

## Applied math – Model 2

1. A Force of magnitude  $15 \text{ kg} \cdot \omega t.$  acts in the direction  $\overline{AB}$  where  $A(-3,1), B(1,4)$ , then the moment of  $\vec{F}$  about the origin = ...

- a)  $39\vec{k}$                   b)  $-39\vec{k}$                   c)  $-3\vec{k}$                   d)  $49\vec{k}$

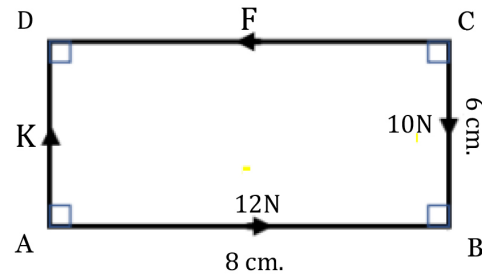
2. A car of mass 2 Tons moves in a straight line such that its position vector  $\vec{x} = (3t^2 - 4t + 1)\vec{c}$  Where  $\vec{c}$  is a unit vector in the direction of motion and  $x$  is in meter, then its momentum after 3 seconds from the beginning of motion equal ....  $\text{kg} \cdot \text{m}/\text{sec}.$

- a) 28                          b) 280                          c) 8000                          d) 28000

3. In the given figure

$ABCD$  is a rectangle,  $AB = 8 \text{ cm}, BC = 6 \text{ cm}$   
Forces  $12, 10, F, k$  acts along  $\overline{AB}, \overline{CB}, \overline{CD}, \overline{AD}$  respectively. If their resultant acts along  $\overline{AC}$ , then  $F, k = \dots$

- a) 100                          b) 110  
c) 120                          d) 130



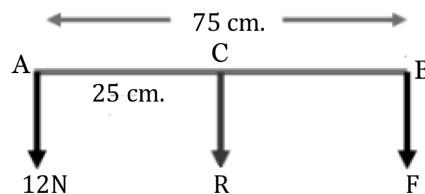
4. A locomotive of mass 30 tons, if the force of its engine is 15 ton. wt. and pulls a number of wagons, each of mass 10 tons to ascend a road inclined to the horizontal by an angle of measure  $30^\circ$  with uniform velocity, if the resistance to the whole train is 10 kg. wt for each ton, then the number of wagons = ...

- a) 5                          b) 7                          c) 8                          d) 9

5. In the opposite figure

$F$  and 12 are two parallel forces with resultant  $R$ .  
if  $AB = 75 \text{ cm}, AC = 25 \text{ cm}$   
then the values of  $F$  and  $R = \dots$

- a) 18,30  
b) 4,16  
c) 16,28  
d) 6,18



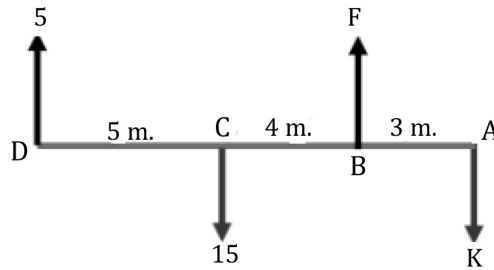


12. If the mass of a body moving along a straight line is given by the relation  $m = 3t + 2$ , and its displacement  $\vec{S} = \left(\frac{1}{3}t^3 + 2t\right)\vec{C}$  where  $\vec{C}$  is a unit vector in the direction of the acting Force, then magnitude of the force at  $t = 1$  is ...

- a) 19                      b) 20                      c) 21                      d) 22

13. In the opposite figure  
If the set of forces shown acts on the rod  $\overline{AD}$  to form a couple whose moment is -75 newtons, then  $F + k = \dots$

- a) 50                      b) 60  
c) 70                      d) 80



14. If Force  $\vec{F}$  acts on a body of mass 1 kg. moving in a straight line starting from the origin where  $f = 5x + 6$  where  $x$  is the distance from the origin measured in meters and  $F$  in newton, then its velocity when  $x = 4$  m is equal to ... m/sec.

