



Answer any 5 questions from 1 to 7. Each carries 1 score.

1. The SI unit of electric current is _____

2. At what temperature water has maximum density ?

3. Name the rotational analogue of force in linear motion.

4. Draw the velocity-time graph of a freely falling body.

5. Two vectors \vec{A} and \vec{B} are acting at an angle ' θ ', the magnitude of the resultant vector is _____

6. 1 kilowatt hour (kWh) = _____ J.

7. The force of attraction due to a hollow spherical shell of uniform density, on a point mass situated inside it is _____

Answer any 5 questions from 8 to 14. Each carries 2 scores.

(5×2=10)

8. a) Write the significant figures for the following :

(i) 0.0420 m

(ii) 1.0050 J

(1)

b) Write any two physical quantities having no unit or dimension.

(1)

9. a) Boiling point of liquid _____ with decrease in pressure.

(1/2)

b) What is sublimation ?

(1½)

10. Explain triangle method of vector addition.

11. What is the pressure on a swimmer 10 m below the surface of a lake ? ($P_a = 1.01 \times 10^5$ Pa).

12. a) Write principle of moments.

(1)

b) Write the condition for mechanical equilibrium of a rigid body.

(1)

13. A light body and a heavy body have same momentum. Which one has high kinetic energy ? Why ?

14. A shell of mass 0.020 Kg is fired by a gun of mass 100 Kg. If the muzzle speed of the shell is 80 ms^{-1} , what is the recoil speed of the gun ?

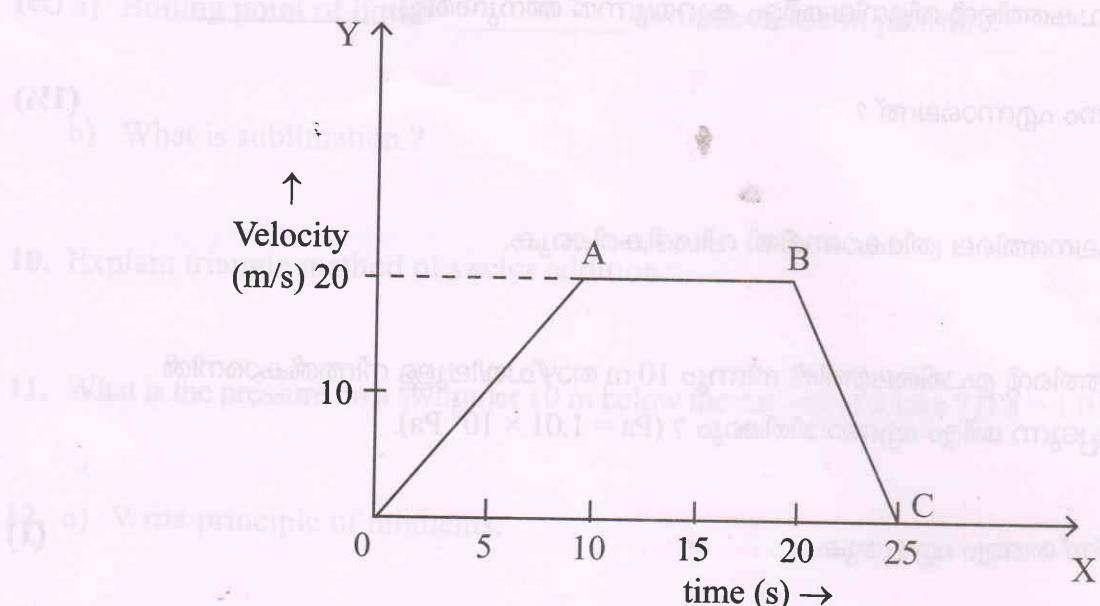
Questions from 15 to 21 carries 3 score each. Answer any six.

(01=2×3)

15. With the help of a diagram derive an equation for centripetal acceleration of a body in uniform circular motion.

(1)

16. The velocity-time graph of a body is shown below :



a) Which part of the graph has zero acceleration ?

(1)

