

Veer Narmad South Gujarat University, Surat

Syllabus for Core Course: F Y B Sc (Applied Physics)

Subject: MECHANICS & ACOUSTICS

Semester I Paper – I (Effective from the academic year (2012-13))

(2 Credits Course - 3 Hours per Week)

UNIT –I: NEWTONIAN GRAVITATION

[Duration 10 Hours]

Newton's law of gravitation, Gravitation and the principle of superposition, Gravitation near Earth's surface, Gravitation inside Earth, Gravitation potential energy, Planets and satellites: Kepler's laws, Satellites: orbits and energy, Einstein and Gravitation.

UNIT-II PROPERTIES OF MATTER

[Duration 10Hours]

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

UNIT-III ACOUSTICS

[Duration 10Hours]

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, Doppler effect.

Note: Illustrative problems on all the relevant topics should be covered.

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

Veer Narmad South Gujarat University, Surat

Syllabus for Core Course: F Y B Sc (Applied Physics)

Subject: OPTICS, ELECTRICITY AND MAGNETISM & HEAT

Semester I Paper – II (Effective from the academic year (2012-13)

(2 Credits Course - 3 Hours per Week)

UNIT-I OPTICS

[Duration 10 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, types of optical fibres.

UNIT II ELECTRICITY AND MAGNETISM

[Duration 10Hours]

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; 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.

UNIT-III THERMAL PHYSICS

[Duration 10Hours]

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. 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.

Note: Illustrative problems on all the relevant topics should be covered.

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 for F Y B Sc (Applied Physics)

Semester – I

Paper I

1. To determine Y , η and σ 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

Veer Narmad South Gujarat University, Surat

Syllabus for Core Course: F Y B Sc (Applied Physics)

Subject: FLUID MECHANICS & MODERN PHYSICS

Semester II Paper – I (Effective from the academic year (2012-13))

(2 Credits Course - 3 Hours per Week)

UNIT- I FLUID DYNAMICS AND STATISTICS [Duration 10 hrs]

What is a fluid? Density and Pressure – Fluids at rest – Measuring Pressure – The Mercury Barometer- The Open-Tube Manometer- Pascal's Principle -Demonstrating Pascal's Principle - Pascal's Principle and the Hydraulic Lever-Archimedes' Principle –Floating-Apparent Weight in a Fluid- Ideal Fluids in Motion – The Equation of Continuity –Bernoulli's Equation-Proof of Bernoulli's Equation-Venturimeter

UNIT II FLOW OF LIQUIDS-VISCOSITY& SURFACE TENSION [Duration 10 hrs]

Viscosity-Critical Velocity-Significance of Reynold's number-Poiseuille's equation for flow of a liquid through a horizontal capillary tube-Alternative deduction of Poiseuille's equation- Experimental determination of coefficient of viscosity for a liquid by Poiseuille's method-Motion in a viscous Medium-Stoke's Law-Determination of coefficient of viscosity of a liquid-Stoke's falling body Surface Tension-Explanation of Surface Tension-Units and Dimensions of Surface Tension-Pressure across a liquid surface-Angle of contact-Rise of a liquid in a capillary tube- Experimental Determination of Surface Tension (The Drop Weight Method, The Capillary Rise Method)

UNIT– III MODERN PHYSICS [Duration 10hrs]

Introduction, properties of X-rays, applications of x-rays, production of x-rays, intensity of X-rays: measurement, variation of X-ray intensity with wavelength, origin of continuous X-radiations, origin of characteristic X-ray lines, Mosley's work on X-ray spectra, diffraction of X-rays: Laue photographs, Bragg's X-ray spectrometer. Lasers and Laser Light, How Lasers Work. The He-Ne Gas Laser.

Note: Illustrative problems on all the relevant topics should be covered.

Reference books

1. Fundamentals of Physics by Halliday/Resnick and Jearl Walker 8th Edition
2. Elements of Properties of Matter by D S Mathur, 11th Ed
3. Atomic and Nuclear physics: Gupta and Ghosh, 2nd Ed
4. University physics by Sears & Zimansky.
5. University physics by Freedman
6. Berkeley physics course volume I.
7. Mechanics by D. S. Mathur
8. Mechanics by J. C. Upadhyay

Veer Narmad South Gujarat University, Surat

Syllabus for Core Course : B Sc (Applied Physics)

Subject: OPTICS & ELECTRICITY AND MAGNETISM

Semester II Paper – II (Effective from the academic year (2012-13))

(3 Credits Course - 3 Hours per Week)

UNIT- I OPTICS [Duration 10hrs]

Interference:- Thin film, plain parallel film, interference due to reflected light, conditions for maxima

and minima, interference due to transmitted light, Newton's ring, conditions for bright and dark rings,

circular fringes, radii of dark fringes, spacing between fringes, determination of wavelength of light, refractive index of liquid, Newton's ring in transmitted light.

Holography:- Introduction, principles of holography, recording of hologram, reconstruction of the image, important properties of hologram, advances-reflection of holography, volume holography, white light reflection holography, rainbow holography, applications.

UNIT II ELECTRICITY AND MAGNETISM [Duration 10 hrs]

Magnetic induction:- Definition, sources of magnetic induction \mathbf{B} , some properties of magnetic induction \mathbf{B} , Ampere's law, definition of Ampere, magnetic dipole.

Electrical Instruments:- Tangent galvanometer, D'Arsonval moving coil galvanometer, construction of pivoted moving coil galvanometer, merits and demerits, voltmeter, ammeter, multimeter.

UNIT-III THERMOELECTRICITY [Duration 10 hrs]

Introduction, Seebeck effect, the variation of Seebeck electromotive force with temperature, The Peltier effect, Explanation of Peltier effect, Seebeck and Peltier effect, Thomson effect, Explanation of Thomson effect.

Note: Illustrative problems on all the relevant topics should be covered.

Reference books

1. Optics by Subramaniam, Brijlal and Avadhnu, twenty third ed.
2. Electricity and magnetism by Rangwala and Mahajan
3. Electricity and magnetism by Sehgal, Chopra and Sehgal
4. Optic and atomic physics by D P Khandelwal
5. Electricity and magnetism by D N Vasudeva.

List of experiments for F Y B Sc (Applied Physics)

Semester – II

Group A

- 1 Measurement of Density and Archimedes' principle
- 2 Determination of Reynold's number
- 3 Determination of the viscosity of a viscous liquid by Stoke's method
- 4 To determine the surface tension of a liquid using single/double capillary
- 5 To determine the surface tension of a liquid by drop weight method
- 6 Study of divergence of a laser beam

Group B

- 1 Newton's rings
- 2 Liquid lens
- 3 Conversion of galvanometer to ammeter
- 4 Study of tangent galvanometer
- 5 Sensitivity of moving coil galvanometer
- 6 Thermocouple

REFERENCE BOOKS

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