First Year First Semester

**Hum/T/A   HUMANITIES-A**

English - 2 Pds/week - 50 Marks  
Sociology - 2 Pds/week - 50 Marks

**HUMANITIES**

1. Basic writing skills  
2. Report, Covering Letter & Curriculum-Vitae writing  
3. Reading and Comprehension  
4. Selected Short Stories

Text Book: ENGLISH FOR ALL

**SOCILOGY**

1. Sociology: Nature and scope of Sociology - Sociology and other Social Sciences - Sociological Perspectives and explanation of Social issues  
2. Society and Technology: Impact of Technology on the Society - A case study  
3. Social Stratification: Systems of Social Stratification - determinants of Social Stratification - Functionalist, Conflict and Elitist perspectives on Social Stratification  
5. Development - Conceptions of and approaches to development - The Roles of State and the Market in the Development  
7. Industrial Policy and Technological change in India - The nature and Role of the State in India  
8. Technology Transfer: The Concept and Types of Technology Transfer-Dynamics of Technology Transfer  
9. Technology Assessment: The Concept - Steps involved in Technology Assessment  
10. Environment: Sociological Perspectives on Environment - Environmental Tradition and values in ancient India  
12. Technological Problems and the Modern Society: Selected Case Studies - Electric Power Crisis, Industrial and/or Environmental Disaster, or Nuclear Accident.

**IEBE/PE/T/112   ENGINEERING MECHANICS-I**

Basic Units and dimensions, Introduction to vector algebra, vector calculus, and directed quantities, Free body diagram, Equilibrium equations, friction forces and application of
friction forces, Collar, screw and belt friction, Properties of surfaces, Principle of virtual work, Distributed force and center of gravity. Kinematics of rectilinear motion.

**IEBE/Chem/T/113 CHEMISTRY-I**

The nature of chemical bonding-molecules and chemical aggregates; ionic and molecular crystals; crystal structure, crystal defects; metallic bond; metallic properties; semiconductors; phase equilibrium; alloys and inter-metallic components; Electrochemistry - electrolytic dissociation & conduction; ionic equilibrium; electrochemical cells; acids and bases; pH and indicators; Thermo chemistry and Chemical thermodynamics - definitions and concepts; nature of work and heat; first law of thermodynamics, enthalpy, ideal gas calculations; heat of reactions; heat of formation; bond energies. Second law of thermodynamics; entropy and spontaneity; entropy and disorder; entropy calculation, free energy; Carbon compounds - their reaction and reaction mechanisms; breaking and making of bonds; reaction intermediate; classification of reagents, types of organic reactions, reactions of hydrocarbons; reactions of functional groups; synthesis of carbon compounds – inter conversion of functional groups; model synthesis. Synthesis of chemicals from petroleum and coal, synthesis of physiologically useful compounds, photochemical synthesis, synthesis using enzymes.

**IEBE/Math/T/114 MATHEMATICS-IJ**


**IEBE/Math/T/115 MATHEMATICS-IIJ**

line. Shortest distance between two skew lines. Products of three or more vectors.
Volume of a tetrahedron, Equation of sphere, cylinder and cone.
Application to differential geometry – plane curves, skew curves, principal triad, tangent, normal and binormal. Serret-Frenet formulae on curvature. Normal plane and the osculating plane.
Complex numbers, De Moivre’s theorem. Exponential values of sine and cosine.
Hyperbolic functions.

