M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION
Bachelor of Technology
Scheme effective from 2018-19
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 Lab	0	0	2	2	1	25		25	50	3

Sr	Category	Group	Course Code	Course Name	L	T	P	Hours	Credit					
		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 Management courses	C	HSMC-ENG-101G	English	2	0	0	2	2	25	75		100	3
				TOTAL CREDIT					**19.5**	**175/200**	**300/375**	**125/75**	**600/650**	

M.D. UNIVERSITY
SCHEME OF STUDIES AND EXAMINATION
Bachelor of Technology
Scheme effective from 2018-19
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

					L	T	P		Credit						
		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	600/500	

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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.	Introductionto 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
2.	WavesandOptics& QuantumMechanics	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
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,	BSC-PHY-115G	• Bio-Technology Engineering

	Magnetism and Quantum Mechanics (OFMQ		• Textile Technology • Textile Chemistry • Fashion and Apparel Engineering

Table 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
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

5.	Math-II (Probability and Statistics)	BSC-MATH-104G	• Fashion and Apparel Engineering • 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

I. **Mandatory Induction program**

(Please refer **Appendix-A** for guidelines. Details of Induction program also available in the curriculum of Mandatory courses.)
[Induction program for students to be offered right at the start of the first year.]

3 weeks duration

· Physical activity

· Creative Arts

· Universal Human Values

· Literary

· Proficiency Modules

· Lectures by Eminent People

· Visits to local Areas

· Familiarization to Dept./Branch & Innovations

Course code	BSC-PHY-101G				
Category	Basic Science Course				
Course title	**Introduction to Electromagnetic Theory**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
	3	**1**		**4**	
Branches (B. Tech.)	• 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				
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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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

Electrostatics in vacuum and linear dielectric medium

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential Boundary conditions of electric field and electrostatic potential; energy of a charge distribution and its expression in terms of electric field.

Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement.

UNIT - II

Magnetostatics

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating It for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

Magnetostatics Ina linear magnetic medium: Magnetization and associated bound currents; auxiliary magnetic field; Boundary conditions on **B** and **H**. Solving for magnetic field due to simple magnets like a bar magnet; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials.

UNIT - III

Faraday's law and Maxwell's equations

Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law; Electromagnetic breaking and its applications; Differential form of Faraday's law; energy stored in a magnetic field.

Continuity equation for current densities; Modified equation for the curl of magnetic field to satisfy continuity equation; displacement current and magnetic field arising from time-dependent electric field; Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector.

UNIT - IV

Electromagnetic waves

The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

Suggested Reference Books

1. David Griffiths, Introduction to Electrodynamics, Pearson Education
2. ICFAI, Electricity and Magnetism, Pearson Education
3. Halliday and Resnick, Physics
4. W. Saslow, Electricity, magnetism and light
5. S.K. Chatterjee, Fundamentals of Electricity and Magnetism- PHI
6.A Mahajan, A Rangwala, Electricity and Magnetism

Course code	BSC-PHY-102G				
Category	Basic Science Course				
Course title	**Waves and Optics & Quantum Mechanics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
	3	**1**		**4**	
Branches (B. Tech.)	• Electrical Engineering • Electronics and Electrical 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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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

Wave and Light Motion

Waves: Mechanical and electrical simple harmonic oscillators, damped harmonic oscillator, forced mechanical and electrical oscillators, impedance, steady state motion of forced damped harmonic oscillator

Non-dispersive transverse and longitudinal waves: Transverse Wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their Eigen frequencies, longitudinal waves and the wave equation for them, acoustics waves.

Light and Optics: Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster's angle, total internal reflection, and evanescent wave.

UNIT – II

Wave Optics and Lasers

Wave Optics: Huygens' principle, superposition of waves and interference of light by wave-front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer. Fraunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity.

UNIT – III

Introduction to Quantum Mechanics

Wave nature of Particles, Time-dependent and time-independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

Solutionofstationary-stateSchrodingerequationforonedimensionalproblems–particle in a box, particle in attractive delta-function potential, square-well potential, linear harmonic oscillator. Scattering from a potential barrier and tunneling; related examples like alpha- decay, field-ionization and scanning tunneling microscope, tunneling in semiconductor structures.

UNIT – IV

Introduction to Solids and Semiconductors

Free electron theory of metals, Fermi level, density of statesin1, 2 and 3 dimensions, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands. Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p -n junction.

References:
1. E. Hecht, "Optics", Pearson Education
2. D. J. Griffiths, "Quantum mechanics", Pearson Education
3. B.G. Streetman, "Solid State Electronic Devices", Pearson Education
4. G. Main, "Vibrations and waves in physics", Cambridge University Press
5. H. J. Pain, "The physics of vibrations and waves", Wiley
6. A. Ghatak, "Optics", McGraw Hill Education,
7. O. Svelto, "Principles of Lasers", Springer Science & Business Media,
8. R. Robinett, "Quantum Mechanics", OUP Oxford
9. D. McQuarrie, "Quantum Chemistry", University Science Books
10. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago
11. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore

Course code	BSC-PHY-103G				
Category	Basic Science Course				
Course title	**Semiconductor Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
	3	**1**		**4**	
Branches (B. Tech.)	• Computer Science Engineering • Information Technology • Computer Science and Information Technology				
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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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.

Prerequisite: "Introduction to Quantum Mechanics" Desirable

UNIT - I
Electronic Materials
Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

UNIT - II
Semiconductors
Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

UNIT - III
Light-Semiconductor Interaction
Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

UNIT - IV
Measurements & Engineered Semiconductor Materials
Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, DLTS, band gap by UV-Vis spectroscopy, absorption/transmission.
Densityofstatesin2D, 1D and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Heterojunctions and associated band-diagram.

References:

1. Pierret, Semiconductor Device Fundamental,
2. P. Bhattacharya, Semiconductor Optoelectronic Devices, Pearson Education
3. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-HillInc.
4. B.E.A. Saleh and M.C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc.
5. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley
6. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York.
7. Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL
8. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

Course code	BSC-PHY-104G				
Category	Basic Science Course				
Course title	**Mechanics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
	3	**1**		**4**	
Branches (B. Tech.)	• Civil Engineering • Printing Technology				
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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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.

Prerequisites: (i) High-school education

UNIT I

Vector Mechanics of Particles

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates.

UNIT II

Mechanics of Particles in Motion and Harmonic Motion

Potential energy function; F=-Grad V, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a forcefield; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler problem; Application: Satellite maneuvers.

Non-inertial frames of reference; Rotating coordinate system: Five-term acceleration formula. Centripetal and Coriolis accelerations; Applications: Weather systems, Foucault pendulum;

Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance.

UNIT III

Rigid Body Mechanics

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples.

Introduction to three-dimensional rigid body motion—only need to highlight the distinction from two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and(b) Moment of inertia tensor; Three-dimensional motion of a rigid body where in all points move in a coplanar manner: e.g. Rod exe cutting conical motion with center of mass fixed—only need to show that this motion looks two-dimensional but is three-dimensional, and two-dimensional formulation fails.

UNIT IV
Statics of Solids

Free body diagrams with examples on modelling of typical supports and joints; Condition for equilibrium in three- and two- dimensions; Friction: limiting and non-limiting cases; Force-displacement relationship; Geometric compatibility for small deformations; Illustrations through simple problems on axially loaded members like trusses.

Suggested Reference Books

1. Shames/Rao: Engineering Mechanics: Statics and Dynamics, Pearson Education

2. Hibbler, Engineering Mechanics, Pearson Education

3. Engineering Mechanics, 2^{nd}ed. — MK Harbola

4. Sinha, Engineering Mechanics, Pearson Education

5. Introduction to Mechanics — MK Verma

6. An Introduction to Mechanics — D Kleppner& R Kolenkow

7. Principles of Mechanics — JL Synge & BA Griffiths

8. Mechanics — JP Den Hartog

9. Engineering Mechanics - Dynamics, 7^{th}ed. - JL Meriam

10. Mechanical Vibrations — JP Den Hartog

11. Theory of Vibrations with Applications — WT Thomson

Course code	BSC-PHY-105G
Category	Basic Science Course
Course title	**Optics, Optical Fibre, Magnetism and Quantum Mechanics**

Scheme and Credits	L	T	P	Credits	Semester-I/II
	3	1		4	

Branches (B. Tech.)	• Bio-Technology Engineering • Textile Technology • Textile Chemistry • Fashion and Apparel 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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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:

Basic concepts of optics and its applications, electricity and magnetism, and quantum physics.

UNIT – I

Optics

Diffraction: Introduction to interference and example; concept of diffraction, Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and multiple slits; diffraction grating, characteristics of diffraction grating and its applications.

Polarisation: Introduction, polarization by reflection, polarization by double refraction, scattering of light, circular and elliptical polarisation, optical activity.

UNIT – II

Fibre Optics and Lasers

Fibre Optics: Introduction, optical fibre as a dielectric wave guide: total internal reflection, numerical aperture and various fibre parameters, losses associated with optical fibres, step and graded index fibres, application of optical fibres.

Lasers: Introduction to interaction of radiation with matter, principles and working of laser: population inversion, pumping, various modes, threshold population inversion, types of laser: solid state, semiconductor, gas; application of lasers.

UNIT – III

Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, electric current and the continuity equation, laws of magnetism. Ampere's Faraday's laws. Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielectrics, applications of dielectric

Magnetisation, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.

UNIT – IV

Quantum Mechanics

Introduction to quantum physics, black body radiation, explanation using the photon concept, photoelectric effect, Compton effect, de Broglie hypothesis, wave-particle duality, Born's interpretation of the wave function, verification of matter waves, uncertainty principle, Schrodinger wave equation, particle in 1-D box.

Course outcomes

Students will be familiar with

·Bragg's Law and introduced to the principles of lasers, types of lasers and applications

·Various terms related to properties of materials such as, permeability, polarization, etc.

·Some of the basic laws related to quantum mechanics as well as magnetic and dielectric properties of materials

·Simple quantum mechanics calculations

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.

6.D. J. Griffiths, "Quantum mechanics", Pearson Education, 2014.

7.R. Robinett, "Quantum Mechanics", OUP Oxford, 2006.

8.D. McQuarrie, "Quantum Chemistry", University Science Books, 2007.

9. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago, 1997.

10.E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore, 1988.

11.B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.

Course code	BSC-PHY-111G				
Category	Basic Science Lab Course				
Course title	**Introduction to Electromagnetic Theory (IEMT) Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
			3	**1.5**	
Branches (B. Tech.)	• 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				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientiation)
- To aware about the least count of varnier calliper and screw gauge and to find the thickness of a slide using varnier calliper and diameter of wire using screw gauge.
- Calculation of radius of curvature of a convex surface using spherometer.
- Angel measurement using spectrometer.

List of Subject related Experiments:

1. To study Hall effect in semiconductors and measure the Hall coefficient.

2. To find frequency of AC mains using sonometer.

3. To study the magnetic properties of materials using B-H curve.

4. To study the Curies temperature of materials using Dielectric set up.

5. To verify the inverse square law with the help of a photovoltaic cell.

6. To determine Planks constant using photocell.

7. To study the characteristics of Solar cell and find out the fill factor.

8. To design and study Active and Passive filters.

9. To find impedance and Q factor using LCR circuit.

10. To study resonance phenomena in LCR circuit.

11. To measure e/m of electron using helical method.

 12. To find temperature co-efficient of platinum using Callender Griffith bridge.

13. To study the forward and reverse characteristics of P-N junction diode.

14. To study the reverse characteristics of Zener diode and voltage regulation using Zener Diode.

Course code	BSC-PHY-112G				
Category	Basic Science Course				
Course title	**Wave Optics & Quantum Mechanics Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
			3	**1.5**	
Branches (B. Tech.)	• Electrical Engineering • Electronics and Electrical Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientation)
- To aware about the least count of vernier calliper and screw gauge and to find the thickness of a slide using vernier calliper and diameter of wire using screw gauge.
- Calculation of radius of curvature of a convex surface using spherometer.
- Angel measurement using spectrometer.

List of Subject related Experiments:

1. To find out wavelength of monochromatic light using Newton's ring experiment.

2. To find out wavelength of monochromatic light using Diffraction grating.

3. To find out wavelength of monochromatic light using Freshnel's bi-prism

4. To study interference phenomena using Michelson's Interferometer and to find out wavelength of monochromatic light.

5. To find specific rotation of sugar using Polarimeter

6. To find thickness of hair using He-Ne laser.

7. To find Cauchy's constants of a prism by using spectrometer.

8. To find resolving power of a telescope

9. To determine Planks constant using photocell.

10. To study the characteristics of solar cell and find out the fill factor.

11. To verify the inverse square law with the help of a photovoltaic cell.

12. To study Zeeman splitting using EPS/ ESR.

Course code	BSC-PHY-113G				
Category	Basic Science Course				
Course title	**Semiconductor Physics Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
			3	**1.5**	
Branches (B. Tech.)	• Computer Science Engineering • Information Technology • Computer Science and Information Technology				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientation)
- To aware about the least count of vernier calliper and screw gauge and to find the thickness of a slide using vernier calliper and diameter of wire using screw gauge.
- Calculation of radius of curvature of a convex surface using spherometer.
- Angel measurement using spectrometer.

List of Subject related Experiments:
1. To study the forward and reverse characteristics of P-N junction diode.
2. To study the characteristics of transistor in common base configuration.
3. To study the characteristics of transistor in common emitter configuration.
4. To study the characteristics of Junction field effect (JFET) transistor.
5. To study the characteristics of Metal oxide semiconductor field effect (MOSFET) transistor.
6. To study the characteristics of Solar cell and find out the fill factor.
7. To design and study Active and Passive filters.
8. To study the reverse characteristics of Zener diode and voltage regulation using Zener Diode.

9. To determine Planks constant using photocell.

10. To measure e/m of electron using helical method.

11. To find capacitance of condenser using fleshing and quenching experiment.

12. To find temperature co-efficient of platinum using Callender Griffith bridge.

13. To find out low resistance by Carry Foster bridge.

14. To find resistance of galvanometer by post office box.
15. To compare the capacitance of two capacitors using De'Sauty Bridge.

Course code	BSC-PHY-114G
Category	Basic Science Course
Course title	**Mechanics Lab**
Scheme and Credits	L	T	P	**Credits**	Semester-I/II
			3	1.5	
Branches (B. Tech.)	• Civil Engineering • Printing Technology
Class work	25 Marks
Exam	25 Marks
Total	50 Marks
Duration of Exam	03 Hours

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientation)
- To aware about the least count of vernier calliper and screw gauge and to find the thickness of a slide using vernier calliper and diameter of wire using screw gauge.
- Calculation of radius of curvature of a convex surface using spherometer.
- Angel measurement using spectrometer.

List of Subject related Experiments:

1. To find the moment of inertia measurement of a fly wheel.

2. To find acceleration due to gravity using bar pendulum.

3. To study resonance phenomena in mechanical oscillators.

4. To examine the behaviour of coupled pendulum.

5. To examine air track experiment and study Collisions between objects, governed by the laws of momentum and energy.

6. To find the modulus of rigidity of a wire using Maxwell's Needle.

7. To determine the moment of inertia of the given disc using Torsion pendulum.

8. To perform experiment on Rotation and Gyroscopic Precession.

9. To measure spring constant using Hook's Law.

10. To measure height of a distant object using sextant.

Course code	BSC-PHY-115G	
Category	Basic Science Course	
Course title	**Optics, Optical Fibre, Magnetism and Quantum Mechanics (OFMQ) Lab**	
Scheme and Credits	L T P Credits	Semester-I/II
	3 1.5	
Branches (B. Tech.)	• Bio-Technology Engineering • Textile Technology • Textile Chemistry • Fashion and Apparel Engineering	
Class work	25 Marks	
Exam	25 Marks	
Total	50 Marks	
Duration of Exam	03 Hours	

Note: Students will be required to learn to take readings of vernier calliper, screw gauge, spherometer, spectrometer etc. during their orientation labs at the starting and **will have to perform at least ten subject related experiments in a semester.**

Basic experiments on least count and error estimation (during orientation)

- To aware about the least count of vernier calliper and screw gauge and to find the thickness of a slide using vernier calliper and diameter of wire using screw gauge.
- Calculation of radius of curvature of a convex surface using spherometer.
- Angel measurement using spectrometer.

List of Subject related Experiments:

1. To study Hall effect in semiconductors and measure the Hall coefficient.

2. To find frequency of AC mains using sonometer.

3. To study the magnetic properties of materials using B-H curve.

4. To study the Curies temperature of materials using Dielectric set up.

5. To verify the inverse square law with the help of a photovoltaic cell.

6. To determine Planks constant using photocell.

7. To study the characteristics of Solar cell and find out the fill factor.

8. To design and study Active and Passive filters.

9. To find impedance and Q factor using LCR circuit.

10. To study resonance phenomena in LCR circuit.

11. To measure e/m of electron using helical method.

12. To find temperature co-efficient of platinum using Callender Griffith bridge.

13. To study the forward and reverse characteristics of P-N junction diode.

14. To study the reverse characteristics of Zener diode and voltage regulation using Zener Diode.

Course code	BSE-CHE-101G				
Category	Basic Science Course				
Course title	**Chemistry I (Theory)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
	3	**1**	**0**	**4**	
Course Outcome	1. To analyse microscopic chemistry 2. Understand the concept of hardness of water and phenomenon of corrosion 3. Rationalise periodic properties 4. Distinguish the ranges of the electromagnetic spectrum				

Duration of Exam **3 Hrs**	Class Work 25 Marks Theory Exam 75 Marks Total 100 Marks

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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

Atomic and molecular structure: Schrodinger equation(Introduction and concept only).. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations(derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions . Band structure of solids and the role of doping on band structures.

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes,

ionization energies, electron affinity and electronegativity, polarizability, oxidation states.   (12)

UNIT-II

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal
Compounds.

Organic reactions and synthesis of a drug molecule :Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded). Synthesis of commonly used drug molecules (Asprin &Paracetamol).   (10)

UNIT-III

Intermolecular forces: Ionic, dipolar and Van der Waals interactions. Equations of state of real gases and critical phenomena.
Water Chemistry and Corrosion: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process). Corrosion: Introduction, Types, Factor affecting corrosion and methods of prevention.   (10)

UNIT-IV

Spectroscopic techniques and applications: Basic concept of spectroscopy, Principle and Applications of different spectroscopic techniques (UV-Visible and IR spectroscopy). Nuclear magnetic resonance and magnetic resonance imaging, Elementary discussion on Flame photometry.   (10)

Suggested Text Books:

(i) University Chemistry, Bruce M. Mahan, Pearson Education.

(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

(iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay,   Pearson Education.

(iv)Fundamentals of Molecular Spectroscopy, by C. N. Banwell

(v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S.

Krishnan

(vi) Physical Chemistry, by P. W. Atkins

(vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th

Edition.

Course Outcomes

The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity.

Course code	BSC-CHE-102G				
Category	Basic Science Course				
Course title	**Chemistry I (Practical)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-I/II
	0	**0**	**3**	**1.5**	
Course Outcome	5. Estimate rate constants of reactions 6. Synthesize a small drug molecule 7. Measure surface tension , viscosity and conductance 8. To analyse a salt sample 9. Determine hardness and chloride content of water				

Duration of Exam 3 Hrs	Internal Practical 25 Marks External Practical 25 Marks Total 50 Marks

Paper No. CHE-103   Credit: 1 ½
03 Hrs./ week   Max. Marks: 25+25
                                                   Duration of Exam: 03 Hrs.

LIST OF EXPERIMENTS:-

1 .Determination of surface tension of given liquid by drop number method.

2. Determine the viscosity of given liquid by using Ostwald's viscometer / Redwood
   viscometer.

3. Calculate the Rf value of given sample using Thin layer chromatography / Paper
   chromatography.

4. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.

5. Determination of chloride content in given water sample.

6.Calculate the strength of strong acid by titrating it with strong base using conductometer.

7. Calculate the emf value of given cell.

8. To prepare the of urea formaldehyde and phenol formaldehyde resin.

9. To determine the rate constant of a reaction.

10. To Prepare iodoform.

11. Calculate the saponification value / acid value of given oil sample.

12. Chemical analysis of two anions and two cations in given sample of salt.

13. Determination of the partition coefficient of a substance between two immiscible
    liquids.

14. To determine the total hardness of given water sample by EDTA method.

15.Study the adsorption phenomena using acetic acid and charcoal.

16. Lattice structures and packing of spheres.

Course Outcomes:

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

The students will be able to:

- Estimate rate constants of reactions from concentration of reactants/products as a function of time.
- Measure molecular/system properties such as surface tension, viscosity, conductance

  of solutions, redox potentials, chloride content of water, etc.
- Synthesize a small drug molecule and analyse a salt sample.

Note: At least 10 experiments are to be performed by the students.
1.Each laboratory class/section 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 groupofnotmore than 3-4 students. Larger groups be strictly discouraged/disallowed.
3.Pre-experimental &post experimentalquiz/questions may be offered for each lab experiment to reinforce &aid comprehension of the experiment.

Suggested Books:
1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essentials of Analytical Chemisty, Shobha Ramakrishnan, Pearson Education.
3. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
4. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula (New Age).
5. Engineering Chemistry, K.Sesha Maheswaramma and Mridula Chugh, Pearson Education.

Math-I (Calculus and Matrices)
BSC-MATH-101G

Course code	BSC-MATH-101G				
Category	Basic Science Course				
Course title	Math-I (Calculus and Matrices)				
Scheme and Credits	L	T	P	Credits	Semester-I
	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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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
Calculus: Indeterminate forms and L'Hospital's rule, Maxima and Minima, Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders, Evolutes and Involutes, Evaluation of definite and improper integrals, Applications of definite integrals to evaluate surface areas and volumes of revolutions, Beta and Gamma functions and their properties.

