

M R

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استاتيكا	فيزياء
الكترونياات	دوائر كهربية
هيدروليكا	ميكانيكا الانشانات

مدرس خصوصي

حضورى

اونلاين

يحصل الطالب علي

مقاطع فيديوات لشرح المقرر بشكل وافي

ملخص للمادة Pdf للمذكرة واطراجة

محاضرات مباشرة علي برنامج زووم

مناقشة الأجزاء الغير مفهومة

تواصل مستمر مع معلم المادة



للواصل

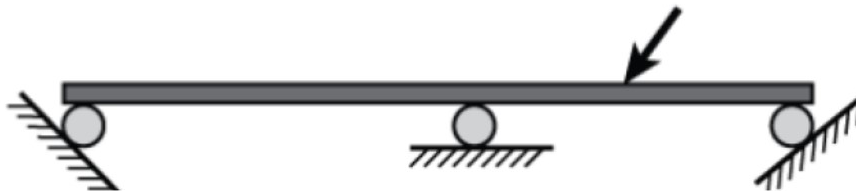
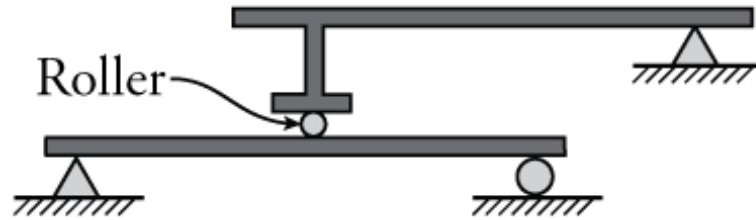
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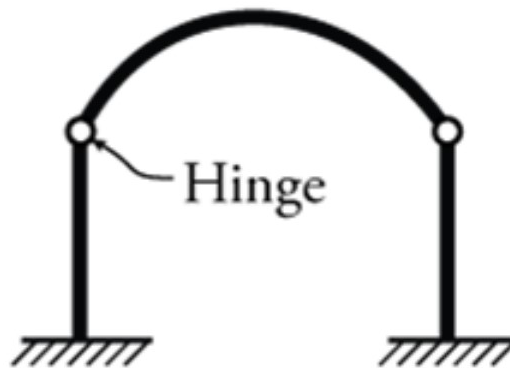
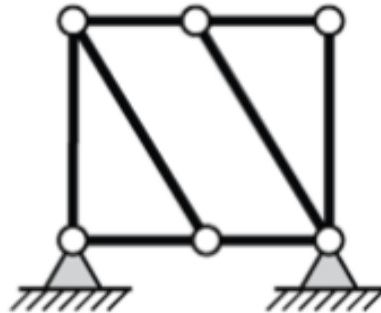
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Assignment No (1) Stability and instability

1. Classify each of the structures as statically determinate, statically indeterminate, or unstable. If indeterminate, specify the degree of indeterminacy. The supports or connections are to be assumed as stated.

حل هذا السؤال عن مقطع الفيديو

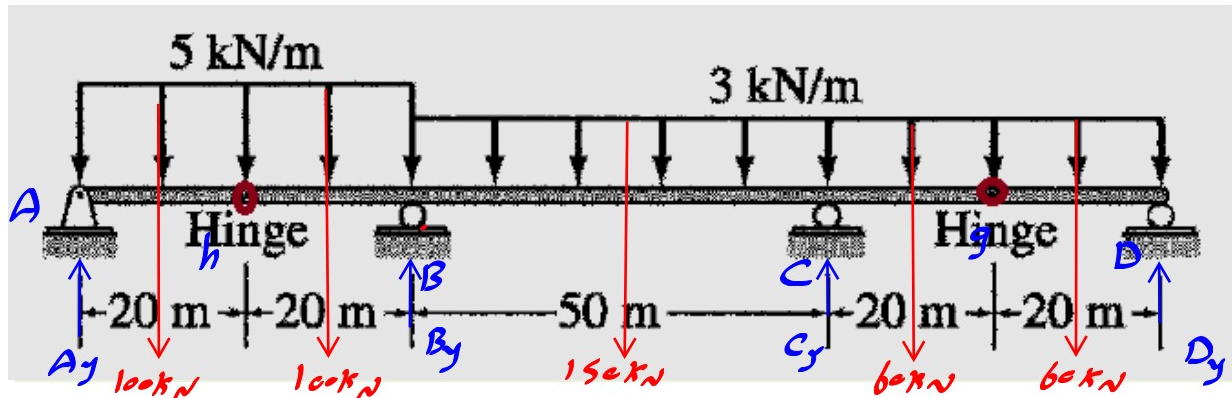




2. For the statically determinate beam loaded with both distributed and concentrated loads shown below.

i. Calculate the reactions of the beam

ii. Solve and draw the internal force diagrams (AFD, SFD & BMD)



