ST. ANDREWS INSTITUTE OF TECHNOLOGY & MANAGEMENT
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SCHEME OF EXAMINATION

&

SYLLABUS

Of

B.TECH (BACHELOR OF TECHNOLOGY)

COMPUTER SCIENCE ENGINEERING – ARTIFICIAL INTELLIGENCE / MACHINE LEARNING

ACADEMIC SESSION

MAHARSHI DAYANAND UNIVERSITYROHTAK (HARYANA)

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

		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

		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

			• Fashion and Apparel Engineering
5.	Math-II (Probability and Statistics)	BSC-MATH-104G	• Computer Science Engineering • Information Technology • Computer Science and Information Technology
6.	Math-II (Vector Calculus, Differential equations and Laplace Transform)	BSC-MATH-106G	• Bio-Technology Engineering

Table 3

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

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
03 Hrs./ week

Credit: 1 ½
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]

UNIT-IV

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			
2	0	0	2			

Internal Assessment	**:**	**25 Marks**
ExternalAssessment	**:**	**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			
0	0	2	1	Internal Assessment	:	25 Marks
				ExternalAssessment	:	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-Data Science)
B.TECH (Computer Science and Engineering-Artificial Intelligence & Machine Learning)

SEMESTER 3rd& 4th
Scheme effective from 2021-22

COURSE CODE ANDDEFINITIONS

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
PEC	Professional Elective Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar

B. Tech. (Computer Science and Engineering- Data Science)

B. Tech. (Computer Science and Engineering- Artificial Intelligence & Machine Learning)

Scheme of Studies/Examination w.e.f. 2021-22

Semester-3

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Internal Assessment	Theory	Practical	Total	
1	PCC-CSE-202G	Discrete Mathematics	3	1	0	4	4	25	75		100	3
2	PCC-CSE-203G	Data Structures & Algorithms	3	0	0	3	3	25	75		100	3
3	PCC-CSE-251G	Digital Logic and Computer Architecture	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-253G	Applied Computational Statistics	3	0	0	3	3	25	75		100	3
6	HSMC-01G	Economics for Engineers	3	0	0	3	3	25	75		100	3
7	LC-CSE-255G	Computational Statistics Lab	0	0	3	3	1.5	25		25	50	3
8	LC-CSE-257G	Digital Logic Design Lab	0	0	3	3	1.5	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	24				800	

B.Tech. (Computer Science and Engineering- Data Science)

B.Tech. (Computer Science and Engineering- Artificial Intelligence & Machine Learning

Scheme of Studies/Examination w.e.f. 2021-22

Semester-4

Sr. No	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Internal Assessment	Theory	Practical	Total	
1	PCC-CSE-201G	Database Management Systems	3	0	0	3	3	25	75		100	3
2	PCC-CSE-250G	Programming for Data Science & AIML	3	0	0	3	3	25	75		100	3
3	PCC-CSE-206G	Operating System	3	0	0	3	3	25	75		100	3
4	PCC-CSE-252G	Object Oriented Programming With Java	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	2	0	0	2	0	-	-	-	-	3
7	PCC-CSE-254G	Fundamentals of AIML	3	0	0	3	3	25	75	-	100	3
8	LC-CSE-212G	Operating System LAB	0	0	4	4	2	25		25	50	3
9.	LC-CSE-256G	Object Oriented Programming LAB	0	0	2	2	1	25		25	50	3
10.	LC-CSE-258G	Programming for Data Science & AI Lab	0	0	2	2	1	25		25	50	3
11.	LC-CSE-209G	Database Management Systems LAB	0	0	4	4	2	25		25	50	3
						Total	24				800	

*__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.

Discrete Mathematics

Course code	PCC-CSE-202G			
Category	Professional Core Course			
Course title	Discrete Mathematics			
Scheme and Credits	L	T	P	Credits
	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, Tata McGraw-Hill
5. Discrete Mathematics, Babu Ram, Pearson Publication
6. Discrete Mathematics, Semyour Lipschutz and Marc Lipson, Schaum's outline

Course Outcomes

The students will learn

1. To solve mathematical problems based on concepts of set theory, relations, functions and lattices.
2. To express logic sentence in terms of quantifiers and logical connectives.
3. To apply basic counting techniques to solve permutation and combination problems.
4. To solve recurrence relations.
5. To classify algebraic structure of any given mathematical problem.
6. To evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
   To develop the given problem as graph networks and solve with techniques of graph theory.

