NAME :

M. KAMRAN

I.D :-

7888

SUB:

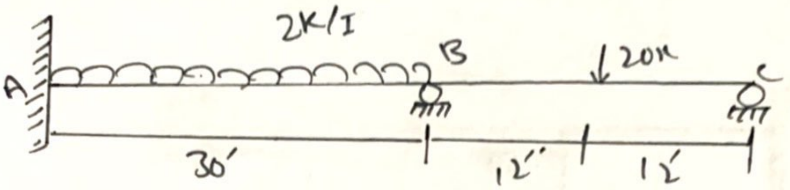
STRUCTURE II

INST: SIR ADEED

DPTT:-

CIVIL

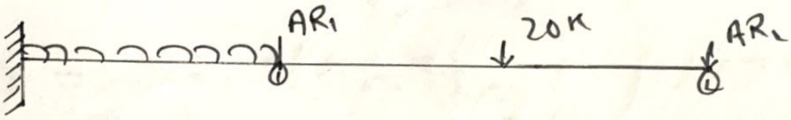
Q No 1:-



EI - Constant

Sol:- $S.I = 2^{\circ}$

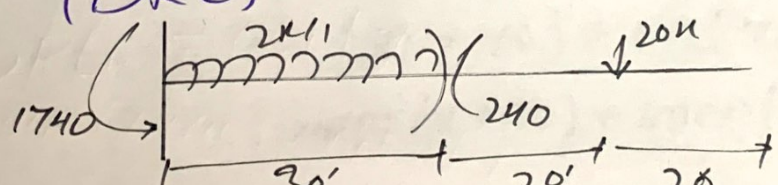
STEP 01:- Select redundant actions



$$\begin{bmatrix} DRS_1 \\ DRS_2 \end{bmatrix} = \begin{bmatrix} ? \\ ? \end{bmatrix} \qquad \begin{bmatrix} AR_1 \\ AR_2 \end{bmatrix} = \begin{bmatrix} ? \\ ? \end{bmatrix}$$

$$|DRS| = (DRL) + F \times AR$$

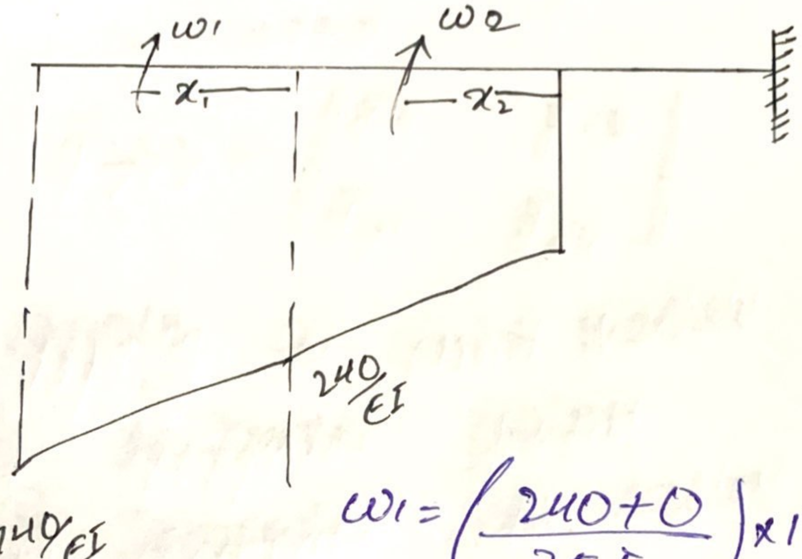
STEP # 02 Compute the value of (DRL)



$20 \times 12 = 240$

$(20 \times 42) + 2 \times 30 \times 15$

$= 1740$



$$w_1 = \left(\frac{240+0}{2EI}\right) \times 12 = 1440/EI$$

$$w_2 = \frac{1}{n+1} \times (b \times h) = \frac{1}{2+1}\left(\frac{1100}{EI}\right) \times 30$$

