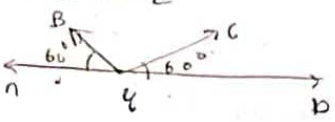
Joint E



ED and EC are tension

$E_x: EB\cos 60 + BA = EC\cos 60 + EP$

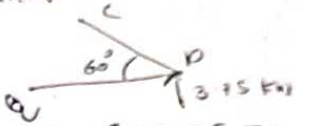
$EB\sin 60 + EC\cos 60 = 0$

$EC = 4.33$ tension

$-4.33 \times \frac{1}{2} + 6.5 = 4.33 \times \frac{1}{2} + ED$

$ED = 2.17$ tension

Joint D



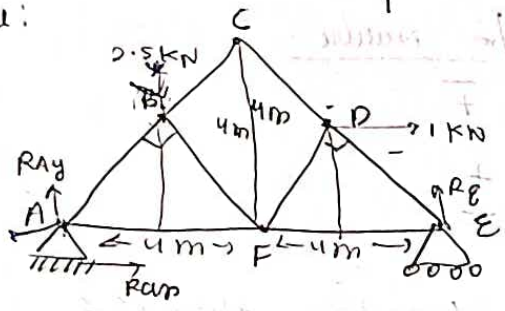
$DC\sin 60 + 3.75 = 0$

$DC = -4.33$ KN

compression.

Member	Force	Nature
AB = BA	7.5	-ve comp.
AE = FA	6.5	+ve tension
BC = CB	5	-ve comp.
AE = EB	4.33	-ve comp.
EC = CE	4.33	+ve tension
ED = DE	2.17	+ve tension
CD = DC	4.33	-ve comp.

Qu:



$R_{Ay} + R_E = 2.5$

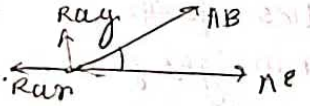
$R_{Ay} = 1$ KN

$R_E \times 8 - 1 \times 2 - 2 \times 2 = 0$

$R_E = 0.75$

$R_A = 1.25$

Joint A



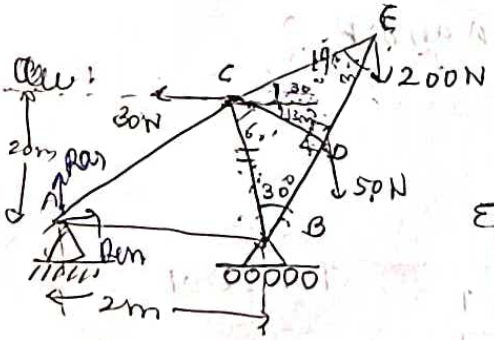
$AB\cos\theta + AE = R_{Ax}$

$R_A = AB\sin\theta$

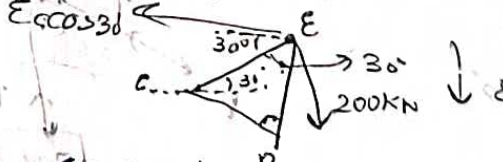
$BA = 1.76$ (tension)

$AE = 0.5$ (compression)

Qu:



Assuming EC and ED are in tension



$EC\cos 30 + ED\cos 60 = 0$

$EC\sin 30 + E\sin 60 + 200 = 0$

$\sqrt{3}EC = -ED$

$EC = 200$

$\frac{EC}{2} = \sqrt{3}\,EP\,\frac{\sqrt{3}}{2}$

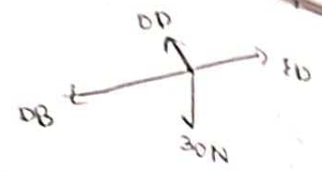
$ED = -356.4$ KN (comp)

$ED = -\sqrt{3} \times 200 = -356.4$ KN.

