

**Veer Narmad South Gujarat University, Surat**  
**Syllabus for FYBSc (Only for Electronics)**  
**Subject: Physics For Electronics**  
**Semester I Paper – I [Effective from June 2011]**  
**(3 Credits Course - 3 Hours per Week)**

**UNIT –I: INVERSE SQUARE LAW FORCE**

**[Duration 15 Hours]**

Forces in the universe--gravitational field and potential-Electric field and potential-Gravitational field due to i) thin spherical shell ii) Solid sphere-Earth's gravitational field, escape and orbiting velocities-Existence of atmosphere around a planet gravitational self energy --electrostatic self energy-motion under force obeying inverse square law--Equivalent one body problem --motion under central forces-Some physical insights in to the nature of motion under central forces--trajectory of a particle and turning points--Kepler's laws-satellite motion.

**UNIT-II PROPERTIES OF MATTER**

**[Duration 15 Hours]**

Introductory, load, stress and strain ,Hooke's law, factors affecting elasticity., three type of elasticity, deformation of a cube-Bulk modulus, modulus of rigidity, Young's modulus, relation connecting elastic constants, Poission's ratio, relations for  $K$  &  $\eta$  in terms of Poission's ratio, limiting value of  $\sigma$  , twisting couple of cylinder, variation of stress in a twisted cylinder (or wire), torsional pendulum, determination of coefficient of rigidity ( $\eta$ ) for a wire by statistical method.

**UNIT-III ACOUSTICS**

**[Duration 15 Hours]**

Simple Harmonic vibration – Progressive waves – properties – Composition of two S.H.M. and beats – stationary waves – Properties. Melde's Experiment for the frequency of electrically maintained tuning fork – Transverse and longitudinal modes – acoustics – Intensity of Sound- Decibel and Bel, Loudness of Sound, Noise Pollution, Reverberation, Sabine's Formula (Derivation not required), Absorption Coefficient, Acoustics of Buildings, Acoustic Grating , Doppler effect..

**REFERENCE BOOKS**

1. Mechanics – Hans and Puri (2nd Edn) - T M H.
2. Elements of Properties of Matter by D.S. Mathur, 11 th ed.
3. Text Book of Sound – Brijlal. and N. Subramaniam - S Chand & Co
4. Properties of Matter and Acoustics by R.Murugesan & Kiruthiga Sivaprasath)
5. Mechanics by D S Mathur

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**UNIT-I OPTICS**

**[Duration 15 Hours]**

**Fermat's principle and its applications:** Introduction, Fermat's principle of least time, Fermat's principle of extremum path, rectilinear propagation of light, reversibility of light rays, laws of reflection, laws of refraction.

**Optical systems and cardinal points:** Introduction, cardinal points, principle points and principle planes, some remarkable feature of principle planes, focal point and focal planes, nodal points and nodal planes, cardinal points of a coaxial system of two thin lenses.

**Fibre optics:** Introduction, optical fibre, critical angle of propagation, modes of propagation, acceptance angle, fractional refractive index change, numerical aperture, types of optical fibres.

**UNIT II ELECTRICITY AND MAGNETISM**

**[Duration 15 Hours]**

**Magnetic properties of materials:** Electron theory of magnetism; dia, para, ferromagnetism; magnetic field B; magnetization M; magnetic field intensity H; magnetic susceptibility and magnetic permeability; magnetic materials and magnetization; magnetic hysteresis area of the hysteresis loop; determination of susceptibility: Guoy's method.

**Helmholtz equation of varying current:** Growth and decay of current in an inductive – resistive circuit, charging and discharging of a capacitor through a resistance, charging and discharging of a capacitor through an inductance.

**UNIT-III THERMAL PHYSICS**

**[Duration 15 Hours]**

**First law's of thermodynamics:** Temperature, the Zeroth law of thermodynamics, measuring temperature, thermal expansion, temperature and heat, the absorption of heat by solids and liquids, a closer look at heat and work, the first law of thermodynamics, some special cases of first law of thermodynamics, heat transfer mechanisms.

Pressure, temperature and RMS speed, translational kinetic energy, mean free path, the distribution of molecular speeds, the molar specific heats of an ideal gas, degrees of freedom and molar specific heats, a hint of quantum theory.

**REFERENCE BOOKS**

- 1 A text book of Optics by Brijlal, Subramanyam and Avadhanulu
3. Electricity and Magnetism – R. Murugesan
4. Electricity and Magnetism – D.N. Vasudeva
5. Electricity and Magnetism – Sehgal and Chopra
6. Fundamentals of physics by Halliday, Resnick and Walker, 8th ed.
7. Heat and Thermodynamics Brijlal and Subramaniam, S.Chand & Co, New Delhi 2004.

## **List of experiments**

### **Semester - I**

#### **Paper I**

1. To determine  $Y$ ,  $\eta$  and  $\sigma$  for a material of a given wire by Searle's dynamical method.
2. Determination of 'Y' of the material of a bar by the vibration method
3. Determination of Poisson's ratio for a rubber
4. Study of simple harmonic motion
5. Resonance tube
6. Verification of the laws of vibration of a string under tension (Melde's experiment)

#### **Paper II**

1. Cardinal points of a lens system
2. To study the variation of refractive index of the material of the prism with wavelength and to verify Cauchy's dispersion formula.
3. The susceptibility of a solid by Guoy's balance method.
4. Thermal conductivity of a bad conductor by Lee's method
- 5 To study the charging and discharging of a capacitor in an LC circuit
6. Study of magnetic field by solenoid.

### **REFERENCE BOOKS**

1. University Practical Physics by D.C Tayal , Himalayan Publishing House
2. Advanced Practical Physics For Students by Worsnop & Flint, Asia Publishing House