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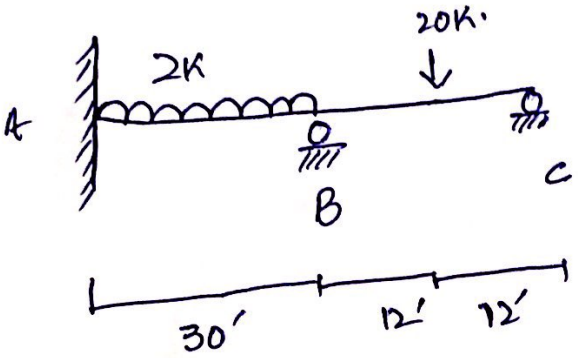
Sub: STRUCTURE II

Deptt: CIVIL

Inst :- ADEED KHAN.

QUESTION - 1

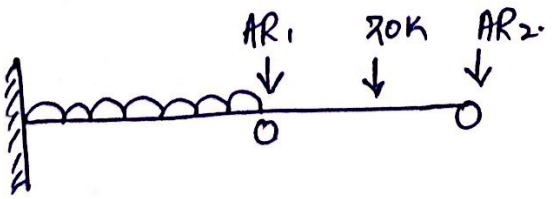


E.I is constant

S.I = 2°

STEP 01:-

Select redundant actions

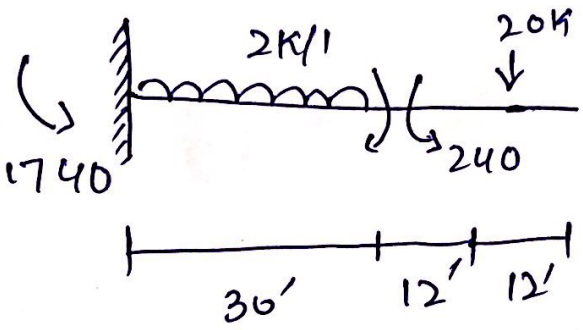


$$\begin{bmatrix} DRS_1 \\ DRS_2 \end{bmatrix} = \begin{bmatrix} ? \\ ? \end{bmatrix}, \quad \begin{bmatrix} AR_1 \\ AR_2 \end{bmatrix} = \begin{bmatrix} ? \\ ? \end{bmatrix}$$

$$[DRS] = [DRL] + F * AR$$

STEP 02:-

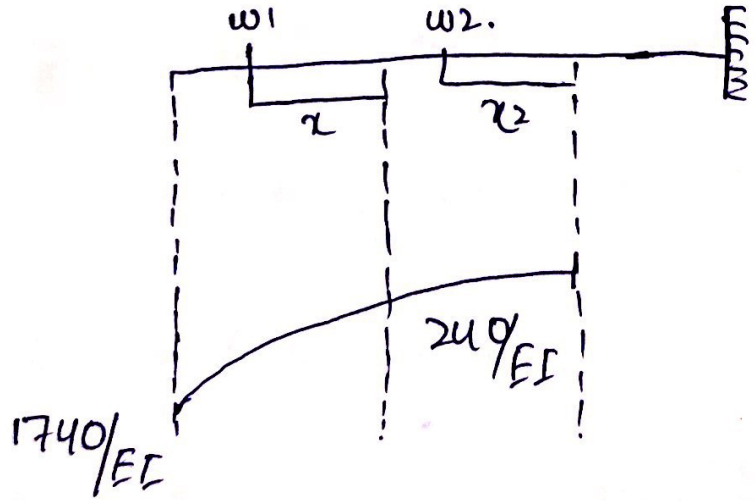
Compute the values of [DPL]



$2 \times 12 = 240$

$(20 \times 12) + 2 \times 30 \times 15$

$\Rightarrow 1740.$



$$w1 = \left(\frac{240+0}{2EI}\right) \times 12 \Rightarrow 1440/EI.$$

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

$$\Rightarrow 11000/EI.$$

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

$$x_1 = \frac{12}{3}\left(\frac{240+2(0)}{240+0}\right) = 4'$$

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

$$DRL_1 = w_1(x_1+30) = 1440(4+30) \Rightarrow 48960$$

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

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

$$DRL_2 = 442860$$

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

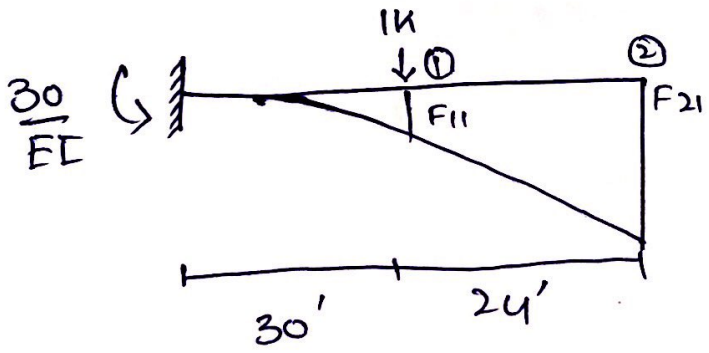
STEP 03:

