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11

PART – III

இயற்பியல / 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. One of the combinations from the fundamental physical constants is $\frac{hc}{G}$. The unit of this expression is

   (a) kg^2 (b) m^3 (c) s^{-1} (d) m

2. 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

3. The position vector of the particle is $r = 3t^2i + 5tj + 9k$. What is the acceleration of the particle at t = 1 sec.

   (a) 6 ms^{-2} (b) 5 ms^{-2} (c) 9 ms^{-2} (d) zero

4. The work done by the conservative force for a closed path is

   (a) always negative (b) zero

   (c) always positive (d) not defined

5. The centrifugal force appears to exist

   (a) Only in rotating frames (b) any inertial frames

   (c) in accelerated frames (d) both in inertia and non-Inertial frames

6. The linear momentum and position vector of the planet is perpendicular to each other at

(a) perihelion and aphelion (b) at all points

(c) only at perihelion (d) no point

7. If a wire is stretched to double of its original length, then the strain in the wire is

(a) 1 (b) 2 (c) 3 (d) 4

8. When a cycle tyre suddenly bursts, the air inside the tyre expands. This process is

(a) isothermal (b) adiabatic

(c) isobaric (d) isochoric

9. For a given gas molecule at a fixed temperature, the area under the Maxwell-Boltzmann distribution curve is equal to

(a) $\frac{PV}{kT}$ (b) $\frac{kT}{PV}$ (c) $\frac{P}{NkT}$ (d) PV

10. The average translational kinetic energy of gas molecules depends on

(a) number of moles and T (b) only on T

(c) P and T (d) P only

11. In a simple harmonic oscillation, the acceleration against displacement for one complete oscillation will be

(a) an ellipse (b) a circle (c) a parabola (d) a straight line

12. Which of the following represents a wave

(a) $(x - vt)^3$ (b) $x(x + vt)$ (c) $\frac{1}{(x + vt)}$ (d) $\sin(x + vt)$

13. 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) $[ML^{-1}T^0]$

14. Which of the following is scalar quantity?

(a) momentum (b) work (c) force (d) displacement

15. If the mass and radius of the earth are doubled then the acceleration due to gravity g

(a) remains same (b) g/2

(c) 2g (d) 4g

PART – II

Note : Answer **any six** questions. Question No. **24** is **compulsory.** **6x2=12**

16. State the principle of homogeneity of dimensions.
17. Define projectile. Give examples.
18. What is impulsive force?
19. Why is there no lunar eclipse and solar every month?
20. Distinguish between cohesive and adhesive forces.
21. Define latent heat capacity. Give its unit.
22. List the factors affecting the mean free path.
23. What is meant by resonance?
24. A car takes your turn with velocity 50 m/s on the circular road of radius of curvature 10 m. Calculate the centrifugal force experienced by a person a mass 60 kg inside the car?

PART – III

Note : Answer **any six** questions. Question No. **33** is **compulsory.** **6x3=18**

25. What are the uses of dimensional analysis?
26. Discuss any 6 properties of scalar product of two vectors.
27. State Newton's three laws.
28. Distinguish between elastic and inelastic collisions.
29. What are the factors affecting the surface tension of liquid?
30. Explain the linear expansion of solid.
31. State the laws of simple pendulum.
32. Distinguish between transverse waves and longitudinal waves.
33. The radius of the circle 3.12 m. Calculate the area of the circle with regard to signature Figure.

PART – IV

Note : Answer **all** the questions. **5x5=25**

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

(OR)

(b) Explain in detail that triangle law of addition.

35. (a) Derive the expression for final speed of a particle moving in an inclined plane.

OR

(b) State and prove work-kinetic energy theorem

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

OR

(b) Derive an expression for escape speed.

37. (a) State and prove Bernoulli's theorem.

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OR

(b) Derive Meyer's relation.

38. (a) Discuss in detail the energy in simple harmonic motion.

OR

(b) Derive Newton's formula for velocity of sound waves in air. Explain the Laplace's correction in it.