Data Structure & Algorithms

Course code	PCC-CSE-203G			
Category	Professional Core Course			
Course title	Data Structure & Algorithms			
Scheme and Credits	L	T	P	Credits
	3	0	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.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures

Unit 1

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

Unit 2

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

Unit 3

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

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

Unit 4

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

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

Suggested books:

"Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, and 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 Logic and Computer Architecture

Course code	PCC-CSE-251G				
Category	Professional Core Course				
Course title	Digital Logic and Computer Architecture				
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				

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

Course Objectives:

- To understand the basic theoretical concepts of digital systems like the binary system and Boolean algebra.
- To express real life problem in logic design terminology.
- To use Boolean algebraic formulations to design digital systems. To design using combinational/sequential circuits
- To understand the Instruction execution stages and the functions of the various computer hardware components.

UNIT- I

Number Systems & Digital Logic Circuits Overview: Data Representation, point ; Number base conversions, complements, codes, Logic Functions- Basic Logic Functions, Logic gates, universal logic gates, Boolean Algebra, Minimisation and realisation of switching circuits/logical expressions; Combinational circuits **;** Design of synchronous sequential circuits.

UNIT- II

Computer Arithmetic: Algorithms for fixed point and floating point addition, subtraction, multiplication and division operations. Hardware Implementation of arithmetic and logic operations, High performance arithmetic.

Instruction Set & Addressing: Memory Locations and Addresses, Machine addresses and sequencing, Various Addressing Modes, Instruction Formats, Basic Machine Instructions. IA-32 Pentium example.

UNIT- III

Processor Organization: CPU, ALU ,Register Transfers, Execution of Instructions, Multiple Bus Organization, Control unit design: hardwired and microprogrammed; Memory Organization: Concept of Memory, RAM, ROM memories, memory hierarchy, cache memories, virtual memory, secondary storage, memory management requirements.

UNIT-IV

Input / Output Organization: Introduction to I/O, Interrupts- Hardware, Enabling and disabling Interrupts, Device Control, Programmed I/O, Direct memory access, buses, interface circuits, standard I/O Interfaces.

Recent trends; Overview of currently used HDLs in industry.

TEXT BOOKS:

- Digital Logic and Computer Design – Third Edition, M. Morris Mano, Pearson Education/PHI.
- Computer Organization – Carl Hamacher, Zvonko Vranesic, Safwat Zaky, fifth edition, McGraw Hill.
- Computer Architecture and Organization- An Integrated Approach, Miles Murdocca, Vincent Heuring, Second Edition, Wiley India.
- Computer Systems Architecture – M. Moris Mano, III Edition, Pearson.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, 2010 Pearson
2. Computer- organization and Design- David A. Paterson and John L. Hennessy, Elsevier.
3. Fundamentals or Computer Organization and Design, - Sivarama Dandamudi Springer Int. Edition.
4. Fundamentals of Logic Design, Roth, 5th Edition, Thomson.
5. Digital Principles and Applications, 6/e, A. P. Malvino, D. K. Leach and G. Saha, McGraw Hill, 2006.
6. Computer Organization and Design, D. A. Patterson and J. L. Hennessy, 3/e, Morgan Kaufmann, 2006.
7. The INTEL Microprocessors, Barry B. Brey, 8/e, Prentice Hall, 2008.

Course Outcomes:

- Student could able to design, understand the number systems, combinational sequential circuits. And they should be in a position to continue with computer organization.
- Students understand in a better way the I/O and memory organization in depth.
- They should be in a position to write assembly language programs for various applications.
- Acquire design thinking capability, ability to design a component with realistic constraints, to solve real world engineering problems and analyze the results.

Python Programming

Course code	PCC-CSE-207G			
Category	Professional Core Course			
Course title	Python Programming			
Scheme and Credits	L	T	P	Credits
	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

Unit 1

Introduction: Installing Python; basic syntax, interactive shell, editing, saving, and running a script; data types; variables, assignments; numerical types; arithmetic operators and expressions; Control statements, Loops and Selection statements; String manipulations: subscript operator, indexing, slicing a string; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file.

Unit 2

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 3

Simple graphics and image processing: Simple graphics, Turtle operations, Manipulating turtle screen, Drawing two dimensional shapes, examining an object attributes, Taking a random walk, Color and RGB scheme, Image processing: Image manipulation operations, properties of images, image module, copying, blurring and reducing image. Graphical User Interfaces: Terminal based and GUI based programs, Simple GUI-Based Programs, Windows and Window Components, Input and Output with Entry Fields, Defining and Using Instance Variables, Other Useful GUI Resources.

