VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

Syllabus in force from 2005 - 2006
F.Y.B.Sc.
Physics Paper - I

UNIT - I
MECHANICS

Rest and motion, reference frame, Newton's laws of motion and their limitations, inertial frame of reference, Applications of Newton's laws – projectile DSM : 2.1 to 2.5, 4.2

Rigid body- translational and rotational motion, torque, angular momentum, moment of inertia-radius of gyration, dimensions and units of moment of inertia analogous parameters in translational and rotational motion, general theorems on moment of inertia, calculation of moment of inertia, particular cases of moment of inertia. DSM: 10.1 to 10.9

UNIT - II
PROPERTIES OF MATTER:

Elastic modulli, Poisson's ratio, limiting values of Poisson's ratio, elastic constants and their relationships. Bending of beams and Cantilever DSM POM: 8.12 to 8.18, 8.29 and 8.30.

WAVE MOTION:

Wave motion, What propagates in wave motion?, Characteristics of wave motion, transverse wave motion, longitidunal wave motion, Definitions, relations between frequency and wavelength, properties of longitudinal progressive waves, equation of SH waves, differential equation of wave motion, particle velocity wave velocity, distribution of plane progressive waves, energy of progressive waves. Ref: SB(W&O): 4.1 to 4.8. 4.11 to 4.15.

UNIT - III
OSCILLATIONS:

Lissajous figures, composition of two S H M in a straight line, composition of two simple harmonic vibrations of equal time periods acting at right angles, composition of two simple harmonic motion at right angles to each other having time periods in the ratio 1:2, experimental methods for obtaining Lissajous figures, uses of Lissajous figures. Ref: SB(W&O): 2.1, 2.2, 2.4, 2.6, 2.8 and 2.9.

ULTRASONICS:

Ultrasonics, production of ultrasonic waves, detection of ultrasonic waves, applications of ultrasonic waves. Ref: SB(W&O):11.23 to 11.25, 11.27.

UNIT - IV

HEAT & THERMODYNAMICS:

Entropy and the second law of thermodynamics, entropy changes of a closed system during an irreversible process, entropy, change in entropy in a reversible process(Carnot's cycle), change in entropy in an irreversible process, third law of thermodynamics, temperature-entropy diagram, entropy of a perfect gas, zero point energy, negative temperatures. Ref: SB(H&T) – 6.42 to 6.51

UNIT - V

ATOMIC AND NUCLEAR PHYSICS:

Radioactivity: Soddy Fajan's displacement laws, Laws of radioactive disintegration, the mean life, laws of successive disintegration, radioactive dating, biological effects of nuclear radiations. Ref: RM – 31.29 to 31.31, 31.34 to 31.36

X-rays: introduction, production of X-rays, the absorption of X-rays,X-ray absorption edges, Bragg's law, the Bragg's X-ray Spectrometer, X-ray spectra, Characteristic X-ray spectrum, Moseley's law. Ref: RM – 7.1, 7.2, 7.4 to 7.7, 7.11 to 7.13

Note: Examples/problems of relevant topics in each unit should be covered.

REFERENCES :-

1. DSM : Mechanics by D S Mathur, S. Chand & Co.
2. DSM POM : Elements of properties of matter by D S Mathur. S. Chand & Co.
3. SB(W&O): Waves and oscillations by Subramanyam and Brijlal. Vikas Pb. House Pvt. Ltd. IInd Revised ed.
4. RM: Modern Physics by R Murugeshan, K Sivaprasath. S Chand & Co. XIIth Edition.
5. SB(H&T) Heat and Thermodynamics by Brijlal and Subrramanyam. S. Chand & Co.

ADDITIONAL REFERENCES :-

1. Fundamentals of Physics by Halliday, Resnick and Walker. J. Wiley & sons, Inc.
2. Mechanics by Zemanski and Sears. Addison – Wesley Pub. Co.
3. Concepts of Modern Physics by A. Beiser. TMH.
4. Modern Physics by S H Patil
5. GG: Atomic and Nuclear Physics by Gupta and Ghosh. Books & Allied(P) Ltd
6. Modern Physics by K Krane. J. Wiley & Sons.
7. Quantum Physics by Resnick & Eisberg. J. Wiley & sons, Inc.

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PAPER - II

UNIT - I

VECTORS:

Product of vectors, vector product of a vector A with the sum of two vectors B and C, Product of three and four vectors, differentiation of vectors, differentiation rules, partial differentiation, scalar and vector field, gradient of a scalar field, divergence of a vector field, curl of a vector field, important vector relationships. Vector integration, Statement of Gauss divergence theorem, stokes theorem, Ref: R –1.9 to 1.19, 1.22 to 1.24.

ELECTROSTATICS:

The conservative nature of electrostatic field, electric potential energy, definition of electric potential, principle of superposition of potential, Poisson's and Laplace's equations. Ref: SCS – 4.2, 4.3, 4.10, 4.24.

