FIRST MID TERM TEST - 2024

Vellore

Standard XI

.Reg.No. ☐☐☐☐☐☐

PHYSICS

Time : 1.30 hrs

Part - I

Marks : 50

I. **Choose the correct answer:**

$10 \times 1 = 10$

1. If the error in the measurement of radius is 2%, then the error in the determination of volume of the sphere will be
   a) 8%   b) 2%   c) 4%   d) 6%

2. Round of the following number 19.95 into the three significant figures.
   a) 19.9   b) 20.0   c) 20.1   d) 19.5

3. The velocity of a particle 'v' at an instant 't' is given by $v = at + bt^2$. The dimensions of 'b' is
   a) $[L]$ b) $[LT^{-1}]$ c) $[LT^{-2}]$ d) $[LT^{-3}]$

4. The dimension of $(\mu_0 \varepsilon_0)^{-\frac{1}{2}}$ is
   a) length   b) time   c) velocity   d) force

5. If the velocity is $\vec{v} = 2\hat{i} + t^2\hat{j} - 9\hat{k}$, then the magnitude of acceleration at $t = 0.5$ s is
   a) 1 ms^{-2} b) 2 ms^{-2} c) zero   d) -1 ms^{-2}

6. A ball is projected vertically upwards with a velocity v. It comes back to ground in time t. Which v - t graph shows the motion correctly?
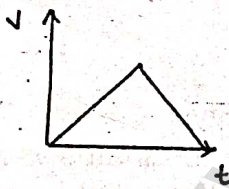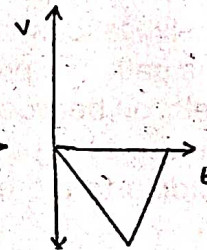

(a)   (b)   (c)   (d)
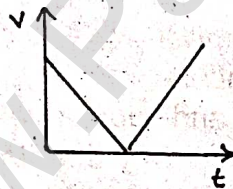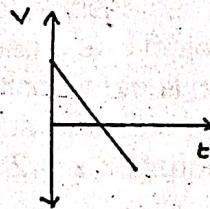
7. An object is dropped in an unknown planet from height 50 m, it reaches the ground in 2 s. The acceleration due to gravity in this unknown planet is
   a) g = 20 ms^{-2} b) g = 25 ms^{-2} c) g = 15 ms^{-2} d) g = 30 ms^{-2}

8. When a car takes a sudden left turn in the curved road, passengers are pushed towards the right due to
   a) inertia of direction   b) inertia of motion
   c) inertia of rest   d) absence of inertia

9. A book is at rest on the table which exerts a normal force on the book. If this force is considered as reaction force, what is the action force according to Newton's Third Law?
   a) Gravitational force exerted by Earth on the book
   b) Gravitational force exerted by the book on Earth
   c) Normal force exerted by the book on the table
   d) None of the above

10. When an object is at rest on the inclined rough surface
    a) Static and kinetic frictions acting on the object is zero
    b) Static friction is zero but kinetic friction is not zero
    c) Static friction is not zero and kinetic friction is zero
    d) Static and the kinetic fractions are not zero

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Part - II

II. Answer any 5 questions. (Q.No.13 is compulsory)　　　　5 x 2 = 10

11. What are the significant features of SI system?
12. Define one Steradian.
13. A RADAR signal is beamed towards a planet and its echo is received 7 minutes later. If the distance between the planet and the Earth is 6.3×10^{10} m. Calculate the speed of the signal.
14. Define displacement and distance.
15. What is your projectile? Give example.
16. Two vectors $\vec{A}$ and $\vec{B}$ are given in the component form as $\vec{A} = 5\hat{i} + 7\hat{j} - 4\hat{k}$ and $\vec{B} = 6\hat{i} + 3\hat{j} + 2\hat{k}$. Find $\vec{A} + \vec{B}$.
17. Define One Newton.
18. How to reduce friction?

Part - III

III. Answer any 5 questions. (Q.No.24 is compulsory)　　　　5 x 3 = 15

19. Check the correctness of the equation $\frac{1}{2}mv^2 = mgh$ using dimensional analysis method.
20. Write a note on triangulation method.
21. What are the limitations of dimensional analysis.
22. Show that the path of a projectile is a parabola.
23. Derive the relation between linear velocity and angular velocity.
24. A particle moves along the x-axis in such a way that its co-ordinates x-varies with time 't' according to the equation $x = 2 - 5t + 6t^2$. What is the initial velocity of the particle?
25. State and explain Lami's theorem.
26. Using free body diagram, show that it is easy to pull an object than to push it.

Part - IV

IV. Answer all the questions.　　　　　　　　　　　　　　　3 x 5 = 15

27. a) Write the rules for determining significant figures.

(OR)

　　b) Explain in detail the triangle law of Vector addition.

28. a) Derive the kinematic equations of motion for constant acceleration.

(OR)

　　b) Briefly explain the origin of friction. Show that in an inclined plane, angle of friction is equal to angle of repose.

29. a) State and prove the law of conservation of linear momentum.

(OR)

　　b) 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.

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