Unit 4

Object Oriented concepts: Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects, Inheritance, polymorphism, operator overloading; abstract classes; exception handling, try block. Multithreading: Threads and Processes, Sleeping Threads, Producer, Consumer, and Synchronization, The Readers and Writers Problem, Shared Cell Class, Thread-Safe Class

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,

Applied Computational Statistics

Course code	BSC-MATH-253G				
Category	Basic Science Course				
Course title	Applied Computational Statistics				
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				

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. Understand the basics of data, exploratory data analysis, statistics and hypothesis testing in problem solving.
2. Illustrate multivariate data analysis methods to solve the problems.
3. Understand the concepts of classification methods to analysis and representation of multivariate data in real world.
4. Understand and illustrate the stochastic process to solve real world problems.

Unit-I

Types of Data (Quantitative, Qualitative, Logical), Exploratory Data Analysis (Histogram, Scatter plots, Box plot, Fundamentals of Descriptive Statistics (moments- Measures of Central Tendency, Measure of spread, Measure Shape), Overview of Probability and Combinatorics, Inferential Statistics (Normal Distribution, Statistic Sampling, Central Limit Theorem), Estimations (Point and Intervals- Confidence intervals with means, sample proportions), Hypothesis Testing :Introduction, Confidence Intervals, Critical Value based approach, P-value base approach, ZTests, TTests ,the $\chi 2$ distribution, ANOVA/ANCOVA.

Unit-II

Multivariate Analysis: Multivariate distributions: multivariate normal distribution and its properties, distributions of linear and quadratic forms, tests for partial and multiple correlation coefficients and regression coefficients and their associated confidence regions. Data analytic illustrations. Wishart distribution (definition, properties), construction of tests, union-intersection and likelihood ratio principles, inference on mean vector, Hotelling's T2. MANOVA- Inference on covariance matrices.

Unit-III

Classification methods: Discriminant analysis, principal component analysis and factor analysis, Canonical Correlation analysis, Correspondence Analysis, Multidimensional Scaling, Cluster analysis. Nonparametric and robust methods of multivariate analysis. Graphical representation of multivariate data.

Unit-IV

Stochastic Process: Markov chains with stationary transition probabilities, properties of transition functions, classification of states, Stationary distribution of a Markov chain, existence and uniqueness, convergence to the stationary distribution. Methods based on Markov chains for simulation of random vectors. MCMC algorithm. Random Walks, queueing processes, branching processes. Gambler's ruin problem, transient states.

References:

1. W. Feller: *An Introduction to Probability Theory and its Applications,* Vol.-II.
2. S. Karlin and H. M. Taylor, *A First Course in Stochastic Processes*.
3. William J. Stewart, *Probability, Markov Chains, Queues and Simulation*.
5. P. G. Hoel, S. C. Port and C. J. Stone, *Introduction to Stochastic Processes*.
6. S. Ross, *Introduction to Probability Models*.
7. T. W. Anderson, *An Introduction to Multivariate Statistical Analysis*.
8. Ross, Introduction to Probability. 9th edition, Pearson, 2006
9. G. Jay Kerns, Introduction to Probability and Statistics Using R, 2016
10. Andy Field, An Adventure in Statistics, SAGE Publications, 2016
11. Dawn Griffiths, Head First Statistics, O'Reilly media Inc., 2019
12. Timothy C Urdan, Statistics in Plain English, Taylor and Francis Publisher, 2010
13. Brian.S. Everitt, Torsten Hothorn, Handbook of Statistical Analyses Using R, Chapman & Hall/CRC 2006
14. C.R. Kothari, Research Methodology, New Age Publishers, 2004
15. Marley W. Watkins, A step by Step Guide to Exploratory Factor Analysis with R and R Studio, Tylor & Francis Group, 2021
16. Josheph F. Hair, William C. Black et.al., Multivariate Data Analysis, 7^{th} ed.
17. Deniel J. Denis, Univariate, Bivariate and Multivariate Statistics Using R, John Wiley & Sons, 2020
18. A. Basilevsky, Statistical Factor Analysis & Related Methods – Theory & Applications, John Wiley & Sons

ECONOMICS FOR ENGINEERS

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

Course Objectives:

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

UNIT-1

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

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

UNIT 2

Production- Meaning of Production and factors of production, Law of variable proportions, and Returns to scale, internal external economies and diseconomies of scale. Various concepts of cost of production- Fixed cost, Variable cost, Money cost, 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 and effect of changes in demand and supply on prices.