UNIT - II

CURRENTS AND MAGNETOSTATICS:

Transients currents: the growth and decay of current in an inductive circuit, the charge and discharge of a capacitor through a resistance, the physics of the LC oscillator, circuit with inductance, capacitance and resistance: charging process of the capacitor, the discharge of the capacitor in a series LCR circuit, logarithmic decrement of the circuit. Ref: SCS – 17.3 to 17.9

Magnetic induction: Definition, Sources of magnetic induction B, Some properties of magnetic induction B, Ampere's law, definition of ampere, magnetic dipole, Ref: RM – 7.1 to 7.3, 7.5, 7.7, 7.9

UNIT - III

ELECTRONICS (DIODES):

Current voltage characteristics of semiconductor diode, resistance of semiconductor diode, breakdown mechanism, Zener diode, Zener diode as a voltage regulator, single phase full wave bridge rectifier, filters. Ref: BS – 2.6, 2.8, 2.9 to 2.11, 2.15, 2.16.

Clipping circuits, applications of clippers, clamping circuits, basic idea of a clamper, positive clamper, negative clamper. Ref: VKM – 20.18 to 20.23.

LED, Photodiode, Ref: M- 5.8

UNIT - IV

ELECTRONICS(TRANSISTORS):

Introduction, Construction of a junction transistor, operation of a PNP transistor, operation of NPN transistor, supply voltage connections, current amplification factors. Characteristic curves of a transistor in CE connection and definitions of the h-parameters,. Ref: BS – 3.2 to 3.6, 3.8.

DIGITAL ELECTRONICS (Logic circuits):
Introduction, The AND gate, The OR gate, The NOT gate, The NAND gate. Ref: BS – 11.1 to 11.6.
ELECTRIC AND MAGNETIC INSTRUMENTS:
Tangent Galvanometer, The D'Arsonval moving coil Galvanometer, The construction of the pivoted moving coil galvanometer, the merits and demerits of moving coil galvanometer. Ref: SCS – 11.2, 11.6, 11.8, 11.9.

UNIT - V
OPTICS:
Geometrical optics: Image formation: Equivalent focal length of two thin lenses separated by a finite distance, power of a lens, cardinal points of an optical system, Principal foci and focal planes, principal points and principal planes, nodal points, Refraction through a thick lens, power of a thick lens. Ref: SB(O): 2.6 to 2.11, 2.15, 2.16
Physical optics: Review of interference: introduction, Young's experiment, coherent sources,
Interference in thin films, interference due to reflected light (thin films), interference due to transmitted light(thin film), fringes produced produced by a wedge shaped thin film, Newton's rings, determination of wavelength of Sodium light using Newton's ring. Ref: SB(O): – 8.1 to 8.3, 8.15 to 8.17, 8.21, 8.23, 8.24.

Note: Examples/problems of relevant topics in each unit should be covered.

REFERENCES:

1. R – Mathematical Physics by Rajput. Pragati Prakashan. Meerut.
2. SCS – Electricity and Magnetism by Sehgal, Chopra & Sehgal. S. Chand & Co.
3. SB(O) – T textbook of optics by Subramanyam & Brijlal. S. Chand & Co.
4. BS – Elements of Electronics by Bagde & Singh. S. Chand & Co.
5. M - Microelectronic circuits by Malvino. TMH.
6. RM - Electricity and magnetism by Rangwala and Mahajan. TMH.
7. VKM – Principles of Electronics by V K Mehta. S. Chand & Co.

ADDITIONAL REFERENCES:

1. Introduction to electrodynamics by D. Griffiths
2. Optics by A Ghatak.

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F. Y. B. Sc. PHYSICS
SYLLABUS FOR EXPERIMENTS

GROUP - A

1. Moment of inertia by Tortional pendulum.
2. Verification of parallel axis theorem.
3. Verification of perpendicular axis theorem.
4. Elastic constants by Searle's method.
5. 'h' by dynamic method.
6. 'h' by static method.
7. Melde's experiment.
8. Thermal conductivity of a bad conductor by Lee's method.
9. Bending of a beam using cathetometer or traveling microscope (cantilever).
10. Bending of a beam supported at two ends and loaded in the middle.
11. Bifilar suspension
12. Sonometer determination of speed of transverse waves in wire
13. Computer simulation of Lissajous figures. [D]
14. Computer simulation of projectile motion with and without resistive forces [D]

GROUP - B

1. Cardinal points of a lens system.
2. Newton's rings
3. Dispersive power of prism.
4. Low resistance by projection method.
5. Study of magnetic field due to a solenoid
6. LCR circuit.
7. Study of decay of current in CR circuit.
8. Conversion of a galvanometer into an ammeter and calibration by tangent galvanometer.
9. Full and half wave rectifier.
10. Logic gates.
11. Zener diode as voltage regulator
12. Study of calculation of different types of errors (average, standard deviation and probable error)
13. Computer simulation of transistor amplifier [D]
14. Study of multimeter Digital and Analogue [D]