i) reactions

$$\sum M_{h_{left}} = -100 \times 10 + A_y \times 20 = 0 \Rightarrow A_y = 50 \text{ kN}$$

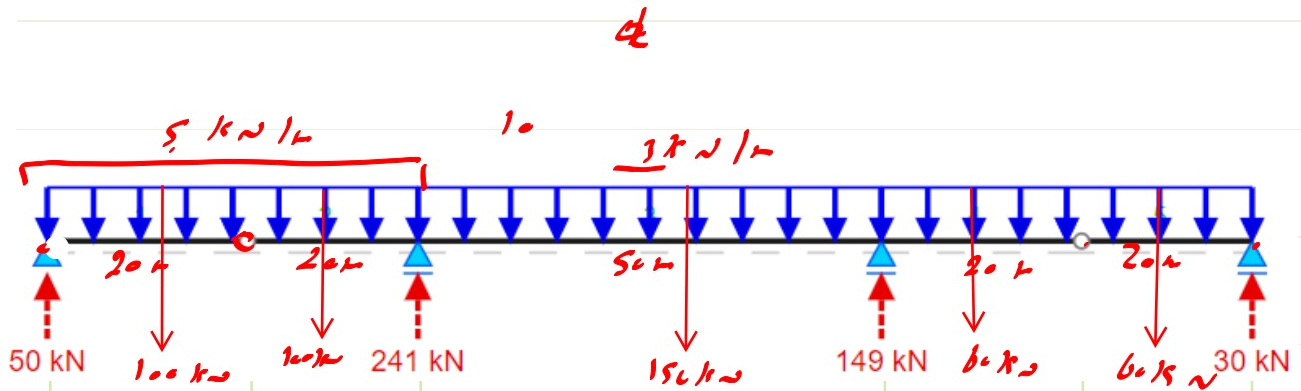
$$\sum M_{h_{right}} = 60 \times 10 - D_y \times 20 = 0 \Rightarrow D_y = 30 \text{ kN}$$

$$\sum M_B = 50 \times 40 - 100 \times 30 - 100 \times 10 + 150 \times 25 - C_y \times 50 + 60 \times 60 + 60 \times 80 - 30 \times 90 = 0$$

$$C_y = 149 \text{ kN}$$

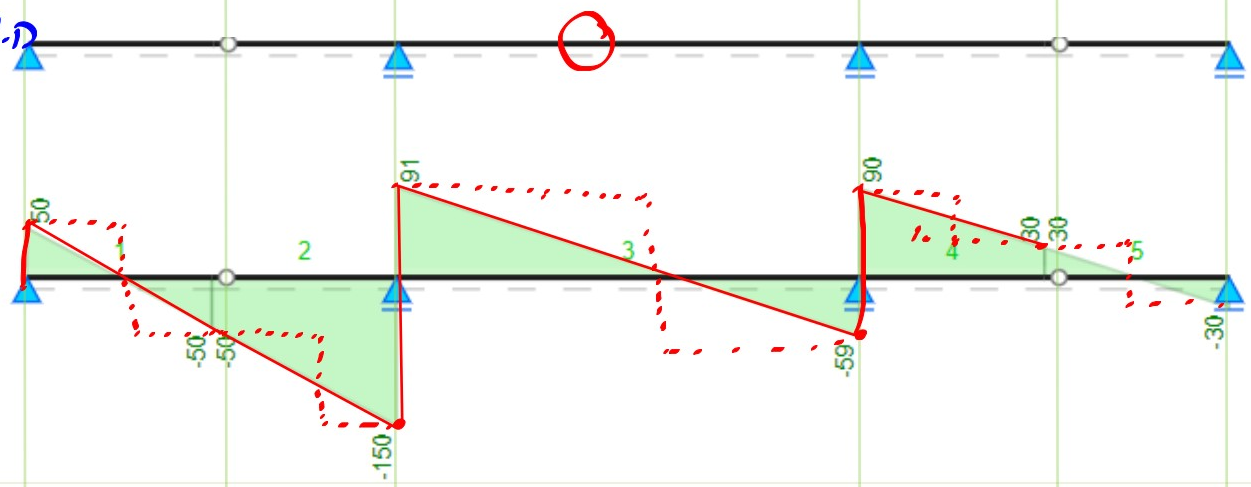
$$\sum f_y = 50 - 100 - 100 + B_y - 150 + 149 - 60 - 60 + 30 = 0$$

