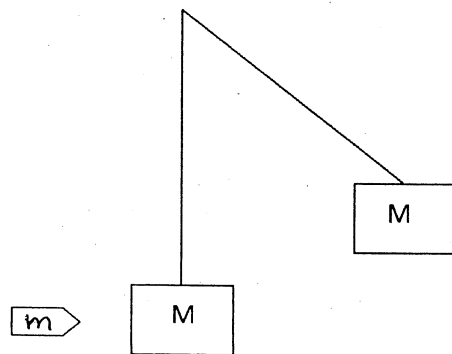


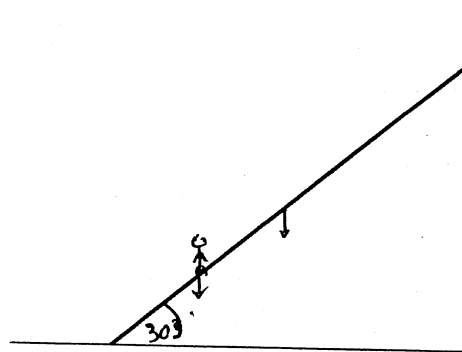


- (1) i State the principle of Conservation of linear momentum.  
ii (a) Define the Kinetic energy and potential energy.  
(b) What is the relationship between the above quantities (question (a)) for a free falling body?  
iii Derive an expression for relationship between linear Momentum(P) and Kinetic energy( $E_k$ ) of an object



- iv Figure show an object hanging wooden block of mass  $M$  and bullet of mass  $m$  moving towards the wooden block. Bullet is embedded into the wooden block. Wooden block with the bullet is raised to height  $h$ .
- (a) What is the potential energy stored in the wooden block with the bullet.  
(b) Find the velocity of the wooden block with the bullet after collision.  
(c) What is principle that you used to find the velocity in question (b) ?  
(d) Can you used the mention principle to measure the velocity of the bullet ?  
Give reason ?  
(e) Show that the velocity of the bullet is  $\left(1 + \frac{M}{m}\right) \sqrt{2gh}$

- (2)
- i. Write the properties of the Couple used in mechanics
  - ii. Write the condition for three parallel forces that are in equilibrium.
  - iii. Forces  $p$  and  $q$  are acting on the object, angle between the forces is  $\theta$ . Find the force and an angle of the resultant.



- iv. Figure shows that ladder is kept on a rough horizontal ground and smooth vertical wall. Mass of the ladder is 40 Kg and a man weighing 80 Kg mass on the ladder  $1/4^{\text{th}}$  of its length from the bottom. Inclination of the ladder to the horizontal is  $30^{\circ}$ .
- (a) Draw the forces acting on the ladder
  - (b) Draw the forces acting on the horizontal ground and vertical wall.
  - (c) Find the reaction on the wall
  - (d) Find the resultant force and direction acting on the ground
  - (e) What is the coefficient of friction on the ground ?

- 03.
- i. Describe briefly the following parameters of a sound wave
    - (a) Reflection
    - (b) Refraction
    - (c) Interference

- ii. The frequency ( $f$ ) of transverse vibration of a wire of a length  $l$  sounding its fundamental note is given by the following equation

$$f = \frac{1}{2l} \sqrt{\frac{T}{m}}$$

- (a) Describe the symbols in the above equation
- (b) Show that above equation is dimensionally correct

- iii. A uniform sonometer wire 1 m long is divided into two segments by a knife edge. The shorter segment is 49.5 cm long. When two segments are simultaneously set in vibration 6 beats per second heard.
- (a) Show that the ratio of the two vibrating frequencies is 1.02 : 1  
(b) Hence find the frequencies of the two vibrations
- iv. Briefly describe a method to find the velocity of sound in air by using a closed pipe.

- Copyrights reserved -