HALF YEARLY EXAMINATION- 2022

CLASS :11 **PHYSICS** 1 2 0 6

TIME : 3.00 Hrs **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. 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 Velocity of a particle v at an instant t is given by $v = at + bt^2$. The dimensions of b is
   a) [L] b) $[LT^{-1}]$ c) $[LT^{-2}]$ d) $[LT^{-3}]$
2. If a particle executes uniform circular motion, choose the correct statement
   a) The velocity and speed are constant
   b) The acceleration and speed are constant.
   c) The velocity and acceleration are constant
   d) The speed and magnitude of acceleration are constant.
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. 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 energy consumed in electrical units when a 75 W fan is used for 8 hours daily for one month (30 days).
   a) 180 Unit b) 18 Unit c) 1.8 Unit d) 1800 Unit
6. The speed of a solid sphere after rolling down from rest without sliding on an inclined plane of vertical height h is,
   a) $\sqrt{\frac{10}{7}gh}$ b) $\sqrt{\frac{4}{3}gh}$ c) $\sqrt{2gh}$ d) $\sqrt{\frac{1}{2}gh}$
7. The work done by the Sun's gravitational force on the Earth is
   a) always zero b) always positive
   c) can be positive or negative d) always negative
8. If a wire is stretched to four times of its original length, then the strain in the wire is
   a) 1 b) 2 c) 3 d) 4
9. When a uniform rod is heated, which of the following quantity of the rod will increase
   a) mass b) weight c) center of mass d) moment of inertia
10. In an isochoric process, we have
    a) W = 0 b) Q = 0 c) $\Delta U = 0$ d) $\Delta T = 0$
11. A sample of ideal gas is at equilibrium. Which of the following quantity is zero?
    a) rms speed b) average speed c) average velocity d) most probable speed
12. The damping force on an oscillator is directly proportional to the velocity. The units of the constant of proportionality are
    a) Kg mS^{-1} b) Kg mS^{-2} c) Kg S^{-1} d) Kg S
13. An air column in a pipe which is closed at one end, will be in resonance with the vibrating body of frequency 83Hz. Then the length of the air column is
    a) 1.5 m b) 0.5 m c) 1.0 m d) 2.0 m

14. Consider a circular road of radius 20 meter banked at an angle of 15 degree. With what speed a car has to move on the turn so that it will have safe turn? ($g=9.8\ mS^{-2}$)
a) $4.1\ mS^{-1}$ b) $5.1\ mS^{-1}$ c) $6.1\ mS^{-1}$ d) $7.1\ mS^{-1}$

15. In sliding.....
a) the rotational motion is zero b) the rotational motion is more than translational motion.
c) the rotational motion is equal to translational motion
d) the translational motion is more than rotational motion.

PART II

II Answer any Six questions and question number 19 is compulsory. 6 X 2 = 12

16. Explain the principle of homogeneity of dimensions.
17. Write a short note on vector product between two vectors.
18. Define One Newton
19. A cyclist while negotiating a circular path with speed $20\ mS^{-1}$ is found to bend an angle by 30^{o} with vertical. What is the radius of the circular path? (given $g = 10mS^{-2}$)
20. Why there are no lunar eclipse and solar eclipse every month?
21. Write Any two practical applications of Capillarity.
22. State the Newton's law of cooling.
23. Define the term degrees of freedom.
24. Define beat.

PART- III

III Answer any SIX questions and question number 27 is compulsory. 6 X 3 = 18

25. What are the limitations of dimensional analysis.
26. State Newton's Laws of motion.
27. Suppose we go 200 km above and below the surface of the Earth, what are the g values at these two points? In which case, is the value of g small?
28. Write a short note on linear thermal expansion.
29. What is the difference between sliding and slipping?
30. Explain resonance. Give an example.
31. Compare elastic and inelastic collisions.
32. List the factors affecting the mean free path.
33. Derive Poiseuille's formula for the volume of a liquid flowing per second through a pipe under streamlined flow.

PART - IV

III Answer all the questions. 5 X 5 = 25

34. a) Derive the expression for the terminal velocity of a sphere moving in a high viscous fluid using stokes force. ***(OR)***
b) Explain in detail the triangle law of addition of vectors.
35. a) Derive the expression for moment of inertia of a rod about its centre and perpendicular to the rod. ***(OR)***
b) Explain in detail the various types of errors.
36. a) Derive Mayer's relation for an ideal gas. ***(OR)***
b) Using free body diagram, show that it is easy to pull an object than to push it.
37. a) Explain how overtones are produced in a Closed organ pipe.
(OR)
b) Write down the postulates of kinetic theory of gases.
38. a) Explain the variation of 'g' with altitude. ***(OR)***
b) i) State work energy theorem. ii) Obtain the relation between Momentum and Kinetic Energy.