Short Questions
(i) What is reference point and reference frame? Show a point (-2, -4) in a frame.
(ii) What is projectile and trajectory? Show the sketch of a trajectory.
(iii) What is wave? What is mechanical wave and E-M wave?
(iv) When work is done?
(v) What are the classification of friction force?
(vi) What is an epoch? Show it on a sketch.
(vii) What are the fundamental forces?
(viii) What is rigid body?
(ix) When there have no acceleration of a moving body?
(x) What is damped and forced vibration?
(xi) Define energy and classify it.
(xii) What is translational motion?
(xiii) Define impulse.
(xiv) Write two postulates of SHV.
(xv) Write some factors which effects on friction force.
(xvi) Define: amplitude, frequency, time period, phase, initial phase (epoch) of a wave
(xvii) State about conservation of momentum.
(xviii) What is moment of inertia?
(xix) Define linear and angular momentum
(xx) Why there have no acceleration for a car when it is in constant velocity?

Explanation Types of Questions:

1. By drawing the diagram of projectile motion, Explain that the time to reach the maximum height of a projectile is half of the time to reach the maximum distance. Or
Explain that the time to reach the maximum distance is twice the time to reach the maximum height. Or
Explain that the time to reach the maximum height of a projectile is equal to the time to come back.

2. Show that total energy of a particle performing SHM is constant. Or
Show that the energy of a body execute simple harmonic motion is the proportional to the square of the amplitude of the vibration.

3. Explain the general equation of simple harmonic motion from differential equation of simple harmonic motion.

4. Show that the moment of inertia of a thin uniform rod is $I = (ml^2)/12$, when axis pass through the mid-point and normal to the length of the rod.

5. Explain the moment of inertial of thin uniform disc, axis pass though the mid-point and normal to its plane.

6. Verify the principle of conservation of momentum in two bodies' collision.

Mathematical Questions:

(a) An object threw to the free space to make an angle of 40 degree at an initial speed of 24 m/sec. Find the position of the object after 0.8 sec. Also find the maximum height of this throwing object.

(b) A 60 kg box is taken from bottom to the top of in incline 12 m long and 8 m off the ground. Consider frictionless surface, how much work must be done by a force parallel to the incline pushing up at constant speed to the top of the incline?

(c) A 150 kg box is pushed by a force of 2000 N at an angle of 30 degree with horizontal line. If the friction coefficient of the box on the surface is 0.75, find the acceleration of the box.

(d) A simple harmonic vibration equation is defined by y = 15 sin (157.0t + φ). The displacement at 0 sec is 7.5cm. Find (i) the epoch (ii) the time period of vibration (iii) maximum acceleration and (iv) phase difference within 5 sec. apart.

(e) A car of mass 700kg is travelling along a horizontal road. The engine of the car is working at a constant rate of 6.5kW. The total resistance of motion is constant and is 275N. What is the acceleration of the car when its speed is at 4m/s?"

(f) A bullet of mass 10g is shot with 500 ms-1 from a gun of mass 4kg. Calculate the recoil velocity of the gun.

(g) A 4000 kg freight car moving at 2 m/s collides with a 10,000 kg freight car at rest. They coupled upon collision. They move away at what velocity?

(h) A 60 kg box is pulled by 600 N forces with an angle of 45 degree along to the horizontal line. If the sliding friction coefficient of the box is 0.4, find the acceleration of the box.

(i) A 62.1-kg male ice skater is facing a 42.8-kg female ice skater. They are at rest on the ice. They push off each other and move in opposite directions. The female skater moves backwards with a speed of 3.11 m/s. Determine the post-impulse speed of the male skater.

(j) A bomber is flying at a constant horizontal velocity of 800 km/hr at an elevation of 1000 m toward a point directly above its target. At what angle of sight Φ should a bomb be released to strike the target?