$$B_y = 241 \text{ kN}$$

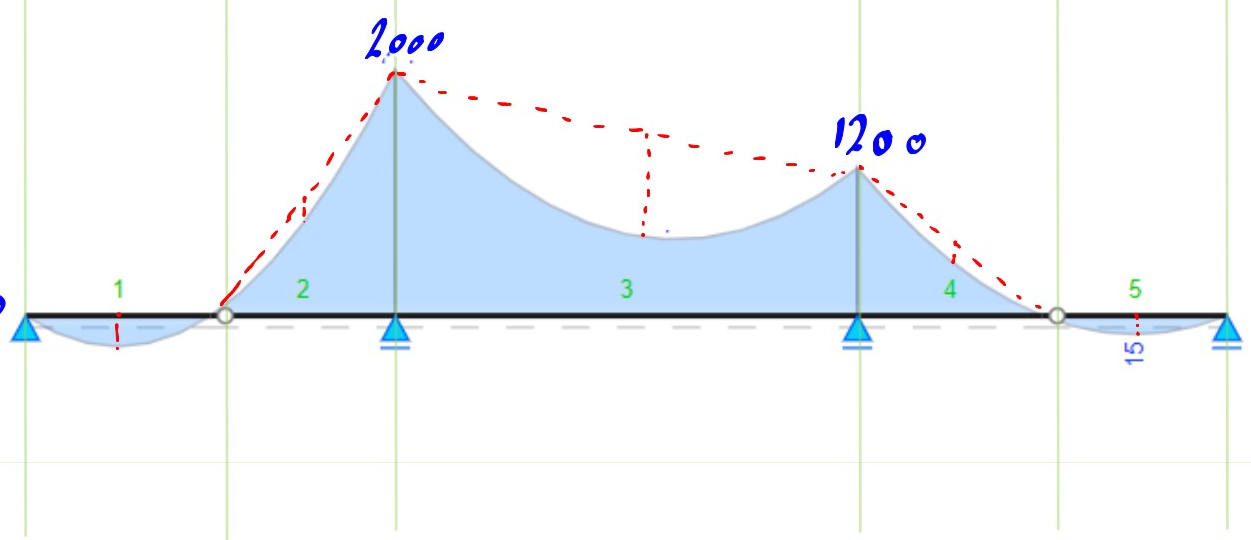


A.F.D

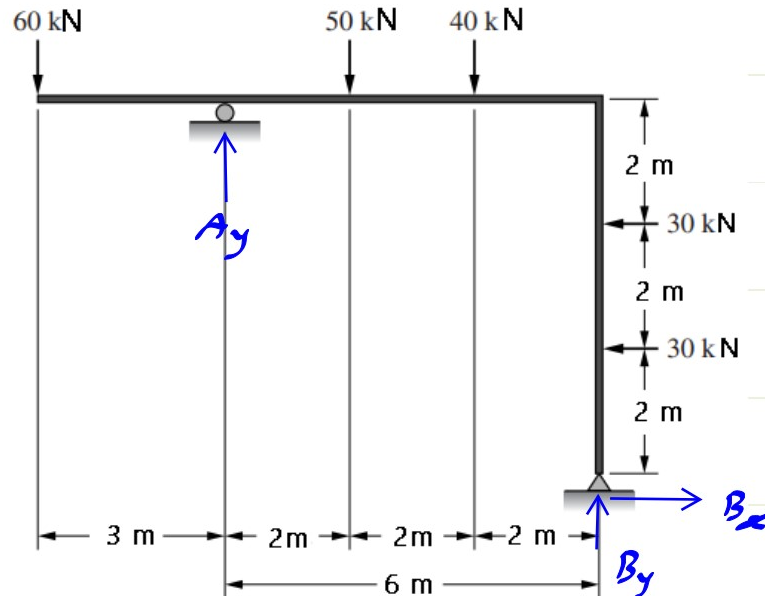
S.F.D



B.M.D



3. Draw the Axial force; shear force and bending moment diagrams for each member of the frame shown below. Assume the frame is pin connected at A, and C is a roller.



