

**N.B.** (1) Question No. 1 is compulsory.

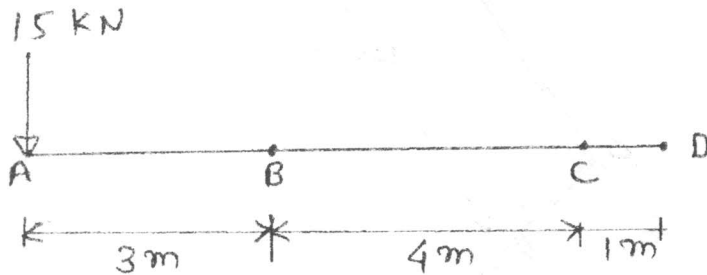
(2) Attempt any **four** questions from remaining **six** questions.

(3) Assume **suitable** data if **necessary** and mention the same **clearly**.

(4) Take  $g = 9.81 \text{ m/sec}^2$ .

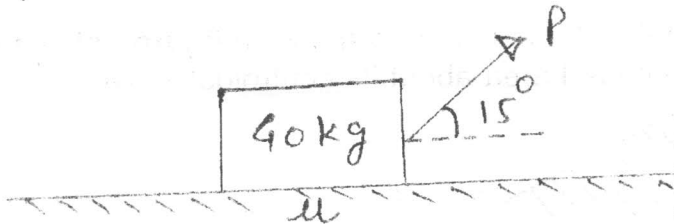
1. Solve any **four** of the following :—

(a) Resolve 15 kN force acting at 'A' into two parallel components at B and C. 5



(b) Derive an expression for centrifugal tension in flat belt drive. 5

(c) Find 'P' required to accelerate the block shown in **figure** below at  $2.5 \text{ m/sec}^2$ . 5  
Take  $\mu = 0.3$ .

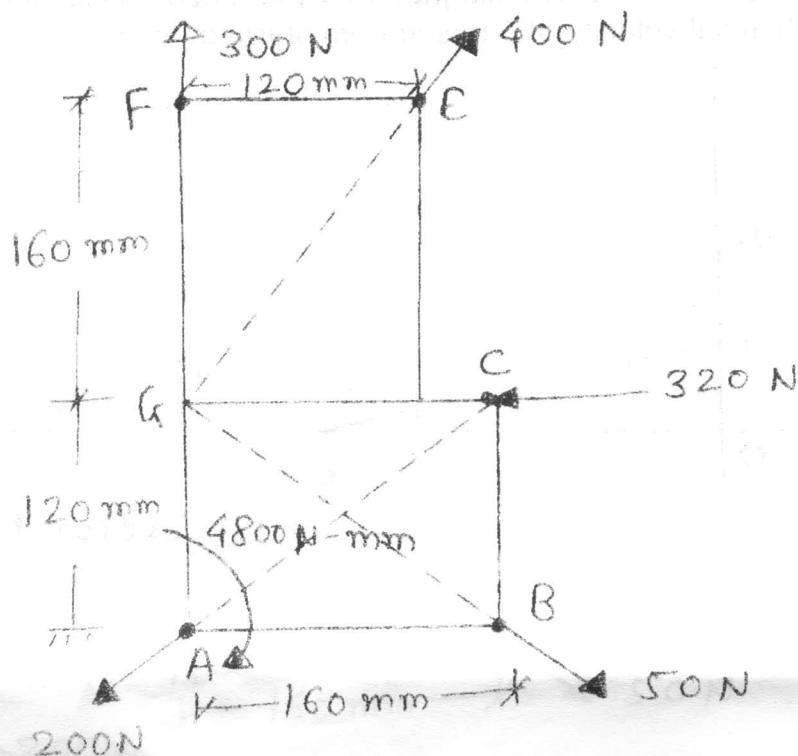


(d) A particle moves in X - Y plane and its position is given by  $\vec{r} = (3t)\mathbf{i} + (4t - 3t^2)\mathbf{j}$ . 5  
Where  $\vec{r}$  is the position vector of the particle measured in meters at time 't' seconds. Find the radius of curvature of its path and normal and tangent components of acceleration when it crosses X-axis again.

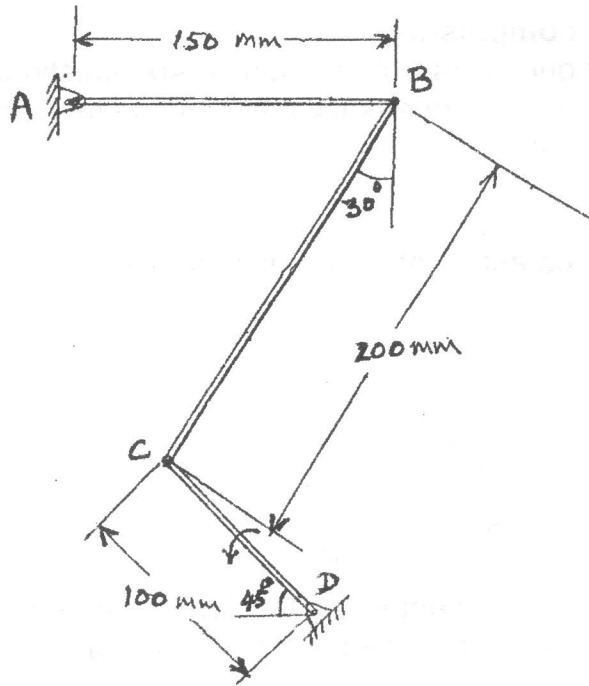
(e) Write short notes on following :— 5

- (i) Classification of truss
- (ii) Assumptions made in the analysis of perfect truss.

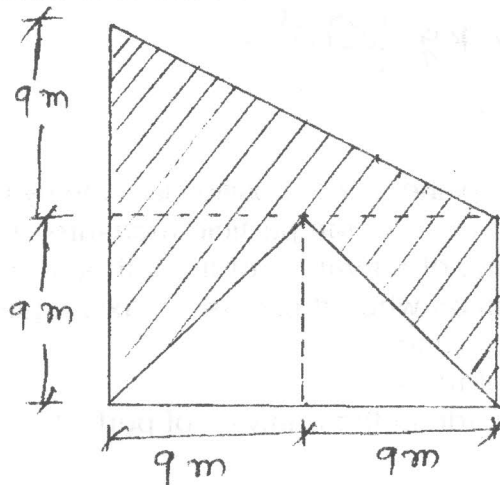
2. (a) Find the resultant of coplaner force system given below and locate the same on AB with consideration of applied moment of 4800 N-mm. 10



- (b) If the link CD is rotating at 5 rad/sec. anticlockwise, determine the angular velocity of link AB at the instant shown.



3. (a) Locate the centroid of the shaded area as shown in figure. Also determine area moment of inertia of shaded area about its centroidal X-axis.



- (b) Figure shows acceleration-time diagram for rectilinear motion. Construct velocity-time and displacement-time diagrams for the motion assuming that the motion starts with initial velocity of 5 m/sec from starting point.

