup languages in Content Management– HTML, XML, and SGML

Course Outcomes:

This course will be helpful for the students to work with

1. Knowledge of printing related features.
2. Thorough knowledge of content management.
3. Knowledge of different software used in printing.

Text & Reference Books:

Content Management: Bridging the Gap between Theory and Practice edited by George Pullman, GuBaotung

http://www.cms.co.uk/cms-glossary.html

https://www.vasont.com/resources/who-needs-cms.html

BASIC OF PRINTING PROCESSES

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td rowspan="2">Course Code: PCC-205G

Course Credit: 3.5

Contact Hours: 4/week, (L-T-P:3-1-0)

Mode: Lectures and Tutorials

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks.</td></tr>
<tr><td>For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.</td></tr>
</table>

Course Objective: To give the students comprehensive knowledge of various types of printing processes available in the industry, their working and suitability for various types of jobs.

UNIT-1

History : Brief history of Printing in the World. A brief survey of the evolution of Printing processes and methods from a craft to the present day sophisticated technology. Brief Introduction of Printing Industry in India, Scope and total Printing capacity. Participation at international level

UNIT-II

Introduction to Printing processes, basic principles, characteristics, identification and applications of letterpress, flexography, lithography and offset, gravure, screen printing etc. General principles of Printing Surface preparation for these processes. Modes of taking impressions. Suitability & limitations of various processes of Printing.

UNIT-III

New trends in Flexography, Scope and possibilities, Difference between the application of Flexo and gravure, Gravure printing-its application and future, Application of Screen printing in modern printing, Use of Flexo, Gravure and Screen printing in security printing application.

UNIT-IV

Different kinds of Printing machine rollers, their types, manufacture, care and maintenance. Common printing faults in various printing processes, set off, scumming, tinting, picking, etc. causes and their remedies.

Course Outcomes:

This course will be helpful for the students to work with

1. Application of various types of printing processes for current market needs.
2. Thorough knowledge of letterpress printing process.
3. Knowledge of various printing defects, causes and their remedies.

Text & Reference Books:

1. Letter Press Printing Part 1, 2, By C.S. Misra
2. Printing Technology by Adams, Faux, Rieber, 5th edition
3. Handbook of Print Media, H. Kippan, Springer
4. Lithographers Manual
5. Printing Technology 5edition – by Adams.

GRAPHIC DESIGN IN PRINTING

General Course Information	
Course Code: PCC-207G Course Credit: 3.0	**Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks.
Contact Hours: 3/week, (L-T-P:3-0-0) Mode: Lectures and Tutorials Examination Duration: 3 Hours	For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Course Objective: This subjects introduces both functions and forms of graphic design. It will help the students in the field of designing, visual communication and advertising. It will lead to successful designing and provides a guide to generate digital files for prepress.

UNIT-I

Introduction to "Graphic Design": What is design, Graphic design, printer's design. Fundamentals of design: line, tone, value, weight, texture, shape, size, space, etc. Principles of design- balances, proportion, rhythm, unity, contrast, simplicity, fitness. Colour theory: dimension of colour, colour schemes, colour symbolism, emotional effects of colour.

UNIT-II

Division of design: natural, conventional, decorative, geometrical and abstract. Type: Methods of type arrangement, classification of typeface of font designing. Printing planning: rough layout, comprehensive, artwork, type of originals, sizing, mashing and cropping. Design management: Definitions in advertising art, modern art abstract art, applied art, advertising, publicity, public relations, sale promotion, sales manager.

UNIT-III

Computer pre requisites for graphic designing, Bit, Types of bits and computers, Grayscale and colours, Channel, Pixel, Bit depth, Design with computers, Various software used for designing. Selection of an appropriate printing process for printing of a job, Pdf and types of Pdf's.

UNIT-IV

What is 3D? Visualizing three dimensional effects, from 2D drawings. Perspective: sense of perspective drawing. Understanding of scale and sense of proportion.

Course Outcome: This course will enable the students

1. To work with theelements of decide.
2. To study theconcepts and understanding of design fundamentals.
3. To apply the knowledge of commercial design.
4. Knowledge about the advance technologies in design and modeling.

Text & Reference Books:

This course will be helpful for the students to work with

1. The Designer's Handbook by Alistair Campbell
2. Design & Technology by Van No strand
3. Handbook of Advertising Art Production by Schelmmer.
4. Art & Production by N.N.Sarkar.
5. Advertising, Art & Production by J. Nath.

COMPUTER TECHNOLOGY IN PRINTING

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td>Course Code: PCC-209G

Course Credit: 3.0</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks.</td></tr>
<tr><td>Contact Hours: 3/week, (L-T-P:3-0-0)

Mode: Lectures and Tutorials

Examination Duration: 3 Hours</td><td>For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.</td></tr>
</table>

Course Objective: This course encapsulates the computer technology which is helpful for Printing, Packaging& Publishing domains. It has a reach to the pre-press sections of industrial sectors for in-depth assignments for better understanding for the students.

UNIT – I

Personal computers – Schematic diagram, Operating systems. Hardware, Software, Device Interfaces, BIOS. Memory – Primary & Secondary Memory, RAM, DRAM, SRAM, ROM, PROM, EPROM, MAGNETIC TAPE, OPTICAL DISK, MBM, CCD.

UNIT – II

Mass Storage Technology – data organization – cache operation, FD, HD, SCSI, Compact Disc. Display devices – CRT displays (Types, Working, Advantages, and Disadvantages), Display adapter - CGA, VGA, SVGA.

UNIT – III

Input /Output devices - Keyboard, mouse, optical scanners (OCR, BCR), Printers (dot matrix, ink jet, laser), VDT's & its types, Plotters, Digitizers, Electronic Typewriters, Light Pens, Web Camera, Joysticks. Electronic Image, File Formats (BMP, TIFF, GIF).Image compression & its types.

UNIT – IV

Introduction to DTP, Trends in Printing Technology, Usage of Computers in Printing. DTP in Printing Technology, Introduction to DTP software, Word Processing Packages. Story editing & formatting, Working with graphics, importing graphics, working with color, table editing, Cost estimation of DTP.

Course Outcome: This course will enable the students

1. Basics of computer technology in Printing fields.
2. Basics of computer technology in Packaging fields.
3. Basics of computer technology in Publishing fields.

Text & Reference Books:

1. Hardware Bible: Winn IL RochTechmedia.
2. Desk Top Typography: Quark X Press
3. Page Maker 6.0: BPB Publication.
4. Printing in a Digital World – David Bergsland
5. Introduction to Prepress - Hugh Speirs
6. Computer Technology – Sinha&Sinha

BASIC SCIENCES FOR PRINTING LAB

<table>
<tr><th colspan="2">General Course Information</th></tr>
<tr><td rowspan="2">Course Code: LC-201G

Course Credit: 1

Contact Hours: 2/week, (L-T-P:0-0-2)

Mode: Practical & Lab Work

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)</td></tr>
<tr><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Internal practical evaluation is to be done by the course co-ordinator. The end semester practical examinations will be conducted jointly by external and internal examiners.</td></tr>
</table>

List of Experiments

1. Study of Colloids in Printing.
2. Study of various types of printing inks.
3. Study of Densitometer
4. Study of Printing Paper
5. Application of pH in Printing
6. Working of Process Camera
7. Working of contact printer
8. Preparation of Dampening Solutions
9. Evaluation of pH & conductivity
10. Evaluation of pH Conductivity and Hardness of Water

BASIC OF PRINTING PROCESSES LAB

General Course Information	
Course Code: LC-205G Course Credit: 1 Contact Hours: 2/week, (L-T-P:0-0-2) Mode: Practical & Lab Work Examination Duration: 3 Hours	**Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** **Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** Internal practical evaluation is to be done by the course co-ordinator. The end semester practical examinations will be conducted jointly by external and internal examiners.

List of Experiments

1. Identification of different tools &equipments used in letterpress.
2. Study of different Printing Processes.
3. Study of various types of image carriers for different Printing processes.
4. Study of different letter press Printing Machines.
5. Overview of pre-make-ready and make-ready operations.
6. Study of Running & Printing faults on various Printing processes.
7. Study of Single Color Flexographic machine
8. Study of Single Color Gravure machine
9. Study of Photo Polymer Plan
10. Study of Gravure cylinders.

GRAPHIC DESIGN IN PRINTING LAB

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td rowspan="2">Course Code: LC-207G

Course Credit: 1

Contact Hours: 2/week, (L-T-P:0-0-2)

Mode: Practical & Lab Work

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)</td></tr>
<tr><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Internal practical evaluation is to be done by the course co-ordinator. The end semester practical examinations will be conducted jointly by external and internal examiners.</td></tr>
</table>

List of Experiments

1. Direct mail.
2. Folders - Single fold & Double fold.
3. Sticker – Two colours.
4. Label designing- 2 and 4 colours
5. Introduction to computers, various software's used for designing purpose – Demonstration (Manipulation of same design)
6. Logo designing
7. Knowledge of different computer commands.
8. Color wheel
9. Designing of visiting card. Letterhead, Envelop, Bill form, Receipt
10. Designing of invitation card, Posters, Title page of a Book, Magazine Cover page.

COMPUTER TECHNOLOGY IN PRINTING LAB.

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td rowspan="2">Course Code: LC-209G

Course Credit: 1

Contact Hours: 2/week, (L-T-P:0-0-2)

Mode: Practical & Lab Work

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)</td></tr>
<tr><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Internal practical evaluation is to be done by the course co-ordinator. The end semester practical examinations will be conducted jointly by external and internal examiners.</td></tr>
</table>

List of Experiments

1. Introduction to Computer Terminologies.
2. Use of different Hardware devices.
3. Word-Processing Software.
4. DTP and its features.
5. Software used in Printing.
6. Page set-up with different sizes and margins.
7. Preparation of Text rich documents; & Image and Text merging.
8. Different kinds of Scanners, their working and uses.
9. Working of Printers.
10. Modifications and Editing of Illustrations and Text.

ENVIRONMENTAL STUDIES

General Course Information	
Course Code: MC-106G Course Credit: 0.0 Contact Hours: 3/week, (L-T-P:3-0-0) Mode: Lectures and Tutorials Examination Duration: 3 Hours	**Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Course Objectives:

To enhance knowledge skills and attitude to environment.

To understand natural environment and its relationship with human activities.

UNIT-I

Multidisciplinary nature of Environmental studies: Definition, scope and importance, need for public awareness; Concept, Structure and function of an ecosystem: Producers, consumers and decomposers, Energy flow in the ecosystem ,Ecological succession ,Food chains, Food webs and ecological pyramids; Introduction, types, characteristics features, structure and function of Forest ecosystem, Grassland ecosystem ,Desert ecosystem, Aquatic ecosystem (Ponds, Stream, lakes, rivers, oceans, estuaries); Biodiversity: Introduction, Definition: genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and option values; Biodiversity at global, national and local level, India as a mega-diversity nation, Hot-spot of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT-II

Renewable and non-renewable resources, Natural resources and associated problems ,Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people; Water resources: Use and over utilization of surface and ground water, floods, droughts conflicts over water, dams benefits and problems; Mineral resources: Use and exploitation, environmental effects of extracting and mineral resources; Food resources: World food problem, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity; Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies; Land resources: Land as a resource, land degradation, main induced landslides, soil erosion and desertification, Role of an individual in conservation of natural resources, Equitable use of resources for suitable lifestyle.

UNIT-III

Definition of Environment Pollution; Causes, effects and control measures of: Air Pollution, Water Pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards; Solid waste Management: Causes effects and control measures of urban and industrial wastes; Role of and individual in prevention of pollution, Pollution case studies; Disaster management: floods, earthquake, cyclone and landslides; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies; different laws related to environment: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.; Issues involved in enforcement of environmental legislation, Public awareness

UNIT-IV

Social issues and the Environment: From unsustainable to Sustainable development, Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problem and concern, case studies; Environment ethics: Issues and possible solutions;Wasteland reclamation; Consumerism and waste products; Human Population growth, variation among nation, Population explosion- Family Welfare Programme, Environment and human health , Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

Field Work: Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain; Study of simple ecosystems – ponds, river, hill slopes etc; Study of common plants, insects, birds; Visit to a local polluted site- Urban/Rural/Industrial/Agricultural.

Course outcomes:

1. Students will be able to enhance and analyze human impacts on the environment.
2. Integrate concepts & methods from multiple discipline and apply to environmental problems.
3. Design and evaluate strategic terminologies and methods for sustainable management of environmental systems.
4. Field studies would provide students first-hand knowledge on various local environment aspects which forms an irreplaceable tool in the entire learning process.

Text & Reference Books:

1. Essentials of Ecology and Environmental Science by Dr. S .V .S. Rana, PHI Learning Pvt. Ltd, Delhi
2. Environmental Chemistry by Anil Kumar De, Wiley Eastern Limited.
3. Environmental Science by T.G. Miller, Wadsworth Publishing Co, 13th edition.
4. Ecology and Environment by P. D. Sharma, Rastogi publications.
5. Erach Bharucha , "Environmental Studies for Undergraduate Courses", University Grants Commission and Bharati Vidyapeeth Institute of Environment Education and Research, Pune, University press pvt. Ltd. (India)
6. Fundamental concepts in Environmental studies by Dr. D.D. Mishra. S. Chand publications

SCIENCES OF PRINTING MATERIALS

General Course Information	
Course Code: PTG-202 -G Course Credit: 3.0 Contact Hours: 3/week, (L-T-P:3-0-0) Mode: Lectures and Tutorials Examination Duration: 3 Hours	**Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Course Objective : This subject should be the foundation of every serious learning about various consumables in Printing. It will help the students in the field of printing and packaging.

