Assignment:-

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Subject : Theory of Structure (II)

(1) Choose the best option.

B is a hinge support and C is roller support and A and D are free ends. A load of 60 kN acts in downward direction at point D. sign conventions are as usual.

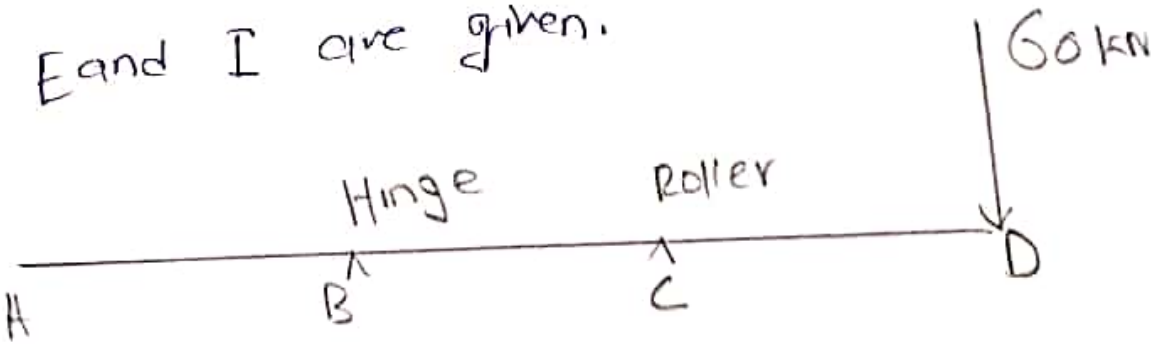
AB = CD = 1m and BC = 3m

All force options are in kN

All moment options are in kNm

All deformation options are in M

E and I are given.



(1) What will be the reaction force at support C?

(a) 20

(b) 40

(c) 80

(d) 120

Answer (C)

(2) What will be the shape of SFD in this case?

(a) Linear
(b) Parabolic
(c) Linear with discontinuity.
(d) Arbitrary Curve.

Answer (d)

(3) What is the shape of BMD for the diagram?

(a) Rectangular
(b) Triangular.
(c) Parabolic
(d) Arbitrary Curve.

Answer (d)

(4) What will be peak value of SFD?

(a) 20
(b) 40
(c) 60
(d) 80

Answer (c)

(5) Where would peak value of BMD lie?

(A) A
(b) b
(c) c
(d) d

Answer (b)

(6) Which type of Point would replace Point A in its conjugate beam?

(a) roller
(b) pin
(c) hinge
(d) Fixed

Answer (b)

-: Assigment :-

(7):- The reation of Shear Stress and Shear strain of an elastic Materials is:-

(a) modulus of Rigidity
(b) Shear modulus
(c) modulus of Elasticity
(d) Both (a) and (b)

Answer:- D

(8):- Stress may be defined as:-

(a) Force per unit Length
(b) Force per unit volume
(c) Force per unit area
(d) None of these.

Answer : C

(9):- Stress may be expressed in Newtons

(a) Per milli meter Square (N/mm^2)
(b) Per centimenter Square ($N(cm^2$)
(c) Per meter Square (N/m^2)
(d) None of these.

Answer : A

(10) According to muller Breslar theorem on conjugate beam slope is equal:.

