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**COURSES OF STUDY**  
for  
**B.Sc. (Subsidiary) Part II Examination**

**PHYSICS (SUBSIDIARY)**  
**Paper II**

**Time - 3 hours**

**Full Marks - 75**

Twelve questions to be set. Six to be answered (taking at least one from group B and two from group A & C each)

**Group A**

**Optics (Four questions to be set)**

General theory of image formation : Cardinal points of an optical system, general relationship, thick lens and lens combinations.  
Interference of light : Division of wavefront and division of amplitude, Michelson Interferometer.  
Fresnel diffraction : Half-period zones, straight edge, explanation of rectilinear propagation of light.  
Fraunhofer diffraction : Diffraction at a slit.  
Diffraction at N Parallel slits, plane diffraction grating.  
Rayleigh criterion, resolving power of telescope.  
Dispersion and Scattering : Theory of dispersion of light, absorption bands and anomalous dispersion, Theory of Rayleigh Scattering.  
Purity of a spectral line, coherence length and coherence time, Einstein's A and B coefficients, coherence of induced emissions, Conditions for laser action, population inversion, Ruby Laser, He-Ne Laser.

**Group B**

**Electricity and Magnetism (Two questions to be set)**

Electric Field : Field due to quadrupole. Torque on a dipole in non-uniform fields.  
Potential energy of a system of charges.  
Diamagnetism, Paramagnetism due to free ions and conduction electrons, concept of domains and Ferromagnetism, Langevin's and Weiss theories, Curie's law.

**Current Electricity & Modern Physics (Four questions to be set)**

Alternating Currents : Skin effect for resistance at high frequencies, Complex impedance, reactance, impedances of LCR series and parallel circuits, resonance, Q factor, Power dissipation and Power factor, A.C. Bridges : Anderson's and DeSauty bridges.

Nuclear Models : Liquid drop model and mass formula, The shell model.

Radioactivity : Decay constant and half-life, Beta-decay, Fermi's theory, neutrino and anti-neutrino

Accelerators : Need for accelerators, cyclic accelerators, cyclotron, synchrocyclotron, quark hypothesis.

**PHYSICS (SUBSIDIARY)****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. Study of characteristics of a Ballistic galvanometer.
2. Study of magnetic field using a vibration magnetometer.
3. Obtaining the B-H curve of a ferromagnetic material (any method)
4. Low resistance measurement, C.F. Bridge or any other method.
5. Study of NAND and NOR circuits (discrete and integrated circuits)
6. Using an AC bridge to measure L or C.
7. Use of Newton's ring to determine the radii of curvature of surfaces