

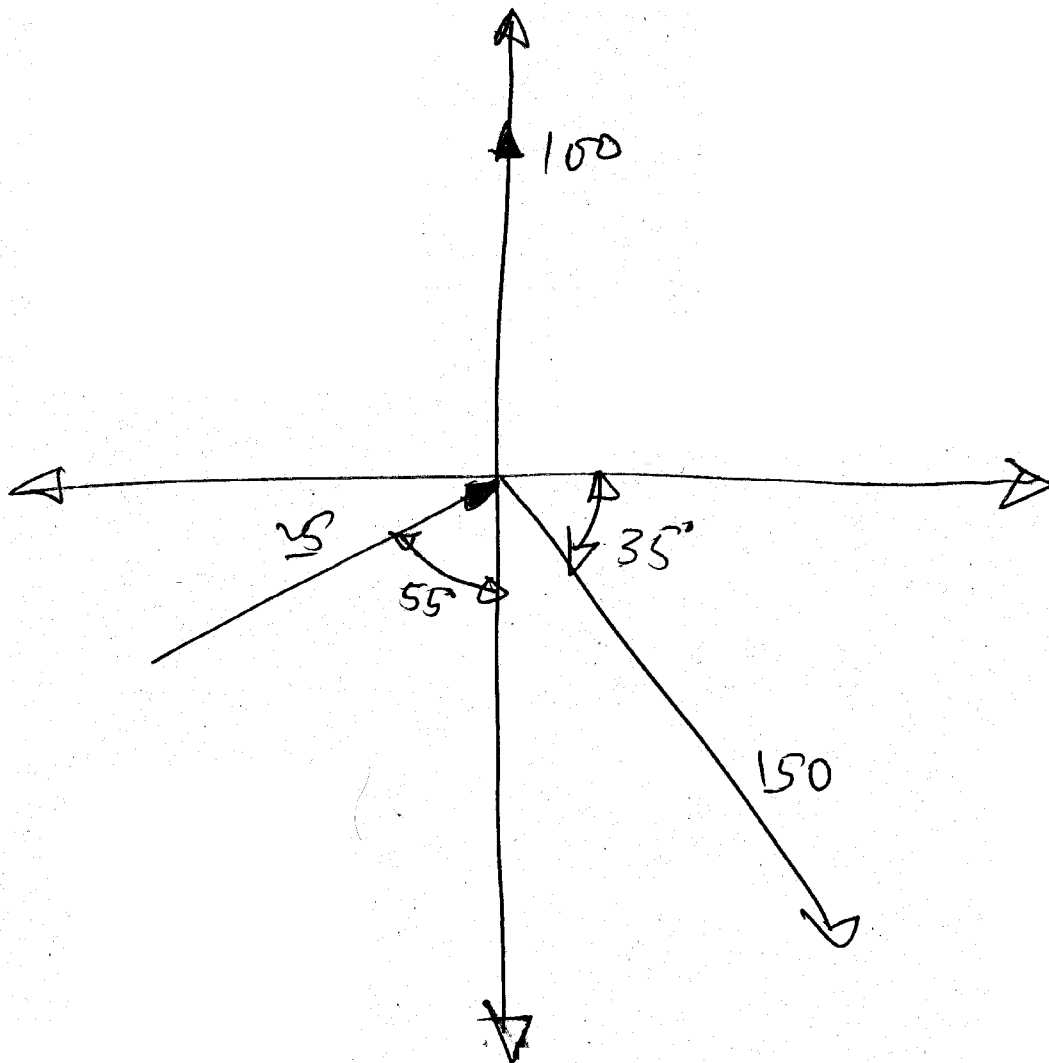
\* Forces in kN.

Fig. 1

OR

(b) Obtain resultant

8



\* Forces in kN

Fig. 2

(c) In detail explain the resolution of forces in 2D and 3D as well, with neat diagrams.

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2 Obtain reactions of A and B.

