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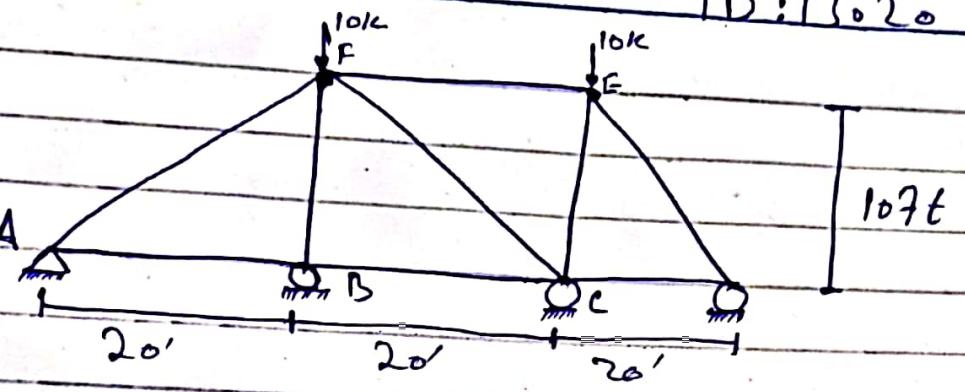
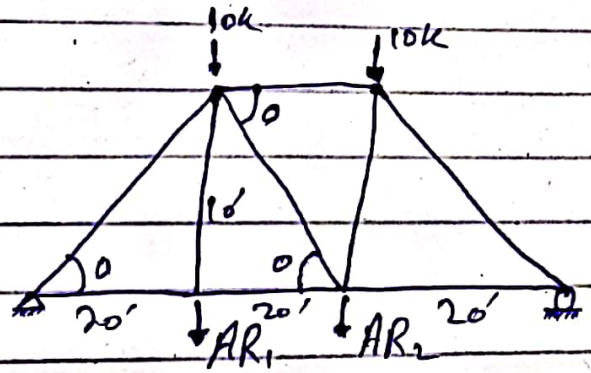
(Q2)




Solution:

Identify the redundants and obtain BDS also compute [DRS] value




$$[AR] = \begin{bmatrix} AR_1 \\ AR_2 \end{bmatrix} = \begin{bmatrix} ? \\ ? \end{bmatrix}$$

$$[DRS] = \begin{bmatrix} DRS_1 \\ DRS_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$\tan\theta = \frac{10}{20}$

$\theta = \tan^{-1}\left(\frac{10}{20}\right)$

$\theta = 26.57^\circ$

$\sin\theta = 0.45$

$\cos\theta = 0.89$

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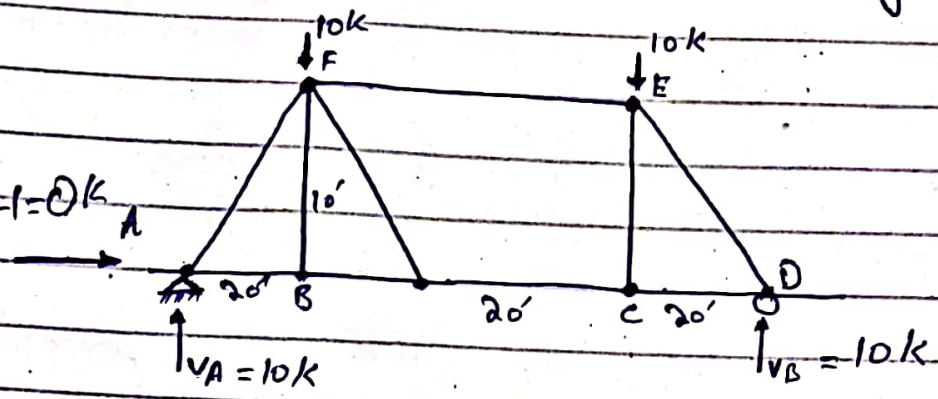
Q2. Solution

Step 1) BDS acted upon by the acted loads;




$\Sigma M_A = 0$

$10 \times 20 + 10 \times 40 - V_B \times 60 = 0$

$V_D = 10$

$\Sigma F_y = 0$

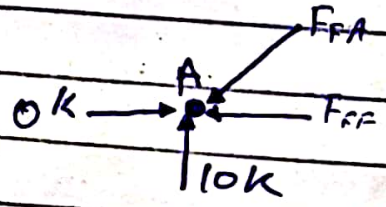
$V_A = 20 - 10$

$V_A = 10k$ ↑

Now we find forces using method of joints and will get,

Joint A:

$\Sigma F_y\ 1 + = 0$




$10 - F_{FF} \sin(26.57) = 0$

$F_{FF} = 22.36\ k$

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Q 2 $\Sigma F_x = 0; \longrightarrow$

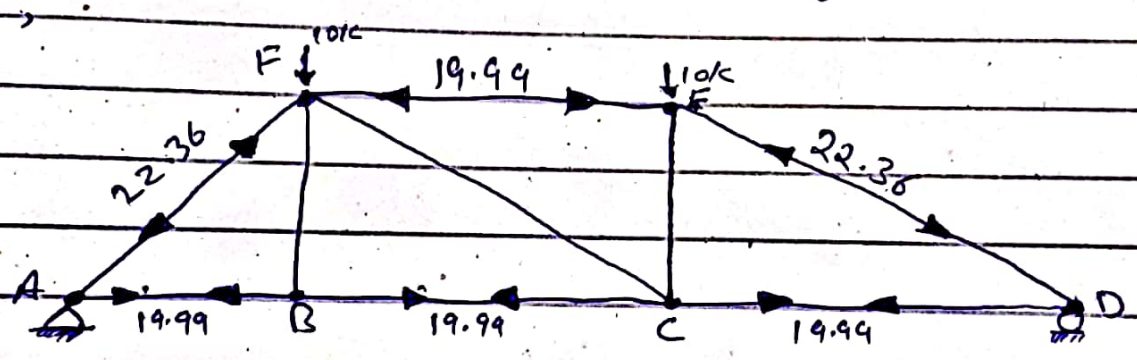
$$0 - F_{BA} = F_{FA} \quad Co:\theta = 0$$

$F_{AA} = -22.36 \cos(26.57)$

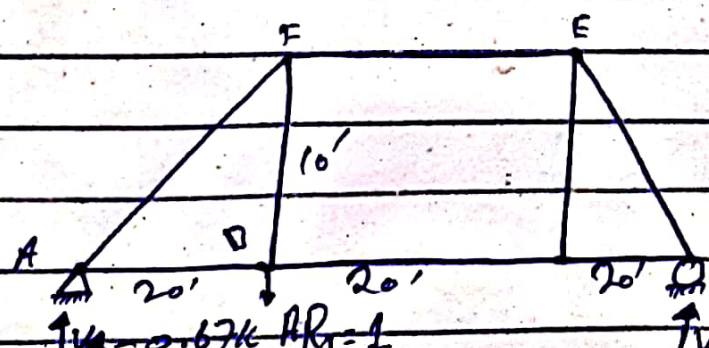
$F_{BA} = -19.99\,k$

$F_{BA} = 19.99k\ (\pm)$

As we know our truss is symatric...
So;




ii) BDS acted upon by unit load at redundant location 2.




$\Sigma M_A = 0\ \circlearrowleft +$

$1 \times 20 - V_C \times 60 = 0$

$V_C = \frac{20}{60} = 0.33k$

$\Sigma F_y \uparrow + = 0$

$V_A = 1 - 0.33$

$V_A = 0.67k$