$$= 11000/EI$$

$$x_1 = \frac{1}{3}\left(\frac{a+2b}{a+b}\right) = 4'$$

$$x_2 = \frac{3}{n+2} \times b = \frac{3}{2+2}(30) = 22.5'$$

$$DRL_1 = w_1(x_1+30) = 48940$$

$$DRL_2 = w_1(x_1+40) + w_2(x_2+12)$$

$$= 1440(4+40) + 11000(22.5+12)$$

$$DRL_2 = 442860$$

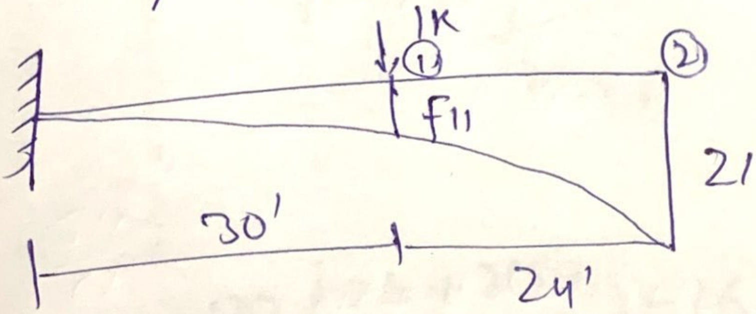
$$[DRL] = \frac{1}{EI}\begin{bmatrix} 48960 \\ 442860 \end{bmatrix}$$

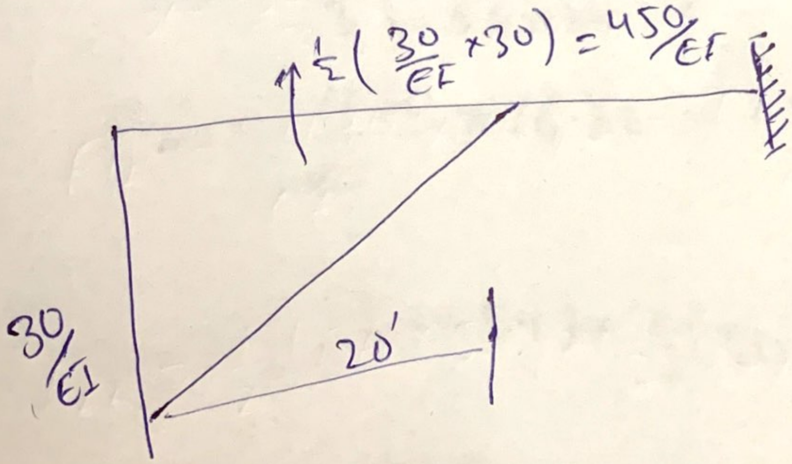
STEP#03:- Constant Flexibility Co-efficient matrix

$$F_{2\times2} = \begin{bmatrix} F_{11} & F_{12} \\ F_{21} & F_{22} \end{bmatrix}$$

a) Apply a unit value of AR_1 at reference point

① Compute the value F_{11} and F_{21}



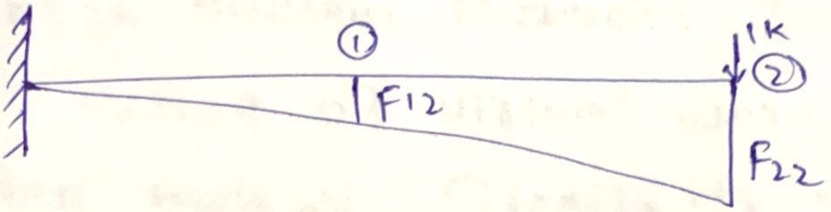


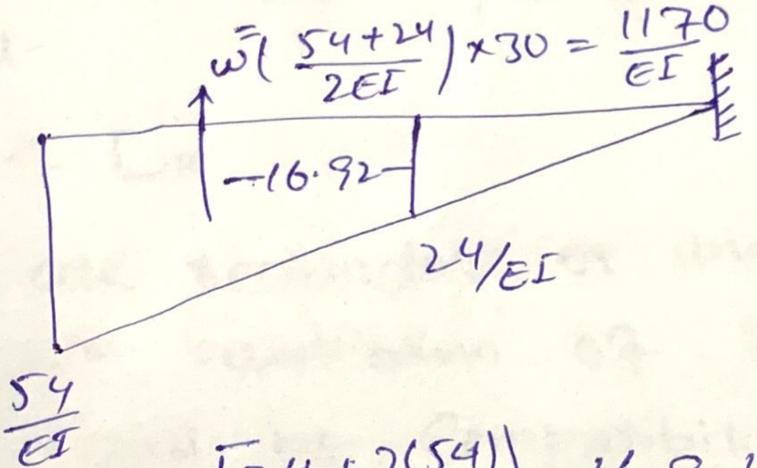
$\frac{2}{3}(20) = 20'$

$$F_{11} = \frac{450}{EI}(20) = \frac{9000}{EI}$$

$$F_{21} = \frac{450}{EI}(20\times24) = \frac{19800}{EI}$$

(b) Apply a unit of AR_2 at reference point ② (ii) Compute the value of F_{12} and F_{22}





$$x = \frac{30}{3}\left(\frac{24+2(54)}{54+24}\right) = 16.92'$$

$$F_{12} = \frac{1170}{EI} \times 16.92 = \frac{19800}{EI}$$

$$F_{22} = \frac{1}{2}(54 \times 54) \times \frac{1}{3}(30) + 24$$

$$= \frac{49572}{EI}$$

QNO 28:-

ANS:- Force Methods:- Strain energy Method Castiglianose theorem Maxwell's reciprocal theoram. Method of virtual work Consistent deformation method - flexibility matrix method-