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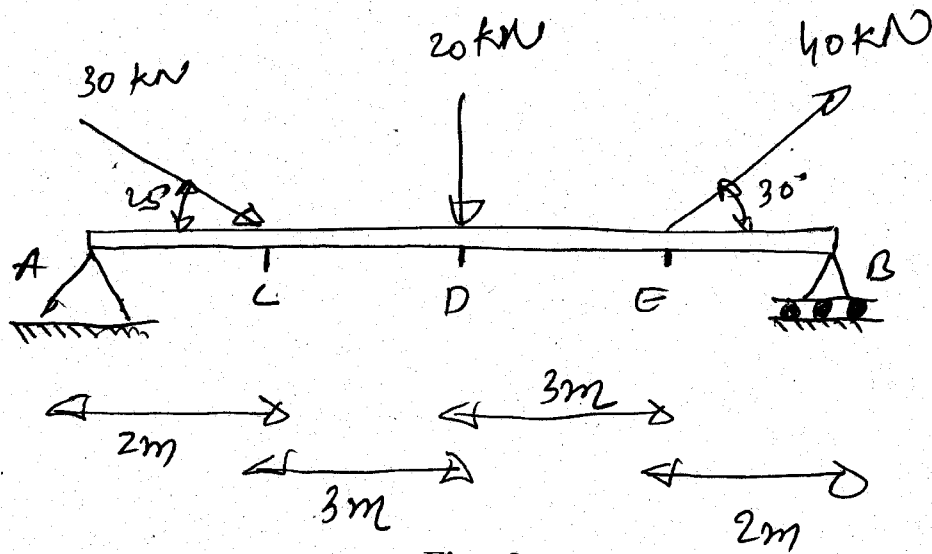


Fig. 3

OR

Clearly, with neat diagrams explain the assumptions in analysis of truss, and also explain steps in method of joints.

3 (a) Draw following types of trusses.

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- (i) Pratt
- (ii) Howe
- (iii) Fink
- (iv) K-truss

(b) Obtain forces in members of truss shown below using method of joints.

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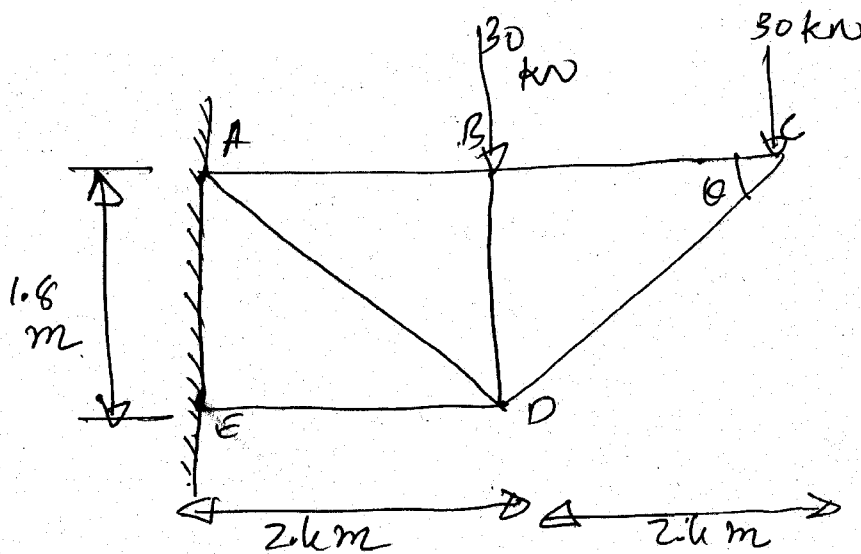


Fig. 4

- 4 (a) Answer the following in brief (any six) : 12
- (i) Differentiate between Center of Gravity and Centroid.
  - (ii) State Parallel axis Theorem.
  - (iii) State necessary conditions for body to be termed as Projectile.
  - (iv) State difference between Potential Energy and Kinetic Energy.
  - (v) Explain Dynamic Equilibrium.
  - (vi) State Pappus - Guldinus Theorem.
  - (vii) Define Radius of Gyration and Moment of Inertia.
- (b) Determine co-ordinates of centroid with respect to 'O' 8  
of the section shown in fig. (consider hatched portion as hollow).