UNIT-4

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

Globalization of Indian economy - merits and demerits.

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

COURSE OUT COMES:

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

REFERENCES:

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

Computational Statistics Lab

Course code	LC-CSE-255G				
Category	Laboratory Course				
Course title	Computational Statistics Lab				
Scheme and Credits	L	T	P	Credits	
	0	0	3	1.5	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

- **Firstly, give a basic insight of R/Mat Lab and its various libraries, R as a Data Importing Tool, Simulation and Hypothesis testing, Simulation, Model building, Evaluation and Deployment, Bayesian computation, Fitting a line with Bayesian techniques and more which requires as per content of Applied Computational Statistics.**

- **Secondly, Experiments/Programs in R/Mat Lab related to the course contents of Applied Computational Statistics can be designed and developed by the subject faculty.**

Digital Logic Design Lab

Course code	LC-CSE-257G				
Category	Laboratory Course				
Course title	Digital Logic Design Lab				
Scheme and Credits	L	T	P	Credits	
	0	0	3	1.5	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Indicative Experiments

1. **Perform following program using Bread Board**
   1. Realization of Logic gates using discrete components, verification of truth table for logic gates, realization of basic gates using NAND and NOR gates
   2. Implementation of Logic Circuits by verification of Boolean laws and verification of De Morgans.
   3. Adder and Subtractor circuit realization by implementation of Half-Adder and Full-Adder and by implementation of Half-Subtractor and Full-Subtractor.
   4. Combinational circuit design
      i. Design of Decoder and Encoder
      ii. Design of Multiplexer and De multiplexer
      iii. Design of Magnitude Comparator
      iv. Design of Code Converter
   5. Sequential circuit design
      i. Design of Mealy and Moore circuit
      ii. Implementation of Shift registers
      iii. Design of 4-bit Counter
      iv. Design of Ring Counter.

2. **Study of working and usage of TASM/MASM.**
   Perform following program using TASM/MASM-
   - Addition and Subtraction of 8/16-bit number
   - Multiplication of 8-bit number
   - Factorial of a given number
   - Design of Half Adder
   - Design of Full Adder
   - Square root of a number

3. **Study of Concepts and working of HDL modeling and logic simulation.**
   Perform following program using HDL modeling and simulation-
   i. Program to realize delay and stimulus in simple circuit
   ii. Design and implement code converters using logic gates simulation
   iii. Program for combinational circuits
   iv. Program for Sequential circuits
   v. Registers and Counters
   vi. Program to implementation of Flip-Flop
   vii. Program to implement SISO, SIPO, PISO and PIPO shift registers using Flip- flops

4. **Implementation of different circuits to solve real world problems:**
   A digitally controlled locker works based on a control switch and two keys which are entered by the user. Each key has a 2-bit binary representation. If the control switch is pressed, the locking system will pass the difference of two keys into the controller unit. Otherwise, the locking system will pass the sum of the two numbers to the controller unit. Design a circuit to determine the input to the controller unit.

5. **Implementation of different circuits to solve real world problems:**
   A bank queuing system has a capacity of 5 customers which serves on first come first served basis. A display unit is used to display the number of customers waiting in the queue. Whenever a customer leaves the queue, the count is reduced by one and the count is increased by one if a customer joins a queue. Two sensors (control signals) are used to sense customers leaving and joining the queue respectively. Design a circuit that displays the number of customers waiting in the queue in binary format using LEDs. Binary 1 is represented by LED glow and 0 otherwise.

TEXT BOOKS:

- Digital Logic & Computer Design – Third Edition, M.Morris Mano, Pearson Education/PHI.
- Computer Organization – Carl Hamacher, Zvonko Vranesic, Safwat Zaky, fifth edition, McGraw Hill.
- Computer Architecture and Organization- An Integrated Approach, Miles Murdocca, Vincent Heuring, Second Edition, Wiley India.
- Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson.

Data Structures and Algorithms Lab Using C

Course code	LC-CSE-213G				
Category	Laboratory Course				
Course title	Data Structures and Algorithms 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				

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	Laboratory Course				
Course title	Python Programming 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				

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)
5. Find the maximum of a list of numbers
6. Linear search and Binary search
7. Selection sort, Insertion sort
8. Merge sort
9. First n prime numbers
10. Multiply matrices
11. Programs that take command line arguments (word count)
12. Find the most frequent words in a text read from a file
13. Simulate elliptical orbits in Pygame
14. 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.