→ $DS < DK$

→ force are redundent or unknowns

→ Starts with equilibrium of force

→ forces found by Compatibility eqns of displacements

→ no of redundants = DS

→ not Suitable for = Computed

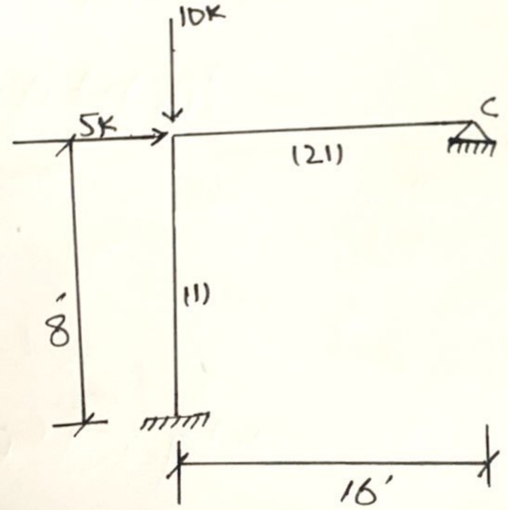
⇒ Displacement methods:- Moment distribution method Slope deflection method Kani's method, Stiffness matrix method-

- Ds > Dk
- Displacement are redunt and unknown.
- Starts with Compatible deformation
- displacements found by equilibrium equation of forces.
- no of redundents = Dk
- not Suitable for Truss.

⇒ SUGGEST:

Displacement method is better and Suitable because it is used ~~&~~ Globaly and easy too.

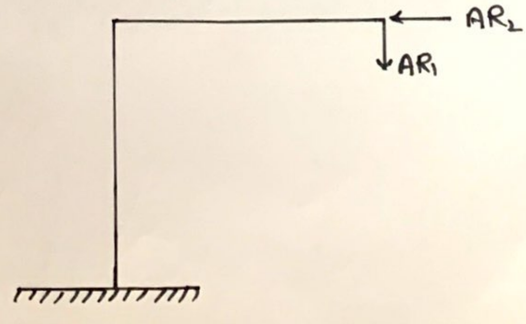
QNO3:- Analyze the rigid joint fram Shown in fig by flexibility Method Assume EI is Constant for all members.



Solution:- $S.I = R-3 \Rightarrow 5-3$

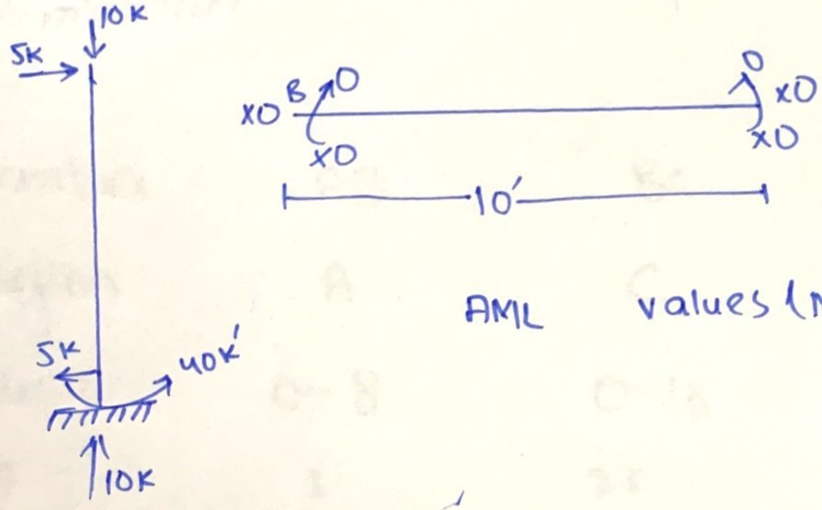
$= 2°$

STEP #01:- Identify the redundant Action.