Unit-II
Sequences and Series: Convergence of sequence and series, Tests for convergence, Power series: Taylor's series, series for exponential, trigonometric and logarithm functions, Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-III
Multivariable Differential Calculus: Limit, Continuity and Partial derivatives, Total derivative, Tangent plane and normal line, Maxima, minima and saddle points, Method of Lagrange multipliers, Gradient, Directional derivatives, Curl and Divergence.

Unit-IV
Matrices: Inverse and rank of a matrix, Rank-nullity theorem, System of linear equations, Symmetric, skew-symmetric and orthogonal matrices and Orthogonal transformation, Determinants, Eigenvalues and eigenvectors, Diagonalization of matrices, Cayley-Hamilton Theorem.

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. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill Publishing Company Limited.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
5. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
6. P. Sivaramakrishna Das and C. Vijyakumari, Engineering Mathematics, Pearson Education.

7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

Course Outcomes
The students will learn:
- To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
- The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- The tool of power series and Fourier series for learning advanced Engineering Mathematics.
- To deal with functions of several variables that are essential in most branches of engineering.
- The essential tool of matrices and linear algebra in a comprehensive manner.

Math-I (Calculus and Linear Algebra)
BSC-MATH-103G

Course code	BSC-MATH-103G				
Category	Basic Science Course				
Course title	Math-I (Calculus and Linear Algebra)				
Scheme and Credits	L	T	P	Credits	Semester-I
	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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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
Calculus: Indeterminate forms and L'Hospital's rule, Maxima and Minima, Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders, Evolutes and Involutes, Evaluation of definite and improper integrals, Applications of definite integrals to evaluate surface areas and volumes of revolutions, Beta and Gamma functions and their properties.

Unit-II
Matrices: Matrices, Vectors: addition and scalar multiplication, Matrix multiplication, Linear systems of equations, Linear Independence, Rank of a matrix, Determinants, Cramer's Rule, Inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

Unit-III
Vector spaces I: Vector Space, Linear dependence of vectors, Basis, Dimension, Linear transformations (maps), Range and kernel of a linear map, Rank and nullity, Inverse of a linear transformation, Rank nullity theorem, Matrix associated with a linear map, Composition of linear maps.

Unit-IV
Vector spaces II: Eigenvalues, Eigenvectors, Symmetric, Skew-symmetric and Orthogonal Matrices, Eigenbases, Diagonalization, Inner product spaces, Gram-Schmidt orthogonalization.

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. D. Poole, Linear Algebra: A Modern Introduction, Brooks Cole.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
7. V. Krishnamurthy, V.P. Mainra and J. L. Arora, An introduction to Linear Algebra, Affiliated East–West Press Private limited.

8. Seymour Lipschutz and Marc Lipson, Linear algebra, Schaum's Outline, Tata McGraw-Hill Publishing Company Limited.
9. Kenneth Hoffman and Ray Kunze, Linear algebra, Pearson Education.

Course Outcomes

The students will learn:

- To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.
- The essential tools of matrices and linear algebra including linear transformations, eigenvalues, diagonalization and orthogonalization.

Math-I (Series, Matrices and Calculus)
BSC-MATH-105G

Course code	BSC-MATH-105G				
Category	Basic Science Course				
Course title	Math-I (Series, Matrices and Calculus)				
Scheme and Credits	L	T	P	Credits	Semester-I
	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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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
Infinite series: Introduction of Arithmetic and Geometric Series**,** Convergence and divergence, Comparison Tests, D' Alembert's Ratio Test, Integral Test, Raabe's Test, Logarithmic and Cauchy root Tests, Gauss's test, Alternating Series, Absolute and Conditional Convergence.

Unit-II
Matrices & Its Application: Elementary Matrices, Elementary Transformations, Inverse using elementary transformations, Rank of a matrix, Normal form of a matrix, Linear dependence and independence of vectors, Consistency of linear system of equations, Linear and Orthogonal Transformations, Eigenvalues and Eigenvectors, Properties of eigenvalues, Cayley-Hamilton Theorem, Diagonalization of Matrices.

Unit-III
Differential Calculus: Limit, Continuity and Differentiability of function of single variable, Successive Differentiation, Leibnitz Theorem, Taylor's and Maclaurin's Series for Single Variable function, Partial derivatives, Homogeneous functions, Euler's Theorem, Jacobian, Maxima-Minima of function of two variables, Lagrange's Method of undetermined multipliers.

Unit-IV
Integral Calculus: Basic concepts of integration and properties of definite integrals, Applications of single integration to find volume of solids and surface area of solids of revolution, Double integral, Change of order of integration, Double integral in Polar Co-ordinates, Applications of double integral to find area enclosed by plane curves, Triple integral, Beta and Gamma functions.

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. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill Publishing Company Limited.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
5. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.

6. P. Sivaramakrishna Das and C. Vijyakumari, Engineering Mathematics, Pearson Education.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

Course Outcomes The students will learn:
- To deal with the nature of infinite series that is essential in most branches of engineering.
- The essential tool of matrices and linear algebra in a comprehensive manner
- The tools of differentiation and integration of functions of univariate and multivariate that are used in various techniques dealing engineering problems.
- The mathematical tools needed in evaluating multiple integrals and their usage.
- To apply differential and integral calculus to find volume of solids and surface area of solids of revolution. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.

Math-II (Multivariable Calculus, Differential equations and Complex Analysis)
BSC-MATH-102G

Course code	BSC-MATH-102G				
Category	Basic Science Course				
Course title	Math-II (Multivariable Calculus, Differential equations and Complex Analysis)				
Scheme and Credits	L	T	P	Credits	Semester-II
	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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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 Integral Calculus: Multiple Integration: Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Centre of mass and Gravity (constant and variable densities), Triple integrals (Cartesian), Orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds, Scalar line integrals, Vector line integrals, Scalar surface integrals, Vector surface integrals, Theorems of Green, Gauss and Stokes.

Unit-II

Ordinary differential equations of first and higher orders: Exact, Linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Second order linear differential equations with variable coefficients, Method of variation of parameters, Cauchy-Euler equation, Power series solutions, Legendre polynomials, Bessel functions of the first kind and their properties.

Unit-III

Complex Variable – Differentiation: Differentiation, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Finding harmonic conjugate, Elementary analytic functions (exponential, trigonometric, logarithm) and their properties, Conformal mappings, Mobius transformations and their properties.

Unit-IV

Complex Variable – Integration: Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof), Taylor's series, Zeros of analytic functions, Singularities, Laurent's series, Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

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. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, Wiley India.
4. S. L. Ross, Differential Equations, Wiley India.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India.
6. J. W. Brown and R. V. Churchill, Complex Variables and Applications, Mc-Graw Hill.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
9. P. Sivaramakrishna Das and C. Vijyakumari, Engineering Mathematics, Pearson Education.
10. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.

Course Outcomes The students will learn:
- The mathematical tools needed in evaluating multiple integrals and their usage.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

Math-II (Probability and Statistics)
BSC-MATH-104G

Course code	BSC-MATH-104G				
Category	Basic Science Course				
Course title	Math-II (Probability and Statistics)				
Scheme and Credits	L	T	P	Credits	Semester-II
	3	1		4	
Branches (B. Tech.)	• Information Technology • Computer Science Engineering • Computer Science and Information Technology				
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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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
Random variables and discrete probability distributions: Conditional probability, Probability spaces, Discrete random variables, Independent random variables, Expectation of discrete random variables, Sums of independent random variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality, The multinomial distribution, Poisson approximation to the binomial distribution, Infinite sequences of Bernoulli trials.

Unit-II
Continuous and Bivariate probability distribution: Continuous random variables 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-III
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.

Unit-IV
Applied Statistics: Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations; Small samples: Test for single mean, difference of means and correlation coefficients; 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. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall.
3. S. Ross, A First Course in Probability, Pearson Education.

4. W. Feller, An Introduction to Probability Theory and its Applications, Wiley.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill Publishing Company Limited.

Course Outcomes

The students will learn:
- The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples.

Math-II (Vector Calculus, Differential equations and Laplace Transform)
BSC-MATH-106G

Course code	BSC-MATH-106G				
Category	Basic Science Course				
Course title	Math-II (Vector Calculus, Differential equations and Laplace Transform)				
Scheme and Credits	L	T	P	Credits	Semester-II
	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 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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
Vector Calculus: Differentiation of vectors, Scalar and vector point functions, Gradient of a scalar field and Directional derivative, Divergence and Curl of a vector field and their physical interpretations, Integration of vectors, Line integral, Surface integral, Volume integral, Green, Stoke's and Gauss theorems (without proof) and their applications.

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

Unit-III
Laplace Transforms and its Applications: Laplace transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Multiplication by t^n, 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.

Unit-IV
Partial Differential Equations: Formation of partial differential equations, Lagrange' linear partial differential equation, First order non-linear partial differential equation, Charpit's method, Method of separation of variables.

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. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
6. P. Sivaramakrishna Das and C. Vijyakumari, Engineering Mathematics, Pearson Education.
7. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, Wiley India.
8. S. L. Ross, Differential Equations, Wiley India.
9. R. K, Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publication House Private Limited.

Course Outcomes The students will learn:
- The mathematical tools needed in evaluating vector calculus and their usage.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- To deal with the Laplace transform and its application that is essential in most branches of engineering
- The essential tool of partial differential equation in a comprehensive manner.

BASIC ELECTRICAL ENGINEERING

Theory :	75
Class Work :	25
Total :	100
Duration of Exam :	3 Hrs.

Course Code	**ESC-EE-101G**		
Category	**Engineering Science Course**		
Course title	Basic Electrical Engineering (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 2.5 marks from all units and remaining eight questions of 12.5 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

DC Circuits
Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws with their applications (Nodal and Mesh Analysis), analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

AC Circuits
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.

Section B

Transformers
Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, transformer tests regulation and efficiency. Auto-transformer and three-phase transformer connections.

Polyphase Circuits
Three phase balanced circuits, voltage and current relations in star and delta connections. Power Measurement by two wattmeter method.

Section C

Electrical Machines
Generation of rotating magnetic fields, construction, working, starting and speed control of single-phase induction motor. Construction and working of a three-phase induction motor. Construction, working, torque-speed characteristic and speed control of dc motor. Construction and working of synchronous generators.

Section D

Measuring Instruments
Construction, operating and uses of moving iron type and moving coil type, induction type voltmeter, Ammeter, watt meter, energy meter.

Electrical Installations
Components of LT Switchgear: Introduction to Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Text / Reference Books

(i)   E. Hughes, "Electrical and Electronics Technology", Pearson Education.
(ii) D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
(iii) S. K Sahdev, Basic of Electrical Engineering, Pearson Education, 2015.
(iv) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
(v) L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
(vi) V. D. Toro, "Electrical Engineering Fundamentals", Pearson Education.

Course Outcomes:
- To understand and analyze basic electric and magnetic circuits
- To study the working principles of electrical machines and Transformers.
- To study various type of measuring instruments.
- To introduce the components of low voltage electrical installations

BASIC ELECTRICAL ENGINEERING LABORATORY

Class Work: 25
Exam : 25
Total : 50

Course Code	ESC-EE-102G		
Category	**Engineering Science Course**		
Course title	Basic Electrical Engineering (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. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Practical resistors, capacitors and inductors.
2. To verify KCL and KVL.
3. To verify Thevenin's and Norton theorems.
4. To verify Maximum power transfer and Superposition theorems.
5. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
6. To perform O.C. and S.C. tests of a transformer.
7. Measurement of power in a 3-phase system by two wattmeter method.
8. Measurement of power by 3 voltmeter/3 Ammeter method.
9. Measuring the response of R-L, R-C, and R-L-C circuits to a step change in voltage. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
10. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
11. Torque Speed Characteristic of shunt dc motor.
12. Speed control of dc motor.

Laboratory Outcomes

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.

Course Code	ESC-CSE-101G			
Category	Engineering Science Course			
Course title	Programming for Problem Solving			
Scheme and Credits	L	T	P	Credits
	3	0	0	1.5
Pre-requisites (if any)	-			

Course Outcomes:

The course will enable the students:
- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional ranching, iteration and recursion.
- To decompose a problem into functions
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems
- To apply programming to solve simple numerical method problems, namely differentiation of function and simple integration.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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 to Programming:
Idea of Algorithm: Steps to solve logical and numerical problems. Representation of
Algorithm: Flowchart/Pseudocode with examples.
C Programming: Keywords, Variables and Data Types: basic, derived and user defined, Type Conversions, Header Files, Basic Input and Output Functions and Statements, Compilation, Syntax and Logical Errors in compilation, Object and Executable Code, Storage Classes, Arithmetic Expressions and Precedence**.**

Unit 2

Preprocessors, Conditional and Branching Statements, Loops/ Iterative Statements**,** Writing and evaluation of conditionals and consequent branching.

Unit 3

Arrays (1-D, 2-D), Character Arrays and Strings, Arrays with Pointers, Functions (including using built in libraries), Parameter passing in functions, Call by Value, Call by Reference, Passing arrays to functions, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Unit 4

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, Introduction to Dynamic Memory Allocation and its Methods, Structures, Union, Defining Structures and Array of Structures, File Handling.

Suggested Text Books:

Ajay Mittal, Programming in C, 'A Practical Approach', Pearson Education.

Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Yashavant Kanetkar, Let Us C, BPB Publication.

Suggested Reference Books

Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Course Code	**ESC-CSE-103G**			
Category	**Engineering Science Course**			
Course title	**Programming in C Lab**			
Scheme and Credits	**L**	**T**	**P**	**Credits**
	0	**0**	**4**	**2**
Pre-requisites (if any)	-			
Remarks	The lab component should have one hour of tutorial followed or preceded by laboratory assignments.			

Laboratory Outcomes
- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program
- To be able to declare pointers of different types and use them in defining self-referential structures.
- To be able to create, read and write to and from simple text files.

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation

Lab 11: Pointers and structures

Tutorial 12: File handling:
Lab 12: File operations: To be able to create, read and write to and from simple text files.

Course Code	ESC-CSE-102G			
Category	Engineering Science Course			
Course title	Programming for Problem Solving			
Scheme and Credits	L	T	P	Credits
	3	0	0	1.5
Pre-requisites (if any)	-			

Course Outcomes:

The course will enable the students:

- To learn various number systems
- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional ranching, iteration and recursion.
- To decompose a problem into functions
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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 to computers and its functional units, Number System: Binary, Octal, Decimal, Hexadecimal and their inter conversion methods. Operations on number systems: Addition, Subtraction, Complement etc.

Unit 2

Introduction to Programming: Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.

C Programming: Keywords, variables, data types, header files, basic input and output functions and statements, Compilation, Syntax and Logical Errors in compilation, object and executable code, Arithmetic expressions and precedence.

Unit 3

Conditional statements, branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops.

Unit 4

Arrays (1-D, 2-D), Character arrays and Strings, Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference. Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Suggested Text Books:

Ajay Mittal, Programming in C, 'A Practical Approach', Pearson Education.

Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Yashavant Kanetkar, Let Us C, BPB Publication.

Suggested Reference Books
Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Pearson
Education.

Course Code	**ESC-CSE-104G**			
Category	**Engineering Science Course**			
Course title	**Programming in C Lab**			
Scheme and Credits	**L**	**T**	**P**	**Credits**
	0	**0**	**4**	**2**
Pre-requisites (if any)	-			
Remarks	The lab component should have one hour of tutorial followed or preceded by laboratory assignments.			

Laboratory Outcomes
- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Course Code	ESC-ME-102G				
Category	ENGINEERING SCIENCE COURSE				
Course Title	WORKSHOP TECHNOLOGY				
Scheme and Credits	L	T	P	CREDITS	Semester-I /II
	1	0	0	1	
Pre-Requisites(if any)					
Theory-75 Marks	Internal Assessment-25 Marks		Total-100 Marks		Duration of Exam-3 Hrs

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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
Manufacturing Processes:
Introduction to Manufacturing Processes and their Classification, , additive manufacturing Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accident, Methods of Safety, First Aid, Objectives of Layout, Types of Plant Layout and their Advantages.

UNIT-II
Carpentry, Fitting & Forming Processes
Basic Principle of Hot & Cold Working, Hot & Cold Working Processes, Rolling, Extrusion, Forging, Drawing, Wire Drawing and Spinning, Sheet Metal Operations: Measuring Layout marking, Shearing, Punching, Blanking, Piercing, Forming, Bending and Joining. Advantages of timber, types of timber, defects in timber, carpentry tools, classification of metals, fitting tools, fitting operations, glass cutting

UNIT-III
Casting and Machine Tools
Introduction to Casting Processes, Basic Steps in Casting Processes, Pattern: Types of Pattern and Allowances, Sand Casting: Sand Properties, Constituents and Preparation. Gating System. Melting of Metal, Cupola Furnace, Casting Defects & Remedies, plastic moulding, lathe machine, lathe operations, CNC machining, Shaper and planner machine.

UNIT-1V

Welding :
Introduction to welding, Classification of Welding Processes, GAS Welding : Oxy-Acetylene Welding, Resistance Welding : Spot and Seam Welding, Arc Welding : Metal Arc, TIG & MIG, Welding Defects and Remedies, Soldering & Brazing.

Suggested Text/Reference Books:

(i) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology",
    7th Edition, Pearson Education, 2018.
(ii) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of

Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
(iii) Kalpakjian S. And Steven S. Schmid, "Manufacturing Processes for Engineering Materials, Pearson Education.
(iv) Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – I" Pearson Education, 2008.
(v) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Pearson Education.
(vi) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House,

Course Outcomes

Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials

Course Code	ESC-ME-103G				
Category	ENGINEERING SCIENCE COURSE				
Course Title	MANUFACTURING PRACTICES				
Scheme and Credits	L	T	P	CREDITS	Semester-I /II
	0	0	4	2	
Pre-Requisites(if any)					
External Practical-25 Marks	Internal Practical-25 Marks		Total-50 Marks		Duration of Exam-3 Hrs

List of Experiments/ Jobs
1. To study different types of measuring tools used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.
2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)
3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.
4. To study different types of fitting tools and marking tools used in fitting practice.
5. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.
6. To prepare joints for welding suitable for butt welding and lap welding.
7. To study plastic moulding and glass cutting process
8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.
9. To prepare simple engineering components/shapes by forging.
10. To prepare mold and core assembly.
11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.
12. To prepare a job involving side and face milling on a milling
13. To study electric machines, electronic components and power tools.
Note :
 At least ten experiments/jobs are to be performed/prepared by the students in the semester.

Laboratory Outcomes

· Upon completion of this laboratory course, students will be able to fabricate components with their own hands.

· They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.

· By assembling different components, they will be able to produce small devices of their interest.

Course Code	ESC-ME- 101G				
Category	**ENGINEERING SCIENCE COURSE**				
Course Title	**ENGINEERING GRAPHICS & DESIGN**				
Scheme and Credits	**L**	**T**	**P**	**CREDITS**	Semester-I /II
	1	**0**	**4**	**3**	
Pre-Requisites(if any)					
External Practical-75 Marks	**Internal Practical/Class Marks-25 Marks**		**Total-100 Marks**		**Duration of Exam-3 Hrs**

UNIT-I
Module 1: Introduction to Engineering Drawing
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module 2: Orthographic Projections
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

UNIT-II
Module 3: Projections of Regular Solids
Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module 4: Sections and Sectional Views of Right Angular Solids
Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

Module 5: Isometric Projections
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT-III
Module 6: Overview of Computer Graphics
Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids]

<div align="center">

UNIT-IV

</div>

Module 7: Annotations, layering & other functions

Applying dimensions to objects, applying annotations to drawings; layers to create drawings, orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies.

Drawing of Engineering objects like coupling, crankshaft, pulley.

Module 8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components, Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Suggested Text/Reference Books:

(i) Shah, M.B. & Rana B.C., Engineering Drawing, Pearson Education

(ii)Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar
 Publishing House

(iii) Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

(iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech
Publishers

(v) (Corresponding set of) CAD Software Theory and User Manuals

Course Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design
concepts into the basic line language of graphics. Therefore, there are many areas (civil,
mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play
major roles in the design and development of new products or construction. Students prepare for actual
work situations through practical training in a new state-of-the-art computer designed CAD laboratory
using engineering software. This course is designed to address:

- to prepare you to design a system, component, or process to meet desired needs within
  realistic constraints such as economic, environmental, social, political, ethical, health and
  safety, manufacturability, and sustainability
- to prepare you to communicate effectively
- to prepare you to use the techniques, skills, and modern engineering tools necessary for
Engineering practice The student will learn :
- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling

Course Code	:	HSMC-ENG-101G
Category	:	Humanities
Course Title	:	English Language Skills

L	T	P	Credits		Internal Assessment	:	25
Marks							
2	0	0	2		External Assessment	:	75
Marks							
					Total	:	100
Marks							
					Duration of Exam	:	03
Hours							

Course Objective:
To equip the students with English language skills needed in academic and professional world and to inculcate human/ethical values in them

Course Outcome:
The students will acquire basic proficiency in English with special emphasis on reading and writing skills, and writing practices along with an inclination to become better human beings.

Course Contents:

Section: A
Basic Writing skills

Subject Verb Agreement, Noun Pronoun Agreement, Governance of Nouns through Prepositions, Basic Verb Patterns (V, SV, SVO, SVOO, SVC, SVOC, SVOA)

Section: B
Vocabulary Building& Creating Grammatical Cohesion

One word substitution, Phrasal Verbs, Commonly used Idioms, Foreign words, Referring Time in Language (Tenses), Use of Active and Passive Voice

Section: C
Phonetics
Basic concept –Vowels, Consonants, Phonemes, Syllable, Transcription of words

Section: D
Reading and Writing Practices

(a) Literary Texts:

    i.   "Patriotism beyond politics and Religion' by Abdul Kalam Azad
    ii.   "The Secret of Work" by Swami Vivekananda
    iii.   "An Outline of Intellectual Rubbish" by Bertrand Russell
    iv.   "Mother Teresa" by Khushwant Singh

(b) Writing official Letters- Issues Concerning Students' academic and social life
(c) Essay Writing
(d) Paragraph Writing

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 10 parts of 2.5 marks from all units and remaining eight questions of 12.5 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.