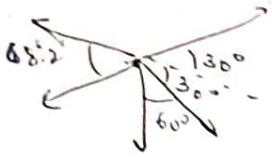
$R_{Ay} + R_B = 250$

$R_{AM} = 30$

Joint D:



Joint E:



$\sum V = 0$

$0 = EB + 7.5$ KN

$EB = 7.5$ KN

$-346 = ED\cos 30° + BD$

$-346.4 = 25\sqrt{3} + BD$

$BD = -359.7$ KN (compression)

$CE\cos 30° + CD\cos 30° = CA\cos 68.2 + BD$

$200\cos 30° + 25\cos 30° = CA\cos 68.2 + 30$

$200\cos 30° + 25\cos 3 = CA\cos 68.3 + 30$

$\frac{225\cos 30 - 30}{\cos 68.2} = CA$

$CA = -443.9$

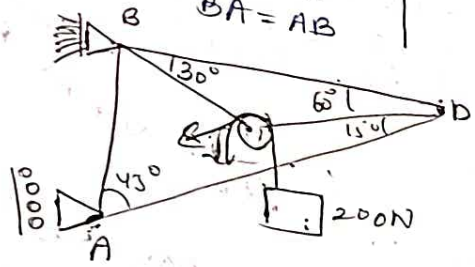
$BD\sin 60 = AB$

$\frac{-38.9.7}{2} = AB$

$AB = -194.55$

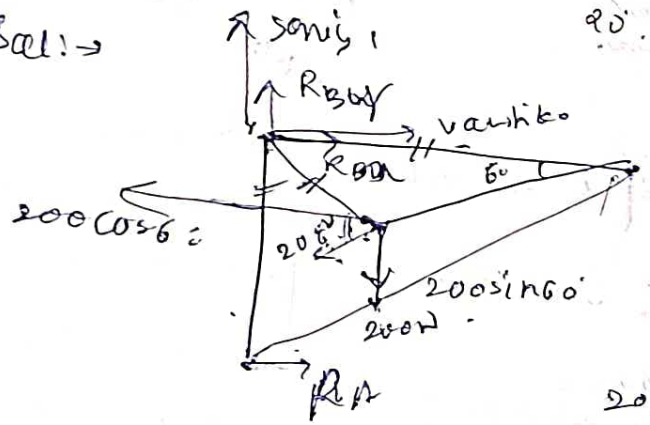
Member	Force (kN)	Nature
ED = DE	348.4	−
EC = CE	20	
BD = DB	389.7	+
DC = CD	25	
BA = AB	194.55	−

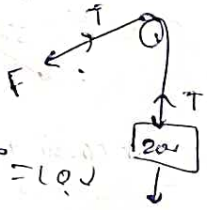
Ques: 2:



In the truss frame there is a small beneath weightless pulley at a joint C. A weight of 200N is hold by a force inclined at 20°. Find the forces in all members and Reaction at joint A and B?

Sol:→



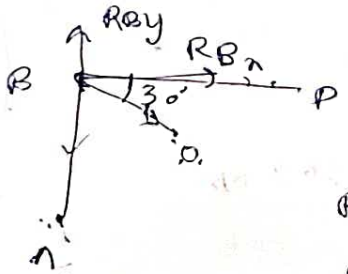


$T = 200$ T

$200\cos 60° = 100$

$RBx + RA = 100$

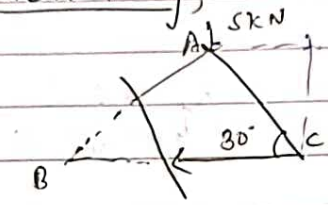
$RBy = 200\sin 60 + 200$



$RBy = RBO\sin 30 + BA$

$RBx + BD + BO\cos 30° = 0$

Alternatively;

