B.Sc. (Part–I) Semester–1 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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YBC--15195   (Contd.)

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