Reactions

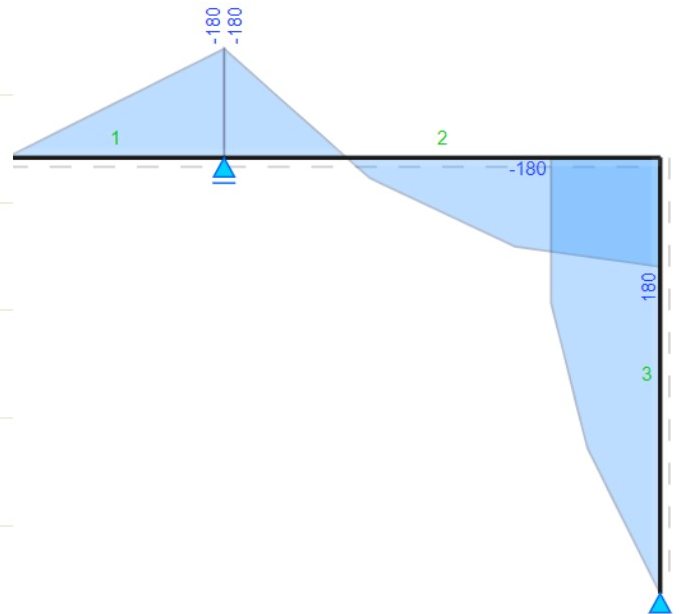
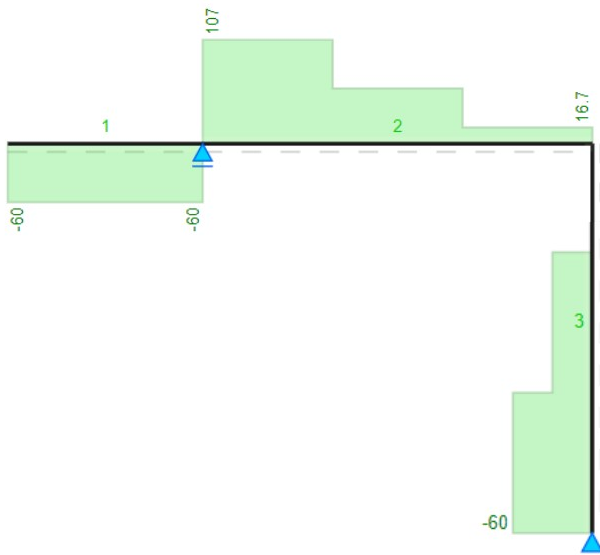
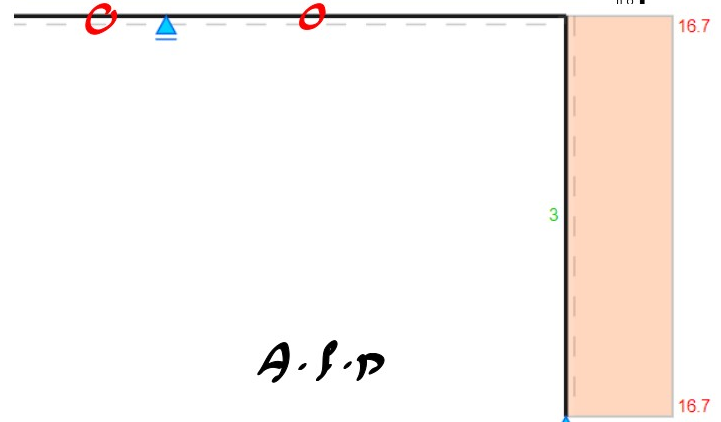
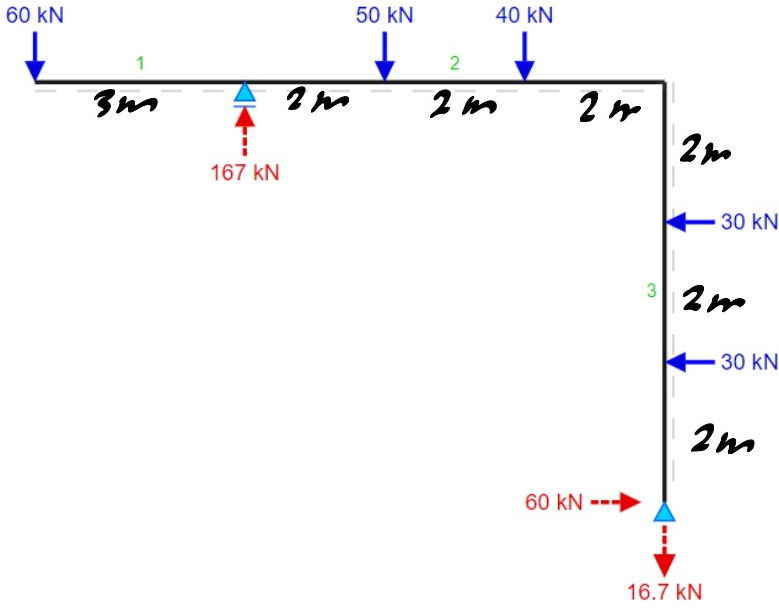
$$\sum F_x = -30 - 30 + B_x = 0 \Rightarrow B_x = 60 \text{ kN}$$