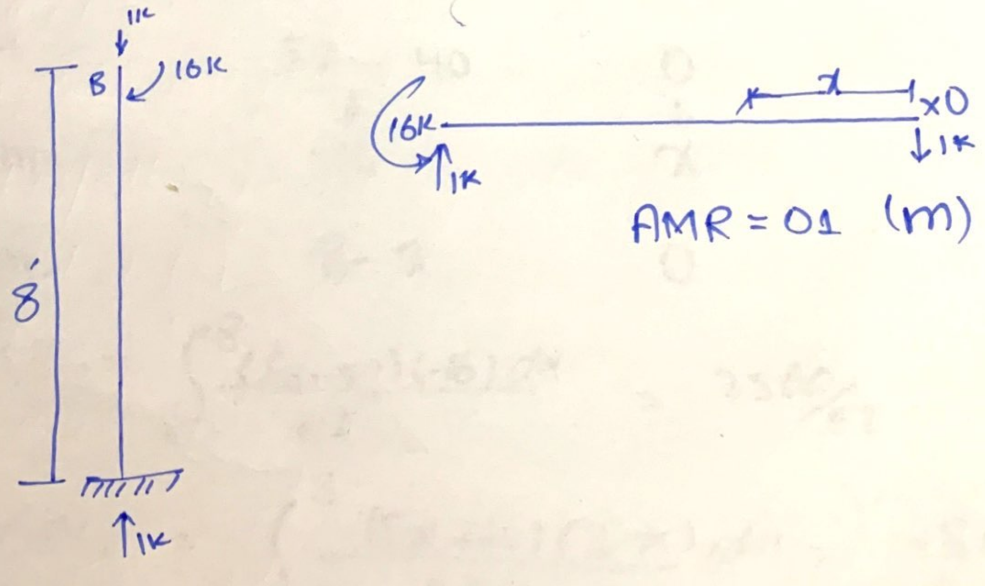


$$\begin{bmatrix} DRS_1 \\ DRS_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \qquad \begin{bmatrix} AR_1 \\ AR_2 \end{bmatrix} = \begin{bmatrix} ? \\ ? \end{bmatrix}$$

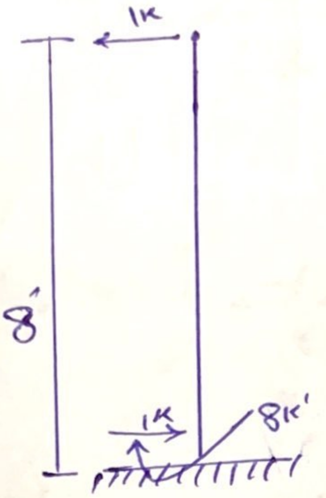
Step#02:- Compute the value of DRL and f

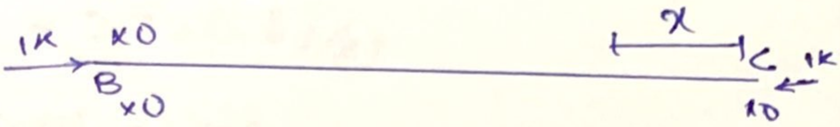


AML values (M)



AMR = 01 (m)





$AM_2 (02)$

Member	AB	BC
Origion	A	C
limit	0-8	0-16
I	I	2I
M	$5x - 40$	0
m_1	-16	x
m_2	$8 - x$	0

$$DRL_1 = \int_0^8 \frac{(5x-40)(-16)\,dx}{EI} = 2560/EI$$

$$DRL_2 = \int_0^8 \frac{(5x-40)(8-x)\,dx}{EI} = \frac{-853.33}{EI}$$

$$F_{11} = \int_0^8 \frac{(-16)^2 dx}{EI} + \int_0^{16} \frac{x^2}{2EI} dx$$

$$= 2730.67/EI$$

$$F_{12} = \int_0^8 \frac{-(16)(8-x)\, dx}{EI} = -512/EI$$

$$F_{22} = \int_0^8 \frac{(8-x)^2}{EI} dx = 170.67/EI$$

$$\begin{bmatrix} AR_1 \\ AR_2 \end{bmatrix} = \begin{bmatrix} F_{11} & F_{12} \\ F_{21} & F_{22} \end{bmatrix}^{-1} \times \begin{bmatrix} DRS_1 - DRL_1 \\ DRS_2 - DRL_2 \end{bmatrix}$$

$$= \begin{bmatrix} 2730.31 & -512 \\ -512 & 170.0 \end{bmatrix} \begin{bmatrix} 0 - 2560 \\ 0 - 853.33 \end{bmatrix}$$