

INTERNATIONAL INDIAN SCHOOL DAMMAM

SECOND TERMINAL EXAMINATION 2015

CLASS: XI

PHYSICS

SET A

TIME: 3 HOURS

MAXIMUM MARKS: 70

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 Question numbers 1 to 5 are very short answer type questions carrying 1 mark each.
- 4 Question numbers 6 to 10 are short answer type questions carrying 2 marks each.
- 5 Question numbers 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 Question numbers 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 What is the angle between the velocity vector and the acceleration vector in uniform circular motion ?
- 2 Why an athlete runs some steps before taking a jump?
- 3 Define conservative force .Give one example.
- 4 Which physical quantities are represented by the following:
(a) Product of moment of inertia and angular acceleration.
(b) Product of torque and angular velocity.
- 5 Draw the stress –strain curve for an elastomer.
- 6 State first law of thermodynamics .Apply it for an isothermal process.
- 7 Distinguish between elastic and inelastic collisions.
- 8 Explain why a spinning cricket ball in air does not follow a parabolic path.

OR

Why is it that a needle may float on clear water but will sink, when some detergent is added to it?

- 9 A body constrained to move along the z-axis of a co-ordinate system is subjected to a constant force, $F = (\hat{i} + 2\hat{j} + 3\hat{k})$ N. What is the work done by this force in moving the body at a distance of 3 m along the z-axis?
- 10 Explain the conditions to be satisfied for a rigid body to be in mechanical equilibrium.
- 11 Draw the figure showing all the forces and obtain an expression for maximum velocity of a vehicle on a circular banked road with a smooth surface.
- 12 State Pascal's law .Explain the working of hydraulic lift.

OR

Derive an expression for excess of pressure inside a liquid drop.

- 13 (a) Define limiting friction.
(b) Determine the maximum acceleration of a train in which a box lying on its floor will remain stationary. Coefficient of static friction μ_s between the box and train's floor is 0.15.
- 14 Define projectile motion .Find the angle of projection at which the horizontal range and maximum height of the projectile are equal?
- 15 Define escape velocity. Obtain an expression for escape velocity in terms of acceleration due to gravity(g).
- 16 If the earth were to shrink suddenly (keeping the mass same), find the new duration of the day? Present duration of the day is 24 hours.
- 17 A steel wire of length 4.8 m and cross-sectional area $3.0 \times 10^{-5} \text{ m}^2$ stretches by the same amount as a copper wire of length 3.6 m and cross-sectional area of $4.0 \times 10^{-5} \text{ m}^2$ under a given load. What is the ratio of Young's modulus of steel to that of copper?
- 18 State parallel axis theorem. Find the moment of inertia of a rod of mass 3 kg and length 1m about an axis perpendicular to it and passing through its midpoint.
- 19 What is centripetal acceleration? Derive an expression for centripetal acceleration?
- 20 Explain why :
(a) Ball bearings are used in machinery.
(b) Action and reaction forces are equal and opposite, but they do not cancel each other.
- 21 The bob of a pendulum of mass 100 g is released from a horizontal position .If the length of the pendulum is 2m, what is the speed with which the bob arrives at the lowermost point, given that it dissipated 10% of its initial energy against air resistance.

- 22 What is impulse? Show that impulse is equal to change in momentum.
- 23 Amith was studying when he noticed that his two year old younger brother was going to touch the hot milk kept on the table. Immediately Amith ran and saved his brother although both of them fell down. His brother was saved and mother became very happy.
- (a) What values of Amith are appreciable?
 - (b) Steam causes more severe burn than boiling water. Explain the reason.
 - (c) The triple point of neon is 24.57 K. Express it in Celsius scale.
- 24 State Kelvin-Planck statement of second law of thermodynamics. Draw the block diagram and explain the working of a heat engine. Obtain an expression for its efficiency (η) in terms of temperatures of the hot reservoir and the cold reservoir.

OR

State Clausius statement of second law of thermodynamics. Draw the block diagram and explain the working of a refrigerator. Obtain an expression for its coefficient of performance (α) in terms of Temperatures of hot reservoir and cold reservoir.

- 25 (a) Define gravitational potential energy. Derive an expression for gravitational potential energy of a body of mass, m , on the surface of earth.
- (b) Write any two conditions to be satisfied for a satellite to be a geostationary satellite.

OR

- (a) State and prove Kepler's law of periods.
- (b) A body weighs 90 kg-wt on the surface of earth. How much it will weigh on the surface of a planet whose mass is $1/9$ and radius $1/2$ of that of earth.

- 26 (a) What do you mean by terminal velocity? Obtain the terminal velocity of a sphere of radius r and density ρ falling through a liquid of density ρ' and coefficient of viscosity η .
- (b) How does the viscosity of gases depend upon temperature?

OR

- (a) State and prove Bernoulli's principle.
- (b) How will you distinguish water and mercury on the basis of angle of contact?

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- 1 Two bodies projected with same initial velocities attain the same horizontal ranges. If the angle of projection for first is 35° , what is the angle of projection for the second?
- 2 A stone tied to the end of a string is whirled in a horizontal circle. When the string breaks In which direction the stone will move?
- 3 Define non- conservative force .Give one example.
- 4 Which physical quantities are represented by the following:
(a) Product of moment of inertia and angular velocity.
(b) Product of torque and angular velocity.
- 5 Draw the stress –strain curve for a perfectly elastic body obeying Hooke’s law.
- 6 State first law of thermodynamics .Apply it for an adiabatic process.
- 7 A body constrained to move along the z-axis of a co-ordinate system is subjected to a constant force, $\mathbf{F} = (\hat{i} + 2\hat{j} + 3\hat{k}) \text{ N}$.What is the work done by this force in moving the body at a distance of 3 m along the y-axis?
- 8 Distinguish between elastic and inelastic collisions.
- 9 Explain the conditions to be satisfied for a rigid body to be in mechanical equilibrium.

10 Explain why a spinning cricket ball in air does not follow a parabolic path.

OR

Why is it that a needle may float on clear water but will sink, when some detergent is added to it?

11 (a) Define limiting friction.

(b) Determine the maximum acceleration of a train in which a box lying on its floor will remain stationary. Coefficient of static friction μ_s between the box and train's floor is 0.15.

12 Define escape velocity. Obtain an expression for escape velocity in terms of acceleration due to gravity.

13 State parallel axis theorem. Find the moment of inertia of a rod of mass 3 kg and length 1m about an axis perpendicular to it and passing through its midpoint.

14 If the earth were to shrink suddenly (keeping the mass same), find the new duration of the day? Present duration of the day is 24 hours.

15 State Pascal's law .Explain the working of hydraulic lift.

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Derive an expression for excess of pressure inside a soap bubble.

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22 Draw the figure showing all the forces and obtain an expression for maximum velocity of a vehicle on a circular banked road.

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- (a) What values of Amith are appreciable?
 - (b) Steam causes more severe burn than boiling water. Explain the reason.
 - (c) The triple point of CO_2 is 216.55 K. Express it in Celsius scale.
- 24 (a) What do you mean by terminal velocity? Obtain the terminal velocity of a sphere of radius r and density ρ falling through a liquid of density ρ' and coefficient of viscosity η .
(b) How does the viscosity of gases depend upon temperature?

OR

- (a) State and prove Bernoulli's principle.
 - (b) How does the surface tension of a liquid depend upon temperature?
- 25 State Kelvin-Planck statement of second law of thermodynamics. Draw the block diagram and explain the working of a heat engine. Obtain an expression for its efficiency (η) in terms of temperatures of the hot reservoir and the cold reservoir.

OR

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