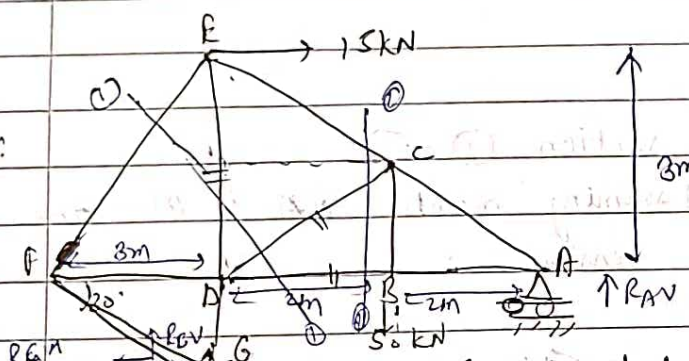


$\Sigma M_A = 0$

$1.25 \times (5 - 2.5\cos 60°) - CB \times 2.5 \sin 60° = 0$

$CB = (+) 2.165 KN$

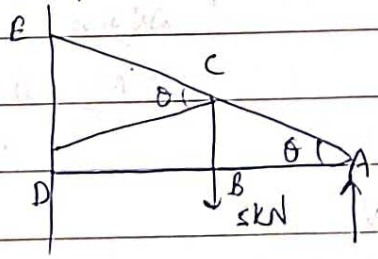
Ques:



For the given plane, determine the magnitude and the nature of force in member BD, CD & ED

$\Sigma H = 0$	$\Sigma V = 0$
$R_{GH} = 15 KN$	$R_{GV} + R_{AV} = 5 KN$ ——— (1)
	$\Sigma M_D = 0$
	$R_{AV} \times 4 - 5 \times 2 - 15 \times 1 = 0$
	$R_{AV} = (+) 20.25 KN$
	$R_{GV} = -15.25 KN$

FBD of ②-② section



$\tan\theta = \frac{1.5}{2}$ (or) $\theta = 36.87°$

$\Sigma M_C = 0$

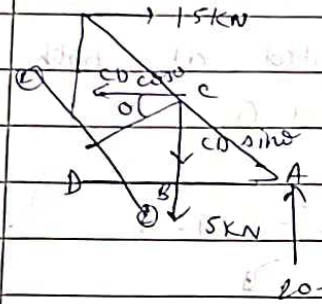
$20.25 \times 2 - DB \times 1.5 = 0$

$DB = +27 KN$

$\Sigma M_A = 0$

$-5 \times 2 - CD\cos\theta \times 2 + CD \sin\theta \, 1.5 = 0$

$CD = (-) 4.17 KN$



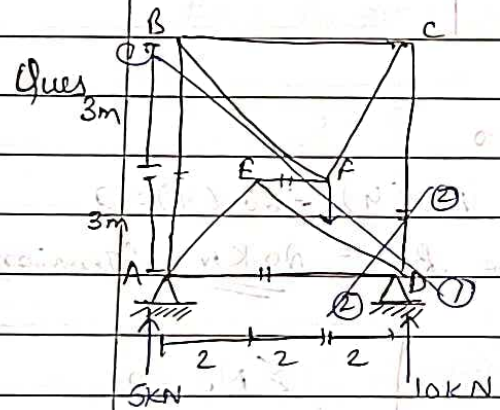
For section ②-②

$\Sigma M_F = 0$

$ED \times 3 + CD \sin 36.07 \times 5 - CD \cos 36.07 \times 1.5 + 5 \times 5 + 15 \times 3 - 20.25 \times 7 = 0$

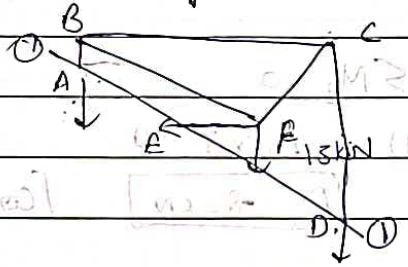
$ED = (+)\,26.42\ KN$

Ques



For a given plane, calculate the value of AB, AD, EF & CD?

FBD for section ①-①



$\Sigma M_A = 0$

$-EF \times 3 + 15 \times 4 + CD \times$

$FE - 2CD = 20$ —①

$\Sigma M_B = 0$

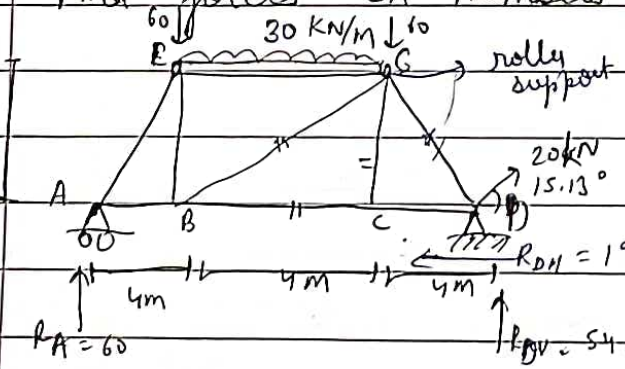
$FE \times 3 + 15 \times 4 + CD \times 6 = 0$