Recommended Readings:

1. Nitin Bhatnagar and Mamta Bhatnagar, *Communicative English for Engineers and Professionals*. Pearson Education.

2. Bhatnagar, k. Manmohan.Ed. *The Spectrum of Life: An Anthology of Modern Prose*. Delhi: Macmillan India Ltd., 2006.

3. C. Murlikrishna& Sunita Mishra, Communication Skills for Engineers, Pearson Ed.

4. Sinha, R.P.*Current English Grammar and Usage*. OUP.

5. Rizvi, M. Ashraf.*Effective Technical Communication*. McGraw Hill Education (India) Pvt. Ltd., 2014.

6. Eastwood, John.*Oxford Guide to English Grammar*.OUP, 2010.

7. Kumar, Sanjay and PushpLata. *Communication Skills*. OUP, 2011.

8. Raman, Meenakshi and Sangeeta Sharma.*CommunicationSkills*.NewDelhi:OUP,2011.

9. Hill, L.A.*A Guide to Correct English*.London:OUP,1965.

10. *Oxford Dictionary of English Idioms*. New Delhi: OUP, 2009

11*http://yousigma.com/religionandphilosophy/swamivivekananda/thescecretofwork.pdf

Course Code	:	HSMC-ENG-102 G
Category	:	Humanities
Course Title	:	English Language Lab

| L | T | P | Credit/s | | Internal Assessment | : | 25 |
Marks
| 0 | 0 | 2 | 1 | | External Assessment | : | 25 |
Marks
| | | | | | Total | : | 50 |
Marks
| | | | | | Duration of Exam | : | 03 |
Hours

Course Objective:
The course aims at developing the desired English language skills of students of Engineering and Technology so that they become proficient in communication to excel in their professional lives. The course has been sodesigned as to enhance their linguistic and communicative competence.

Course Outcome:
The students will acquire basic proficiency in English with special emphasis on listening, comprehension and speaking skills both at social and professional platforms.

Course Contents:
  (i)   Listening comprehension
  (ii)   Recognition of phonemes in International Phonetic Alphabet
  (iii) Self introduction and introduction of another person
  (iv)Conversation and dialogues in common everyday situations
 (v)   Communication at work place (Standard phrases and sentences in various situations)
  (vi)Telephonic communication
  (vii) Speeches for special occasions (Welcome speeches, Introduction speeches, Felicitation
  speeches and Farewell speeches)
  (viii) Tag Questions
  (ix)Formal Presentations on literary texts prescribed in theory paper

Note: Three hour time to each segment is recommended for instruction and practice.

Scheme of End Semester Practical Exam:
  1. A small passage may be read out to the examinees and they will have to write the answers to the questions asked at the end of the passage.Questions will be short answertype.
  2. Examinees may be asked to identify the sounds of phonemes in given words.
  3. Examinees may be asked to introduce themselves or others, participate in role play activities in mock situations, give short responses, engage in hypothetical telephonic conversation or supply the tag questions to statements etc.
  4. Examinees may also be asked to deliver speeches on given situations or make presentation on the literary texts prescribed in Unit IV of theory paper.

Recommended Readings:

  1.   Bhatnagar, Nitin andMamta Bhatnagar.*Communicative English for Engineers and Professionals.*Pearson Education, 2013.
  2.   Swan, Michael.*Practical English Usage*. OUP, 1995.
  3.   Gangal, J.K. *Practical Course in Spoken English*. New Delhi: PHI Learning, 2015.

4. Konar,Nira. *Communication Skills for Professionals*. New Delhi: PHI Learning Pvt. Ltd., 2009.
5. Bansal, R.K. and J.B. Harrison*. Spoken English*. Orient Longman, 1983.
6. Sharma, Sangeeta and Binod Mishra. *Communication Skills for Engineers and Scientists*. Delhi: PHI Learning Pvt. Ltd., 2015.

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 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

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	

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	OperatingSystem	3	0	0	3	3	25	75		100	3
4	PCC-CSE-208G	ObjectOriented 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	OperatingSystem LAB	0	0	4	4	2	25		25	50	3
9	LC-CSE-214G	ObjectOriented 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

Coursecode	PCC-CSE-201G				
Category	Professional Core Course				
Coursetitle	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),DataManipulationLanguage(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 andRBAC 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

Coursecode	PCC-CSE-203G				
Category	Professional Core Course				
Coursetitle	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 BinaryTree, 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 andcomplexity 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

Coursecode	PCC-CSE-205G				
Category	Professional Core Course				
Coursetitle	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.

UNIT1:

FUNDAMENTALSOFDIGITAL SYSTEMSAND LOGICFAMILIES

Digitalsignals,digital circuits,AND, OR,NOT, NAND, NORand Exclusive-ORoperations, Booleanalgebra,examples ofICgates,numbersystems-binary, signed binary, octal hexadecimal number,binary arithmetic,one'sandtwo'scomplementsarithmetic,codes,error detectingand correctingcodes.

UNIT2:

COMBINATIONAL DIGITALCIRCUITS

Standardrepresentationfor logicfunctions,K-maprepresentation,and simplificationoflogic functionsusingK-map,minimizationoflogicalfunctions.Don'tcareconditions,Multiplexer, De-Multiplexer/Decoders,Adders,Subtractors,BCDarithmetic,carry lookaheadadder,serial adder,ALU,elementaryALUdesign,popularMSI chips,digitalcomparator,parity checker/generator,codeconverters,priorityencoders,decoders/drivers fordisplay devices,Q-M method of function realization.

UNIT3:

SEQUENTIAL CIRCUITSAND SYSTEMS

A1-bitmemory,thecircuitpropertiesofBistablelatch,theclockedSRflipflop, J-K-TandD typesflipflops,applicationsof flipflops,shift registers,applicationsof shiftregisters, serialto parallelconverter, paralleltoserialconverter,ringcounter, sequencegenerator,ripple

(Asynchronous)counters, synchronouscounters,counters design using flipflops, specialcounter IC's,asynchronous sequential counters, applications of counters.

UNIT4:

A/D ANDD/A CONVERTERS

Digitaltoanalog converters: weightedresistor/converter,R-2RLadderD/Aconverter, specificationsforD/Aconverters,examplesofD/AconverterICs,sampleandholdcircuit, Analogto digital converters: quantization and encoding, parallel comparator A/Dconverter, successiveapproximationA/Dconverter,countingA/Dconverter,dualslopeA/Dconverter,

SEMICONDUCTOR MEMORIESAND PROGRAMMABLE LOGIC DEVICES

Memoryorganization and operation, expandingmemorysize, classificationand characteristics of memories, sequentialmemory, read only memory (ROM), read and write memory(RAM), contentaddressablememory (CAM),ROMasaPLD,Programmablelogicarray,Programmablearray logic,complex Programmable logic devices (CPLDS), Field Programmable GateArray(FPGA).

CourseOutcomes:

At the end ofthis course,students will demonstrate the abilityto
1. Understand workingof logic families andlogicgates.
2. Designand implement Combinational and Sequential logic circuits.
3. Understand theprocess 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 DigitalElectronics",McGrawHillEducation, 2009.
2. M. M.Mano, "Digital logic and Computerdesign",Pearson Education India,2016.
3. A. Kumar,"Fundamentals ofDigitalCircuits",Prentice HallIndia, 2016.
4. Nasib Singh Gill and J B Dixit, "Digital Design and Computer Organization", University Science Press, New Delhi

Python Programming

Coursecode	PCC-CSE-207G				
Category	Professional Core Course				
Coursetitle	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)

Coursecode	BSC-MATH-203G				
Category	Basic Science Course				
Coursetitle	Mathematics-III (Multivariable Calculus and Differential Equations)				
Scheme and Credits	L	T	P	Credits	Semester 3
	2	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.

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.

ECONOMICSFORENGINEERS

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			

CourseObjectives:

1.Acquaintthestudentstobasicconceptsofeconomicsandtheiroperationalsignificance.

2.Tostimulatethestudentstothinksystematicallyandobjectivelyabout   contemporary economicproblems.

UNIT-1

Definition of Economics- Various definitions, types of economics- Micro and MacroEconomics, 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, Realcost, 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 andeffect 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.

COURSEOUTCOMES:

1.Thestudentswillabletounderstandthebasicconceptofeconomics.

2.Thestudentwillabletounderstandtheconceptofproductionandcost.

3.Thestudentwillabletounderstandtheconceptofmarket.

4.Thestudentwillabletounderstandtheconceptofprivatization,globalizationandbanks.

REFERENCES:

1.JainT.R.,EconomicsforEngineers,VKPublication.

2.ChopraP.N.,PrincipleofEconomics,KalyaniPublishers.

3.DewettK.K.,Moderneconomictheory,S.Chand.

4.H.L.Ahuja.,Moderneconomictheory,S.Chand.

5.DuttRudar&SundhramK.P.M.,IndianEconomy.

6.MishraS.K.,ModernMicroEconomics,PragatiPublications.

7.SinghJaswinder,ManagerialEconomics,dreamtechpress.

8.ATextBookofEconomicTheoryStonierandHague(Longman'sLandon).

9.MicroEconomicTheory–M.L.Jhingan(S.Chand).

10.MicroEconomicTheory-H.L.Ahuja(S.Chand).

11.ModernMicroEconomics:S.K.Mishra(PragatiPublications).

12.EconomicTheory-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			

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

Course code	LC-CSE-211G	
Category	Professional Core Course	
Course title	Digital Electronics Lab	
Scheme and Credits	L T P Credits 0 0 4 2	Semester-3
Branches (B. Tech.)	Computer Science and Engineering	
Class work	25 Marks	
Exam	25 Marks	
Total	50 Marks	
Duration of Exam	03 Hours	

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

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

Coursecode	PCC-CSE-202G				
Category	Professional Core Course				
Coursetitle	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, SemyourLipschutz 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 andCache Coherency.

Unit 4

Input-output Organization :I/O deviceinterface, 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 AviSilberschatz, 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

Course code	PCC-CSE-208G				
Category	Professional Core Course				
Course title	Object Oriented Programming				
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 - 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. BjraneStroustrup, "C++ Programming language",3rd edition, Pearson education Asia(1997)

2. LaforeR."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; Manageriallevels, 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 andrelationship with other Fields; Contemporary challenges and opportunities of OB. **Individual Processes and Behavior**-**Personality**- Concept, determinants andapplications; **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 groupdevelopment, 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 barriersof communication.

UNIT 4

Organizational Processes: Organizational structure - Meaning and types oforganizational 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, OrganisationalBehaviour: Text and cases. New Delhi: Pearson Education.
5. Pareek, Udai, Understanding OrganisationalBehaviour, Oxford University Press, New Delhi.
6. Robbins, S.P. & Judge, T.A., OrganisationalBehaviour, Prentice Hall of India, New Delhi.
7. GhumanKarminder, 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	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 TheMultidisciplinarynatureofenvironmentalstudies.Definition, scopeandimportance.
(2lecture)

Unit-2NaturalResources:

Renewableandnon-

renewableresources:Naturalresour

cesandassociatedproblems.

a) Forest resources:Useandover-exploitation:deforestation, casestudies.Timberextraction,miningdamsandtheireffects onforestsandtribalpeople.

b) Waterresources:Useandover-utilizationofsurfaceand groundwater,floods,drought,conflictsoverwater,dams- benefitsandproblems.

c)
 Mineralresources:Useandexploitation,environmental effects ofextractingandusingmineralresources,casestudies.

d) Foodresources:World foodproblems,changes,causedby agricultureandovergrazing,effectsofmodernagriculture, fertilizer-pesticideproblems,Waterlogging,salinity,case studies.

e)
 Energyresources:Growingenergyneeds;renewablean dnon-renewableenergysources,useofalternateenergysources

,case studies.

f)

Landresources:Landasaresource,landdegradation,maninducedlandslides,soilerosionanddesertification.

*

Roleofanindividualinconservationofnaturalresources

.

* Equitableuseofresourcesforsustainablelifestyles.

(8lectures)

Unit-3 Ecosystems:
* Producers,consumersanddecomposers.

* Energyflowintheecosystem.

* Ecologicalsuccession.

* Foodchains,foodwebsandecologicalpyramids.

*

Introduction,types,characteristicfeatures,structureand functionofthefollowingeco-system:

a. Forestecosystem.

b.

Grasslandecosyste

m. c.   Desert

ecosystem.

d.

Aquaticecosystems(ponds,streams,lakes, rivers, oceans,estuaries)   (6lectures)

Unit-4 Biodiversityanditsconservation

*   Introduction-
Definition:Genetic,Speciesandecosystemdiversity.

*

Valueofbiodiversity:consumptiveuse,productiveuse,
social,ethical,aestheticandoptionvalues.

* Biodiversityatglobal,Nationalandlocallevels.

* Indiaasamega-diversitynation.

* Hot-spotsofbiodiversity.

*

Threatstobiodiversity:habitatloss,poachingofwildlife, man-wildlifeconflicts.

* EndangeredandendemicspeciesofIndia.

*   Conservationofbiodiversity:In-situandex-situ conservationofbiodiversity.

(8lectures)

Unit-5 Environmentalpollution:

Definition,causes,effectsandcontrolmeasuresof:

a) Airpollution.

b) Waterpolluti on

c) Soilpollution

d) Marinepolluti on

e) Noisepollutio n

f) Thermalpolluti on

g) Nuclearhazard s

* Solidswastemanagement:causes,effectsandc ontrol measuresofurbanandindustrialwastes.

* Roleofanindividualinpreventionofpollution.

* Pollutioncasestudies.

* Disastermanagement:floods,earthquake,cycl oneand landslides.

(8lectures)

Unit-6 SocialissuesandtheEnvironment:

* Fromunsustainabletosustainabledevelopment.

* Urbanproblemsrelatedtoenergy.

* Waterconservation,rainwaterharvesting, watershed management.

* Resettlementandrehabilitationofpeople:itspr oblems andconcernscasestudies.

* Environmentalethics:Issuesandpossiblesolutions.

* Climatechange,globalwarming,acidrain,ozo nelayerdepletion,nuclearaccidentsandholocaust. Casestudies.

* Wastelandreclamation.

* Consumerismandwasteproducts.

* EnvironmentProtectionAct.

* Air(PreventionandControlofpollution)Act.

* Water(PreventionandControlofpollution)Act.

* WildlifeProtectionAct.

* ForestConservationAct.

* Issuesinvolvedinenforcementofenvironmentallegislation.

* Publicawareness. (7lectures)

Unit-7 HumanpopulationandtheEnvironment.

Populationgrowth,variationamongnations.P

opulationexplosion-

FamilyWelfareProgramme.

Environmentandhumanhealth.

HumanR

ights.

ValueEd

ucation.

HIV/AI

DS.

WomanandChildWelfare

RoleofInformationTechnologyinEnvironmentandhu

man health.

CaseStudies. (6lectures)

Unit-8 FieldWork:

* Visittoalocalareatodocumentenvironmenta

lassets- river/forest/grassland/hill/mountain.

* Visittoalocalpollutedsite-
urban/Rural/Industrial/ Agricultural.

* Studyofcommonplants,insects,birds.

* Studyofsimpleecosystems-
pond,river,hillslopes,etc. (Fieldworkequalto10
lecturehours).

References

1.   Agarwal,K.C.2001EnvironmentalBiology,NidiPub.Ltd. Bikaner.

2.   Bharucha,Frach,TheBiodiversityofIndia,MApinPublishingPvt.Ltd.Ahmedabad-380013,India,E-mail:mapin@icenet.net(R).

3.   BrunnerR.C.1989,HazardousWasteIncineration,Mc.Graw HillInc.480p.

4.   ClarkR.S.,Marinepollution,SlandersonPressOxford(TB).

5.   Cunningham,W.P.Cooper,T.H.Gorhani,E&Hepworth,M.T. 2001,EnvironmentalEncyclopedia,JaicoPub.House,Mumbai 1196p.

6.   DeA.K.,EnvironmentalChemistry,WileyEasternLtd.

7.   DowntoEarth,CentreforScienceandEnvironment(R).

8.   Gleick,H.P.,1993.Waterincrisis,PacificInstituteforStudiesinDev.Environment&SecurityStockholmEnv.Institute, OxfordUniv.Press,473p.

9.   HawkinsR.E.EncyclopediaofIndianNaturalHistory,Bombay NaturalHistorySociety,Bombay(R).

10.   Heywood,V.H.&Watson,R.T.1995. Global Biodiversity Assessment,CambridgeUni.Press1140p.

11.   Jadhav,H&Bhosale,V.M.1995.EnvironmentalProtection andLaws.HimalayaPub.House,Delhi284p.

12.   Mackinney,M.L.&Schoch,RM1996,EnvironmentalSciencesystems&solutions,Webenhancededition.639p.

13.   MhaskarA.K., MayyerHazardous,Tekchno-Science Publications(TB).

14.   MillerT.G.Jr.EnvironmentalScience,WadsworthPublishing

C o. (T B).

15. Odum,E.P.1971,FundamentalsofEcology.W.B.Saunders Co.USA ,574p.

16. RaoM.N.&Datta,A.K.1987WasteWaterTreatment.Oxford &TBHPubl.Co.Pvt.Ltd. 345p.

17. Sharma,B.K.2001,EnvironmentalChemistry,GoalPubl. House, Meerut.

18. SurveyoftheEnvironment,TheHindu(M).

19. TownsendC.,HarperJ.andMichaelBegon.Essentials of Ecology,BlackwellScience(TB).

20. TrivediR.K.,HandbookofEnvironmentalLaws,Rules, Guidelines,ComliancesandStandards,Vol.IandIIEnviroMedia(R).

21. TrideviR.K.andP.K.Goal,Introductiontoairpollution,Techno SciencePublicatio ns(TR).

22. WagnerK.D.,1998,EnvironmentalManagement,W.B. Saundersco.Philadelphia,USA 499p.

23. AtextbookenvironmentaleducationG.V.S.Publishers byDr. J.P .Y ad av. (M) Magazi ne (R) Referen ce (TB) Textbo ok

Theschemeofthepaperwillbeunder:
ThesubjectofEnvironmental Studieswill beincludedasa qualifyingpaperinallUGCoursesandthestudentswillberequiredtoqualifythesameotherwise thefinalresultwillnotbedeclaredanddegreewillnotbeawarded.

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

includedindeterminingthepercentageofmarksobtainedforthe award
ofdegree.However,thesemarkswillbeshowninthedetailedm arks certificateofthestudents.

Web Technologies

Course code	LC-CSE-210G			
Category	Professional Core Course			
Course title	Web Technologies			
Scheme and Credits	L	T	P	Credits
	2	0	0	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 YashavantKanetkar.
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	T	P	Credits
	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			

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

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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.

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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

(NAAC Accredited 'A+' Grade)

SCHEME OF STUDIES AND EXAMINATION
B.TECH (Computer Science & Engineering)
SEMESTER 5th AND 6th
Scheme effective from 2020-21

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

General Notes:

1. Mandatory courses are non credit courses in which students will be required passing marks in internal assessments.
2. Students will be allowed to use non programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
3. Students will be permitted to opt for any elective course run by the department. However, the department shall offer those electives for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. To run the elective course a minimum of 1/3rd students of the class should opt for it.

Scheme of Studies and Examination
B.TECH (Computer Science & Engineering) – 5th Semester
w.e.f. 2020-21

Sr. No.	Category	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	Engineering Science Course	ESC-CSE-301G	Microprocessor	3	0	0	3	3	25	75		100	3
2	Professional Core Course	PCC-CSE-303G	Computer Networks	3	0	0	3	3	25	75		100	3
3	Professional Core Course	PCC-CSE-305G	Formal Languages & Automata	3	0	0	3	3	25	75		100	3
4	Professional Core Course	PCC-CSE-307G	Design & Analysis of Algorithms	3	0	0	3	3	25	75		100	3
5	Professional Core Course	PCC-CSE-309G	Programming in Java	3	0	0	3	3	25	75		100	3
6	Professional Elective Course	Refer to Annexure I	Elective–I	3	0	0	3	3	25	75		100	3
7	Engineering Science Course	LC-ESC-321G	Microprocessor Lab	0	0	2	2	1	25	-	25	50	3
8	Professional Core Course	LC-CSE-323G	Computer Networks Lab	0	0	3	3	1.5	25	-	25	50	3
9	Professional Core Course	LC-CSE-325G	Design & Analysis of Algorithms Using C++	0	0	3	3	1.5	25	-	25	50	3
10	Professional Core Course	LC-CSE-327G	Programming in Java Lab	0	0	3	3	1.5	25	-	25	50	3
11	Training	PT-CSE-329G	Practical Training-1	-	-	-	-	-	-	-	* Refer Note 1		
			TOTAL CREDIT					23.5				800	

Note:

1. The evaluation of Practical Training-I will be based on seminar, viva-voce, report submitted by the students. According to performance, the students are awarded grades A, B, C, F. A student who is awarded 'F' grade is required to repeat Practical Training.
2. Choose any one from Elective-1
   Excellent: A; Good : B; Satisfactory: C; Not Satisfactory: F.