(a) moment

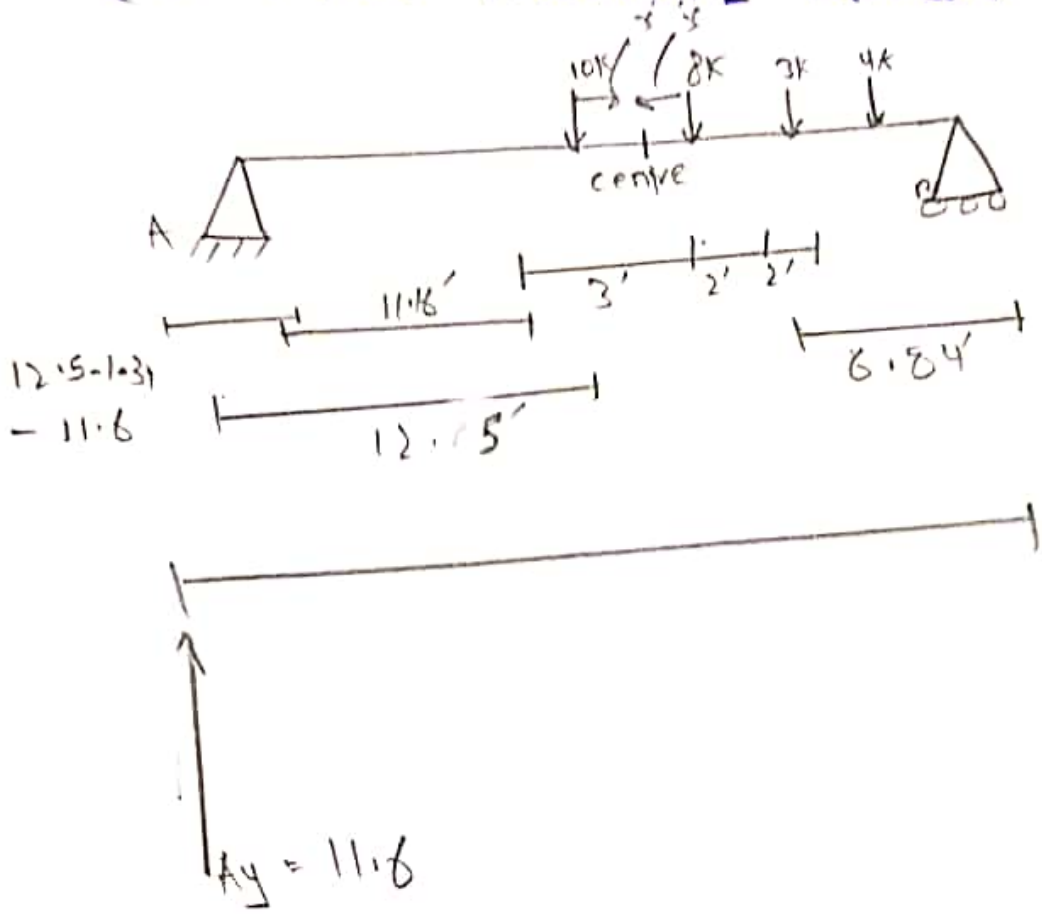
(b) shear

(c) Deflection

(d) None of there

Answer: b

(ii) Max. moment under 10k load:-



Distance b/w 10 kips and Ex

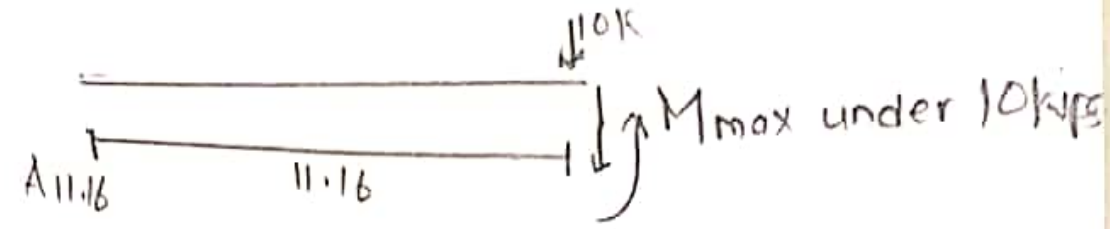
$\bar{x} = \frac{2.68}{2}$

$= 1.34$

New reaction and moment using statics.

$$\downarrow + \sum M_B = 0 : 4(6.34) + 3(8.84) + 8(10.84) + 10(13.84) - A_y(25) = 0$$

For finding moment let us use Cut and sectioning.