UNIT -I

Metals for Plate-making, Printing &Packaging : Types and characteristics of metal used for type alloys, foundry type, & Hot metal composition. Physical and Chemical properties metals used in printing & packaging industry in relation to printing & packaging application, Lithographic properties of Metals.

Photographic Materials : Main kinds of films and photographic papers used in graphic organization, Cross section of films, Main-base, Stripping, Anti halation Coating, Protective Coating, Paper positive materials, Developers, Reducers, and Intensifiers.
Light sensitive materials for printing image carrier for major printing processes.

UNIT -II

Paper Substrates & Non-Paper Substrate for Printing &Packaging:
Paper and Non- Paper Substrate used for printing and packaging industry.
Types of Plastic Substrate – Polyethylene, Polypropylene, Polyvinyl Chloride (PVC), Polyethylene tera-phthalate (PET), Polyester, Polystyrene, Cellophane, Metal, Foils, Laminates.

Printing Inks, Coatings & Varnishes for Printing & Packaging Applications:

Ingredients used in Printing Inks, Coatings and Varnishes. Colorant – Dyes, Pigment, Vehicles, Additives, Binders, Types of printing Inks – Paste Inks, Liquid Inks, Letter Press Inks, Offset/ Lithographic Inks, Gravure Inks, Flexo-graphic Inks. Constituents of coating & varnishes. Application, advantages and limitations of coatings & Varnishes.

UNIT -III

Cushioning Materials Cushioning materials, Solid vs Loose fill, Foam-in-place, Cushion curves and design, Corrugated as a cushioning material, Economics of design - packaging costs vs product damage.

Adhesives for Printing &Packaging : Adhesion, Types of Adhesive – Animal Glues, Fish Glues, Casin Adhesives, Starch Based Adhesives, and Natural resin Adhesives, Cellulose Adhesives, Rubber based adhesives, Synthetic resin adhesives, Inorganic Adhesives, Hot Melt.

UNIT -IV

Miscellaneous Materials : Different types of rubber used in printing, Book binding Materials – Leather, Cloth, Rexene, Threads, Tapes, Stitching Wire, Covering Materials, Varnishes, Laminates Eye-lets, thermoform.

Course Outcomes:

This course will be helpful for the students to study

1. To aware about the consumables in Packaging and Printing.
2. Learning the concepts and understanding of flexography printing and related Technology.
3. Enhance the knowledge of students in Printing & Packaging fields.

Text & Reference Books:

1. Printing Materials: Bob Tompson
2. Materials in Printing Processes
3. Printing Ink Manual
4. Hand Book of Packaging Technology

TECHNOLOGY OF FLEXOGRAPHY

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td rowspan="2">Course Code: PTG-204 -G

Course Credit: 3.0

Contact Hours: 3/week, (L-T-P:3-0-0)

Mode: Lectures and Tutorials

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks.</td></tr>
<tr><td>For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.</td></tr>
</table>

Course Objective: This subject should be the foundation of every serious learning on Flexographic process, Plates and equipments. It will help the students in the field of printing and packaging.

UNIT -I

Introduction to Flexography: Flexographic printing; flexographic market; flexographic products; Advantages, Applications & History of flexography; flexographic substrates and inks.

Basics of Flexography: Comparison with other major printing processes; Mechanical principles of flexography; Basic elements of flexography.

UNIT-II

Flexographic printing plates : Molded Rubber plates and its manufacture; Photopolymer plates- its kinds and methods of preparation; Care, Handling and storage of flexographic plates; Summary of benefits with photopolymer printing plates.

Flexographic Printing Press: Characteristics of the flexo press; components of Flexo press; The Printing System- Inking Configurations, Anilox Roll, Ink feed, Doctor blade, Ink fountain; Types of flexographic presses and their Markets, Examples of flexographic printing presses; Anilox roll - construction, cell structure, Anilox roll wear, selecting the night anilox roll, chrome plating. Fountain rolls - formulating rubber for rolls, Flexo roller covering, Care of covered rolls.

UNIT-III

Accessories and Auxiliary Equipment: Computer control Consoles; In feed and Delivery equipment; Tension control of webs; Register control; Dryers; Web Scanning; Ink control; Robots; Other Auxiliary equipment- sheet cleaner, spray powder Applicator, Static eliminator, electronic Impression control.

Finishing Equipment: Characteristics of finishing equipment; Coaters; Sheeter and Slitters; Die-cutters; Laminating; Foil Stamping and Embossing; De-metalizing.

UNIT-IV

Mounting and Proofing; Miscellaneous procedures - removing plates from the cylinder, mounting metal-backed plates, reusing sticky back, plate staggering, use of release agents; Tools for the operator; Basic requirements for process colour printing; Press room practices; Environment and safety concerns.

Bar Codes: Bar Codes and the package printer; Structure of Bar Codes and their symbols; Specifications for printing Barcodes, Printing the Bar code symbol; Verification of barcodes; generating the barcode symbols

Beyond the Horizon- Tomorrows Flexography: Future narrow web flexography; Future of Ink distribution system. Tomorrows flexographic plates; Markets for today and tomorrow.

Course Outcomes:

This course will be helpful for the students to study

1. To about the Flexo-Printing process, plates and equipments.
2. Learn the concepts and understanding of flexography printing & technology.
3. Enhance the knowledge of students in Printing & Packaging fields.

Text & Reference Books:

1. Flexography principles and practices - Foundation of flexographic technical Association, Ronkonkoma, N.Y. (1991).
2. Package Printing by Nelson R. Eldred.
3. Printing Technology by Adams and Faux.
4. Handbook of Print Media by HelmatKipphan (Ed.).
5. Printing Technology 5E by Adams.

TECHNOLOGY OF SCREEN PRINTING

General Course Information	
Course Code: PTG-206 –G Course Credit: 3.0 Contact Hours: 3/week, (L-T-P:3-0-0) Mode: Lectures and Tutorials Examination Duration: 3 Hours	**Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Course Objective: To give the students complete knowledge of screen printing, its applications, and its current requirements for effective working.

UNIT-I

Historical development of screen printing, Introduction, nature and scope, applications of screen printing, advantages, limitations, Essential Components, Aspects affecting screen printing quality, Screen printing scenario in India

UNIT-II

Screen printing equipment and accessories- printing table, screen frames, screen mesh, squeeze and its considerations, drying racks, emulsion, screen fabric, baseboard, stretching screen fabric to frame, screen printing material, care and maintenance of screens.

UNIT-III

Techniques of preparing stencils, Manual methods- Hand cut, Blocking out method, Photographic Methods- Direct, Indirect, Direct/Indirect, Specialized areas of screen printing- paper and paperboard, textile and jute, glass and ceramics, plastics, wood, metals and metal foils, circuit boards, Gumming, Flocking.

UNIT-IV

Ink and solvents for screen printing, characteristics of screen printing inks, Types and classifications, job and substrate specific ink, screen printing presses and drying systems- drying racks, wicket dryers, jet dryers, infrared dryers, UV dryers, Screen reclamation- Troubleshooting of clogged screens.

Course outcomes:

This course will be helpful for the students to study

1. To conclude various perspectives of Screen Printing.
2. Screen Printing applications in modern Printing and Packaging domains with evidences.
3. Enhance the knowledge of students in Printing & Packaging fields.

Text & Reference Books:

1. Printing Technology by Adams, Faux, Rieber, 5th edition
2. Technology of Screen Printing by B.D. Mendiratta
3. Screen Printing Review by Samuel Hoff
4. Screen Printing by John Stephens
5. Hand Book of in media by HelmatKipphan (Ed.).

DIGITAL TYPESETTING AND E-PUBLISHING

General Course Information	
Course Code: PTG-208 -G Course Credit: 3.0	**Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks.
Contact Hours: 3/week, (L-T-P:3-0-0) Mode: Lectures and Tutorials Examination Duration: 3 Hours	For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Course Objective: This course highlights the relevance of Digital Typesetting for Printing, Packaging, & Publishing sectors. It also touches the E-Publishing of the pre-press sections of industrial sectors for in-depth assignments. For better understanding of the students.

UNIT – I

Preparing copy for press, Acquisition of Text- Automatic input, human input, keyboards, optical character recognition, working principle, factors affecting performance, automatic voice recognition, desktop scanners, pointing device, mouse, light pen, touch screen. Proofing. Text transferring data - capture device, tele communications, modems, ISDN. General rules of page make up. Composition Software - Automatic Page Make up, Text and graphics Integration.

UNIT – II

Hot type composition, Cold Type, Photo lettering, Photo composing -Introduction, Advantages, Basic principle, Image setter, film transport system, Price, Laser type, Processing, environmental issues, other factors. Small, Medium and Large format Image setters. Page description languages. Post Script Language – Introduction. PostScript Fundamentals, Adobe Acrobat.

UNIT – III

Introduction, Origin, components of DTP, applications of DTP. Benefits of DTP. Developments. Output quality, output speed, page make up. Software for DTP – word processing. Heavy duty programmes, medium duty programmes, light duty programmes. Graphic programs. Type manipulation software, OCR software, Image software. Page make up software – approach, typography, document & text handling, applications. DTP solutions.

UNIT – IV

Digital Fonts, True type fonts, Post Script Type 1, Adobe type manager, Transferring fonts, Font manipulation, Vector & Bitmap text and Graphic creation, Raster Image Processing, Future trends and developments.MS Excel, MS Power Point. Page display. Graphics tablets, scanners for text, line art & images, digitizers.

Course Outcome:

This course will be helpful for the students to study

1. To conclude the basics of Digital Typesetting
2. Knowledge of E-Publishing in Printing, Packaging, & Publishing sections.
3. Knowledge of students in Printing & Packaging fields.

Text & Reference Books:

1. Desk Top Publishing 4th edition – **Kirtywilson, Davis, Ron Strutt**.
2. Typesetting-Composition-**Geoff, Barlow**
3. Word Processor to Printed Page - **Micheal Card**
4. Digital Typography-**Donald E.Knuth**
5. Introduction to Prepress - **Hugh Speirs**
6. Introduction to Printing Technology - **Hugh Speirs**
7. Composing and Typography Today - **Mendiratta.B.D.**
8. Hand Book of Typography - **Kailas Takle**.
9. Guide to DTP -**James Cavuoto**
10. Printing Technology – **Adams, Faux, Rieber (5th Edition)**
11. Printing in a Digital World – **David Bergsland**

IMAGING TECHNIQUES IN PRINTING

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td rowspan="2">Course Code: PTG-210-G

Course Credit: 3.0

Contact Hours: 3/week, (L-T-P:3-0-0)

Mode: Lectures and Tutorials

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks.</td></tr>
<tr><td>For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.</td></tr>
</table>

Course Objective : The aim of this subject is to provide through knowledge of various Imaging Techniques of different printing processes and in Printing & Packaging industry.

UNIT –I

Assembly of Film Images : Equipment's and Tools required, Materials and Supplies: Photographic film (Camera Film, Contact Film, Duplicating films).
Proofing materials : Diazo papers, Polymer papers, Brown Print paper, Diffusion Transfer material, Photographic Paper.
Assembly and masking materials : Goldenrod, Vinyl, Clear Film, Peel able Masking Films, Photographic masking films.
Stripping supplies: Screen Tints, Pressure Sensitive Tapes, Adhesives, Opaque's, Cleaning Solutions, Register Tabs Button & Pins. Register masks, GATF image contact masks.
Kinds of press layout: One-up layout, One side multiple layout, One side combination layout, Sheet wise layout, Work-and-Turn layout, Work-and-Tumble layout.

UNIT –II

Image Carriers for Planography : Light Sensitive Coating: Di-cremated colloids, Diazo Compounds, Photo Polymers, Diffusion and transfer methods, Electrostatic. Sensitivity of coating to light. Dye-sensitized photo polymerization, dark reaction, post exposure, safe lights, reciprocity law. Action of light sources on coatings, stabilities of coatings. **Plate materials**: Zinc, Aluminium, Brass, Copper, Steel, Chromium. Action of oil and water on metal - Contact Angle. **Introduction to Graining of plates** (Mechanical Graining, Electrochemical graining).**Light sources for plate making**: Metal Halide, Mercury Lamps, Pulsed - xenon, Laser. **Types of Plates**: Pre-sensitized plates- Negative Working Plates, Positive working plates; Multi-metal plates - Producing a multifocal plate, Types- Bi-metallic, Tri-metallic. Electrostatic plates; Introduction to Deep Etch plates, Wipe on Plates; Toray Waterless Plates- Structure, Processing and use, Advantages and Dis-advantages. Application of Gum on plate.

UNIT -III

Image Carriers for Flexography : Introduction to Flexographic plates. Photo initiators, Photo Sensitizers and Washout Solvents.

Photopolymer Flexographic Plates: Sheet Photo Polymer Plates, Liquid photo polymer plates. Base material for photo polymer plates, Advantages of photo polymer plates. Disadvantages of photo polymer plates; Rubber Flexographic plates, Photo Engravings, Duplicate Plates. Advantages of Rubber Plates, Disadvantage of Rubber Plates.

Image Carriers for Gravure:

Methods of Cylinder Preparation: Diffusion Etch Method, Direct Transfer Method, Electromechanical process, Laser Cutting Method. **Well formation**: Lateral hard dot wells, Direct Contact Wells, Conventional Gravure Wells. **Cylinder Design:** Parts of Gravure Cylinder, Forms of Gravure Cylinder- Integral Shaft, Mandrel. Copper Plating and Polishing. Reuse of Cylinders. Ballard Shell Cylinders.

