

CLASS-XI

MAX.MARKS-20

SUBJECT-PHYSICS

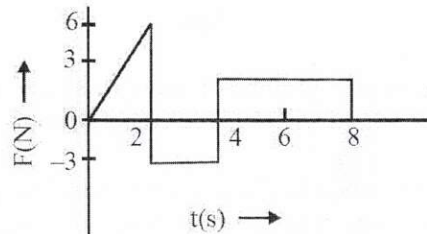
MAX.TIME-1 Hour

General Instruction:-

- (i) All questions are compulsory .There are 12 questions in this question paper with internal choice.
- (ii) SECTION –A: Question numbers 1 to 6 are MCQs , carrying 1 mark each.
- (iii) SECTION –B: Question numbers 7 to 10 are short answer questions carrying 2 marks each.
- (iv) SECTION –C: Question numbers 11 and 12 are long questions carrying 3marks each.
- (v) There will be internal choices in some of the question of section B and section C.

SECTION A

- Q1.** The force F acting on a particle of mass m is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from 0 to 8 s is



- (a) 24 Ns
 - (b) 6Ns
 - (c) 12Ns
 - (d) 20Ns
- Q2.** An elevator weighing 6000 kg is pulled upward by a cable with an acceleration of 5 m s^{-2} , then the tension in the cable is (Take $g = 10 \text{ ms}^{-2}$)
- (a) 6000 N
 - (c) 60000 N
 - (b) 9000 N
 - (d) 90000 N
- Q3.** A ball of mass 2 kg and another of mass 4 kg are dropped together from a 60 feet tall building. After a fall of 30 feet each towards earth, find the ratio of their kinetic energies.
- (a) $\sqrt{2} : 1$
 - (b) 1:4
 - (c) 1:2
 - (d) $1:\sqrt{2}$
- Q4.** A particle is projected making an angle of 45° with horizontal having kinetic energy K . The kinetic energy at highest point will be
- (a) $\frac{K}{\sqrt{2}}$
 - (b) $\frac{K}{2}$
 - (c) $2K$
 - (d) K

- Q5.** An engine develops 10 kW of power. How much time will it take to lift a mass of 200 kg to a height of 40 m. ($g = 10 \text{ m/sec}^2$)
- (a) 4 sec (b) 5 sec
(c) 8 sec (d) 10 sec
- Q6.** A car moves at a speed of 20 m/s on a banked road and describes an arc of a circle of radius $40\sqrt{3}$ m. The angle of banking in degrees is (Take $g = 10 \text{ ms}^{-2}$)
- (a) 30° (b) 25°
(c) 45° (d) 60°

SECTION B

- Q7.** If $F = (60\mathbf{i} + 15\mathbf{j} - 3\mathbf{k})$ N and $\mathbf{v} = (2\mathbf{i} - 4\mathbf{j} + 5\mathbf{k})$ m/s, then calculate instantaneous power.
- Q8.** If angular velocity of a disc depends on an angle rotated θ as $\omega = \theta^2 + 2\theta$ then calculate its angular acceleration α at $\theta = 1$ rad.
- OR**
- An object of mass 3 kg is at rest. Now a force of $F = 6t^2 \mathbf{i} + 4t \mathbf{j}$ is applied on the object then find the velocity of object at $t = 3$ s.

- Q9.** Write three differences between stable, unstable and neutral equilibrium.

OR

In a region potential energy of a particle of mass 10 kg is given $U = (3x^2 + 4y^2)$ J. Find the acceleration of particle when it is released from (2,3)

- Q10.** When a long spring is stretched by 2 cm, its potential energy is 30J. If the spring is stretched by 8 cm, then find the potential energy stored in it.

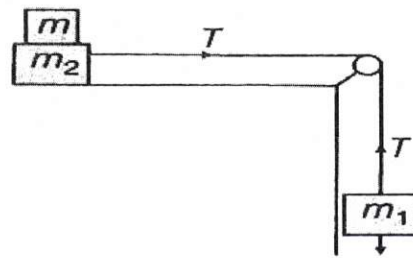
SECTION C

- Q11.** The energy of a system is given by $U = 16x - x^3$. Find position of equilibrium and its type. Also find minimum and maximum value of potential energy.

OR

Derive the expression for gravitational potential energy for a uniform chain of mass M kg kept on a semicircular ring of radius R .

- Q12.** Two masses $m_1 = 5$ kg and $m_2 = 10$ kg connected by an inextensible string over a frictionless pulley, are moving as shown in the figure. The coefficient of friction of horizontal surface is 0.15. What will be the minimum value of mass " m " that should be put on top of m_2 to stop the motion? (take $g = 10 \text{ ms}^{-2}$)



OR

Three identical blocks each of mass 20kg are connected by ideal strings and are being pulled along a horizontal frictionless table by a constant horizontal force F as shown in figure. What is the magnitude of force F if the tension in the string connecting blocks A and B is 60 N?