Database Management System

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

Objectives of the course

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

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

Unit: 1

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit: 2

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

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

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

Unit: 3

Storage strategies: Indices, B-trees, hashing,

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

Unit: 4

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

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

Suggested books:

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

Suggested reference books

1. Principles of Database and Knowledge – Base Systems, Vol 1 by J. D. Ullman, Computer Science Press.
2. Fundamentals of Database Systems, 5th Edition by R. Elmasri and S. Navathe, Pearson Education
3. 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.

Programming for Data Science & AIML

Course code	PCC-CSE-250G				
Category	Professional Core Course				
Course title	Programming for Data Science & AIML				
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				

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 concepts and usage of NumPy and Pandas package for numerical data calculations in Python.
- To understand concepts and applications of various data visualization tools of Python on real world data.
- To understand and implement the Machine Learning Concepts in Python.

Unit 1

Overview of Python Programming Concepts: The concept of data types; variables, assignments; numerical types; operators and expressions; Control Structures; String manipulations; File Handling – creating, reading/writing text/number files; Dictionaries; Functions; OOPs Concepts

Unit 2

Introduction to Numpy - Creation on Array ,Array generation from Uniform distribution, Random array generation, reshaping, maximum and minimum, reshaping, Arithmetic operations, Mathematical functions, Bracket Indexing and Selection, Broadcasting, Indexing a 2D array (matrices);

Data Manipulation with Pandas -Creating a Series - from lists, arrays and dictionaries, Storing data in series from intrinsic sources, Creating Data Frames, Imputation, Grouping and aggregation, Merging, Joining, Concatenation, Find Null Values or Check for Null Values, Reading data from csv, txt, excel, web.

Unit 3

Introduction to Visualization - Installing and setting up visualization libraries, Canvas and Axes, Subplots, Common plots – scatter, histogram, boxplot, Logarithmic scale, Placement of ticks and custom tick labels, Pandas Viz, Style Sheets, Plot type, Area, Barplots, Histograms, Line Plots, Scatter Plots, BoxPlots, Hexagonal Bin Plot, Kernel Density Estimation plot (KDE), Distribution Plots, Categorical Data Plots, Combining Categorical Plots, Matrix Plots, Regression Plots, Grids; Python Visualizations toolkits/libraries.

Unit4

Introduction to Machine Learning with SciKit-Learn & PyTorch– Data Representation and basic functions- Estimator, parameters & model validation, Model Selection, Curve, Grid search, Feature engineering, Naive Bayes Classification, Linear regression, SVM etc; Overview of other Python ML/Deep Learning toolkits/Libraries.

Introduction to NLP with NLTK and its functions, modules like speech tagging, tokenization, parsing, segmentation, recognition , cleaning & normalization of text etc; Overview of other Python NLP toolkits/Libraries.

Course outcomes

- Understand and implement the basics of programming in Python.
- Apply the Numpy package for numerical calculations in Python.
- Apply Pandas package for loading and preprocessing data in Python.
- Implement various data visualization tools of Python on real world data.
- Understand and implement the Machine Learning Concepts in Python.

Textbooks:

1. Charles Dierbach., *Introduction to Python using Computer Science*, Wiley Publications, Second Edition, 2015
2. Mark Lutz , *Learning Python*, O'Reilly publications , Fifth Edition, 2015
3. Jake Vandar Plas, Python Data Science Handbook, O'Reilly , 2016

Reference Books:

Paul Barry, *Head First Python*, Orielly Publications, Second Edition, 2010

Reference Websites: (nptel, swayam, coursera, edx, udemy, official documentation weblink)

https://swayam.gov.in/nd1_noc19_cs59/preview

https://www.python.org/

https://www.datacamp.com/

Operating System

Course code	PCC-CSE-206G				
Category	Professional Core Course				
Course title	Principles of Operating System				
Scheme and Credits	L	T	P	Credits	
	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, and 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 with Java

Course code	PCC-CSE-252G				
Category	Professional Core Course				
Course title	Object Oriented Programming with Java				
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				

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. Understand the basic object oriented programming concepts and apply them in problem solving.
2. Illustrate inheritance concepts for reusing the program.
3. Demonstrate on the multi-tasking by using multiple threads.
4. Develop data-centric applications using JDBC and understand the basics of java console and GUI based programming.

Unit-I

OOPS CONCEPTS AND JAVA PROGRAMMING OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object oriented programming paradigm.