UNIT- IV

Image Carriers Screen Printing: **Stencil Making:** Hand Painted Stencil - Introduction, Block-out methods (selective process) - wax resist method. Knife cut stencils. **Stencil Cutting Tools and Cutting Techniques** - Swirl knife, Computerized stencil Cutting. Photomechanical stencil making - Indirect photo stencil film - making an indirect Photo stencil, indirect photo polymer film. Automatic processing and development - direct emulsion photo stencil - making a direct emulsion photo stencil

Digital Image Carriers:

Image generation of a Digital Offset Machine. Laser plate making system, Computer-to-Plate - Thermal plate, Polyester plate. Auto Plate Processor. Troubleshooting for plates.

Course Outcomes:

This course will be helpful for the students to study

1. The knowledge about various Materials and tools used in plate making department.
2. Explore their knowledge about the various techniques used to generate Image Carrier for various printing processes.
3. Thorough knowledge regarding the latest techniques of digital imaging.

Text & Reference Books:

1. Heidelberg DI Press- Manual Chemistry for Graphic Arts - **Dr. Nelson R. Eldred**.
2. Offset Plate Making - **Robert F. Reed**. Printing Technology 3rd Edition. - **Adams, Fax &Rieber**.
3. Screen Process Printing - **John Stephens**. Sheet fed Offset Press Operating - **Lloyd P. Dejidas**.
4. Flexography Premier - **Donna C. Mulvihill**. Stripping - **Harold L. Peck**.
5. Gravure Process and Technology –GAA. Selecting The Right Litho Plate - BPIF.
6. A. L. Gatehouse; Manual for film planning and plate making; roper – GATF Publication, 1983 edition.
7. Lithographers Manual – GATF seventh edition.
8. Paul J.Hartsuch Chemistry for the Graphic Arts, GATF, 1983 edition.
9. Lan Faux, Modern lithography, MacDonald & Evans Publication, 1973. Edition.
10. Lithographic Image Carriers by C.S. Mishra
11. Printing Technology by Adams, Faux, & Rieber

TECHNOLOGY OF FLEXOGRAPHY LAB

<table>
<tr><th colspan="2">General Course Information</th></tr>
<tr><td rowspan="2">Course Code: LC-204-G

Course Credit : 1

Contact Hours: 2/week, (L-T-P:0-0-2)

Mode: Practical and Lab Work

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)</td></tr>
<tr><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Internal practical evaluation is to be done by the course co-ordinator. The end semester practical examinations will be conducted jointly by external and internal examiners.</td></tr>
</table>

List of Experiments-

1. Introduction and Familiarizing about Flexographic Machine and other related elements.
2. Preparation of Rubber plates
3. Preparation of Photo Polymer Plates
4. Plate Mounting in Flexographic printing machine.
5. Make ready procedures and Single, Two & Four Color Printing in Flexo machine.
6. Study of 6 color and 8 Color flexography machines.
7. Study of Hybrid Printing Systems combining Flexography Printing Technology.
8. Printing on various substrates in flexographic printing.
9. Studying modern flexographic machines with finishing operations.
10. Study of CIC Flexo machines

TECHNOLOGY OF SCREEN PRINTING LAB

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td rowspan="2">Course Code: LC-206-G

Course Credit: 1

Contact Hours: 2/week, (L-T-P:0-0-2)

Mode: Practical and Lab Work

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)</td></tr>
<tr><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Internal practical evaluation is to be done by the course co-ordinator. The end semester practical examinations will be conducted jointly by external and internal examiners.</td></tr>
</table>

List of Experiments-

1. Study of various types of screen materials.
2. Screen stretching techniques.
3. Stencil preparation - Direct,
4. Stencil preparation - Indirect, Direct/Indirect.
5. Screen Printing of various routine documents.
6. Printing on various substrates
7. Screen Reclamation
8. 2 Colour Screen Printing
9. 4 Colour Screen Printing
10. Study of automatic Screen Printing

DIGITAL TYPESETTING AND E-PUBLISHING LAB

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td rowspan="2">Course Code: LC-208-G

Course Credit: 1

Contact Hours: 3/week, (L-T-P:0-0-2)

Mode: Practical and Lab Work

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)</td></tr>
<tr><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Internal practical evaluation is to be done by the course co-ordinator. The end semester practical examinations will be conducted jointly by external and internal examiners.</td></tr>
</table>

List of Experiments-

1. Familiarizing with key board.
2. M.S.Word – Justification works, column work, single column, double column,
3. Fonts & type style changing; copy, cut & paste command, word art.
4. Designing of visiting cards,
5. Page makeup of pamphlets,
6. Page make up of advertisements, folders, journals, book work.
7. Picture and text manipulation.
8. Resizing the images.
9. Table work setting.
10. Comparing various outputs – Dot matrix, Inkjet printer, Laser printer.

IMAGING TECHNIQUES IN PRINTING LAB

<table>
<tr><td colspan="2">General Course Information</td></tr>
<tr><td rowspan="2">Course Code: LC-210-G

Course Credit: 1

Contact Hours: 2/week, (L-T-P:0-0-2)

Mode: Practical & Lab Work

Work Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)</td></tr>
<tr><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Internal practical evaluation is to be done by the course co-ordinator. The end semester practical examinations will be conducted jointly by external and internal examiners.</td></tr>
</table>

List of Experiments-

1. Comparative study of various materials and equipment used in Printing Image Generation Department.
2. Assembling positives for four color jobs
3. Layout preparation
4. Study of Wipe-on plates.
5. Study of Albumin plates and Deep-etch plates.
6. Preparation of Pre-sensitized plate
7. Study of gripper margin and registration processes
8. Study of Flexographic plates and Gravure Cylinder
9. Study of Digital Plates
10. Surface Preparation for Screen Printing Process

SEMINAR-I

<table>
<tr><th colspan="2">General Course Information</th></tr>
<tr><td rowspan="2">Course Code: S-212-G

Course Credit: 1

Contact Hours: 2/week, (L-T-P:0-2-0)

Mode: Tutorials

Examination Duration: 3 Hours</td><td>Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70) Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks.</td></tr>
<tr><td>For the end semester examination, the presentation will be done by the students and Viva-Voce examinations will be conducted by External Examiner.</td></tr>
</table>

For the seminar, the student will select a topic in consultation with allotted seminar the preparation o report for final presentation in exam.

SKILLS & INNOVATION LAB

General Course Information	
Course Code: LC-214-G Course Credit: 0 Contact Hours: 3/week, (L-T-P:0-0-3) Mode: Practical & Lab Work Examination Duration: 3 Hours	**Course Assessment Methods; Max. Marks: 100 (Internal: 30; External: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignments (4 marks) and class performance (2 marks), and end semester examination of 70 marks. For the end semester examination, the presentation will be done by the students and Viva-Voce examinations will be conducted by External Examiner.

A group of 5-7 students are required to carry out a project related to current research & development in the field of Printing Technology. Each group of students will try to propose a novel idea/ modified technique/ new interpretation after identifying an existing new processes and/or materials, creating a higher impact than the existing practices etc. using their innovative ideas and concept generation abilities.

The topic of the project will be decided by the students in consultation with the course coordinator. The project report will be submitted by a group at the end of semester. The students may use the equipments/ machines/ instruments available in the labs/ workshops with the due permission of Chairperson on recommendation of the course coordinator.

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH (Electronics and Computer Engineering)

SEMESTER 3rd and 4th

Scheme effective from 2019-20

COURSE CODE AND DEFINITIONS

Course Code	Definition
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

B.Tech. (Electronics and Computer Engineering)

Scheme of Studies/Examination

Semester- 3 w.e.f. 2019-20

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	PCC-CSE-201G	Database Management Systems (Common with CSE)	3	0	0	3	3	25	75		100	3
2	PCC-CSE-203G	Data Structures & Algorithms (Common with CSE)	3	0	0	3	3	25	75		100	3
3	PCC-CSE-205G	Digital Electronics (Common with CSE)	3	0	0	3	3	25	75		100	3
4	PCC-ECE201G	Electronic Devices (Common with ECE)	2	0	0	2	2	25	75		100	3
5	BSC-MATH-203G	Mathematics - III (Multivariable Calculus and Differential Equations) (Common with CSE)	2	0	0	2	2	25	75		100	3
6	HSMC-01G	Economics for Engineers(Common with CSE)	3	0	0	3	3	25	75		100	3
7	LC-CSE-209G	Database Management Systems LAB(Common with CSE)	0	0	4	4	2	25		25	50	3
8	LC-CSE-211G	Digital Electronics LAB(Common with CSE)	0	0	4	4	2	25		25	50	3
9	LC-CSE-213G	Data Structures & Algorithms LAB Using C(Common with CSE)	0	0	4	4	2	25		25	50	3
10	LC-ECE203G	Electronic Devices Labs(Common with ECE)	0	0	2	2	1	25		25	50	3
Total							23				800	

B.Tech. (Electronics and Computer Engineering)

Scheme of Studies/Examination

Semester- 4 w.e.f. 2019-20

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	PCC-CSE-202G	Discrete Mathematics (Common with CSE)	3	1	0	3	4	25	75		100	3
2	PCC-CSE-204G	Computer Organization & Architecture(Common with CSE)	3	0	0	3	3	25	75		100	3
3	PCC-CSE-206G	Operating System(Common with CSE)	3	0	0	3	3	25	75		100	3
4	PCC-CSE-208G	Object Oriented Programming(Common with CSE)	3	0	0	3	3	25	75		100	3
5	HSMC-02G	Organizational Behaviour	3	0	0	3	3	25	75		100	3
6	* MC-106G	Environmental Sciences	3	0	1	4	0	25	75			3
7	PCC-ECE-202G	Communication System(Common with ECE)	2	0	0	2	2	25	75		100	3
8	LC-CSE-212G	Operating System LAB(Common with CSE)	0	0	4	4	2	25		25	50	3
9	LC-CSE-214G	Object Oriented Programming LAB Using C++(Common with CSE)	0	0	4	4	2	25		25	50	3
10.	LC-ECE-204G	Communication System Lab(Common with ECE)	0	0	2	2	1	25		25	50	3
Total							23				750	

*MC-106G is a mandatory non –credit course in which the students will be required passing marks in theory.

NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH (Electronics and Computer Engineering)

SEMESTER 3rd & 4th

Scheme effective from 2019-20

COURSE CODE AND DEFINITIONS

Course Code	Definition
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

Database Management System

Course code	PCC-CSE-201G				
Category	Professional Core Course				
Course title	Database Management System				
Scheme and Credits	L	T	P	Credits	
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

a. To understand the different issues involved in the design and implementation of a database system.
b. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
c. To understand and use data manipulation language to query, update, and manage a database
d. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
e. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). **Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit: 2

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit: 3

Storage strategies: Indices, B-trees, hashing,

Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit: 4

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Suggested books:

“Database System Concepts”, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Suggested reference books

“Principles of Database and Knowledge – Base Systems”, Vol 1 by J. D. Ullman, Computer Science Press.

“Fundamentals of Database Systems”, 5th Edition by R. Elmasri and S. Navathe, Pearson Education

“Foundations of Databases”, Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

Course Outcomes

1. For a given query write relational algebra expressions for that query and optimize the developed expressions
2. For a given specification of the requirement, design the databases using E R method and normalization.
3. For a given specification, construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
4. For a given query optimize its execution using Query optimization algorithms
5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.
6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

Data Structure & Algorithms

Course code	PCC-CSE-203G				
Category	Professional Core Course				
Course title	Data Structure & Algorithms				
Scheme and Credits	L	T	P	Credits	
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Objectives of the course:

1. To impart the basic concepts of data structures and algorithms.
   To understand concepts about searching and sorting techniques
   To understand basic concepts about stacks, queues, lists, trees and graphs.
   To enable them to write algorithms for solving problems with the help of fundamental data structures

Unit 1:

Introduction: Basic Terminologies: Concept of Data Structure, Choice of right Data Structure, Algorithms , how to design and develop algorithm , Complexity of algorithm. Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.

Unit 2:

Stacks and Queues: Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation -corresponding algorithms and complexity analysis. queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Unit 3:

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.
Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.
Unit 4:

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Selection Sort Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Suggested books:

"Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

Suggested reference books:

Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
"How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

Course outcomes

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

DIGITAL ELECTRONICS

<table>
<tr><td>Course code</td><td colspan="5">PCC-CSE-205G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Digital Electronics</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester 3</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT 1:

FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes.

UNIT 2:

COMBINATIONAL DIGITALCIRCUITS

Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT 3:

SEQUENTIAL CIRCUITS AND SYSTEMS

A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT 4:

A/D AND D/A CONVERTERS

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, Analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter,

SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES

Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Use PLDs to implement the given logical problem.

REFERENCES:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
4. Nasib Singh Gill and J B Dixit, "Digital Design and Computer Organization", University Science Press, New Delhi

PCC-ECE201G Electronic Devices

L	T	P	Credits	
3	0	-	03	Sessional Marks: 25
				Theory Marks: 75
				Duration of Exams: 3 Hours

Course Objective: The objectives of this course are as under:

1. To provide explanation about the operation of all the important electronic devices
2. To study and understand the I/O behavior of various electronics devices to variable inputs
3. To demonstrate how electronic devices are used to design efficient electronic applications

Unit 1

Basic Semiconductor And Pn-Junction Theory: Introduction, Atomic Structure, Band Theory of Semiconductors, Covalent Bond, Metals, Insulators & Semiconductors, Effect of Temperature on Conduction, Drift Current ,Donor & Accepter Impurities in Semiconductor, Law Of Mass Action, Hall's Effect, Hall Coefficient & Mobility, Poisson and continuity equation.

Characteristics Of Diode:PN-Junction, Construction Types, Unbiased Junction, Biased Junction, Space Charge Region, Diode Characteristics & Parameters, Diode Capacitance, Diode Resistance, DC And AC Load Lines, Diode Testing, Zener And Avalanche Breakdown Diodes, Tunnel Diode, Temperature Characteristics of Diode, Reverse Recovery Time, Switching Characteristics of Diode.

