3-1-116

Subject: PHYSICS

SEMESTER- I

Paper I: Mechanics & Properties of Matter

(For Maths Combinations)

UNIT I: Vector Analysis

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation. Vector integration (line, surface and volume), State and proof of Gauss and Stokes theorem.

UNIT II: Mechanics of particles

Laws of motion, motion of variable mass system, motion of a rocket. Conservation of energy and momentum. Collisions in two and three dimensions. Concept of impact parameter, scattering cross-section. Rutherford scattering-derivation.

UNIT III:

1. Mechanics of Rigid bodies

Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum. Euler equation, precession of a top. Gyroscope, precession of the equinoxes.

2. Mechanics of continuous media :

Elastic constants of isotropic solids and their relation, Poisson's ratio and expression for Poisson's ratio in terms of y, n, k. Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions.

UNIT IV: Central forces

Central forces, definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force. Derivation of Kepler's laws. Motion of satellites.

UNIT V : Special theory of relativity

Galilean relativity, absolute frames. Michelson-Morley experiment, negative result. Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four-vector formalism.

Reference Books:

1. BSc Physics -Telugu Akademy, Hyderabad
2. Mechanics - D.S. Mathur, *Sulthan Chand & Co, New Delhi*
3. Mechanics - J.C. Upadhyaya, *Ramprasad & Co., Agra*
4. Properties of Matter - D.S. Mathur, *S.Chand & Co, New Delhi ,11th Edn., 2000*
5. Physics Vol. I - Resnick-Halliday-Krane ,*Wiley, 2001*
6. Properties of Matter - Brijlal& Subrmanyam ,*S.Chand &Co. 1982*
7. Dynamics of Particles and Rigid bodies- Anil Rao, *Cambridge Univ Press, 2006*
8. Mechanics-EM Purcell, *Mc Graw Hill*
9. University Physics-FW Sears, MW Zemansky & HD Young, *Narosa Publications, Delhi*

Signature of the Chairman (B.O.S.) (20.....Exams)

10. College Physics-I. T. Bhimasankaram and G. Prasad. *Himalaya Publishing House.*
11. S.G.Venkatachalapathy, Mechanics, *Margham Publication, 2003.*

Practical paper 1: Mechanics
Minimum of 8 experiments to be done and recorded

1. Volume resonator
2. Viscosity of liquid by the flow method (Poiseuille's method)
3. Young's modulus material a rod by uniform bending
4. Young's modulus material a rod by non- uniform bending
5. Surface tension of a liquid by the method of drops
6. Surface tension of a liquid by capillary rise method
7. Determination of radius of capillary tube by Hg thread method
8. Viscosity of liquid by logarithmic decrement method
9. Bifilar suspension -moment of inertia.
10. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)
11. Fly-wheel
12. Determination of Y of bar -cantilever.

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Signature of the
Chairman (B.O.S.)
(20.....Exams)

3-1-116

Model question Paper for all theory papers

Time : 3 hrs Max marks : 75 Physics

Section A

Answer any five out of 8 questions

Marks: 5 x3 = 15

Section B

Answer All questions with internal choice from all units (I to V) Marks : 5 x 12 =60

**** At least three problems must be included each with a weightage of 5 marks

Signature of the
Chairman (B.O.S.)
(20.....Exams)