2nd Semester

CSE-1201: Discrete Mathematics [3.0 credits, 45 Hours Lecture]

Set theory; Relations; Functions; Graph theory; Propositional calculus and predicate calculus; Mathematical reasoning: induction, contradiction and recursion; counting; Principles of inclusion and exclusion; Recurrence relations; Algebraic structures: rings and groups.

CSE-1202: Programming Fundamentals Lab II [1.5 credits, 45 Hours Lecture]

Advance C and C++ with object oriented concept.

PHY-1203: Physics [3.0 credits, 45 Hours Lecture]

Heat and Thermodynamics: Principle of temperature measurements: platinum resistance thermometer, thermo-electric thermometer, pyrometer; Kinetic theory of gases: Maxwell's distribution of molecular speeds, mean free path, equipartition of energy, Brownian motion, Van der Waal's equation of state, review of the First Law of thermodynamics and its application, reversible and irreversible processes, Second Law of thermodynamics, Carnot cycle; Efficiency of heat engines, Carnot's Theorem, entropy and disorder, thermodynamic functions, Maxwell relations, Clausius-Clapeyron Equation, Gibbs Phase Rule, Third Law of thermodynamics.
Structure of Matter: Crystalline and non-crystalline solids, single crystal and polycrystal solids, unit cell, crystal systems, co-ordinations number, crystal planes and directions, sodium chloride and CsCl structure, packing factor, Miller indices, relation between interplanar spacing and Miller indices, Bragg's Law, methods of determination of interplanar spacing

from diffraction patterns; Defects in solids: point defects, line defects; Bonds in solids, inter-atomic distances, calculation of cohesive and bonding energy; Introduction to band theory: distinction between metal, semiconductor and insulator.
Waves and Oscillations: Differential equation of a simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations, Lissajous' figures, spring-mass system, calculation of time period of torsional pendulum, damped oscillation, determination of damping co-efficient, forced oscillation, resonance, two-body oscillations, Reduced mass, differential equation of a progressive wave, power and intensity of wave motion, stationary wave, group velocity and phase velocity, architectural acoustics, reverberation and Sabine's formula.
Physical Optics: Theories of light; Interference of light, Young's double slit experiment; Displacements of fringes and its uses; Fresnel Bi-prism, interference at wedge shaped films, Newton's rings, interferometers; Diffraction of light: Fresnel and Fraunhoffer diffraction, diffraction by single slit, diffraction from a circular aperture, resolving power of optical instruments, diffraction at double slit & N-slits-diffraction grating; Polarization: production and analysis of polarized light, Brewster's law, Malus law, Polarization by double refraction, retardation plates, Nicol prism, optical activity, polarimeters, polaroid.

PHY-1204: Physics Lab. [1.5 credits, 45 Hours Lecture]

Laboratory works based on PHY -1203.

EEE-1205: Introduction to Electrical Engineering [3.0 credits, 45 Hours Lecture]

Fundamental electrical concepts and measuring units. Direct current: voltage, current, resistance and power. Laws of electrical circuits and methods of network analysis; Introduction to magnetic circuits.
Alternating current: instantaneous and r.m.s. current, voltage and power,

average power for various combinations of R, L and C circuits, phasor representation of sinusoidal quantities.

EEE-1206: Introduction to Electrical Engineering Lab. [1.5 credits, 45 Hours Lecture]

Laboratory works based on EEE-1205.

EEE-1207: Basic Mechanical Engineering [2.0 credits, 30 Hours Lecture]

Sources of energy: conventional and renewable; Introduction to IC engines, Refrigeration and Air conditioning systems. Statics of particles and rigid bodies; Forces in trusses and frames; Relative motion; Kinematics of particles: Newton's Second Law of Motion; Kinematics of rigid bodies.
Introduction to Robotics; Plane, rotational and spatial motion with applications to manipulators; Geometric configurations: structural elements, linkage, arms and grippers; Motion characteristics.

EEE-1208: Mechanical Engineering Drawing [1.5 credits, 45 Hours Lecture]

Introduction; Instruments and their uses; First and third angle projections; Orthographic drawings; Isometric views; Missing lines and views; Sectional views and conventional practices; Auxiliary views.

MATH-1209: Integral Calculus, Ordinary and Partial Differential Equations, and Series Solutions
[3.0 credits, 45 Hours Lecture]

Integral Calculus: Definitions of integration; Integration by the method of substitutions; Integration by parts; Standard integrals; Integration by the method of successive reduction; Definite integrals and its properties and use in summing series; Walli formula, Improper integrals, Beta function and Gamma function; Area under a plane curve in cartesian and polar co-ordinates; Area of the region enclosed by two curves in cartesian and polar co-ordinates; Trapezoidal rule, Simpson rule. Arc lengths of curves in cartesian and polar co-ordinates, parametric and pedal equations; Intrinsic equation; Volume of solids of revolution; Volume of hollow solids of revolution by shell method. Area of surface of revolution; Jacobian, multiple integrals and their application.
Ordinary Differential Equation (ODE): Degree and order of ordinary differential equations; Formation of differential equations; Solution of first order differential equations by various methods; Solution of first order but higher degree ordinary differential equations; Solution of general linear equations of second and higher orders with constant coefficients; Solution of homogeneous linear equations and its applications; Solution of differential equations of higher order when dependent and independent variables are absent; Solution of differential equation by the method based on factorization of operators.
Partial Differential Equations (PDE): Four rules for solving simultaneous equations of the form; Lagrangeâ€™s method of solving PDE of order one; Integral surfaces passing through a given curve; Nonlinear PDE of order one (complete, particular, singular and general integrals): standard forms f(p,q) = 0, z = px + qy + f(p,q), f(p,q,z) = 0, fÂ1(x,p) = f2(y, q); Charpit method; Second order PDE: its nomenclature and classifications to canonical (standard)- parabolic, elliptic, hyperbolic; Solution by separation of variables. Linear PDE with constant coefficients.
Series Solution: Solution of differential equations in series by the

method of Frobenius; Bessel functions, Legendre polynomials and their properties.