

INTERNATIONAL INDIAN SCHOOL DAMMAM

SECOND TERMINAL EXAMINATION 2017

CLASS XI

PHYSICS

Time allowed: 3 Hours

Maximum Marks: 70

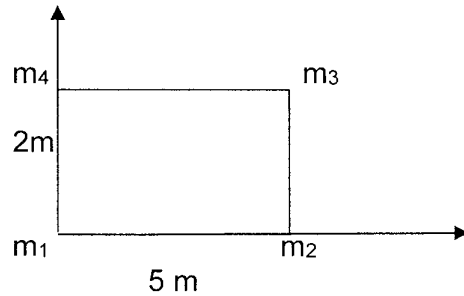
Set A

GENERAL INSTRUCTIONS:

1. All questions are compulsory.
2. There is no overall choice. However an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks.
3. Questions 1 to 5 are very short answer type questions carrying 1 mark each.
4. Questions 6 to 10 are short answer type questions carrying 2 marks each.
5. Questions 11 to 22 are short answer type questions carrying 3 marks each.
6. Question number 23 is a value based question carrying 4 marks.
7. Questions 24 to 26 are long answer type questions carrying 5 marks each.
8. Use of calculator is not permitted. However you may use log table if necessary.

- 1 In uniform circular motion what is the angle between velocity vector and acceleration vector?
- 2 Why wheels are made circular in automobiles?
- 3 A ballet dancer stretches her arms out for slowing down. Name the conservation principle obeyed.
- 4 Give any one use of geostationary satellite.
- 5 Define bulk modulus of elasticity.
- 6 Assuming earth to be a sphere of uniform mass density ,how much would a body weigh half way down towards the center of earth from earth's surface, if it weighs 680 N on the surface? ($g = 10 \text{ ms}^{-2}$)
- 7 Distinguish between conservative and non-conservative forces.

- 8 With the help of a diagram explain the working of hydraulic lift using Pascal's law of external pressure.
- OR**
- Define streamline .Write any two properties of streamlines.
- 9 Derive an expression for orbital velocity of an artificial satellite of mass 'm' moving in a circular orbit at a height 'h' from the earth's surface.
- 10 (a)State Hooke's law.
(b)Why steel is more elastic than rubber?
- 11 Derive an expression for centripetal acceleration of an object in uniform circular motion in a plane. State its SI unit.
- 12 (a)A body constrained to move along z-axis of the co-ordinate system is subjected to a constant force of $(2\mathbf{i}-\mathbf{j}+3\mathbf{k})\text{N}$.Find the work done by this force to move the body 4m along z-axis.
(b)Draw the graph showing the variation of potential energy stored in a spring as a function of extension.
- 13 State the law of conservation of momentum. Prove it by using second law of motion.
- 14 A shell is fired at an angle 30° to the horizontal with a velocity 196ms^{-1} . Find the time of flight and maximum height attained by the shell in its projectile motion.($g=9.8\text{ ms}^{-2}$)
- 15 Give reasons:
(a)An athlete runs some distance before taking a long jump.
(b)A gun recoils back, when it is fired.
- 16 (a)Derive the relation between momentum and kinetic energy.
(b)Two bodies have masses in the ratio 4:1.Find the ratio of their kinetic energy if they possess same momentum.
- 17 Two bodies undergo elastic collisions in one dimension. Derive the final velocities attained by the two bodies.
- 18 (a)Define center of mass of a rigid body.
(b)Find the co-ordinates of center of mass of the given system. Four masses $m_1=1\text{ kg}$, $m_2=2\text{kg}$, $m_3=3\text{kg}$ and $m_4=4\text{kg}$ are kept at the vertices of a rectangle of length 5 m and breadth 2 m. (refer fig)



- 19 State Kepler's third law. Derive an expression for the time period of a satellite revolving around the earth.
- 20 Define gravitational potential energy of a body. Derive an expression for it when a body of mass 'm' is situated at a distance 'r' from the center of earth of mass M_E .

OR

Derive an expression for acceleration due to gravity at an altitude "h" from the earth's surface. What is the maximum value of acceleration due to gravity.

- 21 A load of 2 kg produces an extension of 1 mm on a wire of length 11m and diameter 1 mm. Calculate Young's modulus of elasticity of the wire. ($g=10 \text{ ms}^{-2}$)
- 22 Define terminal velocity. Derive an expression for terminal velocity of a solid sphere (radius r and density ρ) dropped in a liquid (density σ) in terms of coefficient of viscosity (η) of the liquid.
- 23 Vineeth saw his uncle planting seeds in the field. His uncle doesn't know the methods of growing plants. Then he decided to make his uncle aware of this. He explained the importance of ploughing the land before planting the seeds. Uncle was convinced with his ideas. He planted accordingly. The plants were grown successfully.
- (a)What values does Vineeth possess?
 (b)How does ploughing the field help in retaining the moisture of the field?
 Explain the concept in physics regarding to the situation?
- 24 (a)What is friction? Why it is called the self adjusting force?
 (b)Give any one advantage and disadvantage of friction.
 (c)What is the apparent weight of a man of mass 60 kg who is standing on a lift which is moving up with a uniform speed? ($g =10 \text{ ms}^{-2}$)

OR

- (a)State and prove Newton's second law of motion.

(b) A bullet of mass 400 g moving with a speed of 90 ms^{-1} enters a heavy wooden block and is stopped after a distance of 60 cm. What is the average force exerted by the block on the bullet?

- 25 (a) Write any two factors on which moment of inertia depends.
(b) Derive the relation between moment of inertia and angular momentum.
(c) Find moment of inertia of a rod of length 0.5 m and mass 300 g about an axis through one end of the rod, the axis being perpendicular to the rod.
(MOI of the rod about axis through COM and perpendicular to length of rod = $ML^2/12$)

OR

- (a) Derive the relation between torque and angular momentum.
(b) Calculate the moment of inertia of a disc of mass 400 g and radius 7 cm about an axis through its edge and perpendicular to the plane of the disc.
(MOI of disc about axis through COM and perpendicular to the disc = $MR^2/2$)

- 26 (a) Define surface tension.
(b) Obtain an expression for excess of pressure inside a liquid drop.
(c) What will be the effect on angle of contact of a liquid, if the temperature increases?

OR

- (a) State and prove Bernoulli's principle.
(b) How does the viscosity of gases depend upon temperature?