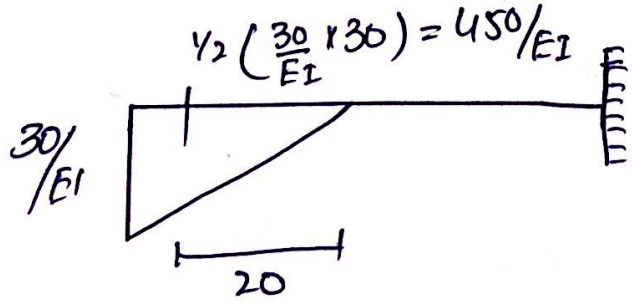
Construct flexability co-efficient matrix

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

a) Apply a unit value of AR1 at reference point

1) Complete the values of F_{11} & F_{21}





$2/3\,(30) = 20'$

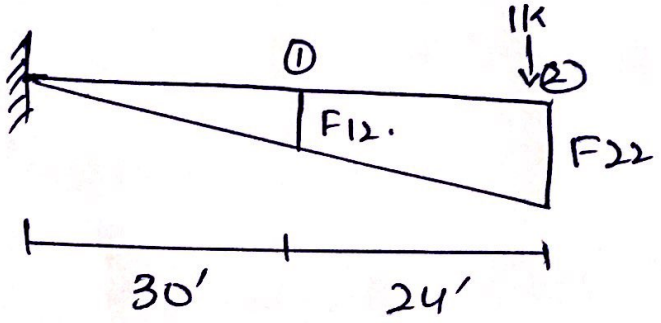
$$F_{11} = \frac{450}{EI}(20) = \frac{9000}{EI}$$

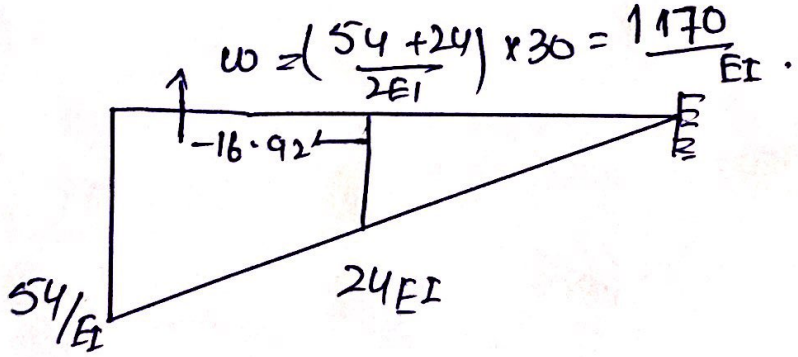
$$F_{21} = \frac{450}{EI}(20+24) = \frac{19800}{EI}.$$

b)

Apply a unit ~~out~~ AR₂ at reference point ②

ii Compute the value of F_{12} & F_{22}.





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

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

$$F_{22} = \frac{1}{2}(54 \times 54) \times \frac{1}{3}(30)24 = \frac{49572}{EI}.$$

QUESTION - 2 ⑥

FORCE METHOD :-

In force method forces are redundant on unknowns.

Force method starts with equilibrium of forces.

Forces found by compatibility equations of displacements

No of redundants = Ds

Not suitible for compute.

It strain energy method.

Ds < Dk

known as flexability method.

DISPLACEMENT METHOD :-

Also known as Stiffness matrix method

Slope deflection method

Moment distribution method

Ds > Dk.

Displacements are redundants or unknowns.

Starts with compatible deformations

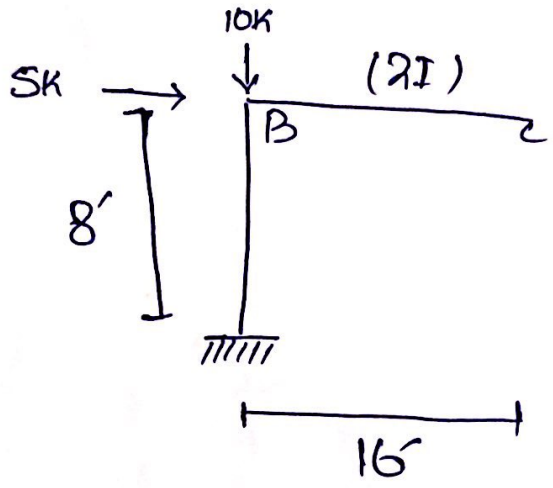
Displacement found by equilibrium equation of forces.