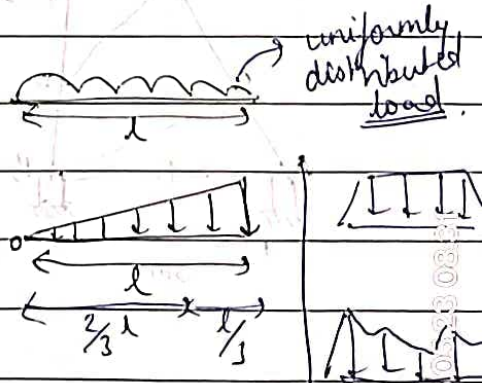
$FE + 2CD = -20$ —②

from (1) & (2) eq.

we get; $FE = 0$ & $CD = (-)10\ KN$.

Ques: Find forces on members BC, BG, EG & GD?





$R_{DH} = 20 \cos 15.13 = 19.3$

Uniform load force is distributed at both ends 60 KN and 60 KN at E and G.

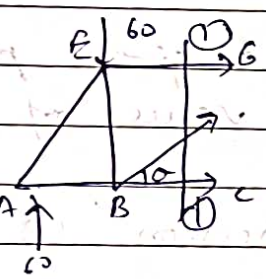
$R_A + R_{DV} + 20 \sin 15.13^\circ = 120$

$\Sigma M_D = 0$

$12 R_A - (60)(4) - 60(8) = 0$

$12 R_A = 240 + 480 = 720 = 60N$

$R_{DV} = 54.5$ KN.



$\Sigma M_G = 0$

$R_A(8) - BC(4) - 60(4) = 0$

$BC = 80$ KN. (Tension)

$\Sigma M_B = 0$

$R_A(4) + EG \times 3 = 0$

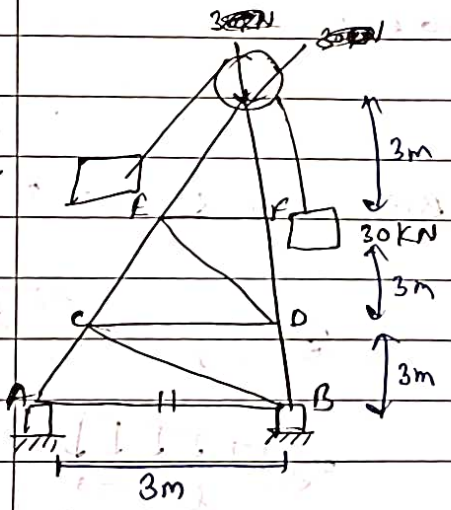
$EG = -80$ KN [Compression]

$\Sigma M_E = 0$

$R_A \times 4 - BC \times 3 - BG \cos\theta \times 3$

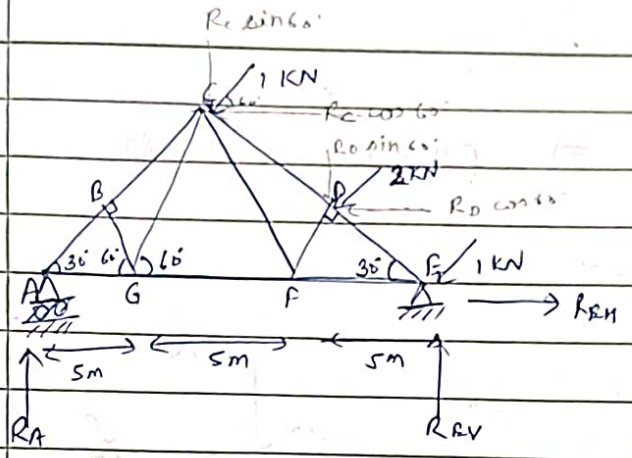
$60 \times 4 - 80 \times 3 - BG \times \frac{4}{5} \times 3 = 0$

$BG = 0$



A steel weight of 30N. Determine the force is CE, ED, FD and AB?