Unit 2

Diode Applications: Half Wave, Full Wave Center Tapped, Full Wave Bridge(Rectification), Series Clipping Circuit, Shunt Clipping Circuit, Clamping Circuit, Bridge Voltage Doubler, Filtering Circuit Using Capacitor & Inductor.

Junction Transistor: Introduction, Construction Of Junction Transistor, Circuit Symbols, Transistor Operation, Unbiased Transistor, Operation Of Biased Transistor, Transistor Current Components, DC & AC Load Line, Operating Point, Transistor Configuration CB, CE, CC, Input/Output Characteristics, Early Effect(Base Width Modulation), Eber's-Moll-Model of Transistor, Maximum Rating of Transistor, Transistor Testing, Transistor as an Amplifier, Transistor as Oscillator.

Unit 3

Bjt Biasing: Bias Stability, Instability Due To β, Thermal Stability, Stability Factor, Fixed Biased Circuits, Effect of Emitter Resistor, Collector to Base Bias, Voltage Divide Biasing, Advantage & drawbacks of Biasing Techniques, Stability Factor calculation of Biasing Techniques, Bias Compensation by various device, Thermal Runway, Transistor Dissipation, Thermal Resistance, Condition of Thermal Stability

Small Signal Circuit: Two Port Network, Hybrid(H-Parameter)Model, Typical Values of H-Parameter Model, Conversion of CE, CB, CC Configuration to Equivalent Hybrid Model, CB Circuit Analysis, CE circuit with & without R_E analysis, CC circuit analysis, Analysis of CE, CB & CC Configuration with approximate Hybrid Model, Miller's Theorem, Dual of Miller Theorem.

Unit 4

FET: Introduction, The Junction FET, Basic Construction, Operation, P- Channel FET, N-Channel FET, High Frequency Model of FET, Low Frequency FET Amplifiers, Transfer Characteristics of FET, MOSFET, Enhancement Mode, Depletion Mode of FET, Circuit Symbol of MOSFET,V-MOSFET.

Special Semicondutor Devices: Optoelectronic Devices, Photoconductors, Photo Diode, Photo Transistor, Photo Voltaic Sensor, Photo Emission, Solar Cells, LED, LCD, Laser Diode, Schottky Diode, SCR, TRIAC, DIAC, UJT, Single Electron Transistor. Infrared LEDs, IGBT, Opto Coupler.

Text/Reference Books:

1. Basic Electronics By Debashion DE. – Pearson Education.
2. Electronics Device & Circuit, By Robert Boylestad ,Louis Nashelsky, 11th Edition, Pearson Education,2015.
3. Electronics Device Circuit By David.A.Bell -- Oxford
4. Integrated Electronics By Millman Halkias -- TMH.
5. Electronics Device &Circuit By Dharam Raj Cheruku -- Pearson Education.
6. Electronics Device &Circuit By B.P Singh and Rekha Singh 2nd Edition – Pearson Education.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the operation of all the important electronic devices
2. Understand the I/O behavior of various electronics devices to variable inputs
3. Understand the design of efficient electronic applications

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Mathematics-III (Multivariable Calculus and Differential Equations)

<table>
<tr><td>Course code</td><td colspan="5">BSC-MATH-203G</td></tr>
<tr><td>Category</td><td colspan="5">Basic Science Course</td></tr>
<tr><td>Course title</td><td colspan="5">Mathematics-III (Multivariable Calculus and Differential Equations)</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester 3</td></tr>
<tr><td>2</td><td>0</td><td></td><td>2</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Multivariable Differential Calculus: Limit, Continuity and Partial derivatives, Homogeneous functions, Euler's Theorem, Total derivative, Maxima, Minima and Saddle points, Lagrange's method of undetermined multipliers

Unit-II

Multivariable Integral Calculus: Double integral, Change of order of integration, Change of variables, Applications of double integral to find area enclosed by plane curves, Triple integral

Unit-III

Ordinary Differential Equations of first order: Linear and Bernoulli's equations, Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order and first degree to simple electric circuits, Newton's law of cooling, Heat flow and Orthogonal trajectories

Unit-IV

Ordinary Differential equations of second and higher order: Linear differential equations of second and higher order, Complete solution, Complementary function and Particular integral, Method of variation of parameters to find particular integral, Cauchy's and Legendre's linear equations, Simultaneous linear differential equations with constant coefficients, Applications of linear differential equations to oscillatory electric circuits

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
4. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
5. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
6. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems,Wiley India.
7. S. L. Ross, Differential Equations, Wiley India.
8. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India.
9. E. L. Ince, Ordinary Differential Equations, Dover Publications

Course Outcomes

The students will learn:

1. To deal with functions of several variables and evaluate partial derivative.
2. The mathematical tools needed in evaluating multiple integrals and their usage.
3. The effective mathematical tools for the solutions of ordinary differential equations that model physical processes.

ECONOMICS FOR ENGINEERS

Course code	HSMC- 01G				
Category	Humanities/ Social Sciences/ Management				
Course title	Economics For Engineers				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Branches (B. Tech.)	Common For All Branches				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:

1. Acquaint the students to basic concepts of economics and their operational significance.
2. To stimulate the students to think systematically and objectively about contemporary economic problems.

UNIT-1

Definition of Economics- Various definitions, types of economics- Micro and Macro Economics, nature of economic problem, Production Possibility Curve, Economic laws and their nature, Relationship between Science, Engineering, Technology and Economic Development.

Demand- Meaning of Demand, Law of Demand, Elasticity of Demand- meaning, factors effecting it, its practical application and importance,

UNIT 2

Production- Meaning of Production and factors of production, Law of variable proportions, and Returns to scale, Internal external economies and diseconomies of scale. Various concepts of cost of production- Fixed cost, Variable cost, Money cost, Real cost, Accounting cost, Marginal cost, Opportunity cost. Shape of Average cost, Marginal cost, Total cost etc. in short run and long run.

UNIT-3

Market- Meaning of Market, Types of Market- Perfect Competition, Monopoly,

Monopolistic Competition and Oligopoly (main features).

Supply- Supply and law of supply, Role of demand & supply in price determination and effect of changes in demand and supply on prices.

UNIT-4

Indian Economy- Nature and characteristics of Indian economy as under developed, developing and mixed economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalization of Indian economy - merits and demerits.

Banking- Concept of a Bank, Commercial Bank- functions, Central Bank- functions, Difference between Commercial & Central Bank.

COURSE OUTCOMES:

1. The students will able to understand the basic concept of economics.
2. The student will able to understand the concept of production and cost.
3. The student will able to understand the concept of market.
4. The student will able to understand the concept of privatization, globalization and banks.

REFERENCES:

1. Jain T.R., Economics for Engineers, VK Publication.
2. Chopra P. N., Principle of Economics, Kalyani Publishers.
3. Dewett K. K., Modern economic theory, S. Chand.
4. H. L. Ahuja., Modern economic theory, S. Chand.
5. Dutt Rudar & Sundhram K. P. M., Indian Economy.
6. Mishra S. K., Modern Micro Economics, Pragati Publications.
7. Singh Jaswinder, Managerial Economics, dreamtech press.
8. A Text Book of Economic Theory Stonier and Hague (Longman's Landon).
9. Micro Economic Theory – M.L. Jhingan (S.Chand).
10. Micro Economic Theory - H.L. Ahuja (S.Chand).
11. Modern Micro Economics : S.K. Mishra (Pragati Publications).
12. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co).

Database Management System Lab

<table>
<tr><td>Course code</td><td colspan="5">LC-CSE-209G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Database Management System Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2"></td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>2</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Computer Science and Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Objectives:

- Keep abreast of current developments to continue their own professional development
- To engage themselves in lifelong learning of Database management systems theories and technologies this enables them to purse higher studies.
- To interact professionally with colleagues or clients located abroad and the ability to overcome challenges that arises from geographic distance, cultural differences, and multiple languages in the context of computing.
- Develop team spirit, effective work habits, and professional attitude in written and oral forms, towards the development of database applications.

Contents:

i. Creation of a database and writing SQL queries to retrieve information from the database.
ii. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
iii. Creation of Views, Synonyms, Sequence, Indexes, Save point.
iv. Creating an Employee database to set various constraints.
v. Creating relationship between the databases.
vi. Study of PL/SQL block.
vii. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
viii. Write a PL/SQL block that handles all types of exceptions.
ix. Creation of Procedures.
x. Creation of database triggers and functions

xi. Mini project (Application Development using Oracle/ MySQL)

a) Inventory Control System

b) Material Requirement Processing.

c) Hospital Management System.

d) Railway Reservation System.

e) Personal Information System.

f) Web Based User Identification System.

g) Time Table Management System.

h) Hotel Management

Digital Electronics Lab

<table>
<tr><td>Course code</td><td colspan="5">LC-CSE-211G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Digital Electronics Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-3</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>2</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Computer Science and Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Implementation all experiments with help of Bread- Board.

1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Half Adder / Full Adder: Realization using basic and XOR gates.
3. Half Subtractor / Full Subtractor: Realization using NAND gates.
4. 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter: Realization using XOR gates.
5. 4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.
6. Multiplexer: Truth-table verification and realization of Half adder and Full adder.
7. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor.
8. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF.
9. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter.
10. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter.
11. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations.
12. DAC Operation: Study of 8-bit DAC , obtain staircase waveform.
13. ADC Operations: Study of 8-bit ADC

Data Structures and Algorithms Lab Using C

<table>
<tr><td>Course code</td><td colspan="5">LC-CSE-213G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Data Structures and Algorithms Lab Using C</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-3</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>2</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Computer Science and Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Data Structures Lab List of practical exercises, to be implemented using object-oriented approach in C++ Language.

1. Write a menu driven program that implements following operations (using separate functions) on a linear array:
    - Insert a new element at end as well as at a given position
    - Delete an element from a given whose value is given or whose position is given
    - To find the location of a given element
    - To display the elements of the linear array
2. Write a menu driven program that maintains a linear linked list whose elements are stored in on ascending order and implements the following operations (using separate functions):
    - Insert a new element
    - Delete an existing element
    - Search an element
    - Display all the elements
3. Write a program to demonstrate the use of stack (implemented using linear array) in converting arithmetic expression from infix notation to postfix notation.
4. Program to demonstrate the use of stack (implemented using linear linked lists) in evaluating arithmetic expression in postfix notation.
5. Program to demonstration the implementation of various operations on a linear queue represented using a linear array.
6. Program to demonstration the implementation of various operations on a circular queue represented using a linear array.
7. Program to demonstration the implementation of various operations on a queue represented using a linear linked list (linked queue).

8. Program to illustrate the implementation of different operations on a binary search tree.
9. Program to illustrate the traversal of graph using breadth-first search
10. Program to illustrate the traversal of graph using depth-first search.
11. Program to sort an array of integers in ascending order using bubble sort.
12. Program to sort an array of integers in ascending order using selection sort.
13. Program to sort an array of integers in ascending order using insertion sort.
14. Program to sort an array of integers in ascending order using radix sort.
15. Program to sort an array of integers in ascending order using merge sort.
16. Program to sort an array of integers in ascending order using quick sort.
17. Program to sort an array of integers in ascending order using heap sort.
18. Program to sort an array of integers in ascending order using shell sort.
19. Program to demonstrate the use of linear search to search a given element in an array.
20. Program to demonstrate the use of binary search to search a given element in a sorted array in ascending order.

LC-ECE203G Electronic Devices Lab

L	T	P	Credits			
-	-	2	1	Class Work	:	25 Marks
				Theory	:	25Marks
				Total	:	50 Marks
				Duration of Exam.	:	3 Hrs.

Course Objective: The objectives of this course are as under:
1. To introduce students to the characteristics of diodes, transistors, JFETs, and op-amps .
2. To provide understanding about the operation and characteristics of different configurations of BJT.
3. To provide understanding about the operation and characteristics of different special semiconductor devices.

LIST OF EXPERIMENTS:

1 Analysis & study of half wave and full wave rectifiers
2 Analysis & study of power supply filter.
3 Analysis & study of diode as a clipper and clamper.
4 Analysis & study of zener diode as a voltage regulator.
5 Analysis & study of CE amplifier for voltage, current and Power gains input, output impedances.
6 Analysis & study of CC amplifier as a buffer.
7 Analysis & study the frequency response of RC coupled amplifier.
8 Analysis & study of transistor as a constant current source in CE configuration .
9 To study characteristics of FET.
10 Analysis & study of FET common source amplifier.
11 Analysis & study of FET common drain amplifier.
12 Study and design of a DC voltage doubler.
13 To study characteristics of SCR.
14 To study characteristics of DIAC.
15 To study UJT as a relaxation oscillator.

Course Outcomes: At the end of the course, students will be able to:
1. Understand the characteristics of diodes, transistors, JFETs, and op-amps.
2. Understand the operation and characteristics of different configurations of BJT.
3. Understand the operation and characteristics of different special semiconductor devices.

Note:-
1 Total ten experiments are to be performed in the semester.
2 At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.
3 At least 5 experiments have to be simulated and results to be validated with experimental results.