Scheme of Studies and Examination
B.TECH (Computer Science & Engineering) – 6th Semester
w.e.f. 2020-21

Sr. No.	Category	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	Professional Core Course	PCC-CSE-302G	Compiler Design	3	0	0	3	3	25	75		100	3
2	Professional Core Course	PCC-CSE-304G	Artificial Intelligence	3	0	0	3	3	25	75		100	3
3	Professional Core Course	PCC-CSE-306G	Advanced Java	3	0	0	3	3	25	75		100	3
4	Engineering Science Course	ESC-CSE-308G	Mobile and Wireless Communication	3	0	0	3	3	25	75		100	3
5	Professional Elective Course	Refer to Annexure II	Elective-II	3	0	0	3	3	25	75		100	3
6	Professional Elective Course	Refer to Annexure III	Elective-III	3	0	0	3	3	25	75		100	3
7	Project	PROJ-CSE-322G	Project-I	0	0	4	4	2	25		25	50	3
8	Professional Core Course	LC-CSE-324G	Compiler Design Lab	0	0	3	3	1.5	25		25	50	3
9	Professional Core Course	LC-CSE-326G	Artificial Intelligence Lab using python	0	0	3	3	1.5	25		25	50	3
10	Professional Core Course	LC-CSE-328G	Advanced Java Lab	0	0	2	2	1	25		25	50	3
11.	Mandatory Courses	MC-317G	Constitution of India	2	0	0							
			TOTAL					24				800	

***MC-317G** is a mandatory non –credit course in which the students will be required passing marks in theory.

NOTE:

1. At the end of 6th 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 7th Semester.
2. Choose any one from Elective-II
3. Choose any one from Elective-III

Annexure I

Elective –I (Professional Elective Course)

1. PEC-CSE-311G:Software Engineering
2. PEC-CSE-313G : System Programming and System Administration
3. PEC-CSE-315G :Digital Image Processing

Annexure II

Elective –II (Professional Elective Course)

1. PEC-CSE-310G:Advanced Database Management System
2. PEC-CSE-312G :Mobile Application Development
3. PEC-CSE-314G:Computer Graphics
4. PEC-CSE-330G :Communication Engineering

Annexure III

Elective –III (Professional Elective Course)

1. PEC-CSE-316G: Distributed System
2. PEC-CSE-318G :Information Technology & Industry Business Skills
3. PEC-CSE-320G : Data Science
4. PEC-CSE-332G :VHDL and Digital Design

MICROPROCESSOR

Course code	ESC-CSE-301G				
Category	Engineering Science Course				
Course title	Microprocessor				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:
- To make understand architecture and working of Intel 8085 microprocessor in depth.
- To make understand architecture and working of Intel 8086 microprocessor in depth.
- Familiarization with the assembly language programming.
- Familiarization with various peripheral operations

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
THE 8085 PROCESSOR: Introduction to microprocessor, 8085 microprocessor: Architecture, instruction set, interrupt structure, and Assembly language programming.

Unit: 2
THE 8086 MICROPROCESSOR ARCHITECTURE: Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals.

Unit: 3
INSTRUCTION SET OF 8086: Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

Unit: 4
INTERFACING DEVICE: 8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, Direct Memory Access and 8237 DMA controller.

TEXT BOOKS:
1. Microprocessor Architecture, Programming & Applications with 8085: Ramesh S Gaonkar; Wiley Eastern Ltd.
2. Intel Microprocessors 8086- Pentium processor: Brey; PHI

REFERENCE BOOKS:
1. Microprocessors and interfacing: D V Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing, Hardware & Applications: Triebel & Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming &Design: Yu-Chang Liu & Glenn A Gibson; PHI.
4. Advanced Microprocessors and Interfacing: Badri Ram; TMH

Course Outcomes:

- Understand the operation and architecture of Intel 8085 microprocessor including Instruction Set Architecture, assembly language programming, timing and speed of operation.
- Learn the operation of circuits for user interaction through switches, keyboard and display devices.
- Understand the operation and architecture of Intel 8086 microprocessor including Instruction Set Architecture, assembly language programming, timing and speed of operation.
- Understand the motivation and need for peripheral operations circuits for digital data exchange, timer, serial communication, merits of direct memory access, interrupt controller and other circuits.

COMPUTER NETWORKS

Course code	PCC-CSE-303G				
Category	Professional Core Course				
Course title	Computer Networks				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:
- To develop an understanding of modern network architectures from a design and
- Performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- To provide an opportunity to do Network programming
- To provide a WLAN measurement idea.

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: Data communication, Components, Computer networks and its historical development, distributed processing, Internet

Network Models: OSI model and TCP/IP Model

Physical Layer – physical layer functions, Data Representation, Simplex, Half Duplex and Full Duplex Transmission, Modulation and Multiplexing, Packet and circuit switching, Transmission media, Topologies, connectionless and connection-oriented services.

Data Link Layer : Data link layer functions and services, MAC Addressing, Framing, Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window Protocol.

Unit: 2
Medium Access Control: MAC layer functions, Random access, Controlled Access and channelization protocols.

Network Layer: Network layer functions and services, Logical addressing, IPv4 classful and classless addressing, subnetting, NAT, IPv4, ICMPv4, ARP, RARP and BOOTP, IPv6, IPv6 addressing, DHCP.

Network Devices: Repeater, hub, switch, router and gateway.

Unit: 3

Routing Algorithms: introduction to routing, Shortest Path Algorithm, Flooding, Hierarchical Routing, Link State and Distance Vector Routing

Transport Layer: Transport layer functions and services, Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP connection management

Application Layer: Application layer functions and services, Domain Name Space (DNS), EMAIL, File Transfer Protocol (FTP), HTTP, SNMP

Unit: 4

Congestion Control, Quality of Service, QoS Improving techniques.
LAN: Ethernet, Token Bus, Token Ring, MAN Architecture- DQDB, WAN Architectures- Frame Relay, ATM, SONET/SDH

Network Security: Firewalls, security goals, types of attack, Introduction to cryptography, Types of ciphers: symmetric and asymmetric key ciphers.

Suggested books:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

Suggested reference books:

1. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
2. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
3. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

Course Outcomes:
- Explain the functions of the different layer of the OSI Protocol.
- Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) and describe the function of each.
- Identify and connect various connecting components of a computer network.
- Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

FORMAL LANGUAGES AND AUTOMATA

Course code	PCC-CSE-305G				
Category	Professional Core Course				
Course title	Formal Languages & Automata				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:

- To understand basic concepts of formal languages and automata theory.
- To study the types of Automata i.e. NFA, DFA, NFA with ϵ-transition and their interconversion methods and importance.
- To Study formal languages of different kinds, such as regular and context-free languages. Understand the concept of grammar and its types. Removal of ambiguity and reduced form and Normal forms of grammar.
- To develop the concepts and design of higher-level automata to accept the language not accepted by finite automata such as PDA &Turing machine.
- To study the various properties of turing machine and their designing.

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:

Finite Automata: Introduction: Set, Power Set, Super Set, Alphabet, languages and grammars, productions and derivation, Deterministic finite automata (DFA), Non-Deterministic finite automata (NDFA), Equivalence of DFA and NDFA, Conversion of NFA to DFA , minimization of finite automata, Finite automata with ϵ- moves, Acceptability of a string by a finite Automata.

Introduction to Machines: Properties and limitations of Finite Automata, Mealy and Moore Machines, Equivalence of Mealy and Moore machines.

Unit 2:

Regular Expression: State and prove Arden's Method, Regular Expressions, Recursive definition of regular expression, Regular expression conversion to Finite Automata and vice versa.

Properties of regular languages: Regular language, pumping lemma for regular sets/languages, Application of regular languages.

Unit 3:

Grammars: Chomsky hierarchy of languages, Relation between different types of grammars, Context-free grammar, Derivation tree / Parse tree, Ambiguity in regular grammar and their removal, Reduced Forms: Removal of useless symbols, null and unit productions, Normal Form: Chomsky Normal form(CNF) and Greibach Normal Form(GNF),

Push Down Automata: Introduction to PDA, Deterministic and Non-Deterministic PDA, Design of PDA: Transition table, Transition diagram and acceptability of strings by designed PDA, Pushdown automata (PDA) and equivalence with CFG.

Unit 4:

Turing machines: The basic model for Turing machines (TM), Deterministic and Non-Deterministic Turing machines and their equivalence, Design of Turing Machines: Transition table, Transition diagram and acceptability of strings by designed turing machine. Variants of Turing machines, Halting problem of Turing machine, PCP Problem of Turing Machine, Linear Bounded Automata, TMs as enumerators.

Undecidability: Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages.

Suggested books:
1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.

Suggested reference books
1. K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata Languages and Computation, 2nd edition, Prentice Hall of India, India.
2. Raymond Greenlaw, H. James Hoover, Fundamentals of the Theory of Computation, Principles and Practice, Morgan Kaufmann, 1998.
3. John C. Martin: Introduction to Languages and Automata Theory, 3rd edition, Tata Mcgraw-Hill, 2007

Course Outcomes:
* To use basic concepts of formal languages of finite automata techniques.
* To Design Finite Automata's for different Regular Expressions and Languages.
* To Construct context free grammar for various languages.
* To solve various problems of applying normal form techniques, push down automata and Turing Machines.

DESIGN AND ANALYSIS OF ALGORITHMS

Course code	PCC-CSE-307G	
Category	Professional Core Course	
Course title	Design and Analysis of Algorithms	
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0		3	
Class work	25 Marks	
Exam	75 Marks	
Total	100 Marks	
Duration of Exam	03 Hours	

Course Objectives:
- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

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 to Algorithms: Algorithm, Performance Analysis (Time and Space complexity), Asymptotic Notation (Big OH, Omega and Theta)-best, average and worst-case behaviour. Elementary Data Structures (Basic terminology of Stacks and Queues, Tree, Graph), Sets and Disjoint Set Union.

Divide and Conquer: General method, Binary Search, Merge Sort, Quick Sort, and other sorting algorithms with divide and conquer strategy, Strassen's Matrix Multiplication algorithms and analysis of these problems.

Unit 2:
Greedy Method: General method, Fractional Knapsack problem, Job Sequencing with Deadlines, Minimum Cost Spanning Trees, Single source shortest paths.

Dynamic Programming: General method, Optimal Binary Search Trees, 0/1 knapsack, The Traveling Salesperson problem.

Unit 3:
Back Tracking: General method, The 8-Queen's problem, Sum of subsets, Graph Colouring, Hamiltonian Cycles.
Branch and Bound: The method, 0/1 knapsack problem, Traveling Salesperson problem, Efficiency considerations.

Unit 4:

NP Hard and NP Complete Problems: Basic concepts, Cook's theorem, NP hard graph problems, NP hard scheduling problems, NP hard code generation problems, and Some simplified NP hard problems.

Suggested Text Books:

1. Fundamental of Computer algorithms, Ellis Horowitz and Sartaj Sahni, 1978, Galgotia Publication
2. Introduction to Algorithms, Thomas H Cormen, Charles E Leiserson and Ronald L Rivest: 1990, TMH

Suggested Reference Books:

1. The Design and Analysis of Computer Algorithm, Aho A.V. Hopcroft J.E., 1974, Addison Wesley.
2. Algorithms-The Construction, Proof and Analysis of Programs, Berlion, P.Bizard, P., 1986. Johan Wiley & Sons,
3. Writing Efficient Programs, Bentley, J.L., PHI
4. Introduction to Design and Analysis of Algorithm, Goodman, S.E. &Hedetnieni, 1997, MGH.
5. Introduction to Computers Science- An algorithms approach, Jean Paul Trembley, Richard B.Bunt, 2002, T.M.H.
6. Fundamentals of Algorithms: The Art of Computer Programming Vol Knuth, D.E.: 1985, Naresh Publication.

Course Outcomes:

- To identify and justify correctness of algorithms and to analyse running time of algorithms based on asymptotic analysis.
- To understand when an algorithmic design situation calls for the divide-and-conquer paradigm. Synthesize divide-and-conquer algorithms.
- Describe the greedy paradigm and dynamic-programming paradigm. Explain when an algorithmic design situation calls for it.
- Developing greedy algorithms/dynamic programming algorithms, and analyze it to determine its computational complexity.
- To write the algorithm using Backtracking and Branch and Bound strategy to solve the problems for any given model engineering problem.

PROGRAMMING IN JAVA

Course code	PCC-CSE-309G				
Category	Professional Core Course				
Course title	Programming in JAVA				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:
- Programming in the Java programming language.
- Knowledge of object-oriented paradigm in the Java programming language.
- The use of Java in a variety of technologies and on different platforms.

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 to Java: Evolution of Java, Object Oriented Programming Structure, Overview and characteristics of Java, Java program Compilation and Execution Process, Organization of the Java Virtual Machine, Client side Programming, Platform Independency & Portability, Security, Relation b/w JVM, JRE and JDK, Introduction to JAR format, Naming Conventions, Data types & Type casting, operators, Security Promises of the JVM, Security Architecture and Security Policy, security aspects, sandbox model

Unit 2:
OOPS Implementation: Classes, Objects, attributes, methods, data encapsulation, reference variables, Constructors, Anonymous block, Method Overloading, Static Data members, Block & methods; Memory Structure: Stack, Heap, Class & Method area
Class loading & Execution flow: Static vs Dynamic Class loading, implicit vs explicit class loading, class loading operations;
Argument Passing Mechanism: Passing primitive arguments, passing objects, Wrapper Classes;
This keyword: Referencing instance members, Intra class constructor chaining, Method chaining;
Inheritance & code reusability: Extending classes for code reusability, Usage of super keyword, Method Overriding, Object class
Inheritance & Runtime Polymorphism: Static & Dynamic binding, Inheritance and Is-A relation, Runtime Polymorphism and Generalization, Abstract classes & methods, Final Keyword;
Interfaces and Role based Inheritance: Feature & Role based Inheritance, Static & Dynamic classing Environment, classes & interfaces, interface applications in real scenarios; Has-A relation: Aggregation & Composition, Nested classes, Inner classes, Anonymous Inner classes, String Buffer Class, tokenizer, applets, Life cycle of applet and Security concerns

Unit 3:

Threads: Creating Threads, Thread Priority, Blocked States, Extending Thread Class, Runnable Interface, Starting Threads, Thread Synchronization, Synchronize Threads, Sync Code Block, Overriding Synced Methods, Thread Communication, wait, notify and notify all.

Swing & AWT:

Swing class hierarchy, containers, user interface components, graphics context, AWT Components, Component Class, Container Class, Layout Manager Interface Default Layouts, Insets and Dimensions, Border Layout, Flow Layout, Grid Layout, Card Layout Grid Bag Layout AWT Events, Event Models, Listeners, Class Listener, Adapters, Action Event Methods Focus Event Key Event, Mouse Events, Window Event

Package & Scopes: Need of Packages, associating classes to Packages, Class path environment variable, Import Keyword and Feature of static import, Public, protected, private & default scope, Private Inheritance;

Exception Handling: exception and error, Exception Handling & Robustness, Common Exceptions and Errors, Try and catch block, Exception handlers, throw keyword, Checked and Unchecked Exceptions, Role of finally, User defined Exceptions;

Unit 4:

Collection Framework: Role and Importance of Collection Framework, List & Set based collection, Iterator & List Iterator, Maps, Searching elements in List, Hash and Tree based collections, Role of equals and hashCode() methods, Comparable and Comparator Interfaces, Thread Safety and Vector, Difference b/w Enumeration and Iterator, Type safety and Generics, Common algorithms and Collections class, Using Properties class for managing properties files;

Database Connectivity Using JDBC: Overview of native and ODBC Drives, Introduction to JDBC, Type of JDBC drivers, Usage of drivers, Defining properties-based Connection Factory; Basic database operations: Insert, Delete, Update, and Select;
Prepared Statement: Statement, Prepared Statement, Setting Query parameters, Executing Queries;
Callable Statement: Creating PL/SQL Stored procedures and functions, Creating Callable statements, Executing procedures & functions, Batch Updation, Transacting Queries, Programmatic initialization of database, ResultSetMetaData, DatabaseMetaData;
Input/Output Stream, Stream Filters, Buffered Streams, Data input and Output Stream, Print Stream Random Access File,
Reflection: reflection API, newInstance()method, javap tool, creating javap tool, creating applet viewer, call private method, java 9 features;

Text Books:
1. Patrick Naughton and HerbertzSchidt, "Java-2 the complete Reference", TMH
2. Sierra & bates, "Head First Java", O'Reilly.

Reference Books:
1. E. Balaguruswamy, "Programming with Java", TMH
2. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
3. Decker &Hirshfield, "Programming.Java", Vikas Publication.

Course Outcomes:
- Knowledge of the structure and model of the Java programming language, (knowledge)

- Use the Java programming language for various programming technologies (understanding)
- Develop software in the Java programming language

MICROPROCESSOR LAB

Course code	LC-ESC-321G				
Category	Engineering Science Course				
Course title	Microprocessor Lab				
Scheme and Credits	L	T	P	Credits	Semester 5
	0	0	2	1	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Hands-on experiments related to the course contents of ESC-CSE-301G.

COMPUTER NETWORKS LAB

Coursec ode	LC-CSE-323G				
Category	Professional Core Course				
Course title	Computer Networks Lab				
Scheme and Credits	L	T	P	Credits	Semester 5
	0	0	2	1.5	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Hands-on experiments related to the course contents of PCC-CSE-303G using hardware resources and using simulation tool.

DESIGN & ANALYSIS OFALGORITHMS USING C++

Course code	LC-CSE-325G				
Category	Professional Core Course				
Course title	Design & Analysis of Algorithms Using C++				
Scheme and Credits	L	T	P	Credits	Semester 5
	0	0	3	1.5	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Objectives:
- Implementation of various algorithms and to analyze the performance of algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

List of programs:

1. Write a Program for iterative and recursive Binary Search.
2. Write a Program to sort a given set of elements using the Quick Sort/Merge Sort/Selection Sort method and determine the time required to sort the elements.
3. Write a Program for implementation of Fractional Knapsack problem using Greedy Method and 0/1 Knapsack problem using Dynamic Programming.
4. Write a Program to find the shortest path from a given vertex to other vertices in a weighted connected graph using Dijkstra's algorithm.
5. Write a Program to find the minimum cost spanning tree (MST) of a given undirected graph using Kruskal's algorithm/Prim's Algorithms.
6. Write a Program to implement N-Queens problem using back tracking.
7. Write a Program to check whether a given graph is connected or not using DFS method.
8. Write a program to implement the Travelling Salesman Problem (TSP).

Note: At least 5 to 10 more exercises to be given by the teacher concerned.

Course Outcomes:

- The course will help in improving the programming skills of the students.
- The design of algorithms for any problem will inculcate structured thinking process in the students and improve the analytical power.

PROGRAMMING IN JAVA LAB

Course code	LC-CSE-327G				
Category	Professional Core Course				
Course title	Java Programming Lab				
	L	T	P	Credits	Semester 5
Scheme and Credits	0	0	3	1.5	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

List of Experiments:

1. Create a java program to implement stack and queue concept.

2. Write a java package to show dynamic polymorphism and interfaces.

3. Write a java program to show multithreaded producer and consumer application.

4. Create a customized exception and also make use of all the5 exception keywords.

5. Convert the content of a given file into the upper case content of the same file.

6. Develop an analog clock using applet.

7. Develop a scientific calculator using swings.

8. Create an editor like MS-word using swings.

9. Create a servlet that uses Cookies to store the number of times a user has visited your servlet.

10. Create a simple java bean having bound and constrained properties.

PRACTICAL TRAINING 1

Course code	PT-CSE-329G				
Category	Professional Core Course				
Course title	PRACTICAL TRAINING 1				
Scheme and Credits	L	T	P	Credits	Semester 5
	0	0	0		
Classwork	-				
Exam	-				
Total	-				
Duration of Exam	-				

The evaluation of Practical Training-I will be based on seminar, viva-voce, report submitted by the students. According to performance, the students are awarded grades A, B, C, F. A student who is awarded 'F' grade is required to repeat Practical Training.

Excellent: A; Good   : B; Satisfactory: C; Not Satisfactory: F.

SOFTWARE ENGINEERING

Course code	PEC CSE-311G				
Category	Professional Elective Course				
Course title	Software Engineering				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

- Be successful professionals in the field with solid fundamental knowledge of software engineering
- Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

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: The process, software products, emergence of software engineering, evolving role of software, software life cycle models, Software Characteristics, Applications, Software crisis.
Software project management: Project management concepts, software process and project metrics Project planning, project size estimation metrics, project estimation Techniques, empirical estimation techniques, COCOMO- A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking

Unit: 2
Requirements Analysis and specification requirements engineering, system modeling and simulation Analysis principles modeling, partitioning Software, prototyping: , Prototyping methods and tools; Specification principles, Representation, the software requirements specification and reviews Analysis Modeling: Data Modeling, Functional modeling and information flow: Data flow diagrams, Behavioral Modeling; The mechanics of structured analysis: Creating entity/ relationship diagram, data flow model, control flow model, the control and process specification; The data dictionary; Other classical analysis methods.
System Design: Design concepts and principles: the design process: Design and software quality, design principles; Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, software procedure, information hiding; Effective modular design: Functional independence, Cohesion, Coupling;

Unit: 3
Architectural Design: Software architecture, Data Design: Data modeling, data structures, databases and the data warehouse, Analyzing alternative Architectural Designs, architectural complexity; Mapping requirements into a software architecture; Transform flow, Transaction flow; Transform mapping: Refining the architectural design.
Testing and maintenance: Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, white box testing, basis path testing: Control structure testing: Black box testing, testing for specialized environments, architectures and applications. Software Testing Strategies: Verification and validation, Unit testing, Integration testing, Validation testing, alpha and beta testing; System testing: Recovery testing, security testing, stress testing, performance testing; The art of debugging, the debugging process debugging approaches. Software re-engineering, reverse engineering, restructuring, forward engineering.