$$\sum M_B = -30 \times 2 - 30 \times 4 - 40 \times 2 - 50 \times 4 + A_y \times 6 - 60 \times 9 = 0$$

$$A_y = 166.67 \text{ kN}$$

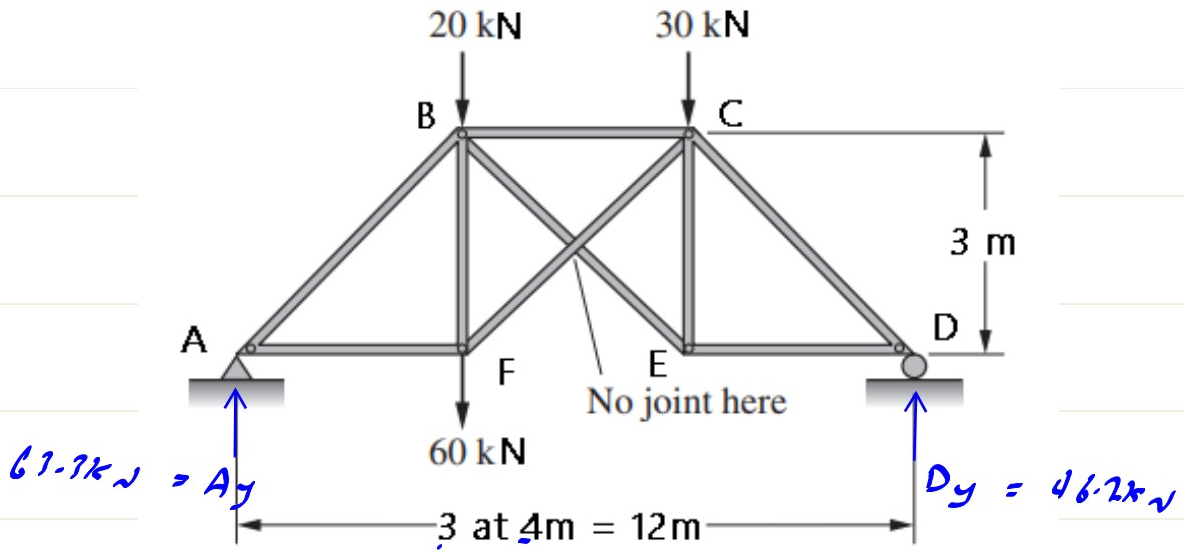
$$\sum F_y = -60 + 166.67 - 50 - 40 + B_y = 0$$

$$B_y = -16.67 \text{ kN} \uparrow = 16.67 \text{ kN} \downarrow$$



4. The roof truss as shown below

- Determine the force in each member by the method of joints, State whether the members are in tension or compression.
- Check the force in members BC, BE and FC by the method of section.