**Ph/T/1A PHYSICS-IA**

1. Use of vectors in particle mechanics, Unit vectors in spherical and cylindrical polar coordinates, Conservative vector fields and their potential functions - gravitational and electrostatic examples, Gradient of a scalar field, Equipotentials, States of equilibrium, Work and Energy, Conservation of energy, Motion in a central field and conservation of angular momentum.
2. Angular momentum of a system of particles, Torque, Moment of inertia, Parallel and Perpendicular axes theorem, Calculation of moment of inertia for (i) thin rod, (ii) disc, (iii) cylinder and (iv) sphere. Rotational dynamics of rigid body (simple cases).
3. Motion of fluids, Bernoulli’s equation and its applications, motion of viscous fluids - Poiseuille's equation.
4. Simple harmonic motion, Composition of simple harmonic motion, Forced vibration and resonance, Wave equation in one dimension and travelling wave solution, Standing waves, Wave velocity and group velocity.
5. Assumption for the kinetic theory of gases, Expression for pressure, Significance of temperature, Deduction of gas laws, Qualitative idea of (i) Maxwell's velocity distribution. (ii) degrees of freedom and equipartition of energy, Specific heat of gases at constant volume and constant pressure.
6. Equation of state of a gas, Andrew's experiment, Qualitative discussion on van der Waal's equation of state, Critical constants, Law of corresponding states.
7. Macroscopic and microscopic description, Thermal equilibrium, Zeroth law of thermodynamics, Concept of international practical temperature scale, Heat and Work, First law of thermodynamics and some applications, Reversible and irreversible processes, Carnot cycle, Second law of thermodynamics, Concept of entropy, Thermodynamic relations.

**Ph/S/1 PHYSICS LABORATORY-I**

(Selected Experiments from the following)

1. Determination of Galvanometer resistance by half - deflection method.
3. To find high resistance by Galvanometer deflection method.
4. To measure mechanical equivalent of heat, J by electrical method (Joule's) using copper calorimeter (radiation correction to be done).
5. To compare to low resistance by drop of potential method.
6. To determine resistance per unit length of wire by using Carey Foster bridge.
7. To estimate strength of a current by using copper voltmeter.
8. a) To compare the EMF's of two cells by using a potentiometer
b) To measure current by using a potentiometer
9. To measure the horizontal components of earth's magnetic field intensity using
deflection and vibrating magnetometers.

10. Determination of co efficient of linear expansion by optical lever method.
12. To determine co-efficient of viscosity by Capillary flow method.
14. To draw mutual and anode characteristics of triode and hence too fine Rp, µ, and gm
15. To draw the transistor characteristics (NPN/PNP) in the given configuration and hence to find hi, hf
16. Determination of refractive index of the material of the glass prism by prism spectrometer (for at least two ?s)
17. Study of collisions in one dimension using a linear air track
18. Use of an air track for obtaining potential energy curves for magnetic interactions.
19. Study of oscillations under potential wells of various shapes using an air track.
20. Experiments on diffraction in single slit, double slit and plane grating using He- Ne laser
   a) To find the wavelength of a monochromatic light by single slit.
   b) To find slit separation of a double slit.
   c) To find number of rulings per cm of a plane grating
21. To find the wavelength of a monochromatic light by Newton rings.
22. Fabry-Perot interferometry: To find out separation of wavelength of sodium D1 & D2 lines.

IEBE/Chem/S/112  CHEMISTRY LABORATORY-I

Experiments to supplement the theoretical paper on "Chemistry-I".

IEBE/PE/S/113  ENGINEERING DRAWING-I


IEBE/PE/S/114  WORKSHOP-I

Carpentry shop.

First Year Second Semester

IEBE/PE/T/121  ENGINEERING MECHANICS-II

Curvilinear motion, projectile, relative motion, Newton's laws of motions, inertia force, central force motion, momentum and impulse, work, power & energy, impact, undamped free vibration of spring-mass system with single degree of freedom.

IEBE/PE/T/122  APPLIED THERMODYNAMICS

IEBE/Chem/T/123 CHEMISTRY-II

Chemical fuels - fossil fuels (coal and petroleum); Product gas, water gas- Blue water gas, Nuclear fuels, binding energy, fission and fusion, controlled fission, power reactor, sources of nuclear fuels, Explosives and rocket fuels, water and waste water chemistry; Ceramics - glass, refractories, abrasives, glazes and enamels, superconductors, cement and lime; Extraction of metals -occurrence, mining; ore dressing, metal extraction - pyrometallurgy, hydrometallurgy and electrometallurgy, metal clusters; catalysis, Iron and Steel, ferrous alloys; non-ferrous alloys; heat treatment of metals and alloys. Metallic corrosion and its prevention. Polymer and Lubricants - Synthesis of polymers.

