

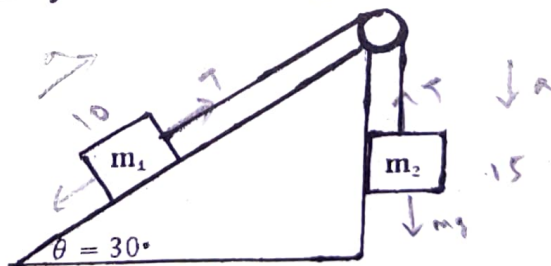
## Instructions

- The question paper contains two sections.
- Scientific calculators are allowed.
- Take  $g=10\text{m/s}^2$

## Section-A

Multiple choice questions (Each question carries **one** mark) **20x1=20marks**

- A projection has maximum range 200m. What is the maximum height attained by it?  
A) 25m      B) 50m      C) 75m      D) 200m
- A stone is just dropped from the window of a train moving along a horizontal straight track with uniform speed. The path of the stone is.....  
A) A parabola for an observer standing by the side of the track  
B) A horizontal straight line for an observer inside the train  
C) Both of the above are true  
D) None of the above is true
- A particle is moving with uniform speed 2m/s along a circle of radius 0.5m. the centripetal acceleration of the particle is  
A)  $2\text{m/sec}^2$    B)  $4\text{m/sec}^2$    C)  $6\text{m/sec}^2$    D)  $8\text{m/sec}^2$
- In the uniform circular motion,  
A) Acceleration and velocity both remains constant  
B) Acceleration and speed both remains constant  
C) Acceleration and velocity both changes  
D) Acceleration and speed both changes
- Two blocks of masses  $m_1=10\text{kg}$  and  $m_2=15\text{kg}$  joined by a light string which is passing over a smooth pulley as shown in figure. The tension in the string is



- A) 90 N      B) 100N      C) 150N      D) 180N
- If a man is walking on a rough surface, the direction of friction force is  
A) Opposite to the direction of motion  
B) Same as that of direction of motion  
C) Perpendicular to that of direction of motion  
D)  $45^\circ$  to the direction of motion
  - A block of mass "m" is placed on a fixed smooth inclined plane of inclination  $\theta$  with the horizontal. The minimum force required just to slide the block on the surface is  
A)  $mg\sin\theta$       B)  $mg\cos\theta$       C)  $mg\tan\theta$       D)  $mg$

- 8) It is easier to pull a lawn roller than to push it. Because pulling
- Involves sliding friction
  - Involves rolling friction
  - Increases the effective weight
  - Decreases the normal reaction
- 9) When a force vector  $F = (i + 2j + k)$  N acts on a body and produces a displacement of  $S = (4i + j + 7k)$  m then the work done is
- 9J
  - 13J
  - 15J
  - 20J
- 10) The angle between the two vectors  $A = i + 2j - k$  and  $B = -i + j - 2k$  is
- $60^\circ$
  - $30^\circ$
  - $45^\circ$
  - $90^\circ$
- 11) A bullet of mass 50g is fired from below into a suspended block of mass 450g. The block raises through a height of 1.8m with the bullet remaining inside the block. Find the initial speed of the bullet
- 60m/s
  - 80m/s
  - 6m/s
  - 8m/s
- 12) A spring which initially in un-stretched condition is stretched by a length  $x$  and again by a further length  $x$ . If the work done in first case is  $W$ , then work done in second case is
- $2W$
  - $3W$
  - $W/2$
  - $W/3$
- 13) A ball of mass 2kg released from height 5m, if the coefficient of restitution is 0.5. what is the speed of the ball after collision with the ground
- 10m/s
  - 50m/s
  - 5m/s
  - 0.5m/s
- 14) The work done by a force  $F = (-6x^3)$  N in displacing a particle from  $x = 4$  m to  $x = -2$  m is
- 360J
  - 240J
  - 240J
  - 360J
- 15) A lorry and a car moving with same Kinetic Energy are brought to rest by applying the same retarding force, then
- Lorry will come to rest in a shorter distance
  - Car will come to rest in a shorter distance
  - Both come to rest in the same distance
  - None of these
- 16) The power of a water pump is 2kW and the amount of water it can raise in one minute to a height of 10m is
- 2000litre
  - 1000litre
  - 1500litre
  - 1200litre
- 17) 1kWh is the unit of
- Power
  - Energy
  - momentum
  - time
- 18) Two bodies of masses 4kg and 1kg are moving towards each other with 5m/s and 2m/s respectively. The velocity of center of mass
- 6 m/s
  - 4m/s
  - 3m/s
  - 2m/s
- 19) The coefficient of restitution ( $e$ ) for a perfectly inelastic collision is
- 1
  - 0
  - 1
  - infinite
- 20) Centre of mass of a body
- Always lies inside the body
  - Always lies outside the body
  - Always lies on the surface of the body
  - May lie inside (or) outside the body



### Section C

Answer any **TWO** question (each question carries 5 marks) **2x5=10marks**

1.

a) Show that the trajectory of an object thrown at certain angle with the horizontal is a parabola **(3marks)**

b) A projectile is fired at an angle of  $60^\circ$  to the horizontal with an initial velocity of 800m/sec. Find the distance it travels before it hits the ground **(2marks)**

2.

a) Explain the terms limiting friction, kinetic friction and rolling friction **(3marks)**

b) A block of mass 4kg is resting on a rough horizontal plane and is about to move when a horizontal force of 30N is applied on it. Find the total contact force exerted by the plane on the block **(2marks)**

3.

a) From a height of 10m above a horizontal floor, a ball is thrown down with initial velocity 10m/s. After striking the floor the ball bounces to the height from which was thrown. Find the coefficient of restitution for the collision between the ball and the floor **(3marks)**

b) Explain the terms center of mass and center of gravity **(2marks)**

4.

State and prove the law of conservation of energy in case of a freely falling body.  
**((1+4=5marks))**