$\curvearrowleft + \sum M_A = -(11.16)(11.16) + \text{max} - 0$

moment at 10 kips = 124.55 kips ft

(iii) max. moment under 8 kips:

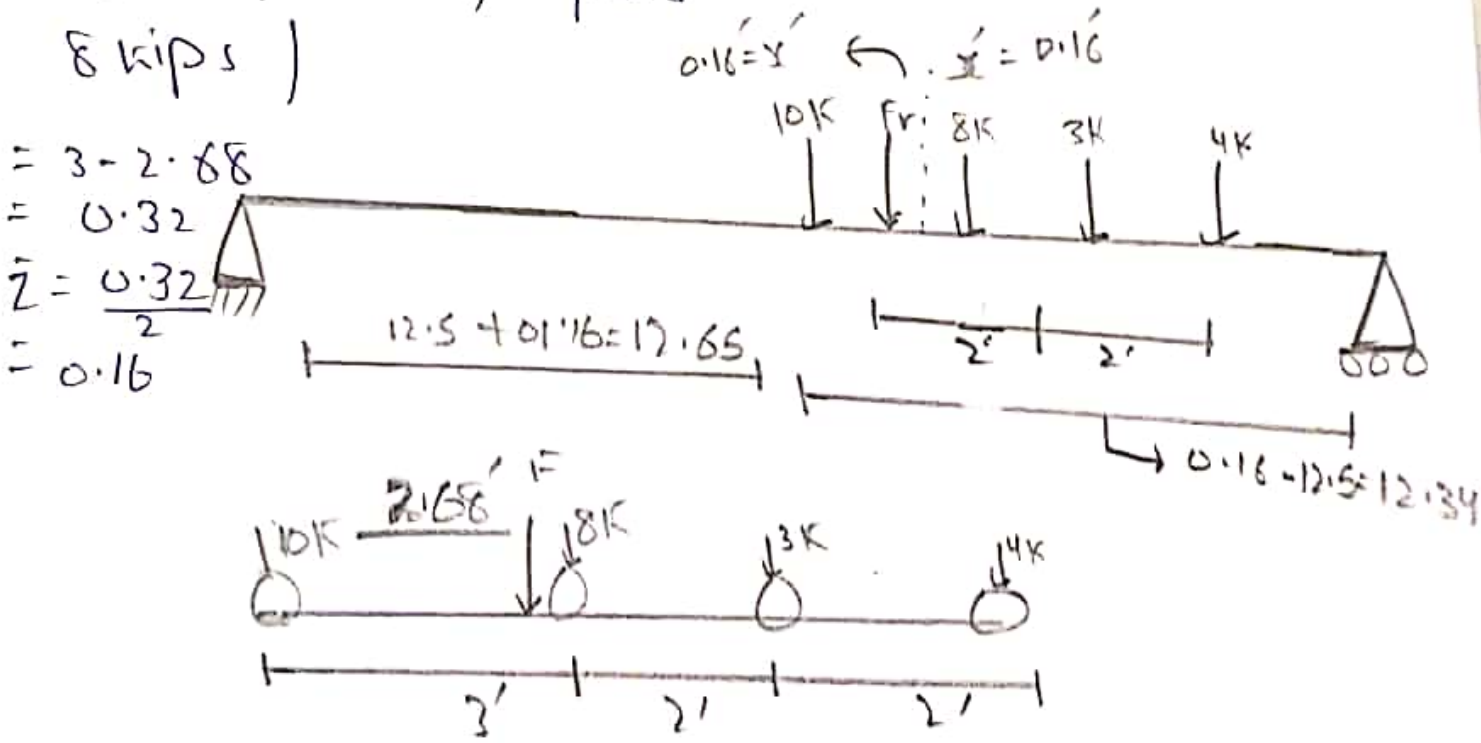
(Distance b/w 7 and 8 kips)