Unit: 4
Software Reliability and Quality Assurance :Quality concepts, Software quality assurance , SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and record keeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability ,The ISO 9000 Quality standards: The ISO approach to quality assurance systems, The ISO 9001 standard, Software Configuration Management. Computer Aided software Engineering: CASE, building blocks, integrated case environments and architecture, repository.

Suggested books:

- Software Engineering – A Practitioner's Approach, Roger S. Pressman, 1996, MGH.

Suggested reference books

- Fundamentals of software Engineering, Rajib Mall, PHI Software Engineering by Nasib Singh Gill, Khanna Book Publishing Co (p) Ltd
- Software Engineering by Ian Somerville, Pearson Edu, 5 edition, 1999, AW,
- Software Engineering – David Gustafson, 2002, T.M.H
- Software Engineering Fundamentals Oxford University, Ali Behforooz and Frederick J. Hudson 1995 JW&S,
- An Integrated Approach to software engineering by Pankaj jalote , 1991 Narosa,

Course Outcomes

1. How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
2. An ability to work in one or more significant application domains
3. Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
4. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
5. Demonstrate an ability to use the techniques and tools necessary for engineering practice

SYSTEM PROGAMMING AND SYSTEM ADMINISTRATION

Course code	PEC CSE-313G				
Category	Professional Elective Course				
Course title	System Programming and System Administration				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course
   1. Evolution of the components of system programming.
2. To learn working and different stages of compilation process.
   3. To learn basic of assembler and loading schemes.
   4. To learn basics of file structure.
   5. To know about filters and pipeline.
    6. To learn shell programming

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
Evolution of Components Systems Programming, Assemblers, Loaders, Linkers, Macros, Compilers. software tools, Text editors, Interpreters and program generators, Debug Monitors, Programming environment.
Compiler: Brief overview of compilation process, Incremental compiler, Assembler: Problem statement, symbol table; Loader schemes, compile and go Loader, general loader schemes, absolute loader, Reallocating loader, Direct linkage Loader, Binders, overlays.

Unit: 2
Theoretical Concept of Unix Operating System: Basic features of operating system; File structure: CPU scheduling; Memory management: swapping, demand paging; file system: block and fragments, inodes, directory structure; User to user communication

Unit: 3
Getting Started with Unix: User names and groups, logging in; Format of Unix commands; Changing your password; Characters with special meaning; Unix documentation; Files and directories; Current directory, looking at the directory contents, absolute and relative pathnames, some Unix directories and files; Looking at the file contents; File permissions; basic operation on files; changing permission modes; Standard files, standard output; Standard input, standard error; filters and pipelines; Processes; finding out about processes; Stopping background process; Unix editor vi.

Unit-4

Shell Programming: Programming in the Borne and C-Shell; Wild cards; Simple shell programs; Shell variables; interactive shell scripts; Advanced features.

System Administration: Definition of system administration; Booting the system; Maintaining user accounts; File systems and special files; Backups and restoration; Role and functions of a system manager. Overview of the Linux operating system

Suggested books:
1. Systems Programming by Donovan, TMH.
2. The unix programming environment by Brain Kernighen& Rob Pike, 1984, PHI & Rob Pike.
3. Design of the Unix operating system by Maurich Bach, 1986, PHI.
4. Introduction to UNIX and LINUX by John Muster, 2003, TMH.

Suggested reference books

1. Advanced Unix programmer's Guide by Stephen Prato, BPB
2. Unix- Concept and applications by Sumitabha Das, 2002, T.M..H

Course Outcomes
1. To understand various file statistics.
2. To work on wildcards.
3. To know about shell programming and AWK utility.

Digital Image Processing

Course Code	PEC-CSE-315G				
Category	Professional Elective Course				
Course title	Digital Image Processing				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

- To become familiar with digital image fundamentals

- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.

- To learn concepts of degradation function and restoration techniques.

- To study the image segmentation and representation techniques.

- To become familiar with image compression and recognition method

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 to Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation.
Unit: 2
Image Transformation & Filtering: Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms.
Image Restoration: Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering
Unit: 3
Image Compression: Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression.
Unit-4

Image Segmentation & Representation: Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors.

Suggested books:
1. Rafael C. Gonzalez, Richard E. Woods,Digital Image Processing Pearson, Third Edition,2010.
2. Anil K. Jain,Fundamentals of Digital Image Processing Pearson, 2002.

Suggested reference books

1. Kenneth R. Castleman, Digital Image Processing Pearson, 2006.

2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB Pearson Education, Inc., 2011.

3. D,E. Dudgeon and RM. Mersereau, Multidimensional Digital Signal Processing Prentice Hall Professional Technical Reference, 1990.

4. William K. Pratt, Digital Image Processing John Wiley, New York, 2002

5. Milan Sonka et al Image processing, analysis and machine vision Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

Course Outcomes

1. Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.

2. Operate on images using the techniques of smoothing, sharpening and enhancement.

3. Understand the restoration concepts and filtering techniques.

4. Learn the basics of segmentation, features extraction, compression and recognition methods for colour models

Course code	PCC-CSE-302G				
Category	Professional Core Course				
Course title	Compiler Design				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

1. To understand and list the different stages in the process of compilation.
2. Identify different methods of lexical analysis.
3. Design top-down and bottom-up parsers.
4. Identify synthesized and inherited attributes.
5. Develop syntax directed translation schemes.

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 to Compilers: Language Processors, The Structure of compiler: its different phases, Compiler Construction Tools, Applications of Compiler Technology.
Lexical Analysis: Role of lexical analyzer, Input Buffering, Specification and recognition of tokens, design of lexical analyzer, regular expressions, A language specifying lexical analyzer, Finite automata, conversion from regular expression to finite automata, and vice versa, minimizing number of states of DFA, Implementation of lexical analyzer.

UNIT 2

Syntax Analysis: Role of parsers, context free grammars.
Parsing Technique: Shift-reduce parsing, Operator precedence parsing, Top down parsing, Predictive parsing.

UNIT 3

LR parsers, SLR, LALR and Canonical LR parser.
Syntax Directed Translations: Syntax directed definitions, construction of syntax trees, syntax directed translation scheme, implementation of syntax directed translation, Intermediate-Code Generation: three address code, quadruples and triples.

UNIT 4

Symbol Table & Error Detection and Recovery: Symbol tables: its contents and data structure for symbol tables; trees, arrays, linked lists, hash tables. Errors, lexical phase error, syntactic phase error, Semantic error.

Code Optimization & Code Generation: Code generation, forms of objects code, machine dependent code, optimization, register allocation for temporary and user defined variables.

Suggested Text Books:

1. Compilers Principle, Techniques & Tools - Alfread V. AHO, Ravi Sethi & J.D. Ullman; 1998 Addison Wesley.

Suggested Reference Books:

1. Theory and practice of compiler writing, Tremblay & Sorenson, 1985, Mc. Graw Hill.
2. System software by Dhamdere, 1986, MGH.
3. Principles of compiler Design, Narosa Publication
4. Elements compiler Design, Dr. M. Joseph, University Science Press

Course Outcomes:

1. To develop the lexical analyser for a given grammar specification.
2. For a given parser specification design top-down and bottom-up parsers.
3. To Develop syntax directed translation schemes.

ARTIFICIAL INTELLIGENCE

Course code	PCC-CSE-304G				
Category	Professional Core Course				
Course title	Artificial Intelligence				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- To provide historical perspective of AI and its foundation.
- To provide the most fundamental knowledge to the students so that they become familiar with basic principles of AI towards problem solving, inference, knowledge representation and learning.
- Explore application of AI techniques in Expert systems, Neural Networks.
- Explore the current trends, potential, limitations, and implications of AI.

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: Definition of AI, History of AI, nature of AI problems, examples of AI problems. **Problem solving by search**: *Uninformed Search*: Depth First Search (DFS), Breadth First Search (BFS). *Informed Search*: Best First Search, A*. *Local Search*: Hill Climbing. *Problem Reduction Search*: AO*. *Population Based Search*: Ant Colony Optimization, Genetic Algorithm. *Game Playing:* Min Max Algorithm, Alpha-Beta Pruning.

UNIT 2

Knowledge Representation: Types of Knowledge, Knowledge Representation Techniques/schemes: Propositional Logic, Predicate Logic, Semantic nets, Frames. Knowledge representation issues. Rule based systems.

UNIT 3

Reasoning under Uncertainty: Basics of Probability Theory, Probabilistic Reasoning, Bayesian Reasoning, Dempster-Shafer Theory.
Planning: Introduction to Planning, Representation of Planning, Partial-order Planning.

UNIT 4

Learning: Introduction to Learning, Types of Learning: Learning by Induction, Rote Learning, Symbol Based Learning, Identification Trees, Explanation Based Learning, Transformational Analogy, Introduction to Neural Networks, Expert Systems, Current trends in Artificial Intelligence

Suggested Test books:

1. Artificial Intelligence: A Modern Approach Third Edition Stuart Russell and Peter Norvig, 2010, Pearson Education.

Suggested reference books:

1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd ed.,2009.
2. Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI.,2010.
3. Artificial intelligence, Patrick Henry Winston, 1992, Addition Wesley 3 Ed.

Course Outcomes:

1. Display the understanding of the historical perspective of AI and its foundation.
2. Apply basic principles of AI in solutions that require problem solving, inference, knowledge representation and learning.
3. Demonstrate fundamental understanding of various application of AI techniques in Expert systems, Neural Networks.
4. Demonstrate an ability to share in discussion of AI, it's the current trends, limitations, and implications of AI.

ADVANCED JAVA

Course code	PCC-CSE-306G				
Category	Professional Course Code				
Course title	Advanced Java				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

Objectives of the course:

1. Programming in the Java programming language,
2. Knowledge of object-oriented paradigm in the Java programming language,
3. The use of Java in a variety of technologies and on different platforms.

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

Servlet: Servlet introduction, web terminology, servlet API, servlet Interface, generic servlet, Http servlet, servlet lifecycle, servlet with IDE (eclipse, My eclipse, Net beans), servlet request, servlet collaboration, servlet configuration, context, attribute in servlet, session technique in servlet, event and listener, servlet filter, CRUD, pagination, input output stream, annotation, single thread model, SSI;

JSP: Lifecycle of JSP, JSPAPI, scripting elements, 9Implicit Objects, directive elements,

Exceptions, action elements, expression language, MVC in JSP, JSTL, custom tags, pagination, CRUD,JSTL function, formatting, XML, SQL tags,

UNIT 2

Struts: Introduction, features, models, components, struts2 architecture, action, configuration, interceptors, validation method, aware Interfaces, stuts2withI18N, zero configuration, struts2withtiles, hibernate with struts2, spring with struts2, UI tags;

Mail API: java mail introduction, methods of sending email, sending mail by Gmail, receiving email, sending attachment, receiving attachment, sending html, forwarding, deleting email;

UNIT3

Hibernate(HB): Introduction, architecture, HB with IDE, HB Log4j, inheritance mapping, HB mapping, transaction management, HB query language, HB criteria query language, named query, HB caching, integration, HB lifecycle;

Spring: Introduction, modules, spring with IDE, dependency injection methods, spring AOP, spring Jdbc template, spring ORM, SPEL, MVC tag library, applications, spring remoting, spring OXM, spring web, security models, spring boot, spring with angular;

UNIT 4

Android: Introduction, history & versions, architecture, building blocks, emulator, android widgets, activity and intents, android fragments, android menu, android service, SQLite, XML & JSON, android speech, multimedia, telephony, maps;

Design Pattern: java design pattern, creational, structural, behavioral, J2EE patterns, presentation layers,

Course Outcome:

1. Knowledge of the structure and model of the Java programming language, (knowledge)
2. Use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language,

Suggested Text Books:

1. Patrick Naught on and Herbertz Schidt, "Java-2 the complete Reference",TMH
2. Sierra & bates, "Head First Java", O'Reilly.

Suggested Reference Books:

1. E. Balaguruswamy, "Programming with Java",TMH
2. Horstmann, "Computing Conceptswith Java2 Essentials", John Wiley.
3. Decker & Hirsh field, "Programming.Java", Vikas Publication.

MOBILE AND WIRELESS COMMUNICATION

Course code	ESC-CSE-308G				
Category	Engineering Science Course				
Course title	Mobile and wireless communication				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- Understand the wireless/cellular radio concepts such as frequency reuse, handoff and interference between mobiles and base stations.
- Identify the techno-political aspects of wireless and mobile communications such as the allocation of the limited wireless spectrum by regulatory agencies.
- Understand the information theoretical aspects such as channel capacity, propagation effects, modeling the impact of signal bandwidth and motion in mobile systems.
- Describe the current and future Mobile Communication Systems, GSM, Satellite, Broadcasting, Bluetooth, Wireless LANs, Mobile Adhoc Networks.
- Describe the mobility support mechanism, WWW and WAPs.

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: Application, History, Market Scenario, Reference Model and Overview, Wireless Local Loop and Cellular system.

Wireless Transmission: Frequencies, Signals, Antennae, Signal Propagation, Multiplexing, Modulation, Spread Spectrum.

MAC Layer: Specialized MAC, SDMA, FDMA, TDMA – Fixed TDM, Classical ALOHA, Slotted, ALOHA, CSMA, DAMA, PKMA, Reservation TDMA. Collision Avoidance, Polling, Inhibit Sense Multiple Access, CDMA.

Broadcasting: Unidirectional Distribution Systems, Digital Audio Broadcasting, Digital Video Broadcasting, Convergence of Mobile and Broadcasting Techniques.

UNIT 2

GSM: Mobile Services, Architecture Radio, Interface, Protocol, Localization, Calling Handover, Security, New data services.

Wireless LAN: IEEE 802 11- System and Protocol Architecture, Physical Layer, MAC Layered Management.

Bluetooth: User scenarios, Physical layer, MAC Layer, Networking, Security and Link Management.

Wimax

UNIT 3

Mobile Network Layer: Mobile IP-Goals, Assumptions, Requirement, Entities, Terminology, IP Packet delivery, Agent Advertisement and Discovery, Registration, Tunneling, Encapsulation, Optimization, Reserve Tunneling, Security, IPv6 , DHCP.

Mobile Adhoc Networks: Routing, Destination Sequence Distance Vector, Dynamic Source Routing, Hierarchical algorithms, Performance Metrics.

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping, TCP, Mobile TCP, Fast-retransmission TCP, Transaction oriented TCP.

UNIT 4

Satellite Systems: History, Applications, GEO, LEO, MEO, Routing, Localization, Handover in Satellite System.

Support for Mobility: File System, WWW, HTML, System Architecture.

WAP: Architecture, Wireless Datagram, Protocol, Wireless Transport Layer Security, Wireless Transaction Protocol, Application Environment, Telephony Applications.

Suggested Reference Books:

1. Jochen Schiller, "MobileCommunication", Pearson Education, 2002
2. LEE, "Mobile Cellular Telecommunications", McGRAW-Hill, 2nd Edition.
3. Theodore S Rappaport, "Wireless Communications", Pearson Education.

Course Outcomes:

- Explain the principles and theories of mobile computing technologies.
- Describe infrastructures and technologies of mobile computing technologies.
- List applications in different domains that mobile computing offers to the public, employees, and businesses.
- Describe the possible future of mobile computing technologies and applications.
- Effectively communicate course work through written and oral presentations

PROJECT - I

Course code	PROJ-CSE-322G				
Category	Professional Core Course				
Course title	PROJECT- I				
Scheme and Credits	L	T	P	Credits	Semester 6
	0	0	4	2	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Students will be assigned projects individually or in a group of not more than 3 students depending on the efforts required for completion of project.

The project will have 4 stages :
(*Marks for internal evaluation are given in brackets)

- Synopsis submission (5 marks),
- 1stmid term progress evaluation (5 marks)
- 2nd mid term progress evaluation (5 marks)
- Final submission evaluation (10 marks).

    The external examiner will evaluate the project on the basis of idea/quality of project, implementation of the project, project report and viva.

COMPILERDESIGN LAB

Course code	LC-CSE-324G	
Category	Professional Core Course	
Course title	Compiler Design Lab	
Scheme and Credits	L T P Credits	Semester 6
	0 0 3 1.5	
Class work	25 Marks	
Exam	25 Marks	
Total	50 Marks	
Duration of Exam	03 Hours	

Objectives of the course:
- Implementation of different concepts of lexical analysis.
- Implementation of parsers.
- Study and use of compiler design tools.

List of programs:

1. Write a Program for Token separation with a given expression.
2. Write a Program for Token separation with a given file.
3. Write a Program for Lexical analysis using LEX tools.
4. Write a Program to identify whether a given line is a comment or not.
5. Write a Program to check whether a given identifier is valid or not.
6. Write a Program to recognize strings under 'a', 'a*b+', 'abb'.
7. Write a Program to simulate lexical analyser for validating operators.
8. Write a Program for implementation of Operator Precedence Parser.
9. Study of LEX and YACC tools:
    i)   Write a Program for implementation of calculator using YACC tool.
    ii)   Write a Program for implementation of Recursive Descent Parser using LEX tool.
10. Write a Program for implementation of LL (1) Parser.
11. Write a Program for implementation of LALR Parser

Note: At least 5 to 10 more exercises to be given by the teacher concerned.

Course Outcomes:

- The course will help in improving the programming skills of the students.
- The implementation of different parsers will help in understanding of compiler designing.

ARTIFICIAL INTELLIGENCE LAB USING PYTHON

Course code	LC-CSE-326G				
Category	Professional Core Course				
Course title	Artificial Intelligence Lab Using Python				
Scheme and Credits	L	T	P	Credits	Semester 6
	0	0	3	1.5	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Program:

1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python.
3. Write a Program to Implement Tic-Tac-Toe game using Python.
4. Write a Program to Implement 8-Puzzle problem using Python.
5. Write a Program to Implement Water-Jug problem using Python.
6. Write a Program to Implement Travelling Salesman Problem using Python.
7. Write a Program to Implement Tower of Hanoi using Python.
8. Write a Program to Implement Monkey Banana Problem using Python.
9. Write a Program to Implement Missionaries-Cannibals Problems using Python.
10. Write a Program to Implement 8-Queens Problem using Python.

Note: At least 5 to 10 more exercises to be given by the teacher concerned.

ADVANCED JAVA LAB

Course code	LC-CSE-328G				
Category	Professional Core Course				
Course title	Advanced Java Lab				
Scheme and Credits	L	T	P	Credits	Semester 6
	0	0	2	1	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Students have to write at list 15 programs based on the course PCC-CSE-306G

Course code	MC-317G			
Category	Mandatory Course			
Course title	**Constitution of India**			
Scheme and credits	L	T	P	Credits
	2	0	0	0

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Unit – I

Philosophy of Indian Constitution: Salient features of Indian Constitution, Preamble, and Nature of Indian Constitution, Procedure for amendment of the Constitution.

Unit – II

Federal structure and distribution of legislative and financial powers between the Union and the States

Unit – III

Organs of Governance: President – Qualification and Powers of the President, Governor- Qualification and Powers of Governor, Parliament: Composition, Qualifications and Disqualifications, Judiciary: Appointment, Tenure and Removal of Judges.

Unit – IV

Fundamental Rights: Origin and development of Fundamental rights, Need for fundamental rights. Introduction to Right to equality , Right to freedom, Right against exploitation, Right to freedom of religion, Cultural and Education rights and Fundamental duties.

References:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S.N. Busi, Dr. B.R. Ambedkar framing of Indian Constitution, latest Edition
3. M.P. Jain, Indian Constitution Law, Lexis Nexis, latest edition
4. D.D. Basu, Introduction to Constitution of India, Lexis Nexis, latest edition.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

The examination of the regular students will be conducted by the concerned college/Institute internally. Each student will be required to score minimum 40% marks to qualify in the paper. The marks 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.

ADVANCED DATABASE MANAGEMENT SYSTEM

Course code	PEC-CSE-310G				
Category	Professional Elective Course				
Course title	Advanced Database Management System				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objective of the course:

- To understand DBMS Components, Advantages and Disadvantages.
- Understanding Data modeling: ER, EER, Network, Hierarchical and Relational data models.
- Understanding normalization, general strategies for query processing, query processor, syntax analyzer, Query decomposition, Heuristic Query optimization.
- To understand transaction concept, schedules, serializability, locking and concurrency control protocols.

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: Architecture, Advantages, Disadvantages, Data models, relational algebra, SQL, Normal forms.

Query Processing: General strategies for query processing, transformations, expected size, statistics in estimation, query improvement. Query evaluation, view processing, query processor.

UNIT 2

Recovery: Reliability, Transactions, recovery in centralized DBMS, reflecting updates, Buffer management logging schemes, disaster recovery.

Concurrency: Introduction, Serializability, Concurrency control, Locking schemes, Timestamp based ordering, Optimistic, Scheduling, Multiversion techniques, Deadlocks.

UNIT 3

Parallel and Distributed Databases: Distributed Data Storage – Fragmentation & Replication, Location and Fragment.
Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

UNIT 4

Objected Oriented and Object Relational Databases: Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Suggested Text Book:

1. Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education,2007
2. Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
3. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

Suggested References Books:

1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
4. W. Kim, "Modern Database Systems", 1995, ACM Press, Addision Wesley,

Course Outcomes:

- Students will get understanding of DBMS Components, Its advantages and disadvantages.
- Understanding about various types of Data modeling: ER, EER, Network, Hierarchical and Relational data models.
- Understanding normalization, general strategies for query processing, query processor, syntax analyzer, Query decomposition, Heuristic Query optimization.
- Understanding transaction concept, schedules, serializability, locking and concurrency control protocols.

