HALF YEARLY EXAMINATION – 2019

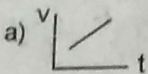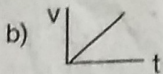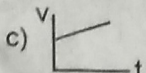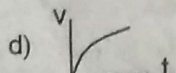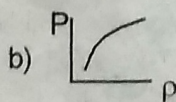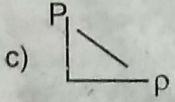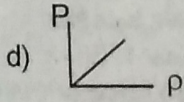**11 -STD**   **PHYSICS**
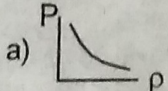
Time Allowed : 3.00 Hours   A.Ramasamian   Maximum Marks : 70

PART – I

15 X 1 = 15

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.

1. The dimension of $(\mu_0 \varepsilon_0)^{-1/2}$ is
   (a) length   (b) time   (c) velocity   (d) force

2. A particle is in circular motion with an acceleration $\alpha = 0.2$ rad s^{-2}. What is the angular displacement made by the particle after 5s ?
   (a) 2.5 rad   (b) 25 rad   (c) 250 rad   (d) 2500 rad

3. An object is dropped from rest. Its v-t graph is :

   a)   b)   c)   d)

4. The work done by the conservative force for a closed path is :
   (a) always negative   (b) always positive   (c) zero   (d) not defined

5. Find the maximum speed at which a car can turn round a curve of 36 m radius on a level road. Given the coefficient of friction between the tyre and the road is 0.53.
   (a) 26.81 m/s   (b) 1.381 m/s   (c) 133.8 m/s   (d) 13.81 m/s

6. Which of the following is not a scalar ?
   (a) Viscosity   (b) Surface tension   (c) Pressure   (d) Stress

7. Choose the correct statement from the following :
   (a) Centrifugal and centripetal force are action reaction pair. (b) Centripetal force is a natural force.
   (c) Centrifugal force arises from gravitational force.
   (d) Centripetal force acts towards centre and centrifugal force appears to act away from the centre in a circular motion.

8. When a ballet dancer folds her arms :
   (a) angular velocity and moment of inertia decreases
   (b) angular velocity and moment of inertia increases
   (c) angular velocity decreases and moment of inertia increases
   (d) angular velocity increases and moment of inertia decreases

9. 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) at no point

10. When a cycle tyre suddenly bursts, the air inside the tyre expands. This process is called _____.
    (a) isobaric   (b) isochoric   (c) adiabatic   (d) isothermal

11. Which of the following shows the correct relationship between pressure and density of an ideal gas at constant temperature ?

    a)   b)   c)   d)

12. Which one of the following represents simple harmonic motion?
    a) acceleration $= kx$ b) acceleration $= k_0 x + k_1 x^2$
    c) acceleration $= -k(x + a)$ d) acceleartion $= k(x + a)$

13. Which of the following represents a wave?

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

14. The wavelength of a sine wave is $\lambda = 1m$. Calculate the wave number.
    (a) 62.8 radm^{-1} (b) 6.28 radm^{-1} (c) 628.0 radm^{-1} (d) 0.628 radm^{-1}
15. The waves produced by a motor boat sailing in water are :
    (a) Transverse   (b) Longitudinal   (c) Stationary   (d) Longitudinal and Transverse

PART - II

Answer any six questions and question number 24 is compulsory. $6 \times 2 = 12$

16. State the Principle of Homogeneity of Dimensions.
17. A particle moves along the x-axis in such a way that its coordinates x varies with time 't' according to the equation $x = 2 - 5t + 6^2$. What is the initial velocity of the particle ?
18. State Newton's II Law of Motion.
19. Define center of gravity.
20. Write any two difference between transverse and longitudinal waves.
21. If Earth has no tilt, what happens to the seasons of Earth ?
22. What are the factors affecting Brownian Motion ?
23. Which one of these is more elastic, steel or rubber ? Why ?
24. If the length of the simple pendulum is increased by 44% from original length calculate the percentage increase in time period of the pendulum.

PART - III

Answer any six questions and question number 33 is compulsory. $6 \times 3 = 18$

25. An oxygen molecule is travelling in air at 300 K and 1 atm, and the diameter of oxygen molecule is 1.2×10^{-10}m. Calculate the mean free path of oxygen molecule.
26. How will you measure the diameter of the Moon using parallax method ?
27. Show that the path of a projectile is a parabola.
28. A car takes a turn with velocity 50 ms^{-1} on the circular road of radius of curvature 10m. Calculate the centrifugal force experienced by a person of mass 60kg inside the car.
29. Which is conserved in inelastic collision? Total energy (or) Kinetic energy - Explain.
30. State Kepler's Laws.
31. State the laws of transverse vibrations in stretched strings.
32. Explain the working of refrigerator.
33. Two pistons of a hydraulic lift have diameters of 60 cm and 5 cm. What is the force exerted by the larger piston when 50 N is placed on the smaller piston ?

PART - IV

Answer all the questions. $5 \times 5 = 25$

34. (a) Obtain an expression for the time period T of a simple pendulum. The time period T depends on :
    (i) mass 'm' of the bob   (ii) length 'l' of the pendulum and
    (iii) acceleration due to gravity 'g' at the place where the pendulum is suspended. [constant $k = 2\pi$]
    (OR)
    (b) State and prove Parallel Axis Theorem.
35. (a) Discuss the properties of scalar and vector products .*(OR)*
    (b) Derive an expression for escape speed.
36. (a) Explain in detail Newton's Law of Cooling.   *(OR)*
    (b) (i) Arrive at an expression for power and velocity. Give some examples for the same.
    (ii) A vehicle of mass 1250 kg is driven with an acceleration 0.2 ms^{-2} along a straight level road against an external resistive force 500 N. Calculate the power delivered by the vehicle's engine if the velocity of the vehicle is 30 ms^{-1}.
37. (a) State and prove Bernoulli's theorem for a flow of incompressible, non-viscous, and stream lined flow of fluid.   *(OR)*
    (b) Discuss in detail the energy in simple harmonic motion.
38. (a) Describe Newton's formula for velocity of sound waves in air and also discuss the Laplace's correction.   *(OR)*
    (b) Obtain an expression for acceleration of a particle moving in an inclined plane.