Ques 6



$\Sigma H = 0$

$R_C \cos 60° + R_D \cos 60° + R_{EH} + 1 \cos 60° = 0$

$1 \times \frac{1}{2} + 2 \times \frac{1}{2} + R_{EH} + \frac{1}{2} = 0$

$R_{EH} = -2$ KN

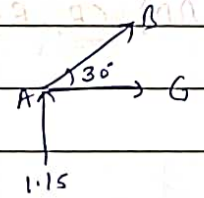
$R_A + R_C \sin 60° + R_D \sin 60° + 1 \sin 60° + R_{EV} = 0$

$R_A + 1 \times \frac{\sqrt{3}}{2} + 2 \times \frac{\sqrt{3}}{2} + 1 \times \frac{\sqrt{3}}{2} + R_{EV} = 0$

$R_A + \sqrt{3} + 2\sqrt{3} + 2 = 0$

$R_A = 2 - 3\sqrt{3}$

FBD of Joint A



Assuming AB & AG are in tension

$\Sigma H = 0$

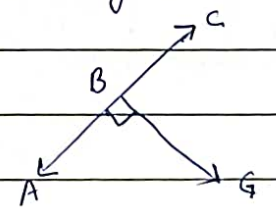
$AG + AB \cos 30° = 0$ & $AG = 2$KN

$\Sigma V = 0$

$1.15 + AB \cos 30° = 0$

$AB = (-) 2.3$ KN

FBD of Joint B



(-2.3)

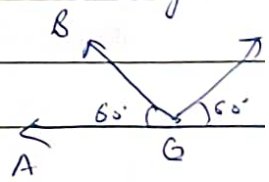
AC ⊥ to AC

BG = 0

|| to AC

$BC = (-) 2.3$ KN

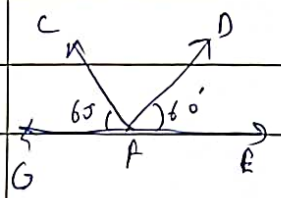
FBD of Join



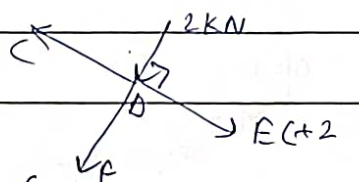
GC = 0

GF = 2

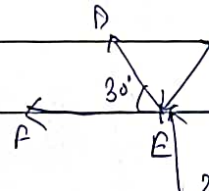
Joint F



FBD Joint D



FBD Joint

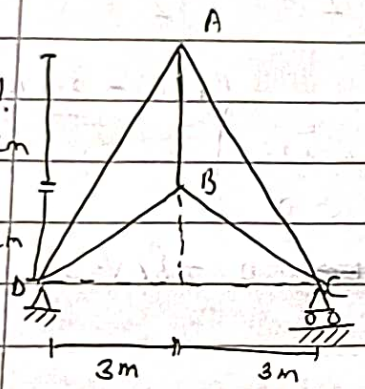


__/__/____

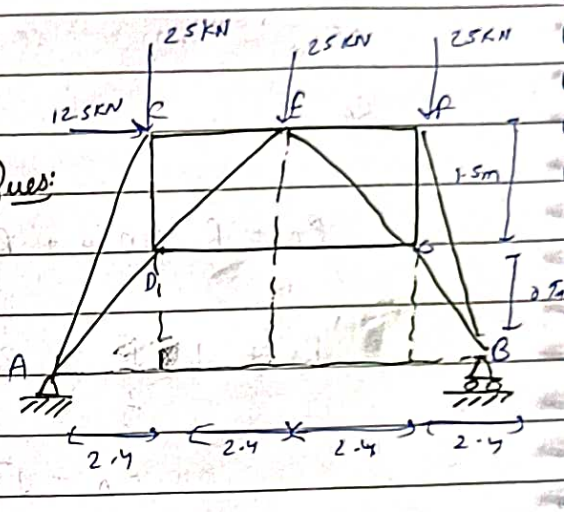
EF = FE = 4KN ⇒ ED = DE = (−) 2.83.

