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Reg. No. | | | | | | | |

Time : 2.30 hrs.

Quarterly Common Examination - 2019

Max. Marks : 70

PHYSICS

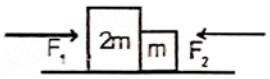
Instructions :

(1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately. (2) Use only Blue or Black ink to write and underline and pencil to draw diagrams.

PART - I

I. Note : i) Answer all the questions. ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer. 15 x 1 = 15

1. The significant figure of the number 0.003401 is a) 6 b) 3 c) 5 d) 4
2. If the force is proportional to square of velocity, then the dimension of proportionality constant is
   a) $[MLT^0]$ b) $[MLT^{-1}]$ c) $[ML^{-2}T]$ d) $[ML^{-1}T^0]$
3. If a particle has negative velocity and negative acceleration, its speed
   a) increases b) decreases c) remains same d) zero
4. A physical quantity is given by $x = \frac{a^2\sqrt{b}}{C^3}$. If the percentage errors of measurement in a, b and c are 3%, 2% and 1% respectively, then the percentage error in x is a) 5% b) 10% c) 8% d) 6%
5. If the object dropped vertically form the top of the building takes 2 second to reach the ground then the height of the building is ($g = 10ms^{-2}$) a) 10m b) 16 m c) 20m d) 25m
6. Two blocks of masses m and 2 m are placed on a smooth horizontal surface as shown. In the first case only a force F_1 is applied from the left. Later only a force F_2 is applied from the right. If the force acting at the interface of the two blocks in the two cases is same then $F_1 : F_2$
   a) 1 : 1 b) 1 : 2 c) 2 : 1 d) 1 : 3



7. Consider a circular leveled road of radius10 m having coefficient of static friction 0.81. Three cars (A, B and C) are travelling with speed 7 ms^{-1}, 8 ms^{-1} and 10ms^{-1} respectively which car will skid when it moves in the circular level road? ($g = 10ms^{-2}$) a) A b) B c) C d) Both B and C
8. The centrifugal force appears to exist a) only in inertial frames b) only in roatation frames
   c) in any accelerated frames d) both in inertial and non inertial frames
9. A ball of mass 1kg and another of mass 2 kg are dropped from a tall building whose height is 80m. AFter, a fall of 40m each towards Earth, their respective kinetic energies will be in the ratio of
   a) $\sqrt{2}$: 1 b) 1 : $\sqrt{2}$ c) 2 : 1 d) 1 : 2
10. If the linear momentum of the object is increased by 0.3 % then the kinetic energy is increased by
    a) 0.1% b) 0.2% c) 0.4% d) 0.6%
11. What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop a) $\sqrt{2gR}$ b) $\sqrt{3gR}$ c) $\sqrt{5gR}$ d) $\sqrt{gR}$
12. A close cylindrical container is partially filled with water. As the container rotates in a horizontal plane about a perpendicular bisector, its moment of inertia
    a) increases b) decreases c) remains constant d) depends on direction of rotation
13. A rigis body rotates with an angular momentums L. If its kinetic energy is reduced to one fourty (1/4) their angular momentum becomes a) L b) L/2 c) 2L d) $L/\sqrt{2}$
14. The speed of the center of a wheel rolling on a horizontal surface is V_0, A point on the rim in level with the

center will be moving at a speed of a) 0 b) V_0 c) $\sqrt{2}\,V_0$ d) $2\,V_0$

15. Which of the following is scalar quantity? a) momentum b) work c) force d) Displacement

PART - II

Answer any six questions and question number 24 is compulsory. **6 x 2 = 12**

16. The radius of the circle is 3.12 m. Calculate the area of the circle with respect to significant figures.
17. Define Projectile. Give two examples.
18. What is the point mass? Give the examples.
19. Under what condition will a car skid on a leveled circular road?
20. A car takes a turn with velocity 50 ms–1 on the circular road of radius of curvature 10 m. Calculate the centrifugal force experienced by a person of mass 60 kg in side the car?
21. State principle of moments.
22. Compare conservative forces and non conservative forces.
23. Define : Center of mass and center of gravity.
24. Water in a bucket tied with rope whirled around in a vertical circle of radius 0.5 m. Calculate the minimum velocity at the lowest point so that the water does no spill form it in the course of motiion. ($g = 10 ms^{-2}$)

PART - III

Answer any six questions and question number 33 is compulsory. **6 x 3 = 18**

25. How will you measure the diameter of the moon using parallax method?
26. Defiine Scalar product of two vectors. Give any four properties of scalar product.
27. Suppose an object is thrown with initial speed of 10 ms^{-1} at an angle $\pi/4$ with the horizontal. What is the range covered? Suppose the same object is thrown similarly in the moon will there by any change in the range? If yes what is the change? (The acceleration due to gravity in the moon ($g_{moon} = 1/6\ g$)
28. Compare the static and kinetic friction.
29. Using free body diagram, show ihat it is easy to pull an object than to push it.
30. Derive the relation between momentum and kinetic energy.
31. A vehicle of mass 1250 kg is driven with an acceleration 0.25 ms^{-2} along a straight level road against an external resistive force 500N, Calculate the power delivered by the vehicle's engine if the velocity of the vehicle is 30 ms^{-1}.
32. Define toque and mention it's unit. Give any two example of torque in day-to-day life.
33. The position vectors of two point masses 10kg and 5 kg are $(-3\vec{i}+2\vec{j}+4\vec{k})$ and $(3\vec{i}+6\vec{j}+5\vec{k})$ m respectively. Locate the position of center mass.

PART - IV

Note : i) Answer all the questions. **5 x 5 = 25**

34. Obtain an expression for the time periiod (T) of a simple perndulum. The time period 'T' depends upon (i) mass 'm' of the bob (ii) length 'l' of the pendulum and acceleration due to gravity "g" at that place (constant $k = 2\pi$) **(OR)**
    Explain in detail the triangular law of Vector addition.
35. Explain in detail about systematic errors and its classification. **(OR)**
    What is Inelastic collisiion? Derive the expression for loss of kinetic energy in perfect in-elastic collision.
36. Derive the Kinematic equations of motion for constant acceleration. **(OR)**
    Derive the expression for final speed of a particle moving in an inclined plane.
37. State law of conservation of linear momentum and prove it. **(OR)** Derive the expression for moment of inertia of a uniform disc about an axis passing through the centre and perpendicular to its plane.
38. Derive the expression for Elastic Potential energy of a spring. **(OR)**
    Derive the expression of Kinetic energy in rotation.