Course code	PEC-CSE-312G				
Category	Professional Elective Course				
Course title	Mobile applications development				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- Introduce the students with the various "Next Generation Technologies" in the area of mobile computing
- Assist students understand the various Mobile operating Systems
- Explore the findings using Android Technologies

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: Mobile operating system, Operating system structure, Constraints and Restrictions, Hardware configuration with mobile operating system, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features

UNIT 2

Introduction to Mobile development IDE's, Introduction to Worklight basics, Optimization, pages and fragments , Writing a basic program- in Worklight Studio, Client technologies, Client side debugging, Creating adapters, Invoking adapters from Worklight Client application, Common Controls, Using Java in adapters, Programming exercise with Skins, Understanding Apache Cordova.

UNIT 3
Understanding Apple iOS development, Android development, Shell Development, Creating Java ME application, Exploring the Worklight Server, Working with UI frameworks, Authentication, Push notification, SMS Notifications, Globalization.

UNIT 4

Android: Introduction to Android, Architecture, memory management, communication protocols, application development methods, deployment.

iOS: Introduction to iOS, Architecture, memory management, communication protocols, application development methods, deployment

Suggested text books:

1. Anubhav Pradhan, Anil V Deshpande, " Mobile Apps Development" Edition:
2. Jeff McWherter, Scott Gowell "Professional Mobile Application Development", John Wiley & Sons, 2012.
3. Barry Burd, "Android Application Development All in one for Dummies", Edition: I
4. Teach Yourself Android Application Development In 24 Hours, Edition: I, Publication: SAMS

Suggested reference books:

1. Neal Goldstein, Tony Bove, "iPhone Application Development All-In-One For Dummies", John Wiley & Sons
2. Henry Lee, Eugene Chuvyrov, "Beginning Windows Phone App Development", Apress, 2012.
3. Jochen Schiller,"Mobile Communications", Addison-Wesley, 2nd edition, 2004.
4. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.

Course Outcomes:

- Explain the principles and theories of mobile computing technologies.
- Describe infrastructures and technologies of mobile computing technologies.
- List applications in different domains that mobile computing offers to the public, employees, and businesses.
- Describe the possible future of mobile computing technologies and applications.
- Effectively communicate course work through written and oral presentations

COMPUTER GRAPHICS

Course code	PEC-CSE-314G				
Category	Professional Elective Course				
Course title	Computer Graphics				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- To have basic understanding of the core concepts of Computer Graphics.
- Understand scan conversion, 2D, 3D – transformation and viewing.
- To be able to create interactive computer Graphics with understanding of shading, image processing and illumination model.

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 to Computer Graphics: What is Computer Graphics, Computer Graphics Applications, Computer Graphics Hardware and software; Two dimensional Graphics Primitives: Points and Lines, Scan Conversion: Point, Line, Circle; Region Filling: Scanline algorithm, Polygon filling algorithm, boundary filled algorithm.

UNIT 2

Two dimensional transformations: Geometric, Coordinate and, composite transformation. **Two Dimensional Viewing:** window to view port mapping; Clipping: point, line, polygon, curve and text clipping

UNIT 3

Three-dimensional transformations: Three dimensional graphics concept, Geometric and Coordinate transformations, **Viewing in 3D:** Projection, Taxonomy of projection, **Hidden surface removal:** Introduction to hidden surface removal, The Z- buffer algorithm, The painter's algorithm, Scanline algorithm, Sub-division algorithm.

UNIT 4

Representing Curves and Surfaces: Parametric representation of curves: Bezier curves, B-Spline curves. Parametric representation of surfaces; Interpolation method.
Illumination, shading, image manipulation: Illumination models, shading models for polygons, shadows, transparency, image processing.

Suggested Text Books:

1. Computer Graphics Principles and Practices second edition by James D. Foley, Andeies van Dam, Stevan K. Feiner and Johb F. Hughes, 2000, Addision Wesley.
2. Computer Graphics by Donald Hearn and M.Pauline Baker, 2 Edition, 1999, PHI
3. Computer Graphics by Z. Xiang, R. Plastock, 2nd Edition, TMH Education.

Suggested Reference Books:

1. Procedural Elements for Computer Graphics – David F. Rogers, 2001, T.M.H Second Edition
2. Fundamentals of 3-Dimensional Computer Graphics by Alan Watt, 1999, Addision Wesley.
3. Computer Graphics: Secrets and Solutions by Corrign John, BPB
4. Graphics, GUI, Games & Multimedia Projects in C by Pilania & Mahendra, Standard Publ.
5. Computer Graphics Secrets and solutions by Corrign John, 1994, BPV
6 Introduction to Computer Graphics by N. Krishanmurthy T.M.H 2002

Course Outcomes:

- Understanding of the software, hardware and applications of Computer Graphics.
- Understanding of Scan conversion, 2D, 3D – transformation and viewing.
- To be able to implement picture on screen using projection, shading, image processing and illumination model.

COMMUNICATION ENGINEERING

Course code	PEC-CSE-330G (Common with ECE)			
Category	Program Elective Course			
Course title	Communication Engineering			
Scheme and Credits	L	T	P	Credits
	3	0	0	3
Class work	25 Marks			
Exam	75 Marks			
Total	100 Marks			
Duration of Exam	03 Hours			

Course Objective:

1. The course will give students about depth knowledge of the communication system.
2. To introduce students to random process and fundamental theorems
3. To make awareness of information theory and coding 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.

Unit:1
SPECTRAL ANALYSIS:
Fourier series, Fourier transforms, Convolution Theorem, Correlation, Cross-Correlation and autocorrelation.

Unit: 2
INFORMATION THEORY:
Introduction to information and entropy, channel capacity for discrete and continuous channels, Shannon's Theorem, Shannon-Hartley Theorem, Noisy channels, coding theory : Shannon-Fano coding, minimum redundance coding, maximization of entropy of a continuous message transmission rate, effect of medium on the information, selection of channels ,effect of noise and its minimization.

Unit:3
RANDOM SIGNAL THEORY:
Representation of random signals, concept of probability, probability of joint occurrence, conditional probability, discrete probability theory, continuous random variables, probability distribution function, probability density function, joint probability density functions.

Unit:4
RANDOM SIGNAL THEORY:
Statistical average and moments, Ergodic processes, correlation Function, power spectral density, central limit theory, response of linear system to random signals. Error function Covariance relation among the spectral densities of the two input-output random processes. Cross spectral densities, optimum filters. Introduction to Linear Block Code abd cyclic Codes

TEXT BOOK :
1. Principles of Communication Systems: Taub Schiling; TMH
REFERENCE BOOKS.
1. Communication Systems: Singh and Sapre ; TMH
2. Communication Systems: A Bruce Carlson; TMH

COURSE OUTCOMES: After the completion of the course the student will be able to:

- To Study and Derive equations for entropy mutual information and channel capacity for all types of channels.
- To acquire the knowledge about Fourier series and Fourier transform signal analysis tool.
- Design a digital communication system by selecting an appropriate error correcting codes for a particular application.
- To learn about Probabilityof Random signal theory and process.
- Formulate the basic equations of linear block codes and a cyclic code.
- Compare the performance of digital communication system by evaluating the probability of

error for different error correcting codes

DISTRIBUTED SYSTEM

Course code	PEC-CSE-316G				
Category	Professional Elective Course				
Course title	Distributed System				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:
- To examine the fundamental principles of distributed systems, and provide students hands-on experience in developing distributed protocols.
- Analyze the issues in distributed operating systems and to address these distributed systems issues in a broader sense. Emphasis will be placed on communication, process, naming, synchronization and fault tolerance.

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: Distributed Operating Systems Definition and goals, Hardware and Software concepts, Design issues.

Communication in Distributed System: Computer Network and Layered protocols, Message passing and related issues, synchronization, Client Server model & its implementation, remote procedure call and implementation issues, Case Studies: SUN RPC, DEC RPC

UNIT 2

Synchronization in Distributed System: Clock synchronization and related algorithms, mutual exclusion, Deadlock in distributed systems

Processes and processors in Distributed systems: Threads, system model, processor allocation, scheduling in distributed systems: Load balancing and sharing approach, fault tolerance, real time distributed systems, Process migration and related issues

UNIT 3

Distributed File systems: Introduction, features & goal of distributed file system, file models, file accessing models, file sharing semantics, file caching scheme, file replication, fault tolerance, trends in distributed file system, case study.

Distributed Shared Memory: Introduction, general architecture of DSM systems, design and implementation issues of DSM, granularity, structure of shared memory space, consistency models, replacement strategy, thrashing

UNIT 4

Security Issues: Introduction of Security in Distributed OS, Overview of security techniques, features, Need, Access Control, Security Management

Distributed Web-based Systems: Architecture, Processes, Communication, Naming, Synchronization

Case Studies: JAVA RMI, Sun Network File System, Google Case Study

Suggested Reference books:

1. Distributed Operating Systems by Andrew S Tannebaum, Pearson
2. Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, PHI
3. Distributed Systems: Concepts and Design by George Coulouris, Jean Dollimore, TimKindberg, Pearson
4. Distributed Computing by Sunita Mahajan & Seema Shah OXFORD
5. Distributed Systems: Principles and Paradigms by Andrew S Tanebaum, Maarten Van Steen, PHI
6. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, HagitAttiya and Jennifer Welch, Wiley India

Course Outcomes:

- List the principles of distributed systems and describe the problems and challenges associated with these principles.
- Understand Distributed Computing techniques, Synchronous and Processes.
- Apply Shared Data access and Files concepts.
- Design distributed system that fulfills requirements with regards to key distributed systems properties.
- Understand Distributed File Systems and Distributed Shared Memory.
- Apply Distributed web-based system and understand the importance of security in distributed system

INFORMATION TECHNOLOGY & INDUSTRY BUSINESS SKILLS

Course code	PEC-CSE-318G				
Category	Professional Core Course				
Course title	Information Technology & Industry Business Skills				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:
- To understand the novel information technology techniques and industry business skills.
- To study about the concept of amazon web services.
- To understand the use of cloud in web services and their different application.
- To study business models used in industry and their implementation.

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
Web Services: History and Introduction to cloud computing, Introduction to AWS, Instances creation methods in AWS, Scalable Computing in AWS, Storage in AWS, Persistence in AWS, Routing from AWS, Delivering strategies with AWS, Messaging management inside AWS, Communicating technique with AWS, AWS Free Tier, Identity Access Management, Security Assertion Markup language, Simple Storage Service, introduction to Google APP Engine, Azure computing method, service models, deployments models of cloud computing, difference between AWS, AZURE, Google Cloud;

Unit: 2
Cloud: Amazon Elastic Compute Cloud, Elastic Block Store, Security Group management, Amazon Machine Images, Storing data in the cloud, storing your objects: S3 and Glacier, ELB and SQS, auto-scaling and Cloud Watch, Cloud Formation, Elastic Beanstalk, and Ops Works, RDS, fault-tolerance, scaling, AZURE architecture and services, Google cloud applications;

Unit: 3
Business: Business models, Building blocks of Sales force, Understand the Security model, Understand the Data model, Configure and manage Sales and Service Cloud, Learn about Sales force Objects, create, rename or modify objects, validation rules, Create different field types and validation rules, Sales Cloud and Service Cloud modules, reports and dashboard, Sales force A Chatter, and Social features, chatter, application lifecycle, visual workflow;

Unit: 4

Security & Applications: security group, NACL, difference between security group and NACL, AWS-Data pipeline, Simple queue services, Simple workflow services, Simple notification Services, Elastic Transcoder.

Suggested reference books:

1. Amazon Web Services in Action by Michael Wittig and Andreas Wittig, Manning Publications;
2. AWS Certified Solutions Architect by Joe Baron, Hisham Baz, Tim Bixler, Biff Gaut, Kevin E. Kelly, Wiley publication;

Course Outcomes:

- Student will understand the concept of web services of amazon, virtual machines and their working.
- For a given region the availability of resources and cost management.
- For a given application scalable model and selection of services.

DATA SCIENCE

Course code	PCC-CSE-320G				
Category	Professional Core Course				
Course title	Data Science				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- The objective of this course is to impart necessary knowledge of the basic foundations needed for understanding data science domain and develop programming skills required to build data science applications.
- To introduce the conceptual knowledge of the area of data science domain, feature and scope of applications.
- To impart programming knowledge needed for data sciences.
- To understand the different issues involved in the design and implementation of a data science applications.
- To understand case studies of essential Data sciences 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.

UNIT 1

Introduction to Data Science: Concept of Data Science, Traits of Big data, Web Scraping, Analysis vs Reporting, Collection, storing, processing, describing and modelling, statistical modelling and algorithm modelling, AI and data science, Myths of Data science

UNIT 2

Introduction to Programming Tools for Data Science: Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK, Visualizing Data: Bar Charts, Line Charts, Scatterplots, Working with data: Reading Files, Scraping the Web,

UNIT 3

Data Science Methodology: Business Understanding, Analytic Approach, Data Requirements, Data Collection, Data Understanding, data Preparation, Modeling, Evaluation, Deployment, feedback

UNIT 4

Data Science Application: Prediction and elections, Recommendations and business analytics, clustering and text analytics

Suggested Text books:

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
2. AurélienGéron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media
3. Jain V.K., "Data Sciences", Khanna Publishing House, Delhi.
4. Jain V.K., "Big Data and Hadoop", Khanna Publishing House, Delhi.

Suggested Reference books:
1. Data Science Workflow: Overview and Challenges by Philip Guo
2. Python for Data Analysis, O'Reilly Media Rajiv, "Machine Learning", Khanna Publishing House, Delhi.
3. Ian Goodfellow, YoshuaBengio and Aaron Courville, "Deep Learning", MIT Press
4. http://www.deeplearningbook.org
5. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan
6. Kaufmann Publishers

Course Outcomes:

- Understand the value of data science and the process behind using it.
- Use Python to gather, store, clean, analyse, and visualise data-sets.
- Apply toolkits to formulate and test data hypotheses and uncover relationships within data-sets
- Understand the data science methodology in the data science pipeline
- Understand real-world challenges with several case studies

Course code	PEC-CSE-332G (common with ECE)	
Category	Program Elective Course	
Course title	VHDL and Digital Design	
Scheme and Credits	L	T	P	Credits
	3	0	0	3
Class work	25 Marks	
Exam	75 Marks	
Total	100 Marks	
Duration of Exam	03 Hours	

Course Objective:

- To understand the modelling & simulation & its role in digital evaluation.
- To learn basic concepts of VHDL language, its different architecture, designing of various Combinational & sequential circuits.
- To study various PLDs & detail study of FPGAs and implementation of various combinational & sequential logic circuits on FPGAs.

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: Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL data objects, classes and data types, Operators, Overloading, logical operators. Types of delays, Entity and Architecture declaration. Introduction to behavioural dataflow and structural models.

UNIT- 2
VHDL STATEMENTS: Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements. Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

UNIT -3

COMBINATIONAL & SEQUENTIAL CIRCUIT DESIGN:VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders , code converters, comparators, implementation of Boolean functions etc. VHDL Models and Simulation of Sequential Circuits Shift Registers, Counters etc.

UNIT-4

DESIGN OF MICROCOMPUTER & PROGRAMMABLE DEVICE: Basic components of a computer, specifications, architecture of a simple microcomputer system, and implementation of a simple microcomputer system using VHDL Programmable logic devices: ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using CPLDs and FPGAs

REFERENCE BOOKS:
1. Ashenden - Digital design,Elsevier
2. IEEE Standard VHDL Language Reference Manual (1993).
3. Digital Design and Modelling with VHDL and Synthesis: KC Chang; IEEE Computer Society Press.
4. "A VHDL Primmer" : Bhasker; Prentice Hall 1995.
5. "Digital System Design using VHDL" : Charles. H.Roth ; PWS (1998).
6. "VHDL-Analysis & Modelling of Digital Systems" :Navabi Z; McGraw Hill.
7. VHDL-IV Edition: Perry; TMH (2002)
8. "Introduction to Digital Systems" :Ercegovac. Lang & Moreno; John Wiley (1999).
9. Fundamentals of Digital Logic with VHDL Design : Brown and Vranesic; TMH (2000)
10. Modern Digital Electronics- III Edition: R.P Jain; TMH (2003).
11. Grout - Digital system Design using FPGA & CPLD 'S,Elsevier

Course Outcome: After the completion of the course the student will be able to:

- Understand the need & application of hardware description language.
- Modelling & simulations of various basic & advanced digital systems using VHDL.
- Implementation of various basic & advanced digital systems using FPGAs.
- Apply knowledge to design & implement combinational circuits & sequential circuits related to research & industry applications.

M.D. UNIVERSITY, ROHTAK
SCHEME OF STUDIES AND EXAMINATION
B. TECH (Computer Science and Engineering)
SEMESTER 7th & 8th
'G' Scheme effective from 2021-22

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

General Notes:

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

2. Students will be permitted to opt for any elective course run by the department. However, the department shall offer those electives for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. To run the elective course a minimum of 1/3rd students of the class should opt for it.

B.Tech (COMPUTER SCIENCE & ENGINEERING)
Scheme of Studies/Examination
Semester 7th
w.e.f. 2021-2022

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Internal Assesment	Theory	Practical	Total	
1	Professional Core Course	PCC-CSE-401G	Neural Networks	3	0	0	3	3	25	75		100	3
2	Professional Elective Course	Refer to Annexure IV	Professional Elective –IV	3	0	0	3	3	25	75		100	3
3	Professional Elective Course	Refer to Annexure V	Professional Elective –V	3	0	0	3	3	25	75		100	3
4	Open Elective Course	Refer to Annexure OEC-I	Open Elective –I	3	0	0	3	3	25	75		100	3
5	Professional Core Course	LC-CSE-421G	Neural Networks Lab	0	0	2	2	1	25	-	25	50	3
6	Project	PROJ-CSE-423G	Project-II	0	0	6	6	3	50	-	50	100	3
7	Professional Core Course	PT-CSE-425G	Practical Training-II	0	0	0	1	-	-	-	-	-	-
		TOTAL CREDIT						16	175	300	75	550	

NOTE:

1. Practical Training II: The evaluation of Practical Training-II will be based on seminar, viva-voce, report submitted by the students. According to performance, the students will be awarded grades A, B, C, F. A student who is awarded 'F' grade is required to repeat Practical

Training.

2. Choose one subject from each Professional Elective –IV, Professional Elective –V and Open Elective – I. List of elective subjects is attached as annexures.

Annexure IV: Professional Elective -IV

1. PEC-CSE-403G: Software Project Management

2. PEC-CSE-405G: Web Mining

3. PEC-CSE-407G: Predictive Analysis

4. PEC-CSE-409G: Information Hiding Techniques

Annexure V: Professional Elective -V

1. PEC-CSE-411G: Network Security and cryptography

2. PEC-CSE-413G: Software Testing

3. PEC-CSE-415G: Cyber Security Threats

4. PEC-CSE-417G: Advanced Computer Architecture

Annexure OEC-I: Open Elective-I

1. OEC-PHY-101G: Material Science

2. OEC-ECE-451-G: Electronic Principles

3. HSMC-08G: Fundamentals of Management

4. OEC-CE-451-G: Disaster Management

5. HSMC-10G: English for Professionals

B.Tech (COMPUTER SCIENCE & ENGINEERING)
Scheme of Studies/Examination
Semester 8th
w.e.f. 2021-2022

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Internal Assesment	Theory	Practical	Total	
1	Professional Core Course	PCC-CSE-402G	Machine Learning	3	0	0	3	3	25	75		100	3
2	Professional Core Course	PCC-CSE-404G	Big Data Analytics	3	0	0	3	3	25	75		100	3
3	Open Elective Course	Refer to Annexure OEC-III	Open Elective-II	3	0	0	3	3	25	75		100	3
4	Professional Core Course	LC-CSE-410G	Big Data Analytics Lab	0	0	0	2	1	25		25	50	3
5	Professional Core Course	LC-CSE-412G	Machine Learning with Python Lab	0	0	2	2	1	25		25	50	3
6	Project	PROJ-CSE-422G	Project-III	0	0	8	4	4	50		50	100	3
		TOTAL CREDIT						15	175	225	100	500	

NOTE:

Choose one subject from open Elective – II. List of elective subjects is attached as annexure.

Annexure OEC-II: Open Elective-II

1. PEC-ME-410G: Quality Engineering

2. OEC-ECE-430G: Wireless Adhoc and Sensor Networks

3. OEC-ECE-452-G: Intelligent Instrumentation for Engineers

4. OEC-CE- 448G: Traffic Engineering and Road Safety

5. OEC-EE-08G: Conventional and Renewable Energy Resources

NEURAL NETWORK

Course code	PCC-CSE-401G				
Category	Professional Core Course				
Course title	Neural Networks				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:
1. To understand the different issues involved in the design and implementation of a Neural Networks.
2. To study the basic of neural network and its activation functions.
3. To understand and use of perceptron and its application in real world
4. To develop an understanding of essential NN concepts such as: learning, feed forward and feed backward
5. To design and build a simple NN model to solve a problem

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

Overview of biological neurons: Structure of biological neuron, neurobiological analogy, Biological neuron equivalencies to artificial neuron model, Evolution of neural network.

Activation Functions: Threshold functions, Signum function, Sigmoid function, Tan-hyperbolic function, Stochastic function, Ramp function, , Linear function, Identity function.

ANN Architecture: Feed forward network, Feed backward network, single and multilayer network, fully recurrent network,

UNIT 2

McCulloch and Pits Neural Network (MCP Model): Architecture, Solution of AND, OR function using MCP model, Hebb Model: Architecture, training and testing, Hebb network for AND function.

Perceptron Network: Architecture, training, Testing, single and multi-output model, Perceptron for AND function

Linear function, application of linear model, linear seperatablity, solution of OR function using liner seperatablity model.