$= 3 - 2.68$

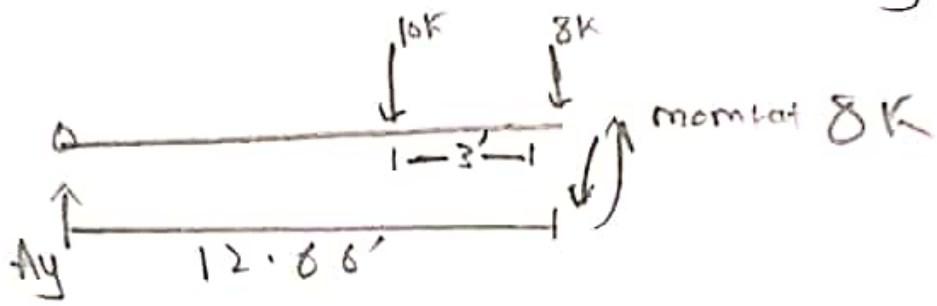
$= 0.32$

$\bar{z} = \frac{0.32}{2}$

$= 0.16$



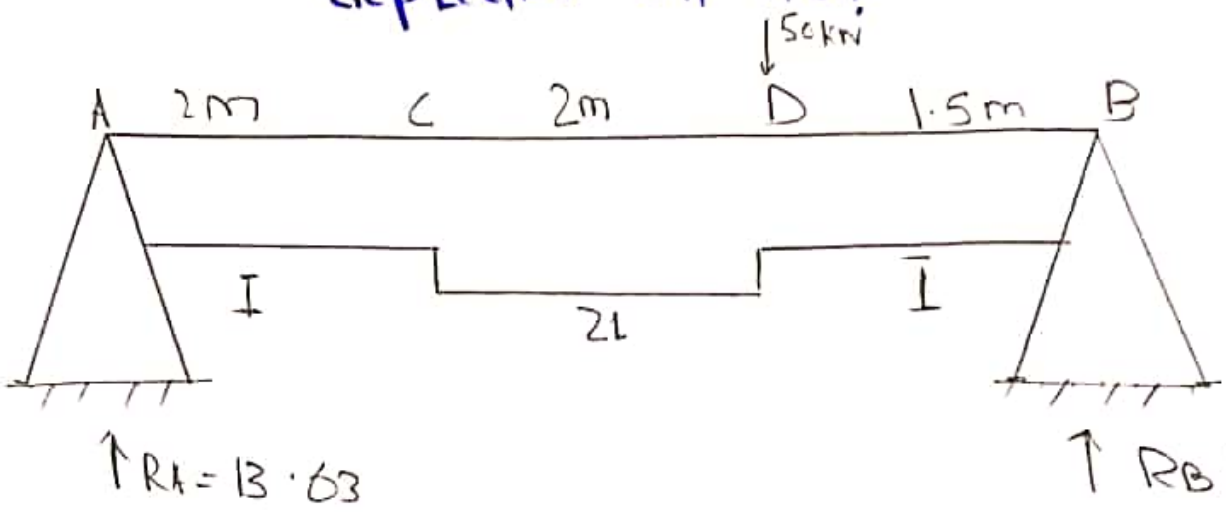
Now it's time for Reaction and moment so by cutting.

