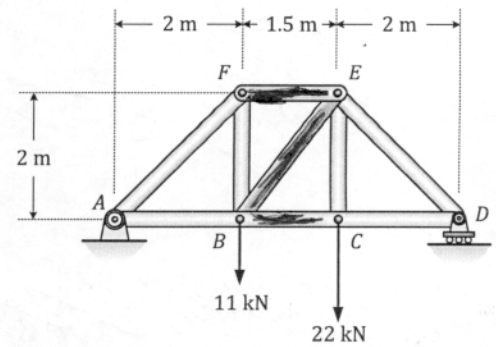


### Question 3:

(2 Marks)

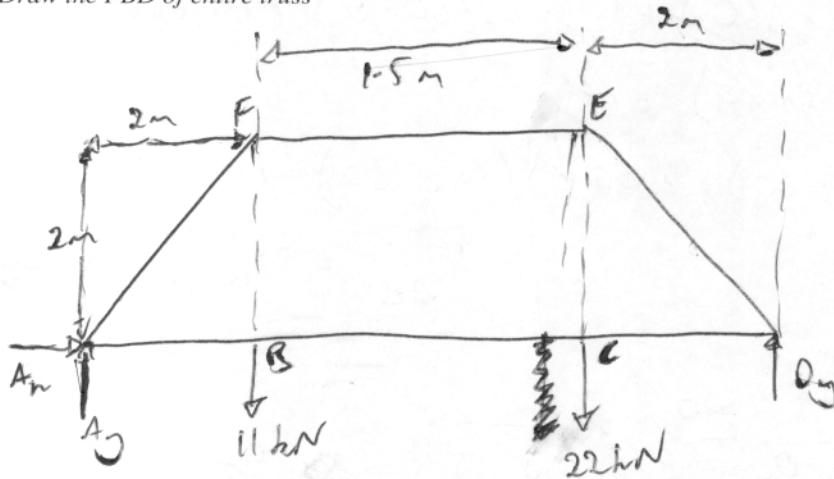
For the loaded truss shown, determine the following:

(Proceed according to the steps provided in solution boxes)



**Solution:**

(a) Draw the FBD of entire truss



(b) Determine the support reactions at A and D

$$\sum F_x = 0$$

$$\therefore A_x = 0$$

$$\sum M_A = 0$$

~~11(2) - 22(2+1.5) + Dy(2+1.5+2) = 0~~

$$-11(2) - 22(2+1.5) + D_y(2+1.5+2) = 0$$

$$\therefore D_y = 18 \text{ kN } \uparrow$$

$$\sum F_y = 0$$

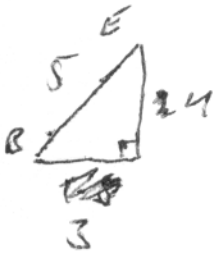
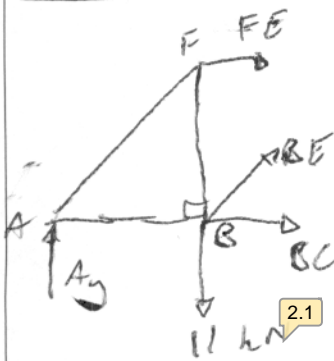
$$D_y + A_y - 11 - 22 = 0$$

$$\therefore A_y = 15 \text{ kN } \uparrow$$



(c) Using the **method of sections** determine the forces in members FE, EB and BC and state if the members are in tension or compression - (Include any free body diagrams needed to support your solution)

FBD, AFB:



$$\sum F_y = 0$$

$$A_y + BE \times \frac{4}{5} - 11 = 0$$

$$\therefore BE = -5 \text{ kN (tension)}$$

$$= 5 \text{ kN (compression)}$$

$$\sum M_B = 0$$

$$-A_y(2) - FE(2) = 0$$

$$\therefore FE = -15 \text{ kN (tension)}$$

$$= 15 \text{ kN (compression)}$$

$$\sum F_x = 0$$

$$BC + BE \times \frac{3}{5} + FE = 0$$

$$\therefore BC = 18 \text{ kN (tension)}$$

(d) Considering the equilibrium of **Joint D**, determine the forces in members DE and CD and state if the members are in tension or compression - (Include any free body diagrams needed to support your solution)

FBD D:



$$\sum F_y = 0$$

$$D_y + ED \times \frac{1}{\sqrt{2}} = 0$$

$$\therefore ED = -18\sqrt{2}$$

$$= 25.5 \text{ kN (compression)}$$

$$\sum F_x = 0$$

$$-CD - ED \times \frac{1}{\sqrt{2}} = 0$$

$$\therefore CD = -(-18\sqrt{2}) \times \frac{1}{\sqrt{2}}$$

$$= 18 \text{ kN (tension)}$$



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Answers:	$F_{FE} = 15 \text{ kN}$ compression	$F_{EB} = 5 \text{ kN}$ compression	$F_{BC} = 18 \text{ kN}$ tension	$F_{DE} = 26 \text{ kN}$ compression	$F_{CD} = 18 \text{ kN}$ tension
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## Index of comments

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2.1 axes, dimensions

2.2 axes