Discrete Mathematics

Course code	PCC-CSE-202G				
Category	Professional Core Course				
Course title	Discrete Mathematics				
Scheme and Credits	L	T	P	Credits	Semester - 4
	3	1		4	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Sets, Relation, Function and Propositional Logic: Operations and Laws of Sets, Cartesian Products, Representation of relations, Binary Relation, Equivalence Relation, Partial Ordering Relation, POSET, Hasse Diagram, Lattices and its types, Function, Bijective functions, Inverse and Composite Function, Finite and infinite Sets, Countable and Uncountable Sets, Cantor's diagonal argument and The Power Set theorem, **S**chroeder-Bernstein theorem, Propositions, Logical operations, Conditional Statements, Tautologies, Contradictions, Logical Equivalence, The use of Quantifiers

Unit-II

Basic Counting Techniques and Recurrence Relation: Pigeon-hole principle, Permutation and Combination**,** the Division algorithm: Prime Numbers, The GCD: Euclidean Algorithm, The Fundamental Theorem of Arithmetic., Linear recurrence relation with constant coefficients, Homogenous Solutions, Particular Solutions, Total Solutions, Solving recurrence relation using generating functions

Unit-III

Algebraic Structures: Definitions and examples of Algebraic Structures with one Binary Operation: Semi Groups, Monoids, Groups; Congruence Relation and Quotient Structures, Permutation Groups, Cyclic groups, Normal Subgroups, Definitions and examples of Algebraic Structures with two Binary Operation: Rings, Integral Domain, Fields; Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

Unit-IV

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Multigraph and Weighted graph, Shortest path in Weighted graphs, Eulerian paths and circuits, Hamiltonian path and circuits, Planar Graphs, Euler's formulae, Graph Colouring, Trees, Binary trees and its traversals, Trees Sorting, Spanning tree, Minimal Spanning tree

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Satinder Bal Gupta: A Text Book of Discrete Mathematics and Structures, University Science Press, Delhi.
3. C. L. Liu and D. P. Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, Tata McGraw – Hill.
4. J.P. Tremblay and R. Manohar, Discrete mathematical structures with applications to computer science, TMG Edition, TataMcgraw-Hill
5. Discrete Mathematics, Babu Ram, Pearson Publication
6. Discrete Mathematics, Semyour Lipschutz and Marc Lipson, Schaum's outline

Course Outcomes

The students will learn

1. To solve mathematical problems based on concepts of set theory, relations, functions and lattices.
2. To express logic sentence in terms of quantifiers and logical connectives.
3. To apply basic counting techniques to solve permutation and combination problems.
4. To solve recurrence relations.
5. To classify algebraic structure of any given mathematical problem.
6. To evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
7. To develop the given problem as graph networks and solve with techniques of graph theory.

Computer Organization & Architecture

Course code	PCC-CSE-204G				
Category	Professional Core Course				
Course title	Computer Organization & Architecture				
Scheme and Credits	L	T	P	Credits	Semester-IV
	3	0	0	3	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Objectives of the course:

To expose the students to the following:

- How Computer Systems work & the basic principles
- Instruction Level Architecture and Instruction Execution
- The current state of art in memory system design
- How I/O devices are accessed and its principles.
- To provide the knowledge on Instruction Level Parallelism
- To impart the knowledge on micro programming
- Concepts of advanced pipelining techniques.

Unit 1

Data representation: Data Types, Complements, Fixed-Point Representation, Conversion of Fractions, Floating-Point Representation, Gray codes, Decimal codes, Alphanumeric codes, Error Detection Codes.

Register Transfer and Microoperations : Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

Unit 2

Basic Computer Organization and Design : Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instruction, Input-Output Instruction, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

Central Processing Unit : General Register Organization, Stack organization, Instruction Format, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC, CISC.

Unit 3

Pipelining: Basic Concepts of Pipelining, Throughput and Speedup, Pipeline Hazards.

Parallel Processors: Introduction to Parallel Processors, Concurrent access to memory and Cache Coherency.

Unit 4

Input-output Organization : I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, Privileged and Non-Privileged Instructions, Software Interrupts.

Memory organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Associative Mapping, Direct Mapping, Set-Associative Mapping, Writing into Cache, Cache Initialization, Virtual Memory.

Suggested books:

1) "Computer System Architecture", 3rd Edition by M.Morris Mano, Pearson.
2) "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
3) "Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.

Suggested reference books:

1) "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2) "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3) "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

Course outcomes :

1) Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.

2) Write assembly language program for specified microprocessor for computing

16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).
3) Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
4) Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
5) Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology.

Operating System

Course code	PCC-CSE-206G					
Category	Professional Core Course					
Course title	Principles of Operating System					
Scheme and Credits	L	T	P	Credits	Semester-4	
	3	0	0	3		
Branches (B. Tech.)	Computer Science and Engineering					
Class work	25 Marks					
Exam	75 Marks					
Total	100 Marks					
Duration of Exam	03 Hours					

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT 1:

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services.
Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. Thread: Definition, Various states, Benefits of threads, Types of threads, Multithreading.
Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non-pre-emptive, FCFS, SJF, SRTF, RR Scheduling.

UNIT 2:
Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.
Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

UNIT 3:

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Optimal Page Replacement and Least Recently used (LRU).

UNIT 4:

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks. Case study on UNIX and WINDOWS Operating System.

Suggested books:

- Operating System Concepts Essentials, 9th Edition by Avi Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
- Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

Suggested reference books:

- Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
- Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
- Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
- Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

Course Outcomes:

CO1: Understand the structure and architectural components of OS to analyze and design the applications to run in parallel. Moreover, students would be able to develop scheduling algorithms to optimize various parameters like CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time for research purpose.

CO2: Understand the design issues associated with Operating system (e.g. Mutual exclusion, Deadlock detection etc.) to gain insight towards developing algorithms/techniques for efficient deadlock handling.

CO3: For a given specification of memory organization, develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.

CO4: Design and implement file management system for a given specification. Identify, use and evaluate the disk management policies with respect to various performance evaluation parameters.

Object Oriented Programming

<table>
<tr><td>Course code</td><td colspan="5">PCC-CSE-208G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Object Oriented Programming</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-4</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Computer Science and Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">75 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit - I

Object-Oriented Programming Concepts: Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, messaging.

Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifiers, static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

Unit - II

Inheritance: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.

Pointers and Dynamic Memory Management: Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, this pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures.

Unit - III

Constructors and Destructors: Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initializer lists.

Operator Overloading and Type Conversion: Overloading operators, rules for overloading operators, overloading of various operators, type conversion - basic type to class type, class type to basic type, class type to another class type.

Virtual functions & Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract clasess, virtual destructors.

Unit - IV

Exception Handling: Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions.

Templates and Generic Programming: Template concepts, Function templates, class templates, illustrative examples.

TEXT BOOKS, AND/OR REFERENCE MATERIAL:

1. Bjrane Stroustrup, “C++ Programming language”,3rd edition, Pearson education Asia(1997)

2. Lafore R.”Object oriented Programming in C++”,4th Ed. Techmedia,New Delhi(2002).

3. Yashwant Kenetkar,”Let us C++”,1stEd.,Oxford University Press(2006)

4. B.A. Forouzan and R.F. Gilberg,CompilerScience,”A structured approach using C++” Cengage Learning, New Delhi.

Course code	**HSMC-02G**				
Category					
Course title	**ORGANIZATIONAL BEHAVIOUR**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**0**	0	**3**	
Branches (B. Tech.)					
Class work	25				
Exam	75				
Total	100 Marks				
Duration of Exam	03 Hours				

The objective of this course is to expose the students to basic concepts of management and provide insights necessary to understand behavioral processes at individual, team and organizational level.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

SYLLABUS

UNIT - 1

Introduction of Management- Meaning, definitions, nature of management; Managerial levels, skills and roles in an organization; Functions of Management: Planning, Organizing, staffing, Directing & Controlling, Interrelationship of managerial functions, scope of management & Importance of management. Difference between management and administration.

UNIT - 2

Introduction of organization:- Meaning and process of Organization, Management v/s Organization; **Fundamentals of Organizational Behavior:** Concepts, evolution, importance and relationship with other Fields; Contemporary challenges and opportunities of OB. **Individual Processes and Behavior**-**Personality**- Concept, determinants and applications; **Perception-** Concept, process and applications, **Learning**- Concept (Brief Introduction) ; **Motivation-** Concept, techniques and importance

UNIT - 3

Interpersonal Processes- **Teams and Groups**- Definition of Group, Stages of group development, Types of groups, meaning of team, merits and demerits of team; difference between team and group, **Conflict-** Concept, sources, types, management of conflict; **Leadership:** Concept, function, styles & qualities of leadership. **Communication –** Meaning, process, channels of communication, importance and barriers of communication.

UNIT 4

Organizational Processes: Organizational structure - Meaning and types of organizational structure and their effect on human behavior; **Organizational culture -** Elements, types and factors affecting organizational culture. **Organizational change:** Concept, types & factors affecting organizational change, Resistance to Change.

Course Outcomes: By the end of this course the student will be able to:

1. Students will be able to apply the managerial concepts in practical life.
2. The students will be able to understand the concept of organizational behavior at individual level and interpersonal level.
3. Students will be able to understand the behavioral dynamics in organizations.
4. Students will be able to understand the organizational culture and change

Suggested Books:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management, Pearson Education Asia, New Delhi.

2. Stoner, J et. al, Management, New Delhi, PHI, New Delhi.
3. Satya Raju, Management – Text & Cases, PHI, New Delhi.
4. Kavita Singh, Organisational Behaviour: Text and cases. New Delhi: Pearson Education.
5. Pareek, Udai, Understanding Organisational Behaviour, Oxford University Press, New Delhi.
6. Robbins, S.P. & Judge, T.A., Organisational Behaviour, Prentice Hall of India, New Delhi.
7. Ghuman Karminder, Aswathappa K., Management concept practice and cases, Mc Graw Hill education.
8. Chhabra T. N., Fundamental of Management, Sun India Publications-New Delhi.

PCC-ECE202G Communication System

L	T	P	Credits
3	0	0	3

Class Work : 25 Marks
Theory : 75 Marks
Total : 100 Marks
Duration of Exam: 3 Hrs.

Course Objective: The objectives of this course are as under:

- To introduce the students to the basics of different types of modulation techniques
- To aim at a comprehensive coverage of design of radio transmitter and receiver

Unit 1

Introduction To Communication System: Modulation, Demodulation, Radio Frequency Spectrum, Signals & their classification, Limitations & Advantages of a Communication System, Comparison of Analog & Digital Communication Systems, Historical Perspective, Modes & Medias of Communication.

Noise: Sources of Noise, External & Internal Noise, Noise Calculations, Noise Figure, Noise Figure Calculation, Noise Temperature, Noise in Communication Systems, Band Pass Noise Model, Cascaded States & its Noise Figure Calculation, Signal in presence of Noise, Pre-Emphasis & De-Emphasis, Noise Quieting Effect, Capture Effect, Noise in Modulation Systems.

Unit 2

Linear Modulation: (AM) Basic definition & derivation for Modulation & Modulation Index, Modulation & Demodulation of AM, Suppressed Carrier Modulation, Quadrature Amplitude Modulation, SSB-SC, DSB-SC, VSB Modulation & Demodulation, Comparison of various AM Systems, Generation of AM waves.

Angle Modulation:
Basic definition & derivation for Modulation & Modulation Index, Generation of FM waves, Comparison between PM & FM, Frequency Spectrum of FM, B.W. & required spectra, Types of FM, vector representation of FM, Universal Curve, Multiple FM, Demodulation of FM waves, Demodulation of PM waves, Comparison between AM & FM.

Unit 3

Transmitters & Receivers: Classification of Radio Transmitters, Basic Block Diagram of Radio Transmitter, Effect of Feedback on operation of Transmitter, Radio Telephone Transmitters, Privacy Device in Radio Telephony, FM Transmitter using Reactance Modulator, Armstrong FM Transmitter, Radio Receivers, Classification, TRF Receiver, Super Heterodyne Receiver, Image Rejection & Double Spotting, Choice of IF, Tracking & Alignment of Receivers, AGC.

Pulse Analog Modulation: Sampling theory, TDM, FDM, PAM, PWM, PPM, Modulation & Demodulation techniques of above all.

UNIT 4

Pulse Digital Modulation: Elements of Pulse Code Modulation, Noise in PCM Systems, Bandwidth of PCM Systems, Measure of Information, Channel Capacity, Channel Capacity of PCM System, Differential Pulse Code Modulation (DPCM). Delta Modulation (DM)

Digital Carrier Modulation And Demodulation Techniques: Digital Modulation Formats, Coherent Binary Modulation & Demodulation: ASK, BPSK, BFSK, Coherent Quadrature Modulation & Demodulation Techniques: QPSK, MSK.
Non Coherent BFSK, Differential PSK, M-Ary Modulation & Demodulation Techniques: M-Ary PSK, M-Ary QAM, M-Ary FSK, Synchronization: Carrier & Symbol Synchronization.

Reference Books:

1. Communication Systems — By Manoj Duhan – I. K. International
2. Electronic Communication Systems — By Kennedy – TMH
3. Communication Systems — By Singh & Sapre – TMH
4. Communication System Engineering — By John G. Proakis and Masoud Salehi, Pearson Education, 2015.
5. Analog Communication — By P. Chakarbarti – DR & Co.
6. Communication Systems — By Simon Haykins – Wiley

COURSE OUTCOMES:

- Student will be familiar with concept of modulation and various modulation techniques
- Ability to model noise in communication systems
- Familiarity with design of radio transmitter and receiver

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Operating System Lab

Course code	LC-CSE-212G				
Category	Professional Core Course				
Course title	Operating System Lab				
Scheme and Credits	L	T	P	Credits	
	0	0	4	2	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Contents:

1 Introduction to UNIX File System.

2. File and Directory Related Commands in UNIX.
3. Essential UNIX Commands for working in UNIX environment.
4. I/O Redirection and Piping
5. Introduction to VI Editors.
6. Introduction of Processes in UNIX
7. Communication in UNIX and AWK.
8. Introduction of the concept of Shell Scripting.
9. Decision and Iterative Statements in Shell Scripting.
10. Writing the Shall Scripts for unknown problems.

