

Tsi11P

Tenkasi District



Common Half Yearly Examination - December 2023

04-01-2024,

Standard 11

Time Allowed: 3.00 Hours

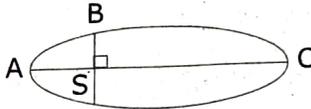
PHYSICS

Maximum Marks: 70

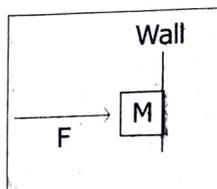
## I. Choose the correct answer:

15×1=15

- 1) The Kinetic energies of a planet in an elliptical orbit about the sun, at positions A, B and C are  $K_A$ ,  $K_B$ ,  $K_C$  respectively. AC is the major axis and SB is perpendicular to AC at the position of the sun S as shown in the figure.



- a)  $K_A > K_B > K_C$     b)  $K_B < K_A < K_C$     c)  $K_A < K_B < K_C$     d)  $K_B > K_A > K_C$
- 2) Assuming you are standing inside an elevator which is accelerating downwards. Your apparent weight  
 a) is greater than actual weight    b) is equal to actual weight  
 c) is lesser than actual weight    d) weightless (free fall)
- 3) If a wire is stretched to double of its original length, then the strain in the wire is  
 a) 1    b) 2    c) 3    d) 4
- 4) Critical velocity of the liquid  
 a) decreases when radius decreases    b) increases when radius increases  
 c) decreases when density increases    d) increase when density increases
- 5) When a uniform rod is heated, which of the following quantity of the rod will increase  
 a) mass    b) weight    c) centre of mass    d) moment of inertia
- 6) A sample of ideal gas is at equilibrium. Which of the following quantity is zero?  
 a) rms speed    b) average speed  
 c) average velocity    d) most probable speed
- 7) In a simple harmonic oscillation, the acceleration against displacement for one complete oscillation will be  
 a) an ellipse    b) a circle    c) a parabola    d) a straight line
- 8) The damping force on an oscillator is directly proportional to the velocity. The units of the constant of proportionality are  
 a)  $\text{Kg ms}^{-1}$     b)  $\text{Kg ms}^{-2}$     c)  $\text{Kg s}^{-1}$     d)  $\text{Kg s}$
- 9) One of the combinations from the fundamental physical constant is  $\frac{hc}{G}$ . The unit of this expression is  
 a)  $\text{Kg}^2$     b)  $\text{m}^3$     c)  $\text{s}^{-1}$     d) m
- 10) If the velocity is  $\vec{v} = 2\hat{i} + t^2\hat{j} - 9\hat{k}$ , then the magnitude of acceleration at  $t = 1\text{ s}$  is  
 a)  $1\text{ ms}^{-2}$     b)  $2\text{ ms}^{-2}$     c) zero    d)  $-1\text{ ms}^{-2}$
- 11) An object of mass  $m$  is held against a vertical wall by applying horizontal force  $F$  as shown in the figure. The minimum value of the force  $F$  is



- a) less than  $mg$   
 c) greater than  $mg$

- b) equal to  $mg$   
 d) cannot determine

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- 12) If a person moving from pole to equator, the centrifugal force acting on him  
 a) increases b) decreases  
 c) remains the same d) increases and then decreases
- 13) If the linear momentum of the object is increased by 0.1%, then the kinetic energy is increased by  
 a) 0.1% b) 0.2% c) 0.4% d) 0.01%
- 14) The ratio of the acceleration for a solid sphere (mass  $m$  and radius  $R$ ) rolling down an incline of angle  $\theta$  without slipping and slipping down the incline without rolling is  
 a) 5:7 b) 2:3 c) 2:5 d) 7:5
- 15) A cyclist while negotiating a circular path with speed  $15 \text{ ms}^{-1}$  is found to bend an angle by  $45^\circ$  with vertical. What is the radius of the circular path? ( $g = 10 \text{ ms}^{-2}$ ).  
 a) 100m b) 150m c) 22.5m d) 1.5m

**II. Answer ANY SIX questions. Q.No. 24 is compulsory:**

6×2=12

- 16) What are the advantages of Dimensional Analysis?  
 17) What are the steps to be followed for developing free body diagram?  
 18) Distinguish between elastic collision and inelastic collision.  
 19) Define torque.  
 20) Define Gravitational field. Give its unit.  
 21) State the laws of floatation.  
 22) A refrigerator has COP of 3. How much work must be supplied to the refrigerator in order to remove 200J of heat from its interior.  
 23) Define degree of freedom.  
 24) An object at an angle such that the horizontal range is 4 times of the maximum height? What is the angle of projection of the object?

**III. Answer ANY SIX questions. Q.No. 33 is compulsory:**

6×3=18

- 25) State laws of simple pendulum.  
 26) Explain Gross error.  
 27) State zeroth and first law of thermodynamics.  
 28) Explain the variation of  $g$  with altitude.
- 29) Two vectors are given as  $\vec{r} = 2\hat{i} + 3\hat{j} + 5\hat{k}$  and  $\vec{F} = 3\hat{i} - 2\hat{j} + 4\hat{k}$ . Find the resultant vector  $\vec{r} = \vec{r} \times \vec{F}$ .
- 30) When a cricket player catches the ball, he pulls his hands gradually in the direction of the ball's motion. Why?  
 31) Distinguish between conservative and non-conservative force.  
 32) Deduce the relation between Torque and Angular acceleration.  
 33) If excess pressure is balanced by a column of oil (with specific gravity 0.8) 4mm high, where  $R = 2.0 \text{ cm}$ . Find the surface tension of the soap bubble.

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**IV. Answer in detail:**

5×5=25

- 34) a) Write the rules for counting significant figures. (OR)  
 b) i) Derive the time period of satellite orbiting the Earth.  
 ii) If the masses and mutual distance between the two objects are doubled. What is the change in the gravitational force between them?
- 35) a) Explain vector product properties. (OR)  
 b) State and Explain Newton's law of cooling.
- 36) a) State and Explain Work-Energy theorem. Give its implications. (OR)  
 b) Derive Poiseuille's formula for the volume of a liquid flowing per second through a pipe under streamlined flow.
- 37) a) State and Explain perpendicular axes theorem. (OR)  
 b) Give the postulates of Kinetic theory of gases.
- 38) a) Explain angle of Repose. (OR)  
 b) Describe the vertical oscillation of a spring.