SESSIONAL PAPER

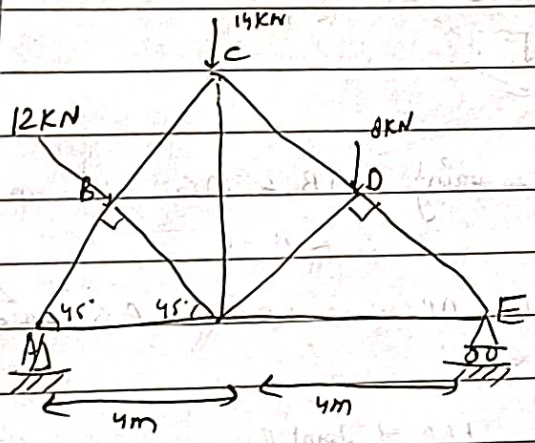
Ques:



Ques:



Ques: 12KN



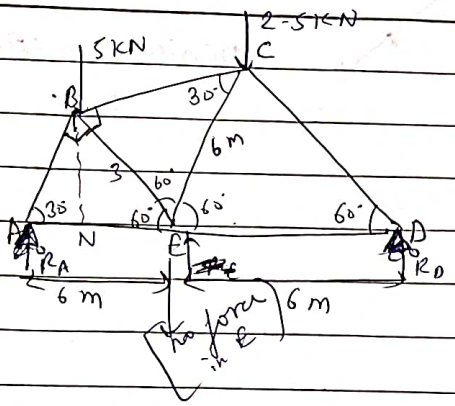
Find forces in members

AD, CE, EG, FB

$\tan 30^\circ = \frac{BN}{AN}$

$\sin 30^\circ = \frac{BE}{CE}$

Ques:



$\Sigma V = 0$

$R_A + R_D + R_E = 7.5\,KN$

$\Sigma M_A = 0$

$BE = 6\sin 30^\circ = 3\,m$

$BN = 3\sin 60^\circ = \frac{3\sqrt{3}}{2}$

$AN = \frac{BN}{\tan 30^\circ} = \frac{\frac{3\sqrt{3}}{2} \times \sqrt{3}}{2}$

$= 4.5m$

$\Sigma M_A = 0$

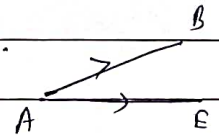
$5 \times (4.5) + 2.5(9) + R_D(12) = 0$

$R_D(12) = 45$

$R_D = 3.75KN$

$\therefore R_A = 3.75\,KN.$

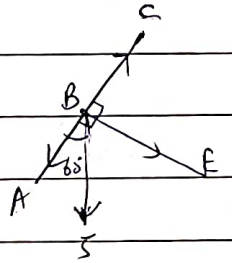
Joint A



$AB\sin 30^\circ + 3.75 = 0$ | $AE + AB\cos 30^\circ = 0$

$AB = -7.5KN$ | $AE = 6.49\,KN$

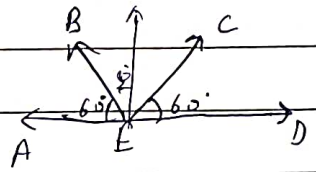
Joint B



$5\sin 60^\circ + BE = 0$ | $5\cos 60^\circ + AB - BC = 0$

$BE = -4.33N$ | $BC = -5\,KN$

Joint E



$BE\cos 30^\circ + CE\cos 30^\circ = 0$

$\frac{\sqrt{3}}{2}(-4.33 + CE) = 0$

$CE\left(\frac{\sqrt{3}}{2}\right) = 3.75$

$CE = 4.33\,KN$

$AE + BE\cos 60^\circ + ED - CE\cos 60^\circ = 0$

$6.49 - \frac{4.33 \times 1}{2} + ED - \frac{4.33 \times 1}{2} = 0$

$ED = 2.16\,(+)$