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AW–1621

B.Sc. (Part–I) Semester–I Examination

1S : PHYSICS

(Mechanics, Properties of Matter Waves and Oscillation)

Time : Three Hours] [Maximum Marks : 80

Note :— (1) All questions are compulsory.
(2) Draw neat diagrams wherever necessary.

1. (a) Fill in the blanks :
(i) The acceleration due to gravity at the poles is _____.
(ii) The fundamental frequency is also called as _____.
(iii) Coefficient of viscosity _____ with increase in temperature.
(iv) Young's modulus of elasticity is related with change in _____. 2

(b) Choose correct answer :
(i) The angle of contact of water with glass is _____.
(a) 90° (b) 0°
(c) Less than 90° (d) Greater than 90°
(ii) Kepler's second law of planetary motion is about _____.
(a) Elliptical orbit (b) Period
(c) Areal velocity (d) Volume
(iii) The moment of linear momentum is _____.
(a) Couple (b) Torque
(c) Impulse (d) Angular momentum
(iv) In compound pendulum, centre of suspension and centre of oscillation are _____.
(a) Interchangeable (b) Not Interchangeable
(c) At equal distance from C.G. (d) None of the above 2

(c) Answer in **one** sentence :
(i) What is cantilever ?
(ii) Define streamline flow.
(iii) Define cohesive force.
(iv) Define moment of inertia. 4

EITHER

2. (a) Define acceleration due to gravity. Explain variation of 'g' with :
(i) Height (ii) Depth 6
(b) State and prove Gauss's Theorem. 4
(c) Define :
(i) Gravitational field (ii) Gravitational potential 2

OR

3. (p) Derive an expression for gravitational potential due to spherical shell at a point outside the shell. 6
(q) State and prove Kepler's Third law of planetary motion. 6

EITHER

4. (a) State and prove theorem of parallel axes, for moment of Inertia. 5
(b) A uniform rod of length 'L' and mass 'm' rotates about an axis passing through one of its ends. Calculate moment of inertia about this axis. 4
(c) If a disc has mass 5kg and radius 0.5m, calculate M.I. of a disc about a tangent perpendicular to its plane. 3

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OR

5. (p) State and prove law of conservation of angular momentum. 4
   (q) Derive an expression for M.I. of circular disc about an axis passing through its center and perpendicular to its plane. 5
   (r) Calculate M.I. of a disc of mass 1 kg and radius 10cm about an axis passing through its center and perpendicular to its plane. 3

EITHER

6. (a) What is compound pendulum ? Obtain an expression for the periodic time of compound pendulum. 6
   (b) Define linear S.H.M. and obtain differential equation of S.H.M. 4
   (c) A mass of 50 gm is attached to a spring having spring constant 0.2. Determine time period of oscillation. 2

OR

7. (p) Define the angular S.H.M. show that the vibration of bar magnet in uniform magnetic field is angular S.H.M. 6
   (q) Solve the differential equation of damped harmonic motion and show that velocity of particle decreases exponentially. 4
   (r) What are bifilar oscillations ? 2

EITHER

8. (a) Find the resultant displacement for the superposition of two mutually perpendicular S.H.M's of same period. 6
   (b) What is piezoelectric effect ? Explain the production of ultrasonic waves of piezoelectric oscillation. 6

OR

9. (p) Describe construction and working of Kundt's tube. 4
   (q) Derive Newton's formula for velocity of sound in medium. 5
   (r) State applications of Ultrasonic wave. 3

EITHER

10. (a) Find the expression for twisting couple per unit twist for cylindrical wire. 6
    (b) Explain how modulus of rigidity of wire can be determined by Maxwell Needle. 6

OR

11. (p) What are torsional oscillations ? Derive an expression for the periodic time of torsional pendulum. 6
    (q) Derive an expression for depression at the loaded end of light beam clamped horizontally at the other end. 6

EITHER

12. (a) State and prove Bernoulli's theorem. 6
    (b) State and prove Stoke's law. 4
    (c) What is the significance of Reynold's number ? 2

OR

13. (p) Explain Jaeger's method to determine surface tension of a liquid. 6
    (q) Explain :
        (i) Streamline flow
        (ii) Turbulent flow. 4
    (r) What is surface tension ? Give its unit and dimensions. 2

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