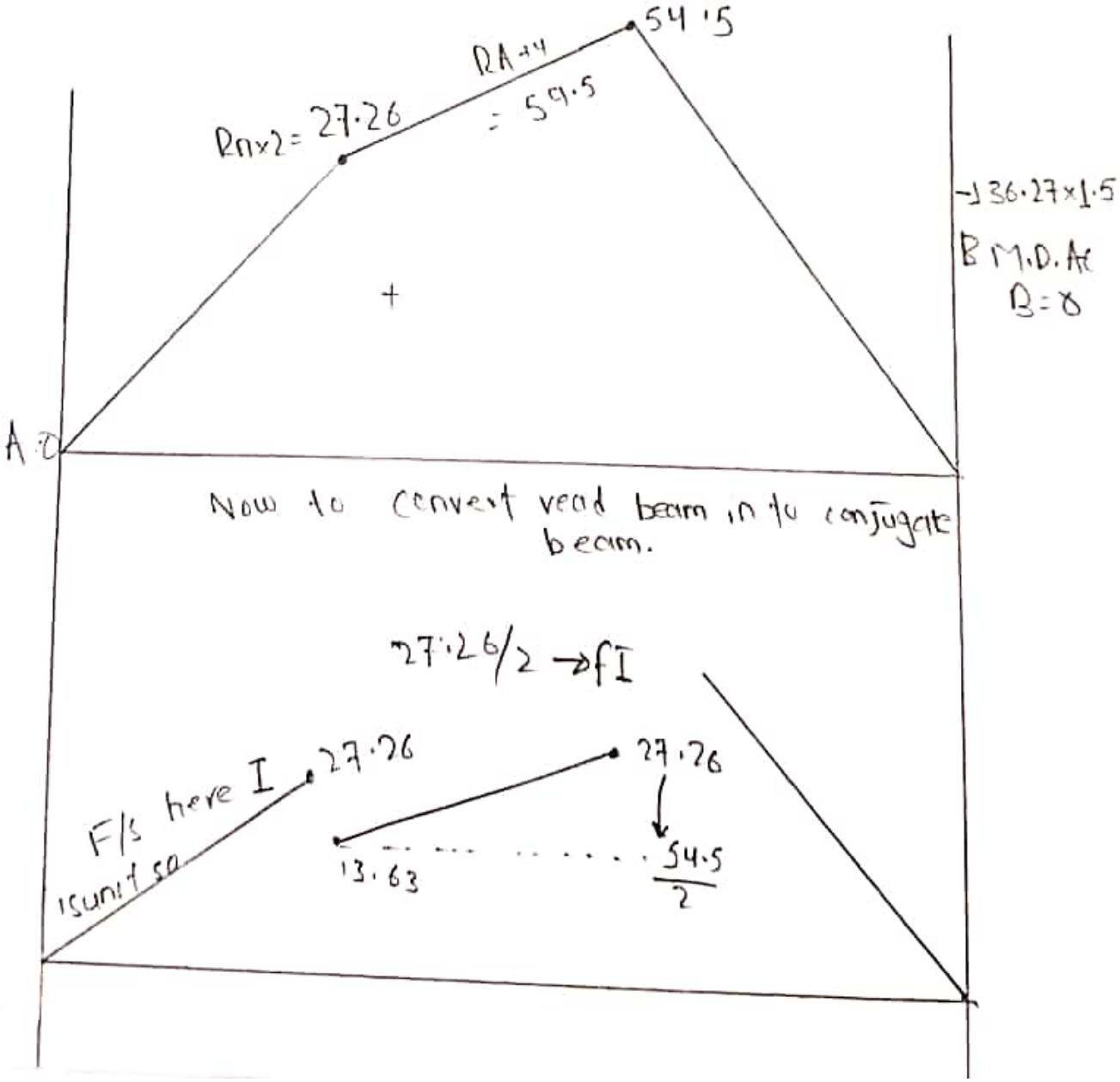


So at the end we will get

$$M_{max} - Max\left(Max\,10K + M_{Max}\,8K + M_{max\,3} + M_{max\,4}\right)$$

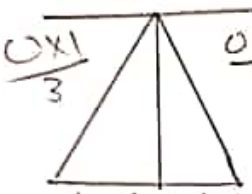
(Q3) Find Slope at A & A, and deplection at AD?





