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11**PART – III****இயற்பியல் / PHYSICS**

(English Version)



Time Allowed : 3.00 Hours]

[Maximum Marks : 70

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

PART – I

- Note :**
- (i) Answer **all** the questions. **15x1=15**
 - (ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. The dimensional formula of Planck's constant h is
 (a) $[ML^2T^{-1}]$ (b) $[ML^2T^{-3}]$ (c) $[MLT^{-1}]$ (d) $[ML^3T^{-3}]$
2. The ice dancer stretching of hands away from body, the moment of inertia and the angular velocity is
 (a) increases, decreases (b) decreases, increases
 (c) increases, increases (d) decreases, decreases
3. The dimension of $(\mu_0 \epsilon_0)^{\frac{1}{2}}$ is
 (a) length (b) time (c) velocity (d) force
4. Which one of the following physical quantities cannot be represented by a scalar?
 (a) Mass (b) length
 (c) momentum (d) magnitude of acceleration
5. The SI unit of Magnetic Induction
 (a) N Am (b) tesla (c) tesla A^{-1} (d) $N^{-1}m^{-1}$
6. If a particle executes uniform circular motion in the xy plane in clock wise direction, then the angular velocity is in
 (a) +y direction (b) +z direction (c) -z direction (d) -x direction

[Turn Over

916105

7. Force acting on the particle moving with constant speed is
(a) always zero (b) need not be zero
(c) always non zero (d) cannot be concluded
8. 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
9. 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}
10. When the pull is hit by the kitti, the path followed by the pull is
(a) parabolic (b) circle (c) straight (d) None of these
11. The work done by the conservative force for a closed path is
(a) always negative (b) zero
(c) always positive (d) not defined
12. The ratio of the acceleration for a solid sphere (mass m and radius R) rolling down an incline of angle θ without slipping and slipping down the incline without rolling is,
(a) 5:7 (b) 2:3 (c) 2:5 (d) 7:5
13. A closed 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
14. If the masses of the Earth and Sun suddenly double, the gravitational force between them will
(a) remain the same (b) increase 2 times
(c) increase 4 times (d) decrease 2 times
15. One horse power is equal to
(a) 746 W (b) 746 V (c) 746 V (d) 786 W

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PART - II

Note : Answer any six questions. Question No. 24 is compulsory.

6x2=12

16. Give any two examples of torque in day-to-day life.
17. Define impulse.
18. Consider a circular road of radius 20 meter banked at an angle of 15 degrees. With what speed a car has to move on the turn so that it will have safe turn?
19. State Lami's theorem.
20. What are the uses of dimensional analysis?
21. What is meant by equal vectors?
22. Write the kinetic equations for linear motion.
23. Define couple.
24. Check the correctness of the equation $E = mc^2$ using dimensional analysis method.

PART - III

Note : Answer any six questions. Question No. 33 is compulsory.

6x3=18

25. Deduce the relation between momentum and kinetic energy.
26. Explain the propagation of errors in addition.
27. Briefly explain 'Rolling Friction'.
28. State Kepler's three laws.
29. Write the rules for rounding off.
30. Two vectors are given as $\vec{r} = 2\vec{i} + 3\vec{j} + 5\vec{k}$ and $\vec{F} = 3\vec{i} - 2\vec{j} + 4\vec{k}$. Find the resultant vector $\vec{\tau} = \vec{r} \times \vec{F}$
31. Discuss any six properties of scalar products.
32. Write the salient features of Static and Kinetic friction.
33. A cyclist while negotiating a circular path with speed 20 m s^{-1} is found to bend an angle by 30° with vertical. What is the radius of the circular path?
(given, $g = 10 \text{ ms}^{-2}$)

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[Turn Over

916105

4

PART - IV**Note :** Answer all the questions.

5x5=25

34. Convert 76 cm of mercury pressure into Nm^{-2} using the method of dimensions.

(OR)

State and prove parallel axis theorem.

35. Explain in detail the triangle law of addition.

(OR)

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

36. Derive the equation of motion, range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction.

(OR)

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

37. Describe the method of measuring Angle of Repose.

(OR)

Explain why a cyclist bends while negotiating a curve road? Arrive at the expression for angle of bending for a given velocity.

38. Prove that at points near the surface of the Earth, the gravitational potential energy of the object is $U = mgh$.

(OR)

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

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