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Register No.

Quarterly Examination - 2023

PHYSICS

PART - A

Marks : 70

15 x 1 = 15

I. Choose the correct answer

1. If the error in the measurement of radius is 2%, then the error in the dimension of volume of the sphere will be a) 8% b) 2% c) 4% d) 6%
2. Which of the following pairs of physical quantities have same dimension?
a) Force and power b) Torque and energy c) Torque and power d) Force and Torque
3. Which of the following physical quantities cannot be represented by a scalar?
a) Mass b) length c) momentum d) magnitude of acceleration
4. If an object is dropped from top of a building and it reaches the ground at $t = 4s$, then the height of the building is (ignoring air resistance) $g = 9.8 \text{ m/s}^2$.
a) 77.3 m b) 78.4 m c) 80.5 m d) 79.2 m
5. The dimension of planck constant
a) $ML^2 T^{-1}$ b) $M^{-1} L^2 T^{-1}$ c) $ML^{-2} T^{-1}$ d) $ML^{-1} T^{-2}$
6. If the velocity is $V = 2\vec{i} + t^2\vec{j} - 9\vec{k}$, then the magnitude of acceleration at $t = 0.5 \text{ sec}$ is
a) 1ms^{-2} b) 2ms^{-2} c) zero d) -1ms^{-2}
7. When the two vectors are mutually perpendicular, their scalar product is
a) zero b) 1 c) -1 d) α
8. $\vec{i} \times \vec{i} =$ a) 1 b) \vec{i} c) 0 d) \vec{j}
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. If the potential energy of the particle is $\alpha - \frac{\beta}{2} x^2$, then force experienced by the particle is
a) $F = \frac{\beta}{2} x^2$ b) $F = \beta x$ c) $F = -\beta x$ d) $F = -\frac{\beta}{2} x^2$
11. $1 \text{ eV} = \dots\dots\dots \text{J}$
a) 10^{-7} J b) 4.186 J c) $3.6 \times 10^6 \text{ J}$ d) $1.6 \times 10^{-19} \text{ J}$
12. The relation between momentum and kinetic energy is.....
a) $KE = \frac{q^2}{2m}$ b) $KE = \frac{p^2}{2m}$ c) $KE + U = P$ d) $\frac{p^2}{2m} = KE - U$
13. If $r = 7\vec{i} + 4\vec{j} - 2\vec{k}$, $F = 4\vec{i} - 3\vec{j} + 5\vec{k}$ find Torque of the system.
a) $(14\vec{i} - 43\vec{j} - 37\vec{k}) \text{ Nm}$ b) $(41\vec{i} - 43\vec{j} - 37\vec{k}) \text{ Nm}$ c) $(14\vec{i} - 34\vec{j} - 37\vec{k}) \text{ Nm}$
d) $(14\vec{i} - 43\vec{j} + 37\vec{k}) \text{ Nm}$

14. A couple produces a) pure rotation b) pure translation c) rotation and translation d) no motion
 15. A rigid body rotates with an angular momentum L . If its kinetic energy is halved the angular momentum becomes.....a) L b) $\frac{L}{2}$ c) $2L$ d) $\frac{L}{\sqrt{2}}$

PART - II

Answer any six questions. Question number 24 is compulsory.

6 x 2 = 12

16. Briefly explain the types of physical quantities.
 17. What are the limitations of dimensional analysis.
 18. Write a short note on the scalar product between two vectors.
 19. Define a radian.
 20. State Newton's third law.
 21. Define - Power.
 22. Explain how the definition of work in physics is different from general perception.
 23. What is the relation between Torque and angular momentum.
 24. A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm what is the angular acceleration of the cylinder if the rope is pulled with a force 20 N?

PART - III

Answer any six questions. Question number 33 is compulsory.

6 x 3 = 18

25. How will you measure the diameter of the moon using parallax method?
 26. Define velocity and speed.
 27. State Newton's second law.
 28. State principle of moment.
 29. Write the various types of potential energy. Explain the formulae.
 30. Write the differences between conservative and non-conservative forces.
 31. What are the conditions in which force cannot produce torque.
 32. How do you distinguish between stable and unstable equilibrium.
 33. A stone of mass 2 kg is attached to a string of length 1 meter. The string can withstand maximum tension 200 N. What is the maximum speed that stone can have during the whirling motion?

PART - IV

Answer all the questions.

5 x 5 = 25

34. Write a short notes on the following.
 a) Unit b) Rounding off c) Dimension less quantities (OR)
 Discuss the properties of scalar and vector products.
 35. Explain in detail the various types of errors. (OR)
 Prove the law of conservation of linear momentum.
 36. Explain the similarities and differences of centripetal and centrifugal forces. (OR)
 State and prove Parallel axis theorem.
 37. Derive the kinematic equation of motion for constant acceleration. (OR)
 State and explain work energy theorem.
 38. Discuss rolling on inclined plane and arrive at the expression for the acceleration. (OR)
 Explain with graphs the difference between work done by a constant force and by a variable force.