COURSES OF STUDY
for
B.Sc. (General) PART I Examination
(See page no. 1 for compulsory subjects)
Optional Subjects for B.Sc.(General) Part I Examination

PHYSICS (GENERAL)
Paper I

Time - 3 hours **Full Marks - 75**

Twelve questions to be set. Six to be answered (taking at least one from each group)

Group A
Relativity & Mechanics (Two questions to be set)

The Lorentz Transformations : Galilean Transformations, Newtonian relativity, Instances of their failure, Electromagnetism, Aberration of light, Michelson-Morley experiment, Einstein's basic postulates and geometric derivation of Lorentz Transformations; Length contraction, Simultaneity, Time dilation.

Relativistic dynamics : Variation of mass with velocity, Mass energy equivalence.

Group B
Mechanics of particles & continuous media
(Three questions to be set)

Generalised co-ordinates, Constraints (Holonomic, Non-holonomic). D'Alembert's principle and Lagrange's equations of motion, Hamilton's equation of motion and their simple applications.

Elastics constants for an isotropic solid, their inter-relation, torsion of a cylinder, bending of a beam.

Kinematics of moving fluids; equations of continuity, Euler's equation. Flow of incompressible and compressible fluids through a capillary tube.

Surface tension and surface energy, Molecular interpretation, pressure on a curved liquid surface.

Group C
Oscillations, Waves and Acoustics (Two questions to be set)

Free and damped oscillations in one dimension, critical damping. Forced oscillator with one degree of freedom, Resonance.

Fourier analysis; Fourier series and Fourier coeffecients, simple examples of rectangular, sawtooth wave and transverse vibration of strings.

The acoustics of halls, reverberation period, Sabine's formula.

Group D

Thermal Physics (Two questions to be set)

Maxwellian distribution of speeds in an ideal gas. Derivation of the distribution of speed and velocity and its experimental verification.

Real gas : vander waal's model; equation of state.

Mean free path, Transport of momentum (viscosity), Energy(thermal conduction) and matter (diffusion)

Group E

Thermodynamics (Three questions to be set)

The zeroth law; the first law, Carnot's theorem, the second law, Entropy as a thermodynamic variable; Principle of increase of entropy. Thermodynamic scale of temperature.

Thermodynamic relationship : Maxwell's equations and their applications.

Black body radiation : temperature radiation, Stefan - Boltzmann law, spectral distribution, Wien's displacement law, Rayleigh - Jeans law and the ultraviolet catastrophy. Planck's hypothesis, mean energy of an oscillator and Planck' law.

PHYSICS (GENERAL)

Practical

Time - 3 hours **Full Marks -25**

(One experiment to be performed in examination) (Expt-15,viva-6,NB-4)

The course shall include the following experiments

1. Kater's pendulum, precise setting and analysis.
2. Study of flexure of a bar.
3. Study of torsion of a wire; dependence on radius, length, torque and material (static method}
4. Study of torsion of wire or fibre (dynamic method).
5. Studying the fall of solids through a liquid.
6. Searl's method for Y, $\eta$and σ from a single set.
7. Study of dependence of period of oscillations of a spring or rubber band on mass and spring constant.
8. Study of transverse wave speed on a string; dependence on density and tension (sonometer)