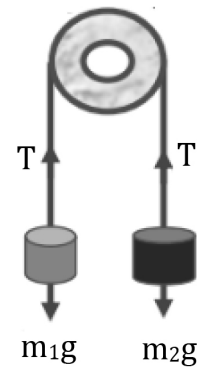
- a)  $8\sqrt{2}$                       b)  $-8\sqrt{2}$                       c)  $\pm 8\sqrt{2}$                       d)  $\pm 2\sqrt{8}$

15. If the line of action of  $\vec{F}$  is parallel to  $\overline{AB}$ , and  $\vec{M}_A = 12\vec{k}$ , then  $\vec{M}_B = \dots$

- a)  $-12\vec{k}$                       b)  $12\vec{k}$                       c)  $24\vec{k}$                       d)  $-24\vec{k}$

16. Two bodies of masses  $m_1$  and  $m_2$  kg. Where  $m_1 > m_2$  are attached to the two ends of a rope passing through a smooth pulley such that the two masses where on the same height from the ground at the beginning of motion and after 1 second, it was found that the vertical distance between the two bodies became 20 cm, then  $m_1 : m_2 = \dots$

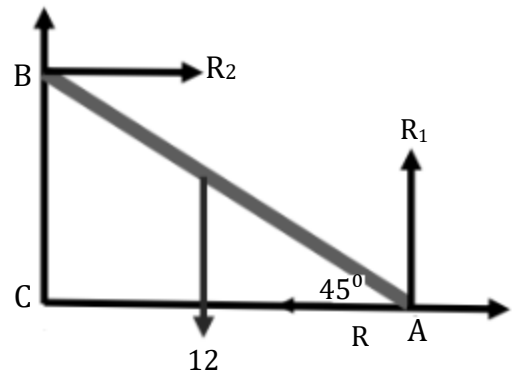
- a) 15: 13                      b) 24: 25                      c) 25: 24                      d) 21: 25



17. In the opposite Figure

$\overline{AB}$  is a uniform rod with weight  $12 \text{ kg} \cdot \text{wt}$ . its end  $A$  rests on a rough horizontal ground and its end  $B$  on a Smooth vertical wall, If the rod was in equilibrium when its angle of inclination with the horizontal was  $45^\circ$ , then the friction force between the rod and the ground =  $\dots \text{ kg} \cdot \text{wt}$ .

- a) 1                      b) 3  
c) 5                      d) 6



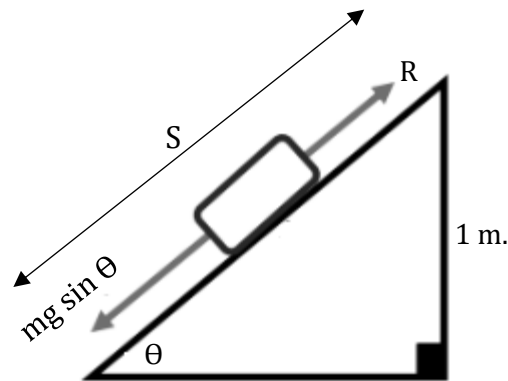
18. A car of mass 5 Tons moving with uniform velocity of magnitude  $36 \text{ km/h}$  ascending a road inclined to the horizontal by an angle whose sine is  $\frac{1}{40}$  against a resistance equal to  $2.5\%$  from the Car's weight, then its power =  $\dots$  horses.

- a) 33                      b)  $33\frac{1}{3}$                       c)  $35\frac{1}{3}$                       d) 34

### Essay Questions

19. In the opposite figure:

A body of mass 300 gm places on the top of an inclined Plane whose height is 1 m. find the velocity by which it reaches the base if given that the work done against resistance of the plane = 1.59 Joule



20. In the given figure

$\overline{AB}$  is a uniform rod of weight  $10 \text{ kg} \cdot \text{wt}$ . if  $AB = 20 \text{ cm}$  and rotate in a vertical plane about  $A$ . If the rod became in equilibrium under the action of a couple whose moment is  $50 \text{ kg} \cdot \text{wt} \cdot \text{cm}$  and acts in the same vertical plane, Find the measure of the angle of inclination of the rod with the vertical.