Java programming: History of java, comments data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, jump statements, simple java standalone programs, arrays, console input and output, formatting output, constructors ,methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, exploring string class.

Unit-II

MULTIPLE INHERITANCE ,INTERFACES AND PACKAGES - Inheritance: Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: dynamic binding, method overriding, abstract classes and methods; Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface; Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

Unit-III

EXCEPTION HANDLING AND MULTITHREADING-Exception Handling: Benefits of exception handling, the classification of exceptions , exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.

MULTITHREADING-Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.

Unit-IV

FILES AND CONNECTING TO DATABASE- Files: streams, byte streams, character stream, text input/output, binary input/output, random access file operations, file management using file class: Connecting to Database, querying a database and processing the results, updating data with JDBC.

GUI PROGRAMMING AND APPLETS- GUI Programming with Java: The AWT class hierarchy, introduction to swing, swings Vs AWT, hierarchy for swing components. Containers: J Frame, J Applet, J Dialog, J Panel, overview of some swing components: J Button, J Label, J Text Field, J Text Area, simple applications. Layout management: Layout manager types, border, grid and flow. Applets: Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets.

Text Books:

1. Herbert Schildt and Dale Skrien,"Java Fundamentals – A comprehensive Introduction", McGraw Hill, 1st Edition, 2013.
2. Herbert Schildt, "Java the complete reference", Mc Graw Hill, Osborne, 7th Edition, 2011.
3. T. Budd, "Understanding Object- Oriented Programming with Java", Pearson Education, Updated Edition (New Java 2 Coverage), 1999.

Reference Books:

1. P. J. Dietel and H. M. Dietel, "Java How to program", Prentice Hall, 6th Edition, 2005.
2. P. Radha Krishna, "Object Oriented programming through Java", CRC Press, 1st Edition, 2007.
3. S. Malhotra and S. Choudhary, "Programming in Java", Oxford University Press, 2nd Edition, 2014.

Web References:

1. http://java.sun.com
2. http://www.oracle.com/technetwork/java/index.html)
3. http://java.sun.com/javase
4. http://www.oracle.com/technetwork/java/javase/overview/index.html
5. http://download.oracle.com/javase/7/docs/api/index.html

E-Text Books:

1. https://cse.iitkgp.ac.in/~dsamanta/java/index.htm, E-book on OOPs using Java by Dr. Debasis
2. http://docs.oracle.com/javase/tutorial/
3. https://www.iiti.ac.in/people/~tanimad/JavaTheCompleteReference.pdf
4. https://www.codejava.net/books/4-best-free-java-e-books-for-beginners

COURSE OUTCOMES (COs):

Use object oriented programming concepts to solve real world problems.

ORGANIZATIONAL BEHAVIOUR

Course code	HSMC-02G				
Category	Humanities/ Social Sciences/ Management				
Course title	Organizational Behaviour				
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				

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: 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.

UNIT 1

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

UNIT 2

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

UNIT 3

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

UNIT 4

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

Suggested Text books:

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

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

Environmental Sciences

Course code	MC-106G				
Category	Mandatory Course				
Course title	Environmental Sciences				
Scheme and Credits	L	T	P	Credits	
	3	0	1	0	
Branches (B. Tech.)	Common For All Branches				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

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

Unit-2 Natural Resources (7 Lectures): Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and over-exploitation: deforestation, case studies. Timber extraction, mining dams and their effects on forests and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources: World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Water logging, salinity, case studies.
e) Energy resources: Growing energy needs; renewable and non-renewable energy sources, use of alternate energy sources, case studies.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
g) Role of an individual in conservation of natural resources.
h) Equitable use of resources for sustainable lifestyles.

Unit-3 Ecosystems (6 lectures):

a) Producers, consumers and decomposers.
b) Energy flow in the ecosystem.
c) Ecological succession.
d) Food chains, food webs and ecological pyramids.
e) Introduction, types, characteristic features, structure and function of the following eco-system :
f) Forest ecosystem.
g) Grassland ecosystem.
h) Desert ecosystem.
i) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-4 Biodiversity and its conservation (8 lectures):

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

Unit-5 Environmental pollution (8 lectures): Definition, causes, effects and control measures of:

a) Air pollution.
b) Water pollution
c) Soil pollution
d) Marine pollution
e) Noise pollution
f) Thermal pollution
g) Nuclear hazards
    * Solids waste management: causes, effects and control measures of urban and industrial wastes.
    * Role of an individual in prevention of pollution.
    * Pollution case studies.
    * Disaster management: floods, earthquake, cyclone and landslides.