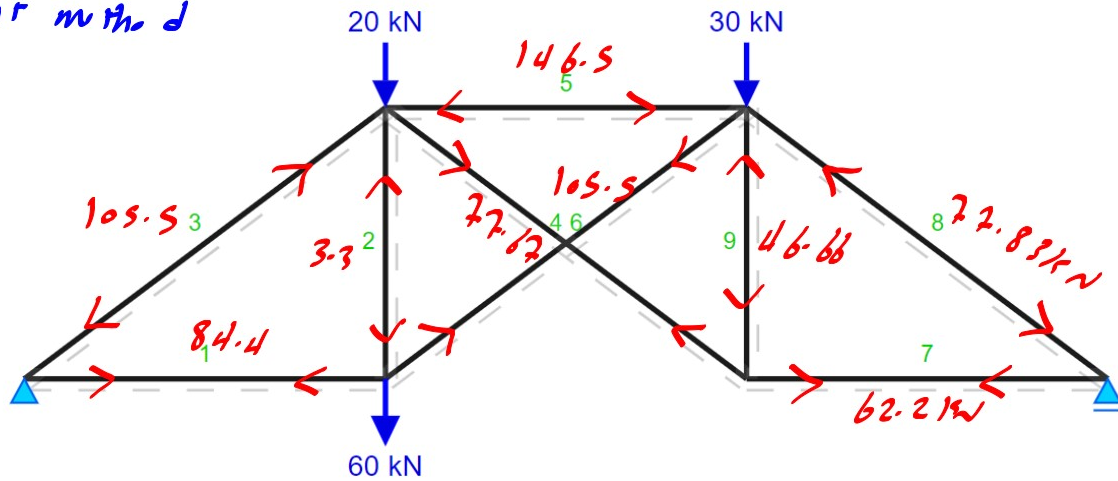
$$\sum M_A = 20 \times 4 + 60 \times 4 + 30 \times 8 - D_y \times 12 = 0$$

$$D_y = 46.2 \text{ kN} \uparrow$$

$$\sum F_y = A_y - 20 - 30 - 60 + 46.2 = 0$$

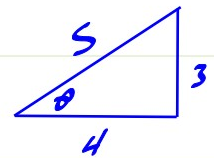
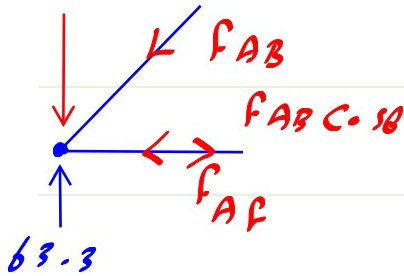
$$A_y = 63.3 \text{ kN} \uparrow$$

(i) Joint method



at joint A

$F_{AB} \sin \theta$



$$\sin \theta = \frac{3}{5} = 0.6$$

$$\cos \theta = \frac{4}{5} = 0.8$$

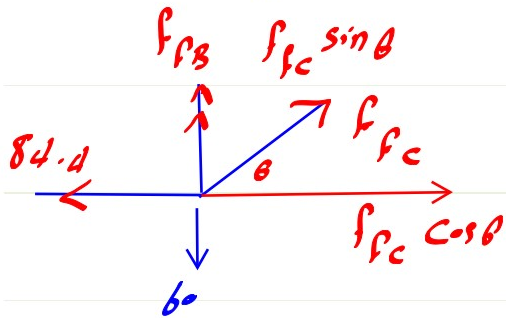
$$\sum F_y = 63.3 - F_{AB} \times 0.6 = 0$$

$$F_{AB} = 105.5 \text{ kN Comp}$$

$$\sum F_x = F_{AF} - 105.5 \times 0.8 = 0$$

$$F_{AF} = 84.4 \text{ kN Tn}$$

at joint F



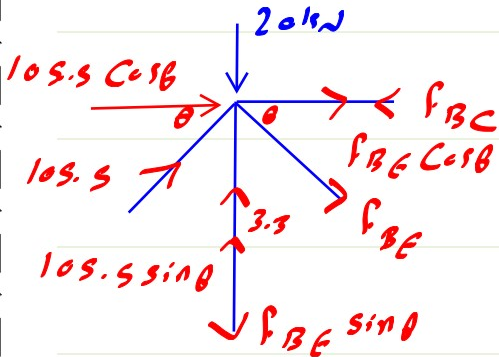
$$\sum F_x = -84.4 + F_{FC} \times 0.8 = 0$$