Suggested Books:

1. UNIX Shell Programming by Yashavant Kanetkar.
2. UNIX Concepts and Applications by Sumitabha Das

Course Outcomes.

Co1: Understand the structure and architectural components of UNIX Operating System to analyze and design the problem. Moreover, students would be able to know the Basic Introduction of UNIX Operating System.

Co2: Basic Introduction of UNIX Commands that are used for operating the UNIX.

Co3: Introduction of Shell Scripting and VI Editor.so that the students get familiar with writing the UNIX scripts in UNIX editor.

Co4: Students will establish themselves as effective professionals by solving real problems with UNIX Shell Scripting knowledge and with attention to teamwork, critical thinking and problem solving skills by Writing Shell Scrips of unknown problems

Object Oriented Programming Lab Using C++

<table>
<tr><td>Course code</td><td colspan="5">LC-CSE-214G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Object Oriented Programming Lab Using C++</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2"></td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>2</td></tr>
<tr><td>Branches (B. Tech.)</td><td colspan="5">Computer Science and Engineering</td></tr>
<tr><td>Class work</td><td colspan="5">25 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Contents:

1. [Classes and Objects] Write a program that uses a class where the member functions are defined inside a class.
2. [Classes and Objects] Write a program that uses a class where the member functions are defined outside a class.
3. [Classes and Objects] Write a program to demonstrate the use of static data members.
4. [Classes and Objects] Write a program to demonstrate the use of const data members.
5. [Constructors and Destructors] Write a program to demonstrate the use of zero argument and parameterized constructors.
6. [Constructors and Destructors] Write a program to demonstrate the use of dynamic constructor.
7. [Constructors and Destructors] Write a program to demonstrate the use of explicit constructor.
8. [Initializer Lists] Write a program to demonstrate the use of initializer list.
9. [Operator Overloading] Write a program to demonstrate the overloading of increment and decrement operators.
10. [Operator Overloading] Write a program to demonstrate the overloading of binary arithmetic operators.
11. [Operator Overloading] Write a program to demonstrate the overloading of memory management operators.
12. [Inheritance] Write a program to demonstrate the multilevel inheritance.
13. [Inheritance] Write a program to demonstrate the multiple inheritance.
14. [Inheritance] Write a program to demonstrate the virtual derivation of a class.
15. [Polymorphism] Write a program to demonstrate the runtime polymorphism.
16. [Exception Handling] Write a program to demonstrate the exception handling.

17. [Templates and Generic Programming] Write a program to demonstrate the use of function template.

18. [Templates and Generic Programming] Write a program to demonstrate the use of class template.

LC-ECE204G Communication System Lab

L	T	P	Credits
-	-	2	1

Class Work	:	25 Marks
Theory	:	25Marks
Total	:	50 Marks
Duration of Exam.	:	3 Hrs.

COURSE OBJECTIVES:

- To provide the basic understanding about various modulation techniques.
- To analyze different characteristic parameters of these modulation techniques.

LIST OF EXPERIMENTS:

1. To study and waveform analysis of amplitude modulation and determine the modulation index of amplitude modulation.
2. To study and waveform analysis of amplitude demodulation by any method.
3. To study and waveform analysis of frequency modulation and determine the modulation index of frequency modulation.
4. To study and waveform analysis of frequency demodulation by any method.
5. To study Amplitude Shift Keying (ASK) modulation.
6. To study Frequency Shift Keying (FSK) modulation.
7. To study Phase Shift Keying (PSK) modulation.
8. To study and waveform analysis of phase modulation.
9. To study Phase demodulation.
10. To study Pulse code modulation.
11. To study Pulse amplitude modulation and demodulation.
12. To study Pulse width modulation.
13. To study Pulse position modulation.
14. To study delta modulation.
15. To deliver a seminar by each student on ADVANCE COMMUNICATION SYSTEM.

COURSE OUTCOMES:

- Students are able to analyze digital communication signals.
- Students understand the basics of PAM, QAM, PSK, FSK, and MSK.
- They can analyze noise and disturbance in modulated signals.

Note:-

1 Total ten experiments are to be performed in the semester

At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.

MC-106G : (ENVIRONMENT SCIENCE)

Theory 75 Marks   Field Work 25 Marks (Practical/Field visit)

Unit-1 The Multidisciplinary nature of environment studies. Definition, scope and importance. (2 lecture)

Unit-2 Natural Resources :

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.

e) Energy resources : Growing energy needs; renewable and non-renewable energy sources, use of alternate energy sources, case studies.

f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.
* Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit-3 Ecosystems :

* Producers, consumers and decomposers.
* Energy flow in the ecosystem.
* Ecological succession.
* Food chains, food webs and ecological pyramids.
* Introduction, types, characteristic features, structure and function of the following eco-system :

a. Forest ecosystem.

b. Grassland ecosystem.

c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit-4 Biodiversity and its conservation

* Introduction - Definition : Genetic, Species and ecosystem diversity.
* Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
* Biodiversity at global, National and local levels.
* India as a mega-diversity nation.
* Hot-spots of biodiversity.
* Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
* Endangered and endemic species of India.
* Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

(8 lectures)

Unit-5 Environmental pollution :

Definition, causes, effects and control measures of :

a) Air pollution.

b) Water pollution

c) Soil pollution

d) Marine pollution

e) Noise pollution

f) Thermal pollution

g) Nuclear hazards

* Solids waste management: causes, effects and control measures of urban and industrial wastes.
* Role of an individual in prevention of pollution.
* Pollution case studies.
* Disaster management : floods, earthquake, cyclone and landslides.

(8 lectures)

Unit-6 Social issues and the Environment:

* From unsustainable to sustainable development.
* Urban problems related to energy.
* Water conservation, rain water harvesting, watershed management.
* Resettlement and rehabilitation of people : its problems and concerns case studies.
* Environmental ethics : Issues and possible solutions.
* Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
* Wasteland reclamation.
* Consumerism and waste products.
* Environment Protection Act.
* Air (Prevention and Control of pollution) Act.
* Water (Prevention and Control of pollution) Act.
* Wildlife Protection Act.
* Forest Conservation Act.
* Issues involved in enforcement of environmental legislation.
* Public awareness. (7 lectures)

Unit-7 Human population and the Environment.

Population growth, variation among nations.

Population explosion- Family Welfare Programme.

Environment and human health.

Human Rights.

Value Education.

HIV/AIDS.

Woman and Child Welfare

Role of Information Technology in Environment and human health.

Case Studies. (6 lectures)

Unit-8 Field Work :

* Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
* Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems- pond, river, hill slopes, etc. (Field work equal to 10 lecture hours).

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, WileyEastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural HistorySociety, Bombay(R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.
16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment. Oxford & TBH Publ. Co. Pvt. Ltd. 345p.
17. Sharma, B.K. 2001, Environmental Chemistry, Goal Publ. House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C., Harper J. and Michael Begon. Essentials of Ecology, Blackwell Science (TB).
20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).
21. Tridevi R.K. and P.K. Goal, Introduction to air pollution, Techno Science Publications (TR).
22. Wagner K.D., 1998, Environmental Management, W.B. Saunders co. Philadelphia, USA 499p.
23. Atext book environmental education G.V.S. Publishers byDr. J.P. Yadav.

(M) Magazine

(R) Reference

(TB) Textbook

The scheme of the paper will be under :

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.

The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.

Exam. Pattern : In case of awarding the marks, the paper will carry 100 marks. Theory: 75 marks, Practical/ Field visit : 25 marks. The structure of the question paper will be :

Part- A: Short Answer Pattern	:	15marks
Part- B : EssayType with inbuilt choice	:	60marks
Part-C : Field Work (Practical)	:	25marks

Instructions for Examiners :

Part- A : Question No. 1 is compulsory and will contain five short- answer type question of 3 marks each covering the entire syllabus.

Part-B : Eight essay type questions (with inbuilt choice) will be set from the entire syllabus and the candidate will be required to answer any four of them. Each essay type question will be of 15 marks.

The examination of the regular students will be conducted by the concerned college/Institute. Each student will be required to score minimum 40% marks separately in theory and practical/Field visit. The marks in this qualifying paper will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

MAHARSHI DAYANAND UNIVERSITY

UNIVERSITY INSTITUTE OF ENGINEERING &TECHNOLOGY

Ph.D. Chemistry Course Work

(One Semester Course)

Scheme of Examination

(i)The duration of the Ph.D. course will be of one semester.
ii) The Department concerned shall design the Ph.D. course as per latest guidelines of UGC which are:
"The Ph.D. course must include a course on research methodology which may include quantitative methods and computer applications.
iii) The scheme for Ph.D. course work is as under:

a) **Common course**: Paper –I
19CHEPC1: Research Methodology

b**) Departmental course**: Paper-II
19CHEPC2: Techniques in Chemistry

c) **Elective Subject** : Paper-III (one optional out of three)
(i) 19 CHEPC31: Inorganic Chemistry (Optional)
(ii)19 CHEPC32: Physical Chemistry (Optional)
iii)19 CHEPC33: Organic Chemistry (Optional)

iv) The qualifying marks in each paper of the course work shall be 50%.
v) It is only on satisfactory completion of Ph.D Programme, which shall be an essential part and parcel of the Ph.D. Programme that a candidate shall be eligible to apply for registration in Ph.D. Programme.

Paper No/Code.	Nomenclature	Load	Credit	Maximum Marks
Paper –I 19CHEPC1	Research Methodology	4 hrs/week	4	100 (80+20)*
Paper-II 19CHEPC2	Techniques in Chemistry	4 hrs/week	4	100 (80+20)*
Paper-III 19CHEPC31 19CHEPC32 19CHEPC33 (one optional out of three)	(i) Inorganic Chemistry (Optional) (ii) Physical Chemistry (Optional) iii) Organic Chemistry (Optional)	4 hrs/week	4	100 (80+20)*

Each candidate has to study two compulsory (Paper I and II) and one optional (Paper-III one of the three optional i.e. Inorganic Chemistry, Physical Chemistry or Organic Chemistry). Each paper will be of 100 marks and will have a teaching load of 4 hrs/week.

* Marks for Internal Assessment = 20. The internal assessment in each paper shall be based on assignment(s) and seminar(s) presented by each candidate and their participation.

PhD (Chemistry)
Paper-I
Research Methodology

Max. Marks: 80
Time: 3 hrs.

***Note**: Examiner will set 09 questions and the candidates will be required to attempt 05 questions in all. Question number 01 will be compulsory containing 08 short answer type questions covering the entire syllabus. Further, examiner will set 02 questions from each section and the candidates will be required to attempt one question from each section. All questions will carry equal marks*

Section A

Research Methodology: Meaning, Scope, Primary sources of literature survey, Journals, patents etc., secondary sources of literature survey, Books, Reference books, Text books, listing of letters.
Chemical Literature: (1) The structure of chemical information, Important paper based and electronic based sources, How to find chemical information on specific compounds and their synthesis; (2) Abstracts and Journals in chemistry, Electronic forms of Journals, major libraries, subscribing Journals related to chemistry in the region and country; and (3) Patents and Patents writing, Parts of patent applications characteristics of the disclosure for a chemistry invention.

Section B

Scientific Writing: Scientific Document; Organization and writing of research paper, short communications, review articles, monographs, technical and survey reports, authored books, and edited books and dissertation.

Section C

Internet and Web programming: Hardware and software requirement for internet, ISP and internet account, Web home page, URL, Browser, Security on web, searching tools and search engines, FTP, Gopher, Telnet, e-mail and application of internet. Creating a web page, Text formation and alignment, Font control, Arranging text in lists, Images on web pages, Back ground and color control, Interactive layouts and frames.

Section D

C++ Programming: Constants, variables, data types, declaration of variables, user defined declaration, operators, hierarchy of arithmetic operators, expression and statements. Control statements: If, switch, conditional operator, go to, if-else. Decision making and looping statement: While, do-while, for, built in functions and program structure input and out put statement. Pointers and arrays.

Ph.D. (Chemistry)
Paper – II
Techniques in Chemistry

Max. Marks: 80
Time: 3 hrs.

Note: ***Examiner will set 09 questions and the candidates will be required to attempt 05 questions in all. Question number 01 will be compulsory containing 08 short answer type questions covering the entire syllabus. Further, examiner will set 02 questions from each section and the candidates will be required to attempt one question from each section. All questions will carry equal marks***

Section A
Purification/ Crystallization

Isolation and purification of organic compounds (solids and liquids) with special emphasis on chromatographic techniques: TLC, column chromatography and HPLC. Drying and dehydrating agents.

Section B
Spectroscopic Techniques

Theory and applications of NMR spectroscopy of H-1, C-13, N-15, P-31 nuclei, two–dimensional NMR spectroscopy, theory and applications of infrared and mass spectrometry of organic compounds.

Section C
Thermal Techniques

Differential Thermal Analysis (DTA): Theories of DTA, factors affecting DTA curves, instrumentation and application of DTA.
Thermogravimetry (TG): Instrumentation and balances, X'- Y' recorder, thermogram, factors affecting thermogram, correlation of DTA and TGA data.

Section-D
Measurement of Thermodynamic Properties

Excess molar volume; dilatometric and density measurement methods.
Excess molar enthalpies, Adiabatic, Isothermal, flow calorimeters.
Gibbs free energy of mixtures ; Marsh as well as Gibb's and VAN Ness static vapour methods for measuring vapour pressure of liquid and hence Gibb's free energy of mixing.

Excess isentropic compressibility ; Tecqniqes for measuring speed of sound by DSA and Interferrometer ;determination of excess isentropic compressibilitys.