Unit-6 Social issues and the Environment (7 lectures):

- From unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people: its problems and concerns case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- 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.

Unit-7 (6 lectures)
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.

Unit-8 Field Work (Field work equal to 10 lecture hours):

- Visit to a local area to document environmental assets - river/forest/grassland/hill/mountain.
- Visit to a local polluted site-urban/Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems- pond, river, hill slopes, etc.

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail: mapin@icenet.net (R).
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc. Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, WileyEastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.

9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural HistorySociety, Bombay(R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-Science Publications (TB). 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.

The scheme of the paper will be under:

The subject of Environmental Studies will be included as a qualifying paper in all UG Courses and the students will be required to qualify the same otherwise the final result will not be declared and degree will not be awarded.
The duration of the course will be 40 lectures. The examination will be conducted along with the semester examinations.

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

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

Instructions for Examiners :

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

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

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

Fundamentals of AIML

Course code	PCC-CSE-254G				
Category	Professional Core Course				
Course title	Fundamentals of AIML				
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				

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.

Learning & Course Outcomes:

On completion of this course, the students are expected to -
1. Understand the very basics and Uses of Artificial Intelligence (AI)
2. Understand the basics and uses of Machine Learning (ML)
3. Understand the Application of AI by domain and its current research trends.
4. Understand the societal impact of AIML, explainable AI and data analytics

UNIT – I

Introduction to AI: What is AI, Turing test, cognitive modeling approach, law of thoughts, the relational agent approach, the underlying assumptions about intelligence, techniques required to solve AI problems, level of details required to model human intelligence, successfully building an intelligent problem, history of AI

UNIT – II

Introduction to Machine Learning: What is Machine Learning, Learning from Data, History of Machine Learning, Big Data for Machine Learning, Leveraging Machine Learning, Descriptive vs Predictive Analytics, Machine Learning and Statistics, Artificial Intelligence and Machine Learning, Types of Machine Learning – Supervised, Unsupervised, Semi-supervised, Reinforcement Learning, Types of Machine Learning Algorithms, Classification vs Regression Problem, Bayesian, Clustering, Decision Tree, Dimensionality Reduction, Neural Network and Deep Learning, Training machine learning systems

UNIT – III

AI Research Trends: Research trends in machine learning, deep learning, reinforcement learning, robotics, computer vision, natural language processing, collaborative systems, algorithmic game theory, internet of things (Io T), neuromorphic computing

Applications of AI by domain: Transportation, home/service robots, healthcare, education, low- resource communities, public safety and security, employment and workplace, entertainment, finance, banking and insurance

UNIT – IV

Role of Artificial Intelligence in Society: Societal challenges AI presents, Ethical and Societal implications, policy and law for AI, fostering dialogue, sharing of best practices

Malicious Use of AI: Prevention and Mitigation: Security relevant properties of AI, Security domains and scenarios: digital security, physical security, political security, factors affecting the equilibrium of AI and security

Explainable AI: Introduction to explainable AI, why explainable AI, interpretability and explain ability, methods of interpretability and explain ability

Introduction to Data Analytics: Working with Formula and Functions, Introduction to Charts, Logical functions using Excel, Analyzing Data with Excel.

Reference Books:

1. Artificial Intelligence 3e: A Modern Approach Paperback – By Stuart J Russell & Peter Norvig; Publisher – Pearson
2. Artificial Intelligence Third Edition By Kevin Knight, Elaine Rich, B. Nair – Mc Graw Hill
3. Artificial Intelligence Third Edition By Patrick Henry Winston – Addison-Wesley Publishing Company
4. Machine Learning using Pytho, U Dinesh Kumar, Manaranjan Pradhan, John Wiley & Sons.
5. A Classical Approach to Artificial Intelligence, M. C. Trivedi, Khanna Publishing House.
6. Machine Learning, V. K. Jain, Khanna Publishing House.
7. Advanced Data Analytics Using Python: With Machine Learning, Deep Learning, Sayan Mukhopadhyay, Apress.
8. Machine Learning for Absolute Beginners: A Plain English Introduction, 2nd ed., Oliver Theobal
9. Big Data and Analytics, S. Acharya, S. Chellappan, Wiley Publication.
10. Introduction to Machine Learning, Jeeva Jose, Khanna Publishing House.