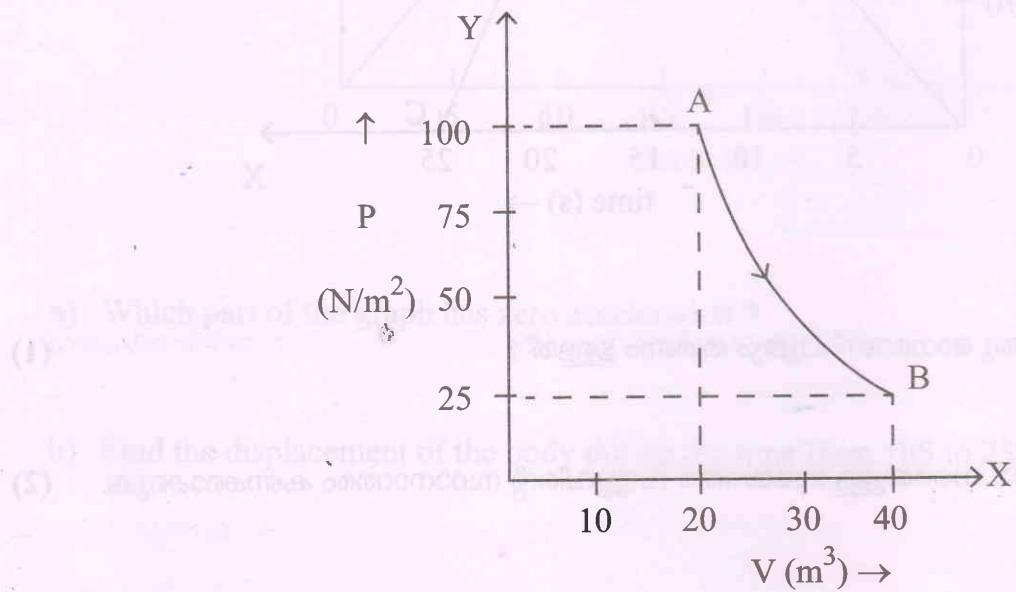
b) Find the displacement of the body during the time from 10S to 25S.

(2)



Score

17. a) State law of inertia. (2)
- b) Give the magnitude and direction of the net force acting on a stone of mass 0.1 Kg just after it is dropped from the window of a train accelerating with 1m/s^2 . (1)
18. a) State law of conservation of angular momentum. (1)
- b) Derive the relation connecting torque and angular momentum. (2)
19. a) Derive an expression for escape velocity from a planet. (2)
- b) The escape speed from moon is _____ (1)
20. a) State first law of thermodynamics. (1)
- b) One mole of a mono atomic ideal gas is taken through a process at 50°C as shown in figure. Find the work done during the process. (2)





21. a) The ratio of hydraulic stress to volume strain is called _____ (1)
b) What is an elastomer ? Give example. (2)

Answer any three questions from 22 to 25. Each carries 4 scores. (3×4=12)

22. a) The force acting on a body in a time 't' is given by, $F = At^2 + Bt$. Find the dimensions of A and B. (1)

- b) The pressure (p) of a liquid column depends on height (h), acceleration due to gravity (g) and density of liquid (ρ). Derive an equation for pressure based on methods of dimension. (3)

23. a) Draw the velocity-time graph of a body having initial velocity V_0 and acceleration 'a'. (1)

- b) Using the above graph derive the following equations.

$$(i) V = V_0 + at$$

$$(ii) S = V_0 t + \frac{1}{2} at^2$$



Score

24. a) Derive an equation for the potential energy of a stretched string. (2)
- b) The bob of a pendulum is released from a horizontal position. If the length of the pendulum is 1.5 m, what is the speed with which the bob arrives at the lowermost point, given that it dissipated 5% of its initial energy against air resistance ? (2)
25. a) According to Torricelli's law, the speed of efflux of a fluid is identical to the speed of a _____ (1)
- b) Using Stoke's law derive equation to find coefficient of viscosity of a fluid. (3)

Question 26 to 29 carry 5 scores. Answer any 3. (3×5=15)

26. a) In a projectile motion, the vertical component of velocity at maximum height is _____ (1)
- b) Derive equations for maximum height and time of flight of a projectile. (3)
- c) Draw the velocity-time of the vertical motion of a projectile. (1)
27. a) With the help of a diagram, explain the working of a hydraulic lift. (3)
- b) In a car lift, compressed air exerts a force F_1 on a small piston having a radius of 5 cm. This pressure is transmitted to a second piston of radius 15 cm. If the mass of the car to be lifted is 1350 Kg, calculate F_1 . ($g = 9.8 \text{ m/s}^2$). (2)



28. a) Derive equation to find the acceleration due to gravity at a height 'h' from the surface of earth. (3)
- b) A saturn year is 29.5 times the earth year. How far is the saturn from the sun if the earth is 1.5×10^8 km away from the sun ? (2)
29. a) Derive equation to find the maximum speed of a vehicle in a level circular road. (3)
- b) An aircraft executes a horizontal loop at a speed of 720 km/hr with its wings banked at 15° . What is the radius of the loop ? (2)

Ques 29
(1) = 2 x 6

30. a) In a projectile motion, following two statements follow true (a) height is _____ (b) Derive equations for maximum height and time of flight. (3)
- (1) Draw a graph of velocity with time for a projectile motion. (2)
31. a) With one point example, explain the concept of resultant force. (3)
(i) In a car lift, compressed air exerts a force. (ii) In a car lift, compressed air exerts a force. (iii) In a car lift, compressed air exerts a force. (iv) In a car lift, compressed air exerts a force. (5)
- (2)