UNIT 3

Learning: Supervised, Unsupervised, reinforcement learning, Gradient Decent algorithm, generalized delta learning rule, Habbian learning, Competitive learning, Back propogation Network: Architecture, training and testing,

UNIT 4

Associative memory: Auto associative and Hetro associative memory and their architecture, training (insertion) and testing (Retrieval) algorithm using Hebb rule and Outer Product rule. Storage capacity, Testing of associative memory for missing and mistaken data, Bidirectional memory

Course Outcomes:
1. For a given conceptual problem student will able to analyze the problem and able to visualize in NN
2. Students will be familiar with different NN models.
3. Students will be able to understand the concept of learning in NN.

Text Books:

1. Introduction to artificial Neural systems by Jacek M. Zurada, 1994, Jaico Publ. House.
2. Principles of Soft Computing by S.N. Deepa, S.N. Sivanandam., Weley publication

Reference Books:

1. "Neural Networks :A Comprehensive formulation", Simon Haykin, 1998, A W
2. "Neural Networks", Kosko, 1992, PHI.
3. "Neural Network Fundamentals" – N.K. Bose , P. Liang, 2002, T.M.H
4. Neural Network , T.N.Shankar, University Science Press
5. Neuro Fuzzy Systems, Lamba, V.K., University Science Press

NEURAL NETWORKS LAB

Course code	LC-CSE-421G				
Category	Professional Core Course				
Course title	Neural Networks Lab				
Scheme and Credits	L	T	P	Credits	Semester 7
	0	0	2	1	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam					

Objectives of the course
1. To understand the different issues involved in the design and implementation of a Neural Networks.
2. To implement the basic of neural network and its activation functions.
3. To develop an understanding of essential NN concepts such as: learning, feed forward and feed backward
4. To design and implement a simple NN model to solve a problem

Practical problems:

1. Introduction to Matlab in context with NN.
2. Plotting of Activation Functions: Threshold functions, Signum function, Sigmoid function, Tan-hyperbolic function, Ramp function, Identity function using matlab
3. Implementation of some basic model like MCP with suitable example.
4. Implementation of Hebb model with suitable example.
5. How the weights and bias values affect the output of a neuron.
6. How the choice of activation function (or transfer function) affects the output of a neuron. Experiment with
7. Implementation of linearly separable concept for a problem.
8. To study some basic neuron models and learning algorithms by using Matlab's neural network toolbox.

Outcomes of the course
1. For a given conceptual problem student will be able to analyze the problem and able to visualize using NN
2. Students will be familiar with different NN models and its implementation.
3. Students will be able to understand the concept of learning in NN and its implementation.

PROJECT-II

Course code	PROJ-CSE-423G				
Category	Professional Core Course				
Course title	Project-II				
Scheme and Credits	L	T	P	Credits	Semester 7
	0	0	6	3	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hrs				

Students will be assigned projects individually or in a group of not more than 3 students depending on the efforts required for completion of project.

The project will have 4 stages:

(*Marks for internal evaluation are given in brackets)

1. Synopsis submission (10 marks),

2. 1st mid-term progress evaluation (10 marks)

3. 2nd mid-term progress evaluation (10 marks)

4. Final submission evaluation (20 marks).

The external examiner will evaluate the project on the basis of idea/quality of project, implementation of the project, project report and viva.

PRACTICAL TRAINING-II

Course code	PT-CSE-425G				
Category	Professional Core Course				
Course title	Practical Training-II				
Scheme and Credits	L	T	P	Credits	Semester 7
	0	0	1		
Class work					
Exam					
Total					
Duration of Exam					

Practical Training II: The evaluation of Practical Training-II will be based on seminar, viva-voce, report submitted by the students. According to performance, the students are awarded grades A, B, C, F. A student who is awarded 'F' grade is required to repeat Practical

Training.

SOFTWARE PROJECT MANAGEMENT

Course code	PEC-CSE-403G				
Category	Professional Elective Course				
Course title	Software Project Management				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:

By the end of this course the students will be able to:

1. Identify different stages of Project Management and able to manage scope & objectives defined by project stakeholders at the same time as focussing on project success.
2. Analyse cost benefit evaluation, different risk associated with project, and techniques used to evaluate & mitigate risk.
3. Manage the resources, monitoring the progress of project using different techniques and managing contracts & peoples associated with the project.
4. Understand the importance of software quality and techniques to enhance software quality.

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 to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.

Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

UNIT 2

Project Evaluation & Estimation: Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods, rapid application development,

waterfall, V-process model, spiral models, Prototyping, delivery. Albrecht function point analysis.

Activity planning & Risk Management: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project, precedence networks.

Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values.

UNIT 3

Resource allocation & monitoring the control: Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence.

Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control.

Managing contracts and people: Introduction, types of contracts, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behaviour, organizational behaviour: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures.

UNIT 4

Software quality: Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, external standards, techniques to help enhance software quality.

Text Book:

1. Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH

Reference Books:

1. Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH

2. Software Project Management, Walker Royce, 1998, Addison Wesley.

3. Project Management 2/c. Maylor

4. Managing Global software Projects, Ramesh, 2001, TMH.

Web Mining

Course code	PEC-CSE-405G				
Category	Professional Elective Course				
Coursetitle	Web Mining				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:
1. To understand the architecture of web, mining the data, issues, challenges.
2. To study the methods of extracting knowledge from web data, text and unusual data.
3. To understand and use data mining language like R, Python etc.
4. To understand the optimization of web and its 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.

Unit: 1

Data Mining Foundations: Basic concepts in data Mining, Web mining versus Data mining, Discovering knowledge from Hypertext data; An overview of web mining : What is Web mining,   Web mining taxonomy, Web mining subtasks, issues, challenges

Unit: 2

Web Search and Information Retrieval : Information Retrieval Models, Web Search and IR, Text Mining, , Latent Semantic Indexing,   Web Spamming, Clustering and Classification of Web Pages, Information Extraction , Web Content Mining;

Unit: 3

Optimization : Introduction to Models and Concept of Computational Intelligence, Social   Behavior as Optimization: Discrete and Continuous Optimization Problems, Classification of Optimization Algorithms, Evolutionary Computation Theory and Paradigm, Swarm and   Collective intelligence

Unit: 4

Swarm Intelligence Techniques: Particle Swarm Optimization, Ant Colony Optimization, Artificial Bees and Firefly Algorithm etc., Hybridization and Comparisons of Swarm Techniques, Application of Swarm Techniques in Different Domains and Real World Problems

Course Outcomes:

power of web search engine by classifying the web documents and identifying the web pages
1. Learn how the Web mining helps to improve the power of web search engine by classifying the web documents and identifying the web pages.
2. How to predict user behaviour in the web.
3. For a given data set how the optimization will be performed.

Suggested books:
1. Witton Frank, Data Mining , Morgan Kauffan Publishers.
2. Kennedy, J. and Eberhart, R.C., Swarm Intelligence, Morgan Kaufmann Publishers, 2001
3. Bonabeau, E., Dorigo, M. and Theraulaz, G., Swarm Intelligence: From Natural to Artifical Systems, Oxford University Press, 1999
4. Dorigo, M., Stutzle, T., Ant Colony Optimization, MIT Press, 2004
5. Parsopoulos, K.E., Vrahatis, M.N., Particle Swarm Optimization and Intelligence: Advances and Applications, Information Science Reference, IGI Global, 2010
6. Clerc, M., ParticleSwarm Optimization, ISTE, 2006
7. Nature Inspired Metaheuristic Algorithms, Xin-She Yang, Luniver Press, 2010

PREDICTIVE ANALYTICS

Course code	PEC-CSE-407G				
Category	Professional Elective Course				
Course title	Predictive Analytics				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:

1. To provide the knowledge of various quantitative and classification predictive models based on various regression and decision tree methods.
2. To provide the knowledge to select the appropriate method for predictive analysis
3. To provide the understanding of how to search, identify, gather and pre-process data for the analysis.
4. To provide the understanding of how to formulate predictive analytics questions.

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: The Analytics Life Cycle, Introduction to Predictive Analytics, Matrix Notation, Basic Foundations, Model, Method and Feature Selection
Regression: Covariance, Correlation and ANOVA review; Simple Linear Regression, OLS Model Diagnostics, Dummy Variables, Multivariate Regression, OLS Assumptions ,Weighted Least Squares (WLS), Generalized Linear Models (GLM).

Unit 2
Classification Models: Introduction, Binomial Logistic Regression, Multinomial Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis.
Decision Trees: Introduction Regression Trees, Regression Tree Issues, Classification Trees, Pruning Trees, Bootstrap Aggregation (Bagging), Random Forest Models.

Unit 3
Data Pre-Processing: Overview, Variable Types, Introduction to Data Transformations, Data Transformations: Categorical to Dummy Variables, Polynomials, Box-Cox Transformation,

Log & Elasticity Models, Logit Transformation, Count Data Models, Centering, Standardization, Rank Transformations, Lagging Data (Causal Models), Data Reduction.

Unit-4
Variable Selection: Dimensionality Issues, Multi-Collinearity, Variable Selection Methods, Step Methods.
Dimensionality: Regularization (Penalized or Shrinkage Models, Ridge Regression, LASSO, Dimension Reduction Models, Principal Components Regression (PCR), Partial Least Squares (PLS).
Machine Learning: Machine Learning Overview, Bias vs. Variance Trade-off, Error Measures, Cross-Validation.

Course Outcomes:
1. Ability to develop and use various quantitative and classification predictive models based on various regression and decision tree methods.
2. Ability to select the appropriate method for predictive analysis
3. Ability to search, identify, gather and pre-process data for the analysis.
4. Ability to formulate predictive analytics questions.

Suggested books:
1. "An Introduction to Statistical Learning: with Applications in R" by James, Witten, Hastie and Tibshirani, Springer, 1st. Edition, 2013.

Suggested reference books
1. "The Elements of Statistical Learning-Data Mining, Inference, and Prediction " by Trevor Hastie, Robert Tibshirani, Jerome Friedman , Second Edition , Springer Verlag, 2009.
2. Predictive & Advanced Analytics (IBM ICE Publication)

INFORMATION HIDING TECHNIQUES

Course code	PEC-CSE-409G				
Category	Professional Elective Course				
Course title	Information Hiding Techniques				
Scheme and Credits	L	T	P	Credits	Semester 7
	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.

Course Objectives:

1. To learn about data hiding applications and their techniques.
2. To learn about hacking.
3. To learn security based protocols, attacks and intrusions.
4. To work with advance data hiding techniques.

UNIT 1
Introduction to Information Hiding: Types of Information Hiding, Applications, Importance & Significances. Differences between cryptography and steganography, Wisdom from Cryptography, types of steganography their application and significances. Past present and future of steganography

UNIT 2
Framework for Secret Communication, Security of Steganography System, Information Hiding in Noisy Data, Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding in Written Text, Steganographic system, Study of Different methods of insertion and retrieval of message using image steganography, Study of histrogram analysis using MATLAB of original image and stegno image

UNIT 3
Basics of watermarking, Watermarking process, Watermarking applications, Requirements and Algorithmic Design Issues, Evaluation and Benchmarking of Watermarking, Bit plane of an Image, study of noises in stego images and their

comparisons, Robustness of watermarking schemes on different attacks like blurring, cropping , compression of theimage. PSNR calculation of the images.

UNIT 4

Use of image steganography in biometric sciences, Study of security enhancement of biometric template using steganographic Frame proof codes:-Definition, Introduction of frame proof codes, Methods to obtain 2- frame proof codes using mutually orthogonal latin squares. Use of frame proof codes in ownership and software piracy.

Course Outcomes:

After completing the course the student will be able to:

1. Explain information security.
2. Give an overview of access control of relational databases.
3. State the basic concept in information systems security, including security technology and principles, software security and trusted systems and IT security management.
4. Learn advance data hiding techniques.

Suggested Books:

1. Recent Advances in Information Hiding and Applications, Pan, J.-S., Huang, H.-C., Jain, L.C., Zhao, Y., Springer (2013).
2. Information Hiding Techniques for Steganography and Digital Watermarking, StefanKatzenbeisser, Fabien A. P. Petitcolas, Artech House, 2000.

Course code	PEC-CSE-411G				
Category	Professional Elective Course				
Course title	Network Security and Cryptography				
Scheme and Credits	L	T	P	Credits	Semester 7
	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.

Course Objectives:

1. To understand cryptography theories; algorithms & systems.
2. To understand the symmetric and asymmetric key algorithms.
3. To understand necessary approaches & techniques to build protection mechanisms in order to secure Computer Networks.
4. Acquire fundamental knowledge on the concepts of different security layers.

UNIT- I

Introduction: Plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography.

UNIT- II

Symmetric Key Algorithms:- Introduction, algorithms types and modes, DES, AES.

Asymmetric Key Algorithms: Introduction, history of asymmetric key cryptography, RSA symmetric and asymmetric key cryptography together, Digital signature.

UNIT- III

Internet Security Protocols: Basic concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), S SL versus SET, Electronic Money, Email Security.

UNIT- IV

User Authentication And Kerberos:- Introduction, Authentication basics, Passwords, authentication tokens, certificate based authentication, biometric based authentication, Kerberos, key distribution center(KDC), Security handshake pitfalls, single Sign on(SSO) approach.

TEXT/ REFERENCE BOOKS:

1. Cryptography and Network Security, 2nd Edition by Atul Kahate, TMH
2. Network Management Principles & Practices by Subramanian, Mani (AWL)
3. SNMP, Stalling, Willian (AWL)
4. SNMP: A Guide to Network Management (MGH)
5. Telecom Network Management by H.H. Wang (MGH)
6. Network Management by U. Dlack (MGH)

Course Outcomes:

After completing the course the student will be able to

1. Compare various cryptographic techniques.
2. Work with symmetric & asymmetric key algorithms.
3. Design secure applications.
4. Inject secure coding in the developed applications.

Course code	PEC-CSE-413G				
Category	Professional Elective Course				
Course title	Software Testing				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:

1. To study fundamental concepts of software testing including software testing objectives, process, criteria, strategies, and methods.
2. To learn how to plan a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
3. To gain an insight into techniques and skills on how to use modern software testing tools to support software testing projects.

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: Overview of Software Development Life Cycle (SDLC), Significance of Software Testing in SDLC, Objectives and Limitations of software testing. Difference between an Error, Fault and Failure (Software Bug), Software Testing Life Cycle (STLC) and Seven Principles of Software Testing, Role of Software Testing in Software Quality

Unit 2

Test Case Design: Test Cases and Test Suite, Test Case Planning and Designing, Characteristics of Good Test Case Design, Format of test case.
Testing Activities: Levels of Testing- Unit, Integration Testing and System Testing. V Model for Software Testing.

Unit 3
Types of Software Testing: Black box testing, White Box and Gray Box Testing.

Reporting and Analyzing bugs: Problem reports, Content and Characteristics of Problem Report, analysis and Tactics for analyzing a reproducible bug. Making a bug reproducible, Problem/Bug Reporting tools

Unit 4

Test Case Selection: Need of Regression Testing, Non-feasibility of Exhaustive Testing, Selection, Minimization and Prioritization of test cases in regression testing.

Testing Tools: Manual vs Automated Testing, Types of Testing Tools, Automated Test Case Generation

Course Outcomes:
1. Understand software testing and quality as a fundamental component of software development life cycle
2. Understand and design the test cases for a given problem
3. Understand the process of Reporting of software failures(bugs) using tools like Bugzilla
4. Develop the knowledge of selection of appropriate test cases for execution during regression testing

Suggested books:
1. "Software Testing: Principles and Practices", by Naresh Chauhan. Oxford University Press

Suggested reference books
1. "William Perry, Effective Methods for Software Testing , John Wiley & Sons, New York, 1995.
2. Boris Beizer, Software Testing Techniques , Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
3. Louise Tamres, Software Testing , Pearson Education Asia, 2002
4. Roger S. Pressman, Software Engineering – A Practitioner's Approach , Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
5. Boris Beizer, Black-Box Testing – Techniques for Functional Testing of Software and Systems , John Wiley & Sons Inc., New York, 1995.
6. K.K. Aggarwal & Yogesh Singh, Software Engineering , New Age International Publishers, New Delhi, 2003.

CYBER SECURITY THREATS

Course code	PEC-CSE-415G				
Category	Professional Elective Course				
Course title	Cyber Security Threats				
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				

Course Objectives:

1. The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
2. The learner will understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
3. The learner will be able to examine secure software development practices.
4. The learner will understand principles of web security.
5. The learner will be able to incorporate approaches for risk management and best practices.
6. The learner will gain an understanding of cryptography, how it has evolved, and some key encryption techniques used today.
7. The learner will develop an understanding of security policies (such as confidentiality, integrity, and availability), as well as protocols to implement such policies.

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: Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Cyber crimes. Network Threats: Active/ Passive – Interference – Interception –Impersonation – Worms –Virus – Spam's – Ad ware - Spy ware – Trojans and covert channels –Backdoors – Bots – IP, Spoofing - ARP spoofing - Session Hijacking - Sabotage-Internal treats Environmental threats - Threats to Server security.

UNIT 2

Security Threat Management: Risk Assessment - Forensic Analysis - Security threat correlation –Threat awareness - Vulnerability sources and assessment- Vulnerability assessment tools –Threat identification - Threat Analysis - Threat Modelling - Model for Information Security Planning.

UNIT 3

Security Elements: Authorization and Authentication - types, policies and techniques – Security certification - Security monitoring and Auditing - Security Requirements Specifications – Security Policies and Procedures, Firewalls, IDS, Log Files, Honey Pots

UNIT 4

Access control, Trusted Computing and multilevel security - Security models, Trusted Systems, Software security issues, Physical and infrastructure security, Human factors – Security awareness, training, Email and Internet use policies.

Course Outcomes:
1. Analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.
2. Design, develop, test and evaluate secure software.
3. Develop policies and procedures to manage enterprise security risks.
4. Evaluate and communicate the human role in security systems with an emphasis on ethics, social engineering vulnerabilities and training.
5. Interpret and forensically investigate security incidents.

Reference Books:

1. Swiderski, Frank and Syndex, "Threat Modeling", Microsoft Press, 2004.
2. William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", Prentice Hall, 2008.
3. Joseph M Kizza, "Computer Network Security", Springer Verlag, 2005
4. Thomas Calabres and Tom Calabrese, "Information Security Intelligence: Cryptographic Principles & Application", Thomson Delmar Learning, 2004.

ADVANCED COMPUTER ARCHITECTURE

Course code	PCC-CSE-417G				
Category	Professional Elective Course				
Course title	Advanced Computer Architecture				
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				

Course Objectives:
1. To make students know about the Parallelism concepts in Programming.
2. To give the students an elaborate idea about the different memory systems and buses.
3. To introduce the advanced processor architectures to the students.
4. To make the students know about the importance of multiprocessor and multicomputer.
5. To study about data flow computer architectures.

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
Architecture And Machines: Some definition and terms, interpretation and microprogramming. The instruction set, Basic data types, Instructions, Addressing and Memory. Virtual to real mapping. Basic Instruction Timing.

Unit 2
Cache Memory Notion: Basic Notion, Cache Organization, Cache Data, adjusting the data for cache organization, write policies, strategies for line replacement at miss time, Cache Environment, other types of Cache. Split I and D-Caches, on chip caches, Two level Caches, write assembly Cache, Cache references per instruction, technology dependent Cache considerations, virtual to real translation, overlapping the Tcycle in V-R Translation, studies. Design summary.

Unit 3

Memory System Design: The physical memory, models of simple processor memory interaction, processor memory modeling using queuing theory, open, closed and mixed-queue models, waiting time, performance, and buffer size, review and selection of queuing models, processors with cache.

Unit 4

Concurrent Processors: Vector Processors, Vector Memory, Multiple Issue Machines, Comparing vector and Multiple Issue processors.

Shared Memory Multiprocessors: Basic issues, partitioning, synchronization and coherency, Type of shared Memory multiprocessors, Memory Coherence in shared Memory Multiprocessors.

Course Outcomes:

1) Understand the Concept of Parallel Processing and its applications.
2) Implement the Hardware for Arithmetic Operations.
3) Analyze the performance of different scalar Computers.
4) Develop the Pipelining Concept for a given set of Instructions.
5) Distinguish the performance of pipelining and non-pipelining environment in a processor.

Text Book:

Advance computer architecture by Hwang & Briggs, 1993, TMH.

Reference Books:

Pipelined and Parallel processor design by Michael J. Fiynn – 1995, Narosa

Material Science

Course code	OEC-PHY-101G			
Category	Open Elective Course			
Course title	Material Science			
Scheme and Credits	L	T	P	Credits
	3	0	0	3
Class work	25 Marks			
Exam	75 Marks			
Total	100 Marks			
Duration of exam	03 Hours			

Course objectives:

The course intends to provide the knowledge of
1. Crystal structure and defects in solids.
2. Classification of different solids.
3. Properties of semiconductor, dielectric and magnetic materials.

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

Crystal Structure

Space lattice and translation vectors, Unit cell, Bravais lattice, Closed packed structures, Miller indices, Diffraction of electromagnetic waves by crystals: X-rays, electrons and neutrons, Bragg's law, X-ray diffraction (Laue and Powder method), Point defects in solids - Schottky and Frenkel defects.

UNIT - 2

Electrical Properties

Classification of solids into conductors, semiconductors and insulators, Semiconductor Materials: intrinsic and extrinsic, Fermi level and electron & hole concentrations at equilibrium, Carrier transport: diffusion and drift, p-n junction, Zener and Avalanche breakdown.

UNIT - 3

Magnetic Properties

Atomic magnetic moments and origin of magnetization, Types of magnetic materials, Ferromagnetism: molecular field, Curie temperature, Domain theory, Hysteresis and its applications.

Superconductivity: Properties of superconductors, Meissner effect, London equations, Elements of BCS Theory, Applications of superconductors.

