11 **R**

ERODE – First Mid-Term Test - 2023

PHYSICS

Time : 1.30 Hrs.

Register No. [   ]

Marks : 50

Choose the best answer.   **10 x 1 = 10**

1. Which of the following has the highest number of significant figures?

   a) $0.007 \ m^2$ b) 2.64×10^{24} kg   c) $0.0006032 m^2$ d) 6.3200 J

2. Which of the following pairs of physical quantities have same dimension?

   a) force and power b) torque and energy   c) torque and power   c) force and torque

3. The diamensional formula for gravitational constant G is

   a) $ML^3 \ T^{-2}$ b) $M^{-1} \ L^3 \ T^{-2}$ c) $M^{-1} \ L^{-3} \ T^{-2}$ d) $ML^{-3} \ T^2$

4. Identify the unit vector in the following

   a) $\hat{i} + \hat{j}$ b) $\dfrac{\hat{i}}{\sqrt{2}}$ c) $\hat{k} - \dfrac{\hat{j}}{\sqrt{2}}$ d) $\dfrac{\hat{i} + \hat{j}}{\sqrt{2}}$

5. Which one of the following physical quantities cannot be represented by a scalar

   a) mass b) length c) momentum   d) magnitude of acceleration

6. If a particle has a negative velocity and negative acceleration, its speed

   a) Increases b) decreases c) remains same d) zero

7. If an object is thrown vertically up with the initial speed u from the ground, then the time taken by the object to return back to ground is

   a) $\dfrac{u^2}{2g}$ b) $\dfrac{u^2}{g}$ c) $\dfrac{u}{2g}$ d) $\dfrac{2u}{g}$

8. Velocity ϑ is given by $\vartheta = at^2 + bt + c$, where t is time. What are the diamentions of a, b and c respectively?

   a) $[LT^{-3}]$ $[LT^{-2}]$ and $[LT^{-1}]$ b) $[LT^{-1}]$ $[LT^{-2}]$ and $[LT^{-3}]$ c) $[LT^{-2}]$ $[LT^{-3}]$ and $[LT^{-1}]$

   d) $[LT^{-1}]$ $[LT^{-3}]$ and LT^{-2}

9. The angle between vectors $(\vec{A} \times \vec{B})$ and $(\vec{B} \times \vec{A})$ is

   a) zero b) π c) $\dfrac{\pi}{4}$ d) $\dfrac{\pi}{2}$

10. A particle projected vertically upwards returns to the ground in time T. Which graph represents the correction variation of velocity (ϑ) against time t?

   a)   b)   c)   d)

11 Physics - 1
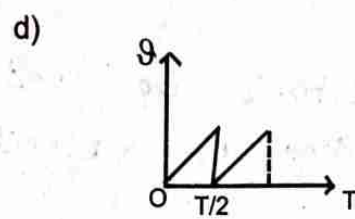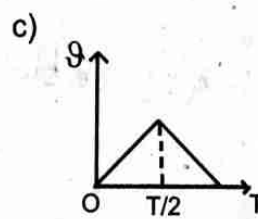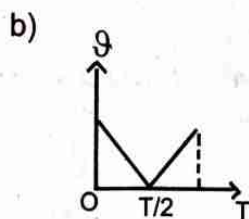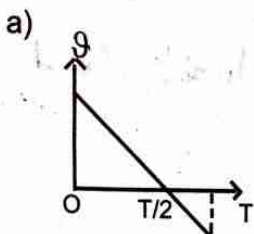
PART - II

II.   Answer any five of the following. Q.No.18 is compulsory.   **5 x 2 = 10**

11. Distinguish between fundamental and derived units?

12. Write any two rules for determining significant figures with examples.

13. Define light year.

14. Check the correctness of the equation ½ mv^2 = mgh using diamensional analysis method.

15. Define a vector. Give examples.

16. Define a radian?

17. What is meant by projectile? Give examples.

18. 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 $\vec{\tau} = \vec{r} \times \vec{F}$.

PART - III

III.   Answer any five of the following. Q.No.26 is compulsory.   **5 x 3 = 15**

19. How will you measure the diameter of the moon using parallax method?

20. What are the limitations of dimensional analysis (write any three)

21. What are Random errors? How is it minimized?

22. From a point on the ground, the top of a tree is seen to have an angle of elevation 60⁰. The distance between the tree and a point is 50m. Calculate the height of the tree?

23. Define angular velocity and angular displacement.

24. Define displacement and distance.

26. 25. A train was moving at the rate of 54 kmh⁻¹ when brake were applied. It came to rest within a distance of 225m. Calculate the retardation produced in the train.

PART - IV

IV.   Answer any 3 of the following   **3 x 5 = 15**

27. Write a note on triangulation method and radar method to measure larger distances.

    (OR)

    Obtain an expression for the time period T of a simple pendulum. The time period T depends on
    i) mass 'm' of the bob ii) length 'l' of the pendulum and iii) acceleration due to gravity g at the place where the pendulum is suspended (constant K = 2π)

28. Explain detail the triangle law of addition.

    (OR)

    Discuss the properties of scalar product.

29. Derive the kinematic equations of motion for constant acceleration.

    (OR)

    Derive the expression for centripetal acceleration.

25. Obtain the relation between linear velocity and angular velocity.