

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

- 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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