Books suggested:

1. A textbook of Quantitative Inorganic Analysis, A.I. Vogel, ELBS, London.
2. Dynamics of Chromatography- Part I; J.C. Gidding; Dekker, New York.
3. Vogel's textbook of practical Organic Chemistry, B.S. Furhen ey. al. Longman Group.
4. Spectrometric Identification of Organic Compounds, R.M. Silverstein, G.C. Bassler and T.C. Morrill.
5. Spectrometric Methods in Organic Chemistry, D.H. Williams and I. Fleming.
6. Organic Spectroscopy, William Kemp, John Wiley.

Ph.D. (Chemistry)
Paper-III (i)
Inorganic Chemistry (Optional)

Max. Marks: 80
Time: 3 hrs.

Note: ***Examiner will set 09 questions and the candidates will be required to attempt 05 questions in all. Question number 01 will be compulsory containing 08 short answer type questions covering the entire syllabus. Further, examiner will set 02 questions from each section and the candidates will be required to attempt one question from each section. All questions will carry equal marks***

Section A

Electro analytical Techniques
Polagraphy**:-** Introduction and Basic Principles, Polarograph, Polarographic cells, Half wave Potential and its significance.
DME:**-** Advantages and Disadvantages of DME, SCE
Carbon electrodes-Carbon paste Electrode
Types of Currents**:-** Diffusion Current, Migration Current, Kinetic Currents, Catalytic Currents, Limiting Currents
Amperometry **:-** Principles and Applications
Square Wave Polarography, Voltametry, Coulometry, Superimposed
AC Polarography**:-** Principles, theory and applications of these techniques.

Section-B

Nanomaterials**:-** Definition, Methods of Preparation
Properties of Nanomaterials**:-** Physio-chemical and optical, Electrical and Electronics properties.Applications of Nanomaterials
Gold, Silver & Pt Nanomaterials**:-** General Properties and Applications

Section-C

Phosphorescent Materials
Luminescence, Types of Luminescence, Fluorescence, Phosphorescence, Frank Condon Principle, Jablouski diagram, Organic Electroluminescence, Organic Light Emitting diode, Structure and working of OLED,Applications of OLED Inorganic phosphorescent materials, Long Persistant phosphors phosphors for LED, Applications of Inorganic Phosphors

Section –D

Organometallic Compounds of Main Group Elements:

General characteristics of different types of main group organometallics, stability, routes of M-C bond formation: Oxidative addition, transmetallation, Carbanion halide exchange, metal-hydrogen exchange, metal hydride addition to alkenes, methylenations and by Aryl diazonium salts.
Structure elucidation by spectral techniques like IR, NMR, Mossbauer for compound of Si, Ge, Sn, Pb, As, Sb, Bi and Te.

PhD (Chemistry)
Paper-III (ii)
Physical Chemistry (optional)

Max. Marks: 80
Time: 3 hrs.

Note: ***Examiner will set 09 questions and the candidates will be required to attempt 05 questions in all. Question number 01 will be compulsory containing 08 short answer type questions covering the entire syllabus. Further, examiner will set 02 questions from each section and the candidates will be required to attempt one question from each section. All questions will carry equal marks***

Section-A

Thermodynamics of liquid mixtures

Molecular interactions in liquid mixtures: Ion-ion interactions, Ion-dipole interactions, Dipole-dipole interactions, Ion-induced dipole interactions, Dipole-induced dipole interactions, Quadruple-octuple interactions; specific interactions, hydrogen bonding, charge-transfer interactions and contact charge-transfer interaction. Thermodynamic of excess functions; excess molar volumes, excess molar enthalpies, excess isentropic compressibilities, excess Gibbs free energy, excess heat capacity and their significance. Statistical theories of liquid mixtures; (i) Cell model (ii) Flory's theory (iii) Sanchez and Lacombe's theory.

Section-B

Quantum mechanics

The Born-Oppenheimer approximation, The Hellmann-Feynman theorem, Huckel molecular orbital (HMO) theory. Applications of HMO theory (i) to set up and solve secular equation ; (ii) to calculate resonance energy; (iii) to draw molecular orbital energy diagram for (1) Ethylene molecule taking in to consideration the overlap integral and (2) Pyrrole molecule. Determination of resonance integral, "β" in HMO theory by (1) Ionization potential; (2) Electronic spectra and (3) delocalization energy methods.

Section-C

Solid State Chemistry:

Defects in crystals; Various types of defects in crystal; Thermodynamics of Schottky and Frenkel defects formation; Colour centers; Non-stoichiometric defects; Classification of solids; lattice energy; evaluation of Madelung constant (NaCl); calculation of repulsive potential exponent; Lattice heat capacity; Einstein and Debye model of lattice heat capacity; Debye T^3 low.

Section D

Electrodics:

Electron transfer under an interfacial electrical field; Butler-Volmer equation; electrode kinetic involving semiconductor solution interface; photo-electrochemistry; p-type photo-cathodes; n-type photo-anodes; Rate determining step in photo-electrochemical reaction; Ionic conductivity in solids; Solid electrolytes; Fast-ion conductors, oxygen ion conductors, sodium ion conductors; Solid state ionic devices, Batteries: Lithium batteries; Sodium batteries; fuel cells; sensors.

Ph.D. (Chemistry)
Paper – III (iii)
Organic Chemistry (Optional)

Max. Marks: 80
Time: 3 hrs.

Note: ***Examiner will set 09 questions and the candidates will be required to attempt 05 questions in all. Question number 01 will be compulsory containing 08 short answer type questions covering the entire syllabus. Further, examiner will set 02 questions from each section and the candidates will be required to attempt one question from each section. All questions will carry equal marks***

Section – A

Stereo selective Synthesis

Principle of stereo selectivity, 1,2- and 1,3-asymmetric induction, acyclic stereoselection, distereoselection in cyclic systems.

Enantioselective synthesis: Enantioselective hydroboration, hydrogeantion, epoxidation, enantioselective synthesis via hydrazones.
Role of enzymes in chiral synthesis.

Section - B

Disconnection approach of synthesis

Introduction, main synthetic strategies, Synthetic strategies of 1,2- and 1,4-difuntionalised compounds, Group disconnection, Umpolung Strategies, α-functionalisation of carbonyl compounds. Synthetic approach to cyclic systems.
Retro synthetic and reconnection strategies.

Reagents

Preparation and application of following reagents:
Hypervalent iodine, organoboron reagents (IBBN, CATB, IpC_2BH, PINB), Organosilicon compounds, Trifluoromethyl sulphonates (triflates).

Section – C

Heterocyclic compounds

General synthesis of

(a) compounds with three or more heteroatoms in the ring
    (1,2,3)- and (1,2,4)-triazoles
    (1,2,4)- and (1,3,4)-oxadiazoles
    (1,2,5)- and (1,3,4)-thiadiazoles
    (1.2.3)-, (1,2,4)- and (1,3,5)-triazines.

Tetrazoles and tetrazines.

(b) Bridgehead nitrogen containing compounds:

Indolines

Imidazo [1,2-a] and [1,5-a]pyridines

Triazolo [1,5-a] pyridines

S-triazolo [3,4-b] [1,3,4] thiadiazoles

Imidazo [2,1-b] [1,3,4] thiadiazoles

S-triazolo [3,4-b] [1,3,4] thiadiazines

Thiazolo [3,2-b] [1,2,4] triazoles.

Section – D

Green Chemistry

Basic principles of green chemistry, Application of non-conventional techniques in organic synthesis (ultrasonic, microwave and grinding). Solid state synthesis and synthesis under solvent free conditions. Use of ionic liquids.

Drug discovery and development

A rational approach to drug design and drug development of following drugs:

cimetidine

oxamniquine.

Books recommended:

1. Asymmetric Synthesis Ed. J, D. Morrison, vol. 1-5. Academic Press.
2. Stereochemistry of Organic Compounds by D. Nasipuri.
3. Designing organic synthesis by S. Waren.
4. Heterocyclic Cchemistry by T. L. Gilchrist.
5. Comprehensive Heterocyclic Chemistry by A. R. Katritzky and C. W. Rees.
6. Green Chemistry by M. Kidwai and V. K. Ahluwalia.
7. Wilson and Gisvold's Text Book of organic medicinal and pharmaceutical chemistry Ed. R. F. Dorge.

UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY
MAHARSHI DAYANAND UNIVERSITY, ROHTAK
SCHEME OF STUDIES & EXAMINATIONS

Doctor of Philosophy (Ph.D.) Course Work – UIET, Mathematics

Scheme effective from 2019-20

1) The duration of the Ph.D. course work will be of one semester.

2) The scheme for Ph.D. course work is as under:
   a) Common course:
      19-UIETMATH-PC-C1: Research Methodology (Mathematical Modelling and Computational Technique)
   b) Departmental course:
      19-UIETMATH-PC-C2: Review of Literature and Seminar (in Relevant Research Area)
      Elective Subject (Departmental Elective Subject)

3) The qualifying marks in each paper of the course work shall be 50%.

4) It is only on satisfactory completion of Ph.D. course work Programme, which shall be an essential part and parcel of the Ph.D. programme that a candidate shall be eligible to apply for registration in Ph.D. Programme.

Sr. No	Paper No.	Paper Title	Internal Assessment Marks **	Examination Marks		Total Marks	Duration of Exam
				Theory Marks	Practical Marks		
1.	19-UIETMATH-PC-C1	Research Methodology (Mathematical Modelling and Computational Technique)	20	80		100	03 Hrs
2.	19-UIETMATH-PC-C2	Review of Literature and Seminar (in Relevant Research Area)	20		80	100	03 Hrs
3.		Elective Subject (Departmental Elective Subject) any one from the list attached	20	80		100	03 Hrs
	Total		60	160	80	300	

** Based on attendance, assignment and presentation of 5, 5 and 10 marks respectively.

Syllabus (Ph. D. UIET, Mathematics)

List of departmental Elective subjects:

1	19-UIETMATH-PC-D1	Information Theory and Applications
2	19-UIETMATH-PC-D2	Stochastic Processes
3	19-UIETMATH-PC-D3	Wavelet Analysis
4	19-UIETMATH-PC-D4	Computational Fluid Dynamics
5	19-UIETMATH-PC-D5	Reliability Engineering
6	19-UIETMATH-PC-D6	Advanced Solid Mechanics
7	19-UIETMATH-PC-D7	Biofluid Mechanics

19-UIETMATH-PC-C1

Research Methodology (Mathematical Modelling and Computational Technique)

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions taking at least one question from each unit. Question no. 1 covering all syllabus is compulsory and of short answer type. All questions shall carry equal marks.

L	**T**	**P/D**	**Marks of Internal: 20**
3	**-**		**Examination: 80**
Duration of Exam: 3 Hrs			**Total Marks: 100**

Unit I

Introduction to research methodology- Meaning of research, objective of research, types of research, significance of research, formulation of research problem, Mathematical modelling, Techniques of mathematical modelling, Classifications, Characteristics and limitations of mathematical models, Mathematical modelling in population dynamics, linear growth and decay models, Non-linear growth and decay models, Mathematical modelling of epidemics, Mathematical modelling in dynamics.

Unit II

Basic theory of linear difference equations with constant coefficients, Mathematical modelling through difference equations, Mathematical modelling through difference equations in population dynamics and genetics. Mathematical Modelling through difference equations in probability theory. Miscellaneous examples of Mathematical modelling through difference equations

Unit III

Review of literature, concepts of bibliography and references, Basic concepts of paper writing and report generation, Steps of report writing, types of research reports, significance of report writing, Plagiarism Report, Patent and Copyright, Methods of presentation of report, Citation of Research Report.

Unit IV

Overview of MATLAB, operators, Display format, elementary built-in functions, working with variables, General commands, data types, data import, arrays, operations with arrays. Matrices: Eigenvalues and Eigenvectors, Similarity Transformation and Diagonalization, Functions, Script files, operators, Loops and Conditional Statements, Programming in MATLAB, Graphics- 2-D and 3-D Plots, input and output.

Reference Books:

1. C. R. Kothari – Research Methodology Methods and Techniques – Wishwa Prakashan Publishers – Second Edition
2. Rudra Pratap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Oxford University Press.
3. J. N. Kapur, Mathematical Modelling, Willey Eastern Limited, Reprint, 2000.
4. D. J. G. James and J. J. Macdonald, Case studies in Mathematical Modelling, Stanly Thames, Cheltonham.
5. J.N. Kapur, Mathematical entropy Models.

6. M. Crossand A. O. Moscrcadini, The art of Mathematical Modelling, Ellis Harwood and John Wiley.
7. C. Dyson, Elvery, Principles of Mathematical Modelling, Academic Press, New York.
8. D. N. Burghes, Modelling with Difference Equations, Ellis Harwood and John Wiley.

19-UIETMATH-PC-C2

Review of Literature and Seminar (in Relevant Research Area)

1. The research student is required to prepare a concept paper/working paper/review paper by reviewing at least 25 research papers / references books / unpublished doctoral dissertations / other reports etc.

2. To qualify the paper the research student is required either to present the prepared paper in an International Conference/ Seminar/ Workshop or publish the same in a research journal. Acceptance for publication or presentation will be considered as published/ presented.

3. A duly constituted committee of three teachers of the department by the Director/Head shall evaluate the completion of the paper.

19-UIETMATH-PC-D1

Information Theory and Applications

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions taking at least one question from each unit. Question no. 1 covering all syllabus is compulsory and of short answer type. All questions shall carry equal marks.