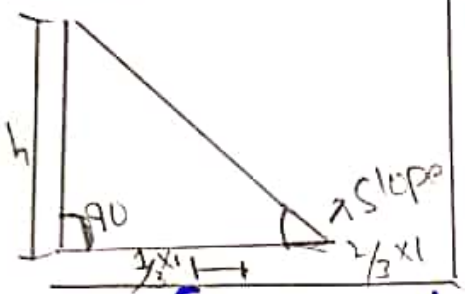
Reaction s:-

HINT



$R_A \times 5.5 - 50 \times 1.5$

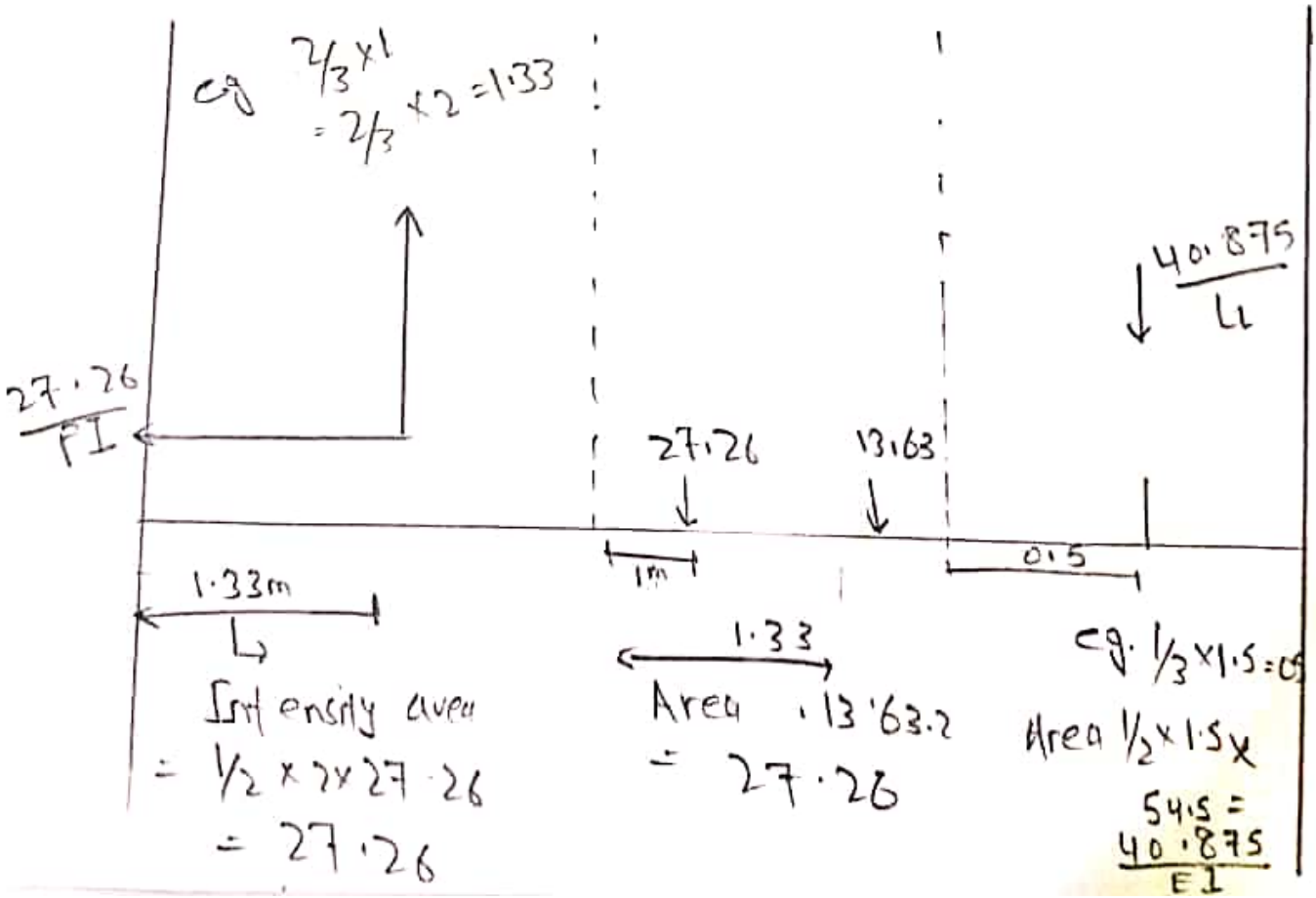
$R_A = \frac{50 \times 1.5}{5.5} = 13.68\ kN \uparrow$



$R_B = \frac{50 \times 4}{5.5} = 36.37\ kN \uparrow$

(Step 2)

So all ave. positive So it means forces acting upward



To find the reaction Conjugate beam calculations.

$$M_{OA} = 0$$

$$= \left(\frac{27.26 \times 1.33}{EI}\right) + \left(\frac{27.26}{EI} \times 3\right) + \left(\frac{13.63}{EI} \times 3.33\right)$$

$$+ \left(\frac{40.875}{EI} \times 4.5\right) - \left(R_B \times 5.5\right) = 0$$

$$R_B = \frac{63.15}{EI} \text{ kN} \uparrow$$

$$+\uparrow \Sigma F_y = 0$$

$$R_m R_B = 27.26 + 27.26 + 13.63 + 40.875$$

$$R_A = \frac{45.205 \text{ kN } (\uparrow)}{EI}$$

a) Now slope at (A)

$$\theta_A = S.F = A$$

$$R_A = \frac{45.865}{EI} \text{ Radian}$$