VILLUPURAM DIST.

Class : 11

Register Number

COMMON QUARTERLY EXAMINATION - 2024 - 25

Time Allowed : 3.00 Hours] [Max. Marks : 70

PHYSICS

PART-A

Note: (i) Answer all the questions 15x1=15

(ii) Choose the most suitable answer from the given four alternatives and write the option code and the corresponding answer.

1. If the length and time period of an Oscillating pendulum have errors of 1% and 3% respectively then the error in measurement of acceleration due to Gravity is
   (a) 4% (b) 5% (c) 6% (d) 7%
2. If an object is dropped from the top of a building and it reaches the ground at t = 4 s, then the height of the building is (ignoring air resistance) ($g = 9.8\ ms^{-2}$)
   (a) 77.3 m (b) 78.4 m (c) 80.5 m (d) 79.2 m
3. 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
4. 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
5. 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%
6. A spring of force constant k is cut into two pieces such that one piece is double the length of the other. Then, the long piece will have a force constant of
   (a) 2/3k (b) 3/2k (c) 3k (d) 6k
7. A couple produces,
   (a) Pure rotation (b) Pure translation (c) Rotation and translation (d) No motion
8. The speed of the centre of a wheel rolling on a horizontal surface is vo. A point on the rim in level with the centre will be moving at a speed of speed of,
   (a) zero (b) v_o (c) $\sqrt{2}\, v_o$ (d) $2v_o$
9. The force is given interms of time t and displacement x by the equation F = AcosBx + CsinDt, then the dimension formula of AD/B is
   (a) $[M^0LT^{-1}]$ (b) $[ML^2T^{-3}]$ (c) $[M^2L^2T^{-2}]$ (d) $[M^2L^2T^{-3}]$
10. Two vectors $\vec{A}$ and $\vec{B}$ have equal magnitude. The magnitude of $\vec{A} + \vec{B}$ is n times the magnitude of $\vec{A} - \vec{B}$ then angle between $\vec{A}$ and $\vec{B}$ is
    (a) $\sin^{-1}(n^2-1/n^2+1)$ (b) $\cos^{-1}(n-1 / n+1)$
    (c) $\cos^{-1}(n^2-1/n^2+1)$ (d) $\sin^{-1}(n-1/n+1)$
11. If kinetic energy of a moving body becomes 4 times its initial kinetic energy then the percentage change in its momentum will be
    (a) 100% (b) 200% (c) 300% (d) 400%
12. A force act on a 2kg object so that its position is given as a function of time as $x = 3t^2 + 5$. What is the work done by this force in first 5 seconds
    (a) 850J (b) 900J (c) 950J (d) 875J
13. A uniform sphere of mass 500g rolls without slipping on a plain horizontal surface with its centre moving at a speed of 5.00 cm/s its kinetic energy is
    (a) 8.75×10^{-4}J (b) 8.75×10^{-3}J (c) 6.25×10^{-4}J (d) 1.13×10^{-3}J
14. The orbital period of a satellite orbiting in a circular orbit of radius R is T. The orbital period of another satellite orbiting in a circular orbit of radius 9R is
    (a) 9 T (b) 27 T (c) 12 T (d) 3 T

15. The kinetic energy of the satellite orbiting around the Earth is
    (a) Equal to potential energy (b) Less than potential energy
    (c) Greater than kinetic energy (d) Zero

II. Answer any six questions in which question No.24 is compulsory **6X2=12**

16. Define Gravitational Potential.
17. State Conservation of Angular Momentum.
18. A box is pulled with a force of 20 N to produce a displacement of 10 m. If the angle between the force and displacement is 60°, find the work done by the force.
19. A book of mass m is at rest on the table draw the free body diagram for the book.
20. Define Impulse?
21. What is unit Vector? If $\vec{r} = \hat{i} + \hat{j} + \hat{k}$, the value of $\hat{r}$
22. An athlete covers 3 rounds on a circular track of radius 50 m. Calculate the total distance and displacement travelled by him.
23. State any two rules of Rounding off.
24. Two objects of masses 3 kg and 6 kg are moving with the same momentum of 30 $kgms^{-1}$. Will they have same kinetic energy.

III. Answer any six questions in which question No. 33 is compulsory **6X3=18**

25. Explain the characteristics of elastic and inelastic collision.
26. Show that in horizontal projection the path of a projectile is a parabola
27. Explain geo stationery satellite
28. The position of the particle is represented by $y=ut+1/2gt^2$
    a) What is the force acting on the particle?
    b) What is the momentum of the particle?
29. What is Gross error state the reason for it and how to Minimise the Error.
30. State Principle of Moments.
31. Calculate the area of the triangle for which two of its sides are given by the vectors $\vec{A} = 5\hat{i} - 3\hat{j}$, $\vec{B} = 4\hat{i} + 6\hat{j}$
32. Write the differences between conservative and Non-conservative forces. Give two examples each.
33. The position vectors of two point masses 10 kg and 5 kg are $(-3\hat{i} + 2\hat{j} + 4\hat{k})$ m and $(3\hat{i} + 6\hat{j} + 5\hat{k})$ m respectively. Locate the position of centre of Mass.

IV Answer all the questions. **5X5=25**

34. a) (i) State the applications of Dimensional Analysis.
    (ii) Check the correctness of the equation $^1/_2mv^2 = mgh$ using dimensional analysis method.

(OR)

    b) Discuss the properties of vector products.

35. a) Explain the need for Banking of tracks.

(OR)

    b) Explain the Variation of 'g' with Height.

36. a) Arrive at an expression for power and Velocity. Give some examples for the Same.

(OR)

    b) Discuss rolling on inclined plane and arrive at the expression for the acceleration

37. a) Derive the expression for moment of inertia of a rod about its centre and perpendicular to the rod.

(OR)

    b) Explain the motion of blocks connected by a string in Vertical Motion.

38. a) Derive the expression for Centripetal Acceleration.

(OR)

    b) State and explain work energy principle. Mention any three examples for it.