L	**T**	**P/D**	**Marks of Internal: 20**
3	**-**		**Examination: 80**
Duration of Exam: 3 Hrs			**Total Marks: 100**

Unit I

Axiomatic Approach of Probability, Sample space. Definition and properties of random variables, discrete and continuous random variables, probability mass and density functions, distribution function. Binomial and Poisson distributions, Mathematical Expectation: Definition and its properties. Variance, Covariance, Moment generating function- definitions and their properties

Unit II

Measure of Information – Axioms for a measure of uncertainty, The Shannon entropy and its properties. Joint and conditional entropies, Mutual Information. Transformation and its properties. Uncertainty of an absolutely continuous random variable. Generalized Information and Divergence Measure. Craft's Inequality, Measure of entropy for lifetime distribution,.

Unit III

Life Distributions: Concept of distribution function, hazard function, Reliability function, MTTF, Bathtub failure rate; loss of memory property of Exponential distribution - parametric families of some common life distributions – Exponential, Weibull and Gamma and GPD its characterization. Empirical distribution function and its properties.

Unit IV

Concept of Order statistics - Distribution of the Order Statistics including that of maximum and minimum, Application of Order Statistics: Systems with components in series, Systems with parallel components, k-out-of-m systems, Non-series parallel systems, Systems with mixed mode failures. Standby redundancy: Simple standby system, k-out-of-n standby system.

Reference Books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 2002
2. H. A. David and H.N. Nagaraja, Order Statistics, 3/e, John Wiley & Sons, 2003
3. N.L Johnson, S. Kotz and N. Balakrishnan, Continuous Univariate Distributions, Vol.1 & 2, Wiley Series in Probabilty and Statistics, 1994
4. R.E. Barlow and Proschan F., Statistical Theory of Reliability and Life Testing; Rinehart and Winston, 1985.
5. Baisnab and M. Jas, Element of Probability and Statistics, Tata McGraw Hill, 1993
6. P. L. Meyer, Introductory Probability and Statistical Applications, Addison-Wesley Publishing Company, 1970

19-UIETMATH-PC-D2

Stochastic Processes

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions taking at least one question from each unit. Question no. 1 covering all syllabus is compulsory and of short answer type. All questions shall carry equal marks.

L	**T**	**P/D**	**Marks of Internal: 20**
3	**-**		**Examination: 80**
Duration of Exam: 3 Hrs			**Total Marks: 100**

Unit I

Stochastic processes and their classification – Markov chain– Examples (Random walk, Gambler's ruin problem)- classification of states of a Markov chain-Recurrence-Basic limit theorem of Markov chains-Absorption probabilities and criteria for recurrence.

Unit II

Markov chains continuous in time – General pure birth processes and Poisson process, birth and death processes, finite state continuous time Markov chains.

Unit III

Renewal Process: Definition and examples, renewal equation, mean renewal time, stopping time, – key renewal theorem – Study of residual life time process. Markov Process with Continuous State Space: Introduction to Brownian motion, Congestion Process: Queuing Process, M/M/1 Queue.

Unit IV

Stationary process – weakly and strongly stationary process – Moving average and Autoregressive processes and their covariance functions - Brownian Motion process – Joint probabilities for Brownian motion process – Brownian motion as a limit of random walk

Reference Books:

1. J. Medhi, Stochastic Processes, New Age International Publishers, 2008
2. H. M. Taylor and S. Karlin, An Introduction to Stochastic Modeling, 3rd Edition, Academic Press, New York, 1998
3. S. M. Ross, Stochastic Processes: Wiley, 2009
4. W. J. Stewart, Probability, Markov chains, queues, and simulation: The mathematical basis of performance modeling, Princeton University Press, 2009
5. G. R. Grimmett, and D. R. Stirzaker, Probability and random processes, Oxford University press, 2001
6. E. Cinlar, Introduction to Stochastic Processes, Prentice-Hall Inc., New Jersey, 1975
7. B.R. Bhat, Stochastic Processes, 2/e, New Age Publications, 2002.
8. Bhattacharya and E.C. Waymire, Stochastic Process with Applications John Wiley and sons, 1992

19-UIETMATH-PC-D3

Wavelet Analysis

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions taking at least one question from each unit. Question no. 1 covering all syllabus is compulsory and of short answer type. All questions shall carry equal marks.

L	**T**	**P/D**	**Marks of Internal: 20**
3	**-**		**Examination: 80**
Duration of Exam: 3 Hrs			**Total Marks: 100**

Unit I

Fourier series, Convergence of Fourier series, Fourier transform in $L^1(R)$ and $L^2(R)$, Inverse Fourier transform, Basic properties of Fourier transform, Convolution, Plancherel formula, Poission summation formula, Gabor transform, Short term Fourier transform and the uncertainity principle

Unit II

Mother wavelet, Motivation and definition of continuous wavelet transform (CWT), Basic properties of wavelet transform, Parseval's formula and energy preserving relation of CWT, Reconstruction formula for CWT, Wavelet series, Discrete wavelet transform, Haar wavelet, Mexican hat wavelet, Meyer wavelet

Unit III

Motivation, definition and examples of multiresolution analysis (MRA), The Haar MRA, Properties and characterizations of scaling functions, Direct sum decomposition of L^2(R), Linear phase filtering, Orthonormal wavelet basis, Compactly supported wavelets, Daubechies wavelets, Biorthogonal wavelets

Unit IV

Wavelet Packets, Multiwavelet, Multiwavelet packets, Two dimensional discrete wavelet transform, Applications of wavelet transform in signal processing, image processing and time series analysis

Reference Books:

1. C.K.Chui, A first course in wavelets, Academic press NY 1996
2. R.M. Rao & A.S. Bopardikar, Wavelet Transforms: Introduction to theory and applications, Addison Wesley, 1998
3. I. Daubechies, Ten lectures in wavelets, Society for Industrial and Applied Maths, 1992
4. K. Ahmad and F. A. Shah, Introduction to Wavelet Analysis with Applications, Anamaya Publishers, 2008
5. D. F. Walnut, An introduction to Wavelet Analysis, Birkhauser, New York, 2002
6. S. Mallat, A wavelet tour of signal processing, Academic Press, 2009
7. O. Christensen, An introduction to frames and Riesz bases, Birkhauser, 2003

19-UIETMATH-PC-D4
Computational Fluid Dynamics

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions taking at least one question from each unit. Question no. 1 covering all syllabus is compulsory and of short answer type. All questions shall carry equal marks.

L	T	P/D		
3	**-**			**Marks of Internal: 20**
				Examination: 80
				Total Marks: 100

Unit-I

Introduction to Computational Fluid Dynamics and Principles of Conservation: Continuity Equation, Navier Stokes Equation, Energy Equation and General Structure of Conservation Equations, Classification of Partial Differential Equations and Physical Behaviour.

Unit-II

Finite Difference Technique: Finite difference methods; different means for formulating finite difference equation; Taylor series expansion, integration over element, local function method; treatment of boundary conditions; boundary layer treatment; variable property; interface and free surface treatment; accuracy of f.d. method.

Unit-III

Finite Volume Technique: Finite volume methods; different types of finite volume grids; approximation of surface and volume integrals; interpolation methods; central, upwind and hybrid formulations and comparison for convection-diffusion, Finite Element Methods: Finite element methods; Rayleigh-Ritz, Galerkin and Least square methods; interpolation functions; one and two dimensional elements; applications.

Unit-IV

Methods of Solution: Solution of finite difference equations; iterative methods; matrix inversion methods; ADI method; operator splitting; fast Fourier transform, Time integration Methods: Single and multilevel methods; predictor corrector methods; stability analysis; Applications to transient conduction and advection diffusion problems. Numerical Grid Generation: Numerical grid generation; basic ideas; transformation and mapping. Navier-Stokes Equations: Explicit and implicit methods; SIMPLE type methods; fractional step methods.

Reference Books:

1. Ferziger, J. H. and Peric, M. (2003). Computational Methods for Fluid Dynamics. Third Edition, Springer Verlag, Berlin.
2. Versteeg, H. K. and Malalasekara, W. (2008). Introduction to Computational Fluid Dynamics: The Finite Volume Method. Second Edition (Indian Reprint) Pearson Education.
3. Anderson, D.A., Tannehill, J.C. and Pletcher, R.H. (1997). Computational Fluid Mechanics and Heat Transfer. Taylor & Francis.

19-UIETMATH-PC-D5

Reliability Engineering

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions taking at least one question from each unit. Question no. 1 covering all syllabus is compulsory and of short answer type. All questions shall carry equal marks.

L	**T**	**P/D**	**Marks of Internal: 20**
3	**-**		**Examination: 80**
Duration of Exam: 3 Hrs			**Total Marks: 100**

Unit I

Random Variable, Probability distributions: Exponential, Rayleigh, Weibull, Gamma and Lognormal; Laplace transform, Reliability and quality, Failure and failure modes, Hazard rate, Bathtub curve, Causes of failure and unreliability, Reliability in terms of Hazard Rate and failure density functions, Mean time to failure (MTTF), Mean time between failures (MTBF), Time dependent hazard models: Constant Hazard Model, Linear and Non-Linear Hazard Models, Weibull Model, Gamma Model; Stress dependent hazard models

Unit II

System with components in series, System with parallel components, *k* out of *m* systems, Non-series parallel systems, Systems with mixed mode failures, Various kinds of active redundancies and standby redundancy, Simple standby system, *k*-out-of-*m* standby system, Coherent system, Fault-tree Technique

Unit III

Network reduction technique, Path tracing technique, Supplementary variable technique, Regenerative Point Technique, Pointwise and steady state availabilities, Reliability and availability analysis of a two-unit parallel system with repair using markov model, Reliability and availability analysis of single-unit and two- unit cold standby systems with constant failure and arbitrary repair rates using regenerative point and supplementary variable techniques

Unit IV

System maintenance and system repair under different repair disciplines, Replacement policies, Warranty models, Manufacture's cost, Customer's cost, Reliability achievement and utility cost models, Depreciation cost models and availability cost model for parallel system

Reference Books:

1. E. Balagurusami, Reliability Engineering, Tata McGraw Hill, New Delhi, 1984.
2. R. E. Barlow and Proschan, Statistical Theory of Reliability & Life Testing, Holt, Reinhart and Winston, 1975
3. L. J Bain, Statistical Analysis of Reliability & Life testing , Models, Marcel Dekker, 1978
4. L. S. Srinath, Reliability Engineering, Affiliated East West Press, New Delhi, 1991.
5. E A. Elsayed, Reliability Engineering, Addison Wesley Longman. Inc. Publication, 1996
6. A. Birolini, Reliability Engineering: Theory and Practical, Springer-Verlag, 1999
7. J. S. Gurjar, Reliability Technology: Theory and Applications, I. K. International Publishing House Pvt. Ltd., 2007

19-UIETMATH-PC-D6
Advanced Solid Mechanics

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions taking at least one question from each unit. Question no. 1 covering all syllabus is compulsory and of short answer type. All questions shall carry equal marks.

L	**T**	**P/D**	**Marks of Internal: 20**
3	**-**		**Examination: 80**
Duration of Exam: 3 Hrs			**Total Marks: 100**

UNIT-I

Non-Linear Theory Deformation gradient tensor. Decomposition of a deformation stretch and rotation. Strain tensors. Strain-displacement relations. Principal stretches. Strain invariants. Length and angle changes. Deformation of volume and surface elements. Homogeneous deformation-dilation, simple extension, simple shear and plane strain.

UNIT-II

Material derivative. Velocity and acceleration fields. Principle of conservation of mass equation of continuity. Principles of balance of linear and angular momentum. Equations of motion in spatial coordinates. Principle of conservation of energy. Piola stresses. Equations of motion in material co-ordinates.

UNIT-III

General Solution of the equilibrium equations Papkovitch-Neuber solution Lame's strain potential. Galerkin vector. Love's strain function. Applications to the solution of the Kelvin problem for an unbounded medium and the Boussinesq problem for a semi-infinite medium. Exact solution of some linear elastic problems Spherical shell subject to internal and external pressures. Gravitating elastic sphere.

UNIT-IV

Thermoelasticity Generalized Hooke's law including the effects of thermal expansion, Thermoelastic Navier's equation, Thermal stresses in a long cylindrical shell and solid cylinder, Thermal stresses in a hollow spherical shell and solid spherical shell.

Reference Books:

1. Mal. A.K. and Singh, S.J. Deformation of Elastic Solids, Prentice Hall, 1991
2. Fung, Y.C., Foundations of Solid Mechanics.
3. S. Valliappan, Continuum Mechanics – Fundamentals, Oxford & IBH Publishing Co., 1981
4. I. S. Sokolnikoff- Mathematical Theory & Elasticity, Tata McGraw Hill, New Delhi, 1977
5. S. Saada, A.S. Elasticity: Theory and Applications, Pergaman Press, 1973.

19-UIETMATH-PC-D7

Biofluid Mechanics

Note: Total 9 questions are to be set by the examiner/teacher covering the entire syllabus uniformly. A candidate is required to attempt any five questions taking at least one question from each unit. Question no. 1 covering all syllabus is compulsory and of short answer type.. All questions shall carry equal marks.

L	**T**	**P/D**	**Marks of Internal: 20**
3	**-**		**Examination: 80**
Duration of Exam: 3 Hrs			**Total Marks: 100**

Unit I

Introduction, Basic equation of fluid Mechanics, Circulatory Biofluid Mechanics, Properties of flowing blood.

Unit II

Models of biofluid flows, Poiseuille's Flow and its application in blood flow, Pulsatile flow, The Pulse wave.

Unit III

Non-Newtonian fluids: Classification, Time independent, Time dependent, Viscoelastic fluid, Laminar Flow, Casson Model, Flow in elastic tubes

Unit IV

Computational Biofluid Mechanics: Introduction, Mathematical Modelling, Computational Method for the study of flow, Laminar Flow Model, Turbulent flow Model.

Reference Books:

1. Mazumdar, J. N. , Biofluid Mechanics , World Scientific Publishing, 1992.