No. of redundants = Dk.

not suitible for truss.

SUGGEST:- Displacement method is bellow and suitible because it is used globally and is easy too.

QUESTION- 3 (8)

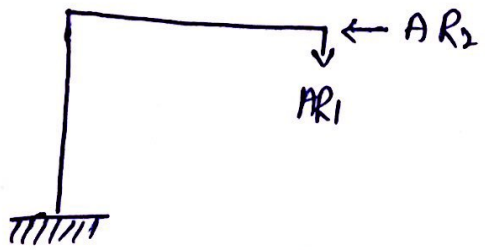


SOLUTION:

$$S.I = R - 3$$
$$= 5 - 3$$
$$\Rightarrow 2^0$$

STEP I:

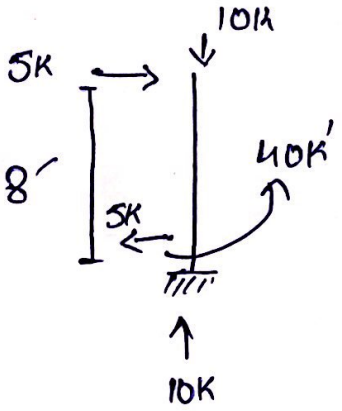
Identify the redundant actions

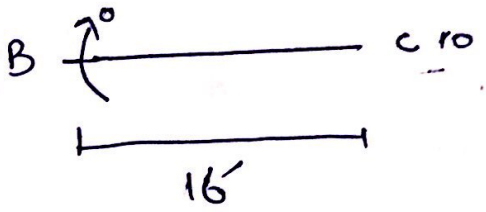


$$\begin{bmatrix} DRS_1 \\ DRS_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \quad \begin{bmatrix} AR_1 \\ AR_2 \end{bmatrix} = \begin{bmatrix} ? \\ ? \end{bmatrix}$$

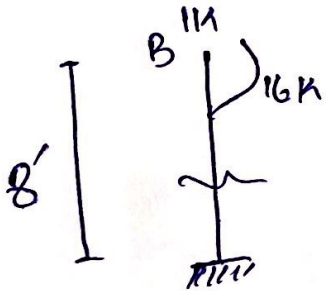
STEP: 02:

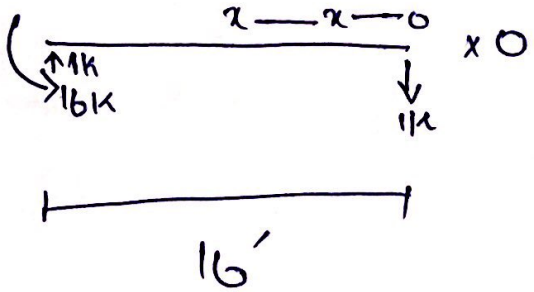
Compute the value of DRL & F



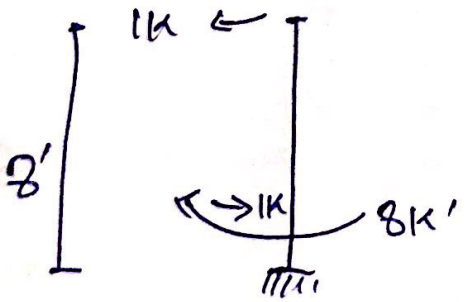


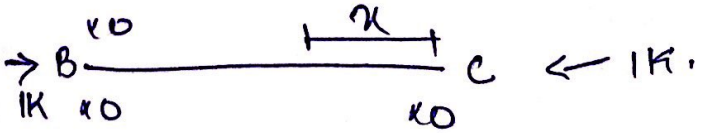
AML- values (M)





AMR = 01 (m)





AMR₂ (02.

Members	AB	BC
Origin	A	C
Limit	0-8	0-16
I	I	2I
M	$5x-40$	0
m_1	-16	x
m_2	$-8-x$	0

$$DR_1 = \int_0^8 \frac{(5x-40)(-16)\,dx}{EI} = 2560/EI.$$

$$DR_2 = \int_0^8 \frac{(5x-40)(8-x)}{EI} = \frac{-853.3}{EI}.$$

$$F_{1t} = \int_0^8 \frac{-(16)^2\,dx}{EI} + \int_0^{16} \frac{x^2}{2EI}\,dv = 2730.67/EI$$

$$F_{2t} = \int_0^8 \frac{-(16)(8-x)\,dx}{EI} = -512/EI$$