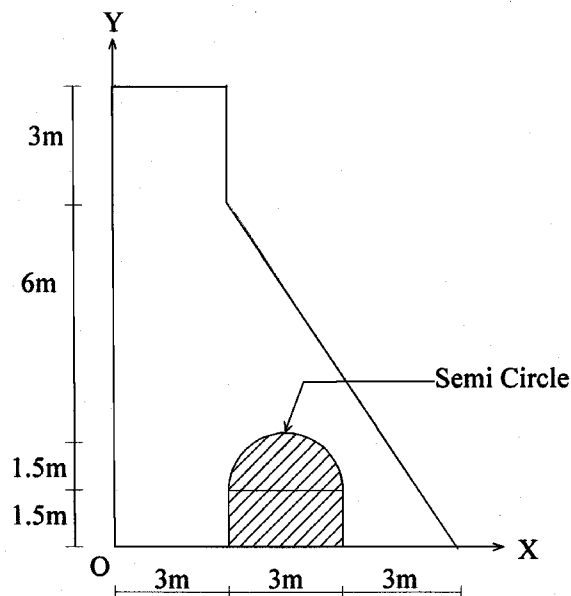
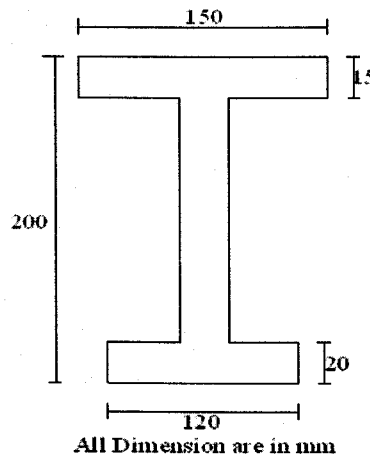


Fig. 5

- 5 (a) An I section is made of three rectangles as shown 8  
in figure. Find the moment of Inertia of the section  
about the horizontal axis passing through the Center  
of Gravity of the section.

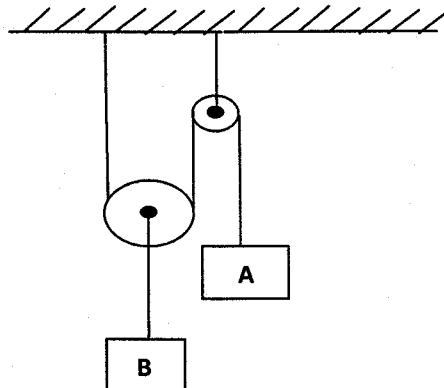


**Fig. 6**

- (b) Explain 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> system of pulleys with neat sketches. 4

**OR**

- (b) If the velocity of the block - A shown in figure moving up is increasing at the rate of 0.80 m/s each seconds, determine the acceleration of block-B. 4



**Fig. 7**

**6** Solve the following : (Any **three**) **18**

- (i) Driver of a car travelling at 70 kmph observes the light turning red 300 m. ahead of him. The traffic light is designed to remain red for 30 seconds before turning green. If the driver wishes to pass the lights without stopping to wait for the light to turn green, obtain the required deceleration of the car and the speed at which the car crosses the traffic light. Draw the figure also.

- (ii) A particle move along a curve such that  $r = 20t^3 - 10t^2 + 5t$  and  $\theta = 3t^2$  where  $r$  is in mm and  $\theta$  is in radians. find the velocity and acceleration of the particle when  $t = 1$  second.
- (iii) A car is uniformly accelerated and passes the successive kilometer stones with velocities of 20 kmph and 40 kmph respectively. Determine the acceleration of the car. What will be the velocity of the car when it passes third kolometer stone ? Also find out time taken for each of these two intervals of one kilometer.
- (iv) A body is falling freely under the action of gravity passes two points 20 m apart vertically in 0.5 sec. From what height above the higher point, did it start to fall ?
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