Name : Babar Zaman

ID : 13259

Subject : Theory of structure II

Exam : Summer 2020

Semester : 8th B-tech

Instructor : Engr. Humaira Arshad

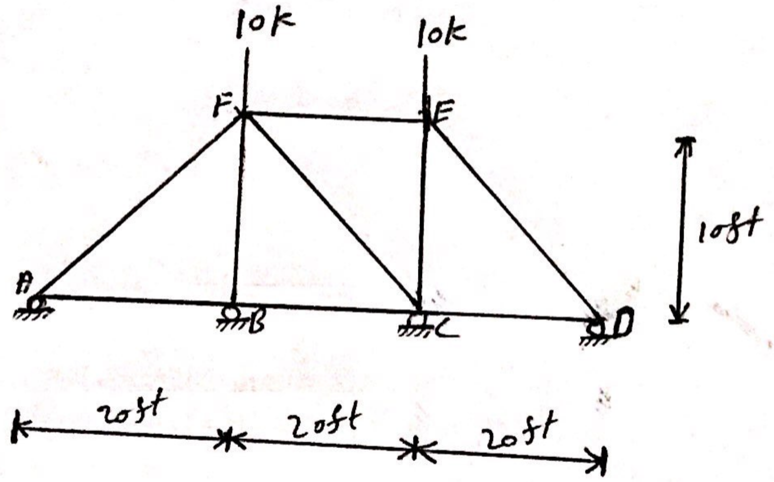
A-

(page 1)

Q25: Analyze the given truss using flexibility method.

Take EI = constant

S.I = 2 degree so two redundant action should be chosen.

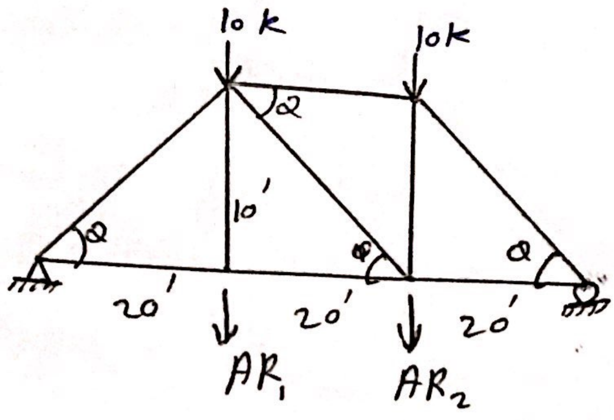


Ans: Identify the redundants and obtain BDS also compute (DRS) value.

Solution:

②

step# 1



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

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

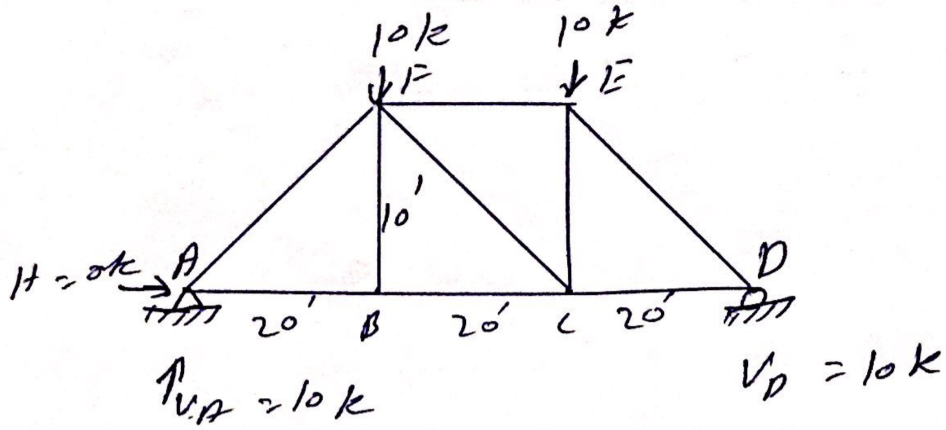
$\tan \alpha = 10/20$

$\alpha = \tan^{-1}\left(\frac{10}{20}\right)$; $\sin \alpha = 0.45$

$\alpha = 26.57^\circ$; $\cos \alpha = 0.89$

step #(2)

BDS acted upon by the actual loads.



$\Sigma M_A = 0$

$10 \times 20 + 10 \times 40 - V_D \cdot 60 = 0$

$V_D = 10$

$\Sigma F_y = 0$

$V_A = 20 - 10$

$V_A = 10k$

(4)

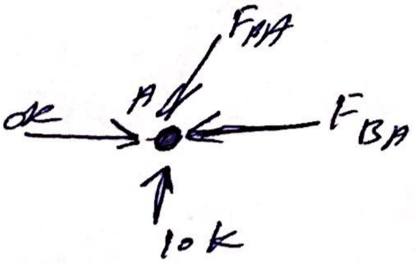
Now we find forces using method of joints and we will get;

Joint A:

$\Sigma F_y \uparrow + = 0$

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

$F_{FA} = 22.36\,k$



$\Sigma F_x = 0 : \overset{+}{\longrightarrow}$

$0 - F_{BA} - F_{FA} \cos\alpha = 0$

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

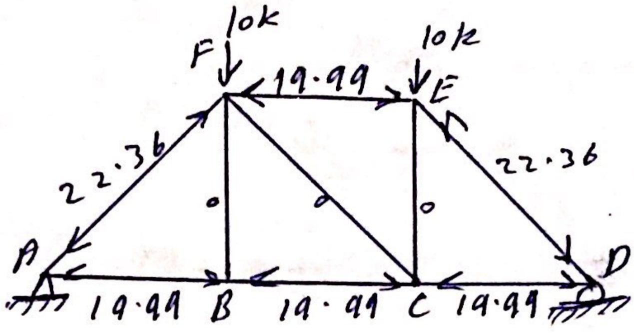
$F_{BA} = -19.99\,k$

$F_{BA} = 19.99\,k\,(\overset{+}{\rightarrow})$

Scanned with CamScanner

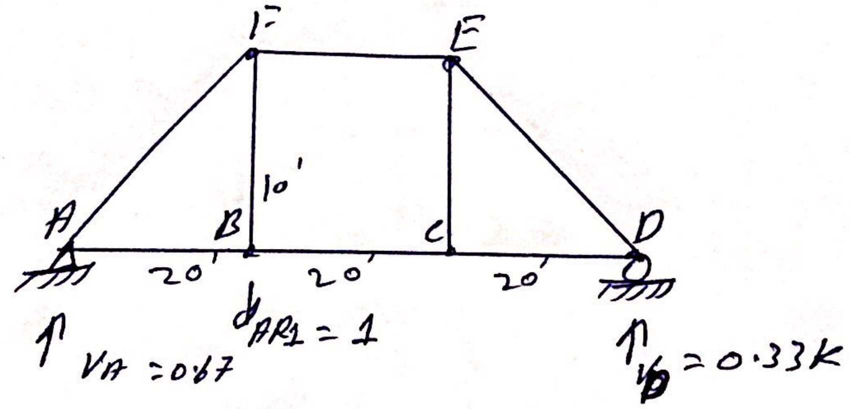
As we know (us) our truss symmetric

So;



ii: BDS acted upon by unit load at redundant..

Location 1 ...



$\Sigma M_A = 0$ ↻+

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

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

$\Sigma F_y \uparrow + = 0$

$V_A = 1 - 0.33$

$V_A = 0.67k$

Scanned with CamScanner

Q1:) Analyze the given beam using flexibility method, if support A rotates by 0.002 rad clockwise, support B settles down by 1 inch and support C settles down by 1.25 inch.

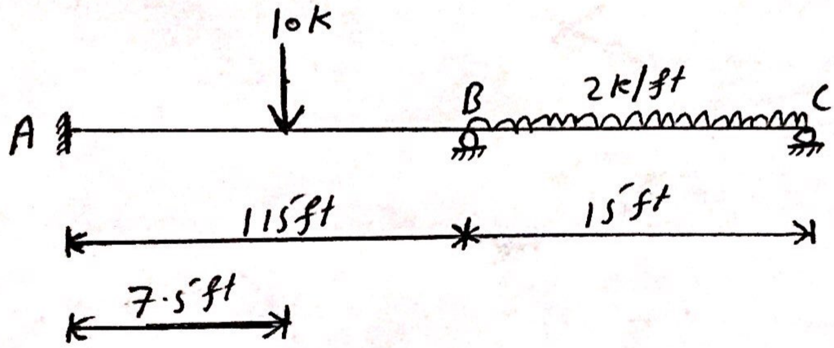
Take:

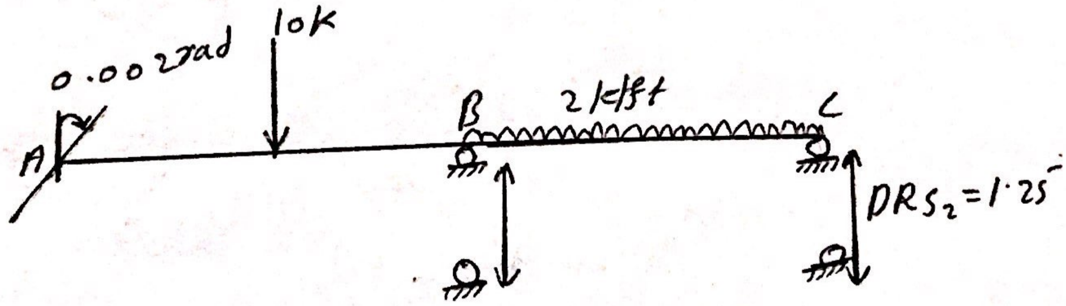
$E = 30000$ ksi

$I = 800 in^4$

$EI = 166666.6\ k\text{-}ft^2$

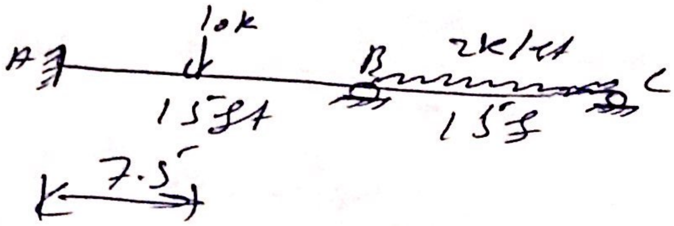
S.I = 2 degree so two redundant action should be chosen.





Ans:)

(2)



$E = 30000$ ksi

$I = 800$ in4

$EI = 166666.6$ k-ft2

SI = 2 degree so two redundant action should be chosen.

So

$\sum F_y = 0$ ↻+

~~~~10 + 2 ~~+~~ 15 = -3

$\sum f_x = -15 + 10 + 2k$

$= +3$.
~~~~

$\sum F_x \overset{+}{\rightarrow} = 0$ (3)

~~Fy +~~

$\sum M_y = 0$ ↻+

0.2022 + 10k + 2k

+ 7.5 + 15 =

0.025 m

$\tan\alpha = 10/20$

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

$\alpha = 26.57^{\circ}$

$\sin\alpha = 0.45$

$\cos\alpha = 0.89$

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

$[DRs] = \begin{bmatrix} DRs \\ DRs \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$