Operating System Lab

Course code	LC-CSE-212G			
Category	Laboratory Course			
Course title	Operating System Lab			
Scheme and Credits	L	T	P	Credits
	0	0	4	2
Branches (B. Tech.)	Computer Science and Engineering			
Class work	25 Marks			
Exam	25 Marks			
Total	50 Marks			
Duration of Exam	03 Hours			

Contents:

1. Introduction to UNIX File System.
2. File and Directory Related Commands in UNIX.
3. Essential UNIX Commands for working in UNIX environment.
4. I/O Redirection and Piping
5. Introduction to VI Editors.
6. Introduction of Processes in UNIX
7. Communication in UNIX and AWK.
8. Introduction of the concept of Shell Scripting.
9. Decision and Iterative Statements in Shell Scripting.
10. Writing the Shall Scripts for unknown problems.

Suggested Books:

1. UNIX Shell Programming by Yashavant Kanetkar.
2. UNIX Concepts and Applications by Sumitabha Das

Course Outcomes.

Co1: Understand the structure and architectural components of UNIX Operating System to analyze and design the problem. Moreover, students would be able to know the Basic Introduction of UNIX Operating System.

Co2: Basic Introduction of UNIX Commands that are used for operating the UNIX.

Co3: Introduction of Shell Scripting and VI Editor.so that the students get familiar with writing the UNIX scripts in UNIX editor.

Co4: Students will establish themselves as effective professionals by solving real problems with UNIX Shell Scripting knowledge and with attention to teamwork, critical thinking and problem solving skills by Writing Shell Scrips of unknown problems

Object Oriented Programming LAB

Course code	LC-CSE-256G				
Category	Lab Course				
Course title	Object Oriented Programming LAB				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

Tentative List of Experiments:

1. Program to define a structure of a basic JAVA program
2. Program to define the data types, variable, operators, arrays and control structures.
3. Program to define class and constructors. Demonstrate constructors.
4. Program to define class, methods and objects. Demonstrate method overloading.
5. Program to define inheritance and show method overriding.
6. Program to demonstrate Packages.
7. Program to demonstrate Exception Handling.
8. Program to demonstrate Multithreading.
9. Program to demonstrate I/O operations.
10. Program to demonstrate Network Programming.
11. Program to demonstrate Applet structure and event handling.
12. Program to demonstrate Layout managers.

NOTE: More programs related to the course contents of Object Oriented Programming using Java can be designed and developed by the subject faculty.

Programming for Data Science & AIML LAB

Course code	LC-CSE-258G				
Category	Laboratory Course				
Course title	Programming for Data Science & AIML LAB				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

Tentative List of Experiments:

1. Python program to display details about the operating system, working directory, files And directories in the current directory, lists the files and all directories, scan and classify them as directories and files
2. Python program to convert an array to an array of machine values and vice versa
3. Python program to get information about the file pertaining to the file mode and to get time values with components using local time and gm time.
4. Python program to connect to Google using socket programming
5. Python program to perform Array operations using Numpy package
6. Python program to perform Data Manipulation operations using Pandas package.
7. Python program to display multiple types of charts using Matplotlib package
8. Python program to perform File Operation on Excel Data Set
9. Python program to implement with Python Sci Kit-Learn & NLTK.
10. Python program to implement with Python NLTK/Spicy/Py NLPI.

NOTE: More programs related to the course contents of Object Programming for Data Science & AIML can be designed and developed by the subject faculty.

Database Management System Lab

Course code	LC-CSE-209G			
Category	Laboratory Course			
Course title	Database Management System Lab			
Scheme and Credits	L	T	P	Credits
	0	0	4	2
Branches (B. Tech.)	Computer Science and Engineering			
Class work	25 Marks			
Exam	25 Marks			
Total	50 Marks			
Duration of Exam	03 Hours			

Course Objectives:

- Keep abreast of current developments to continue their own professional development
- To engage themselves in lifelong learning of Database management systems theories and technologies this enables them to purse higher studies.
- To interact professionally with colleagues or clients located abroad and the ability to overcome challenges that arises from geographic distance, cultural differences, and multiple languages in the context of computing.
- Develop team spirit, effective work habits, and professional attitude in written and oral forms, towards the development of database applications.

Contents:

i. Creation of a database and writing SQL queries to retrieve information from the database.
ii. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
iii. Creation of Views, Synonyms, Sequence, Indexes, Save point.
ii. Creating an Employee database to set various constraints.
iii. Creating relationship between the databases.
iv. Study of PL/SQL block.
v. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
vi. Write a PL/SQL block that handles all types of exceptions.
vii. Creation of Procedures.
viii. Creation of database triggers and functions
ix. 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