IEBE/Math/T/124 MATHEMATICS-IIIJ

Sequence and infinite series: Convergence and divergence; ODE: 1st order exact equation, 1st order linear equation. Linear Differential equations of second and higher orders with constant coefficients; Euler – Cauchy equations; Variation of parameters; Ordinary point and regular singularity of a second order differential equation; Series solution; Bessel functions; Legendre, Laguerre and Hermite Polynomials; Orthogonal properties.
Fourier Series: Periodic function; Trigonometric series in sines and cosines; Euler formulae; Dirichlet’s conditions; Even and odd functions; Half range cosine and sine series.
Partial differential equations: Solution of one dimensional wave and diffusion equations and Laplace is equation in two dimensions two by the method of separation of variables.

IEBE/CSE/T/125 NUMERICAL METHODS AND COMPUTER PROGRAMMING

Approximation in numerical computation; Truncation and rounding errors; Numerical solution of a system of linear equations; Matrix Inversion; Iterative methods, Newton Raphson method; Interpolation, numerical integration; Numerical solution of ordinary differential equation; Introduction to Computer system.

Program Logic; Introduction to the programming language C; constants, variables, expressions, iteration and recursion, function, array, scope rules, structure and pointers. Files and file handling.

Ph/T/2A PHYSICS-IIA
1. Electric potential and intensity, Flux of electric field, Gauss's law and its application to problems with spherical and cylindrical symmetry, Capacitance- parallel plate and spherical condensers, Energy of a capacitor, Energy density of an electric field, Potential and field due to a dipole, Dielectric polarisation, Electric displacement vector, dielectric susceptibility.
2. Biot-Savart law and Ampere's law in magnetostatics, Calculation of magnetic field in simple situations like (i) straight wire (ii) circular wire (at a point on the symmetry axis) and (iii) Solenoid.

**Ph/S/2** PHYSICS LABORATORY-II
(Selected Experiments from the following)

1. Determination of Galvanometer resistance by half - deflection method.
3. To find high resistance by Galvanometer deflection method.
4. To measure mechanical equivalent of heat, J by electrical method (Joule's) using copper calorimeter (radiation correction to be done).
5. To compare to low resistance by drop of potential method.
6. To determine resistance per unit length of wire by using Carey Foster bridge.
7. To estimate strength of a current by using copper voltmeter.
8. a) To compare the EMF's of two cells by using a potentiometer
b) To measure current by using a potentiometer
9. To measure the horizontal components of earth's magnetic field intensity using deflection and vibrating magnetometers.
10. Determination of co efficient of linear expansion by optical lever method.
12. To determine co-efficient of viscosity by Capillary flow method.
14. To draw mutual and anode characteristics of triode and hence too fine Rp, µ, and gm
15. To draw the transistor characteristics (NPN/PNP) in the given configuration and hence to find hi, hf
16. Determination of refractive index of the material of the glass prism by prism spectrometer (for at least two ?s)
17. Study of collisions in one dimension using a linear air track
18. Use of an air track for obtaining potential energy curves for magnetic interactions.
19. Study of oscillations under potential wells of various shapes using an air track.
20. Experiments on diffraction in single slit, double slit and plane grating using He- Ne
laser

a) To find the wavelength of a monochromatic light by single slit.
b) To find slit separation of a double slit.
c) To find number of rulings per cm of a plane grating

21. To find the wavelength of a monochromatic light by Newton rings.
22. Fabry-Perot interferometry: To find out separation of wavelength of sodium D1 & D2 lines.

**IEBE/CSE/S/122 COMPUTER PROGRAMMING LABORATORY-I**

Programming in C: compilation of small programs involving expression evaluation; Usage of control structures; Programs to handle one and two dimensional arrays; Functions; Solving problems related to numerical methods: differential equations; numerical integration and other iterative methods.

**IEBE/Chem/S/123 CHEMISTRY LABORATORY-II**

Experiments as a sequence to the theoretical paper Chemistry-II.

**IEBE/PE/S/124 ENGINEERING DRAWING-II**

Advanced problems on projection drawing, sectional views & auxiliary views, screw threaded forms, bolts and nuts, studs & their uses, keys splines, etc. riveted and welded joints, pulleys, rigid coupling & joints for rods, pipes, etc. various types of lines & their projections, concepts of true length, intersection & development of common surfaces. Introduction to AUTO-CAD and its use in engineering drawing.