$$F_{FC} = 105.5 \text{ kN Tension}$$

$$\sum F_y = -60 + 105.5 \times 0.6 + F_{FB} = 0$$

$$F_{FB} = -3.3 \text{ kN Tension} = 3.3 \text{ kN Compression}$$

at joint B



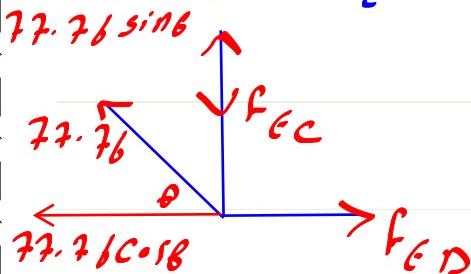
$$\sum F_y = 3.3 + 105.5 + 0.6 - F_{BE} \times 0.6 - 20 = 0$$

$$F_{BE} = 77.67 \text{ kN Tension}$$

$$\sum F_x = -F_{BC} + 77.67 \times 0.8 + 105.5 \times 0.8 = 0$$

$$F_{BC} = 146.5 \text{ kN Compression}$$

at joint E



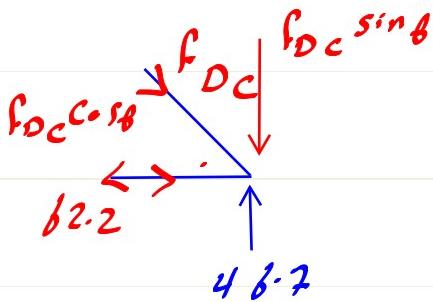
$$\sum F_x = F_{ED} - 77.76 \times 0.8 = 0$$

$$F_{ED} = 62.2 \text{ kN Tension}$$

$$\sum F_y = F_{EC} - 77.76 \times 0.6 = 0$$

$$F_{EC} = 46.66 \text{ kN Compression}$$

at joint D



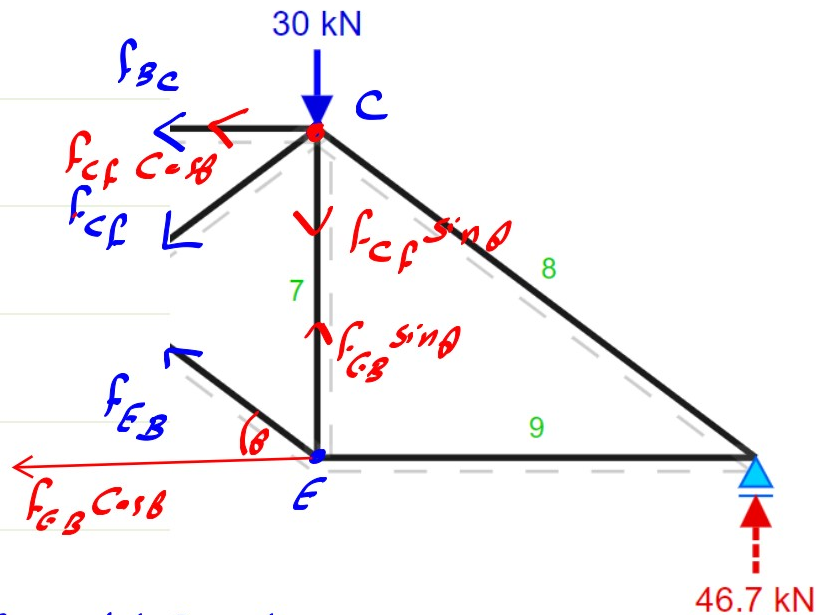
$$\sum F_y = 46.7 - f_{DC} \sin \theta = 0$$

$$f_{DC} = 77.83 \text{ kN Comp}$$

for check

$$\sum F_x = -62.2 + 77.83 \times 0.8 = 0$$

(ii) Section method



$$\sum M_C = f_{EB} \times 0.8 \times 3 - 46.7 \times 4 = 0$$

$$f_{EB} = 77.83 \text{ kN Tension}$$

$$\Sigma f_y = 46.2 - 30 + 77.83 \times 0.6 - f_{CF} \times 0.6 = 0$$

$$f_{CF} = 105.66 \text{ kN Tension}$$

$$\Sigma f_x = -77.83 \times 0.8 - f_{BC} - 105.66 \times 0.8 = 0$$

$$f_{BC} = -146.8 \text{ kN Tension} = 146.8 \text{ kN Compression}$$