UNIT - 4

Dielectric Properties

Molecular theory, Polarization, Electric displacement vector, susceptibility, dielectric constant, permittivity and various relations between these parameters, Gauss's law in the presence of a dielectric, Energy stored in a uniform electric field, Concept of local molecular fields and Claussius - Mossotti relation.

Course outcome:
At the end of the course, the student should at least be able to:
1. Segregate crystals based on their structure and apply effects of defects on manipulating properties of solids.
2. Distinguish between insulator, conductor and semiconductor. They should know the difference between intrinsic and extrinsic semiconductors and about the fermi level position in these semiconductors.
3. Select various dielectric, magnetic materials for specific applications in different fields.

Suggested reference books:

1. Concepts of Modern Physics- Arthur Beiser (TMGH)
2. Solid State Physics- S.O. Pillai (New Age Int. Ltd. Pub.)
3. Modern Physics for Engineers- S.P. Taneja (R. Chand)
4. Engineering Physics- Satya Prakash (Pragati Prakashan)
5. Engineering Physics- Malik & Singh (McGraw Hill)
6. Charles Kittel, Introduction to Solid State Physics, 7th Edition, John Wiley & Sons, 2008.
7. S O Pillai, Solid State Physics, 8th edition, New Age international Publishers, 2018

ELECTRONIC PRINCIPLES

Course code	OEC-ECE-451-G				
Category	Open Elective Course				
Course title	Electronic Principles				
Scheme and Credits	L	T	P	Credits	Semester 7th
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Course Objective:

1. Study the basic principles of electronic systems.
2. Understand working of Digital electronics.
3. **Understand the working of Display devices.**

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

SEMICONDUCTOR DIODE: P-N junction and its V-I Characteristics, P-N junction as a rectifier, Switching characteristics of Diode. Diode as a circuit element, the load-line concept, half-wave and full wave rectifiers, clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

UNIT 2

ELECTRONIC DEVICES: LED, Zener Diode as voltage regulator, BJT, UJT, MOSFET, Thyristor, DIAC, TRIAC.

UNIT 3

DISPLAY DEVICES: LED, LCD, Seven Segment, Sixteen Segment.

UNIT 4

DIGITAL ELECTRONICS: Binary, Octal and Hexadecimal number system and conversions, Boolean Algebra, Truth tables of logic gates (AND, OR, NOT) NAND, NOR as universal gates, Difference between combinational circuits and sequential circuits, Introduction to flipflops (S-R & J-K).

Course Outcomes:

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

1. Understand the working of electronic components.
2. Understand the Digital System and various displays.

TEXT BOOK :

      1.Integrated Electronics: Millman & Halkias ; McGrawHill

      2.Modren Digital Electronics: R.P. Jain; McGraw-Hill

REFERENCE BOOKS:

1. Electronics Principles: Malvino ; McGrawHill
2. Electronics Circuits: Donald L. Schilling & Charles Belove ; McGrawHill
3. Electronics Devices & Circuits: Boylestad & Nashelsky ; Pearson.

FUNDAMENTALS OF MANAGEMENT

Course code	HSMC-08G				
Category	Open Elective Course				
Course title	Fundamentals of Management				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:
Students will be able to understand:

1. Evolution of Management and contribution of Management thinkers.
2. The importance of staffing and training
3. The concept of material management and inventory control
4. The components of marketing and advertising, various sources of finance and capital structure.

UNIT 1

Meaning of management, Definitions of Management, Characteristics of management, Management vs. Administration. Management-Art, Science and Profession. Importance of Management.
Development of Management thoughts. Principles of Management. The Management Functions, Inter-relationship of Managerial functions. Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.

UNIT 2

Production Management: Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods.

UNIT 3
Marketing Management - Definition of marketing, marketing concept, objectives & Functions of marketing. Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

UNIT 4

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

Course outcomes:
Students will be able to understand
1. Evolution of Management and contribution of Management thinkers.
2. Importance of staffing and training
3. The concept of material management and inventory control
4. The components of marketing and advertising
5. Various sources of finance and capital structure

Suggested Books:
1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S.Bhalla.(Kalyani Publishers)

2. Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)

Suggested Reference Books:
1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)

2. Management – Harold, Koontz and Cyrilo Donell (Mc.Graw Hill).

3. Marketing Management – S.A. Sherlikar (Himalaya Publishing House, Bombay).

4. Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi)

5. Management - James A.F. Stoner & R.Edward Freeman, PHI.

Course code	OEC-CE-451G			
Category	Open elective courses			
Course title	Disaster Management			
Scheme and Credits	L	T	P	Credits
	3	0	0	3
Class work	25 Marks			
Exam	75 Marks			
Total	100 Marks			
Duration of Exam	3 Hours			

Course objectives:

1. To provide basic conceptual understanding of disasters and its relationships with development.
2. Provide an understanding of the social nature of natural hazards and disasters
3. Increase awareness of hazards and disasters around the world and the unequal social consequences stemming from disaster events.

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: Definition of Disaster, hazard, Global and Indian scenario, role of engineer, importance of study in human life, long term effects of disaster. Geological Mass Movement and land disasters, Atmospheric disasters, Disaster Mitigation

Unit-2

Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion

Man-made Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.

Unit -3

Case Studies: Damage profile analysis- Uttarkashi/Bhuj/Latur earthquakes, Kedarnath landslide, Kerala floods, cyclone Fani and Amphan, Bihar floods, Covid 19, Forest Related disasters, Mining disasters, Atmospheric disasters.

Unit 4

Disaster Management: Importance of public awareness, Preparation and execution of emergency management programme. Scope and responsibilities of National Institute of Disaster Management (NIDM) and National disaster management authority (NDMA) in India. Use of Internet and software for effective disaster management. Applications of GIS, Remote sensing and GPS in this regard.

Course Outcomes:

After completing this course, students should be able:

1. To know natural as well as manmade disaster and their extent and possible effects on the economy.
2. To Plan national importance structures based upon the previous history.
3. To acquaint with government policies, acts and various organizational structures associated with an emergency.
4. To know the simple dos and don'ts in such extreme events and act accordingly.

Reference Books

1. Singhal J.P. Disaster Management, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423

2. Tushar Bhattacharya, Disaster Science and Management, McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011

ENGLISH FOR PROFESSIONALS

Course code	HSMC-10G			
Category	Open Elective Course			
Course title	English For Professionals			
Scheme and Credits	L	T	P	Credits
	3	0	0	3
Class work	25 Marks			
Exam	75 Marks			
Total	100 Marks			
Duration of Exam	03 Hours			

Course Objectives:

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.

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

Communication Process Types and Levels, Scopes and significance, Technical and Tools of Effective communication

UNIT 2

Speaking files and Personality Development Oral Presentation, Body Language, Voice Modulation, Negotiation, Group Discussion, Interview techniques

UNIT 3

Advanced Technical Writing Job Application, CV writing, Business Letters, Memos, Minutes, Notices, Report Writing and structure, Blog writing.

UNIT 4

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

BASICS OF MACHINE LEARNING

Course code	PCC-CSE-402G				
Category	Professional Core Course				
Course title	Basics of Machine Learning				
Scheme and Credits	L	T	P	Credits	Semester-8
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To learn the basic concept of machine learning and types of machine learning.
2. To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
3. Explore supervised and unsupervised learning paradigms of machine learning.

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
Machine Learning: Definition, History, Need, Features, Block diagrammatic representation of learning machines, Classification of Machine Learning: Supervised learning, Unsupervised learning, Reinforcement Learning, Machine Learning life cycle, Applications of Machine Learning.

Unit-2
Dimensionality Reduction
Dimensionality reduction: Definition, Row vector and Column vector, how to represent a dataset, how to represent a dataset as a Matrix, Data preprocessing in Machine Learning: Feature Normalization, Mean of a data matrix, Column Standardization, Co-variance of a Data Matrix, Principal Component Analysis for Dimensionality reduction.

Unit-3

Supervised Learning

Supervised Learning: Definition, how it works. Types of Supervised learning algorithms k-Nearest Neighbours, Naïve Bayes, Decision Trees, Naive Bayes, Linear Regression, Logistic Regression, Support Vector Machines.

Unit-4

Unsupervised Learning

Unsupervised Learning: Clustering: K-means. Ensemble Methods: Boosting, Bagging, Random Forests.

Evaluation: Performance measurement of models in terms of accuracy, confusion matrix, precision & recall, F1-score, receiver Operating Characteristic Curve (ROC) curve and AUC, Median absolute deviation (MAD), Distribution of errors

Suggested books

1. E. Alpaydin, Introduction to
2. Machine Learning, Prentice Hall of India, 2006.
2. T Hastie, R Tibshirani and J Friedman, The Elements of Statistical Learning Data Mining, Inference, and Prediction, 2nd Edition, Springer, 2009.
3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2010.

Suggested reference books

1. R. O. Duda, P. E. Hart, and D.G. Stork, Pattern Classification, John Wiley and Sons, 2012.
2. Simon O. Haykin, Neural Networks and Learning Machines, Pearson Education, 2016

Course Outcomes

1. Understand fundamental issues and challenges of supervised and unsupervised learning techniques.
2. Extract features that can be used for a particular machine learning approach
3. To compare and contrast pros and cons of various machine learning techniques and to get an   insight of when to apply a particular machine learning approach.
4. To mathematically analyse various machine learning approaches and paradigms.

BIG DATA ANALYTICS

Course code	PCC-CSE-404G				
Category	Professional Core Course				
Course title	Big Data Analytics				
Scheme and Credits	L	T	P	Credits	Semester 8
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To Provide an explanation of the architectural components and programming models used for scalable big data analysis.
2. To Identify the frequent data operations required for various types of data and Apply techniques to handle streaming data
3. To describe the connections between data management operations and the big data processing patterns needed to utilize them in large-scale analytical applications
4. To Identify describe and differentiate between relational and non-relational database and how Data Warehouses, Data Marts, Data Lakes, and Data Pipelines work.
5. Explain how the Extract, Transform, and Load process works to make raw data ready for analysis.

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 to Big Data: Big Data: Why and Where, Application and Challenges, Characteristics of Big Data and Dimensions of Scalability, The Six V, Data Science: Getting Value out of Big Data, Steps in the Data science process, Foundations for Big Data Systems and Programming, Distributed file systems

Unit: 2
Data Repositories and Big Data Platforms: RDBMS, NoSQL, Data Marts, Data Lakes, ETL, and Data Pipelines, Foundations of Big Data, Big Data Processing Tools, Modern Data Ecosystem, Key Players, Types of Data, Understanding Different Types of File Formats, Sources of Data Using Service Bindings

Unit: 3

Introduction to Big Data Modeling and Management: Data Storage, Data Quality, Data Operations, Data Ingestion, Scalability and Security Traditional DBMS and Big Data Management Systems, Real Life Applications, Data Model: Structure, Operations, Constraints, Types of Big Data Model

Unit: 4

Big Data Integration and processing: Big Data Processing, Retrieving: Data Query and retrieval, Information Integration, Big Data Processing pipelines, Analytical operations, Aggregation operation, High level Operation, Tools and Systems: Big Data workflow Management

Suggested books:

Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

Suggested reference books

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
4. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
6. Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
7. Pete Warden, "Big Data Glossary", O'Reily, 2011.
8. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
9. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012
10. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

Course Outcomes

1. For a given query Describe the Big Data landscape including examples of real world big data problems including the three key sources of Big Data: people, organizations, and sensor.
2. For a given specification, Recognize different data elements in your own work and in everyday life problems
3. For a given specification select a data model to suit the characteristics of your data
4. For a given problem one will be able to Retrieve data from example database and big data management systems and identify when a big data problem needs data integration
5. For a given problem one will be able to design an approach to leverage data using the steps in the machine learning process and apply them to explore and prepare data for modelling.

BIG DATA ANALYTICS LAB

Course code	LC-CSE-421G				
Category	Big Data Analytics				
Course title	Neural Networks Lab				
Scheme and Credits	L	T	P	Credits	Semester 8
	3	0		3	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

A student has to attempt 12-15 practicals based on theory on an open-source tool.

MACHINE LEARNING WITH PYTHON

Course code	LC-CSE-421G				
Category	MACHINE LEARNING WITH PYTHON				
Course title	MACHINE LEARNING WITH PYTHON LAB				
Scheme and Credits	L	T	P	Credits	Semester 8
	3	0		3	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

A student has to attempt 12-15 practicals based on theory on an open-source tool.

Project-III

Course code	PROJ-CSE-422G				
Category	Professional Core Course				
Course title	Project-III				
Scheme and Credits	L	T	P	Credits	Semester 8
	0	0	8	4	
Class work	50 Marks				
Exam	50 Marks				
Total	50 Marks				
Duration of Exam	03 Hrs				

Students will be assigned projects individually or in a group of not more than 3 students

depending on the efforts required for completion of project.

The project will have 4 stages:

(*Marks for internal evaluation are given in brackets)

1. Synopsis submission (10 marks),

2. 1st mid-term progress evaluation (10 marks)

3. 2nd mid-term progress evaluation (10 marks)

4. Final submission evaluation (20 marks).

The external examiner will evaluate the project on the basis of idea/quality of

project, implementation of the project, project report and viva.

QUALITY ENGINEERING

Course code	PEC-ME-410G				
Category	Open Elective Courses				
Course title	QUALITY ENGINEERING				
Scheme and Credits	L	T	P	Credits	Semester-8
	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

Basic Concepts of Quality: Definitions of Quality and its importance in industry, Quality function, Quality Characteristics, Quality process, Quality Traits, Applications of Quality Concept, Introduction to quality control, Computer aided quality control, Total quality control(TQC) and its implementation, Elements of TQC, Quality Circle, Objectives of quality circle, Role of management in quality circle, Quality in service organizations, characteristics of a service organization, Important service dimensions, Design of service quality.

UNIT2

Basic Statistical Concepts: The Concept of variation, Distinction between variables and attributes data, The frequency distribution, graphical representation of frequency distribution, Quantitative description of distribution, the normal curve, concept of probability, laws of probability, probability distributions, hyper geometric distribution, binomial distribution, The Poisson distribution.

UNIT3

Quality systems: Quality systems, Need for quality System, Need for standardization, History of ISO:9000 series standards and its features, steps to registration, India and ISO:9000, Automated inspection systems technologies, Different forms of Inspection, Industrial inspection,

UNIT4

Total Quality Management: Introduction o TQM, Concepts, Characteristics of TQM, Relevance of TQM, Approaches to TQM Implementation, TQM philosophies, Taguchi Philosphy, JIT, Kaizen, Six Sigma approach, 5-S approach

Course Outcomes: Upon completion of this course the student will be able to:

1. Attain the basic techniques of quality improvement, fundamental knowledge of statistics and probability
2. Use control charts to analyze for improving the process quality.
3. Describe different sampling plans
4. Acquire basic knowledge of total quality management
5. Understand the modern quality management techniques

Text Books:
1. Quality planning and Analysis, Juran and Gryna, TMH, New Delhi
2. Quality Management, Kanishka Bed, Oxford University Press, New Delhi
3. Introduction to SQC, Montgomery DC, 3e, Wiley, New Delhi
4. Fundamentals of quality control and improvement, A Mitra, Mcmillan pub. Company, NY

Reference Books:
1. Fundamentals of Applied Statistics, Gupta and Kapoor, Sultan Chand and Sons, New Delhi.

WIRELESS ADHOC AND SENSOR NETWORKS

Course code	OEC-ECE-430G				
Category	Open Elective Course				
Course title	Wireless Adhoc and Sensor Networks				
Scheme and Credits	L	T	P	Credits	SEMESTER 8
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course
2. Learn Ad hoc network and Sensor Network fundamentals
3. Understand the different routing protocol
4. Have an in-depth knowledge on sensor network architecture and design issue.
5. Understand the transport layer and security issues possible in Ad hoc and Sensor networks
6. Have an exposure to mote programming platforms and tool.

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 Ad Hoc Networks: Characteristics of MANETs, Applications of MANETs and challenges of MANETs - Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, Other routing algorithms.

UNIT- II
Data Transmission: Broadcast storm problem, Broadcasting, Multicasting and GeocastingTCP over Ad Hoc: TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT- III
Basics of Wireless, Sensors and Applications: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT- IV

Data Retrieval in Sensor Networks: Routing layer, Transport layer, High-level application layer support; Adapting to the inherent; dynamic nature of WSNs; Sensor Networks and mobile robots. Security: Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

Sensor Network Platforms and Tools: Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms - Operating System: TinyOS– Imperative Language: nesC, Dataflow style language: TinyGALS, Node-Level Simulators, ns2 and its sensor network extension, TOSSIM.

Suggested Books:

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P.Aggarwal, World Scientific Publications, March 2006, ISBN – 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman

Course Outcomes:

1. Understand the needs of Wireless Adhoc and Sensor Network in current scenario.
2. Describe current technology trends for the implementation and deployment of wireless Adhoc/sensor networks.
3. Discuss the challenges in designing MAC, routing.
4. Transport protocols for wireless Ad-hoc/sensor networks.
5. Explain the principles and characteristics of wireless sensor networks.

TRAFFIC ENGINEERING AND ROAD SAFETY

Course code	OEC-CE- 448G				
Category	Open Elective Course				
Course title	Traffic Engineering and Road Safety				
Scheme and Credits	L	T	P	Credits	SEMESTER 8
	3	**0**	0	**3**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

COURSE OBJECTIVES:

1. Acquaint the students to basic concepts of Traffic and their significance.
2. To stimulate the students to think systematically and objectively about various traffic 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.

UNIT1

Traffic Characteristics: Importance of traffic characteristics. Road user characteristics. Vehicular characteristics. Max dimensions and weights of vehicles allowed in India.

Traffic Studies: Traffic volume study, speed study and origin and destination study. Speed and delay study.

UNIT2

Traffic Accidents: Accident surveys. Causes of road accidents and preventive measures. Capacity and Level of Service.

Relationship between speed, volume and density, PCU, Design service volume, Capacity of non-urban roads. IRC recommendations, Brief review of capacity of urban roads.

UNIT3

Traffic Control Devices: Signs, Signals, markings and islands. Types of signs, Types of signals, Design of Signal, Intersections at grade and grade separated intersections. Types of grades separated intersections, Parking surveys: On street parking, off street parking.

UNIT-4

Road safety audit, RSA team, RSA Report, Elements of RSA, Vehicular air pollution and Situation in India, Motor vehicle act, Vehicular emission norms in India and abroad, Alternate fuels, Factors affecting fuel consumption.

COURSE OUTCOMES:

After completing this course, students should be able:

- To realize the significance of traffic engineering in today life.
- To understand the processes involved in traffic studies.
- To appreciate the role of Traffic regulations.

RECOMMENDED BOOKS:

- Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
- Highway Engg by S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
- Traffic Engg and Transport Planning by L.R.Kadiyali, Khanna Publishers, Delhi.
- Principles of Transportation and Highway Engineering by G.V.Rao, Tata McGraw-Hill Publishing Co. Ltd. N.Delhi.

CONVENTIONAL AND RENEWABLE ENERGY RESOURCES

Course code	**OEC-EE- 08G**				
Category	Open Elective Course				
Course title	**Conventional And Renewable Energy Resources**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**SEMESTER 8**
	3	**0**	0	**3**	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3 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:
1. The course will provide understanding of power generation technology using conventional and non-conventional energy sources which will be useful for understanding the operation and working of power plants.
2. Students will learn basics of Tariff structure for energy production.
3. Students will understand the operation, maintenance and working of substations.

UNIT1

INTRODUCTION: Energy sources, their availability, recent trends in Power Generation, Amount of generation of electric power from Conventional and non-conventional sources of energy in Haryana, India and some developed countries of the world. Interconnected Generation of Power Plants.

UNIT2

POWER GENERATION PLANNING: Load forecasting, load curves, load duration curve, Base load and Peak load Power Plants, connected Load, maximum demand, demand factor, Group diversity factor, load factor, significance of load factor, plant factor, capacity factor, selection of unit size, No. of Units, reserves, cost of power generation, Depreciation, tariff.

UNIT3

CONVENTIONAL ENERGY SOURCES: Selection of site, capacity calculations, classification, Schematic diagram and working of Thermal Power Stations(TPS), Hydro Electric Plant and Nuclear Power Plant .

NON-CONVENTIONAL ENERGY SOURCES: Selection of site, capacity calculations, Schematic diagram and working of Wind, Solar, fuel cell, Magneto Hydro Dynamic (MHD) system.

UNIT4

ELECTRIC ENERGY CONSERVATION & MANAGEMENT: Energy management,
Energy Audit, Energy Efficient Motors, Co-generation.

Course Outcomes:

After learning the course the students should be able to:

1. Describe the working of thermal power station using single line diagram and state the functions of the major equipment and auxiliaries of a TPS.

2. Explain hydro energy conversion process with block diagrams and identify the appropriate site for it.

3. Explain the working of Nuclear power station.

4. Describe the working of Solar Power station and wind power plant.

5. Compare various economic aspects of different types of Tariffs.

6. Classify various substations and describe working of its equipments.

7. Compare various generating systems.

REFERENCES:

1. Renewable Energy Sources and Emerging Technologies : D.P Kothari, K.C.Singla, Rakesh Ranjan- PHI Publications, 'Latest Edition'.
2. Electric Power Generation, B.R.Gupta, 'Latest Edition'.
3. Power Generation, Operation and Control, Wood and Wollenberg, John Wiley & Sons,'Latest Edition'.
4. A Course in Electric Power System, Soni, Gupta, Bhatnagar, Dhanpat Rai & Sons, 'Latest Edition'.
5. Power System Engineering, Nagrath & Kothari, Tata Mc-Graw Hill, New Delhi, 'Latest Edition'.
6. Power Plant Engg: G.D. Rai, 'Latest Edition'.
7. Electric Power: S.L. Uppal (Khanna Publishing), 'Latest Edition'.