Date:

Name :- Muhammad Adil Rehman

ID :- 7939

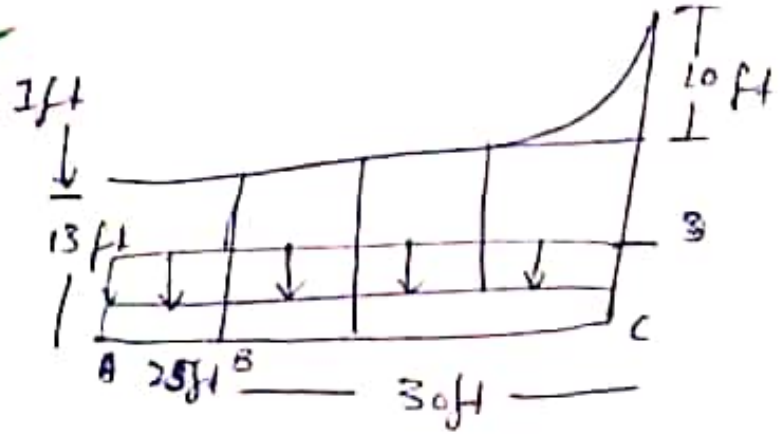
Section:- B

Subject:- structural analysis

Assignment:- 4

Q.1

Given :-



⇒ Solution :-

Members BC

$\pm \rightarrow \Sigma f_x = 0;$

$B_x = 0$

Member AB_j

$\pm \rightarrow \Sigma f_x = 0_j$

$A_x = 0$

FBD 1.

$C_+ + \Sigma M_B = 0_j$

$F_N(1) - B_y(15) - 30(7.5)$

$= 0$

FBD 2 -

$C_+ + \Sigma M_C = 0_j$

$-F_H(10) - B_y(30) + 90(15) = 0$

⇒ Sol :-

$B_y = 0_j$

$F_H = E_{mn} = \boxed{225}$

Maximum force occurs at E, where slope is maximum

From eq 5.8

$$w_0 = \frac{2F_H h}{\ell^2} = \frac{3(225)(10)}{30^2}$$

$$= 7.5 \text{ k/ft}$$

from eq 5-11

$$f_{max} = w_0 \ell \sqrt{1+\left(\frac{L}{2n}\right)^2}$$

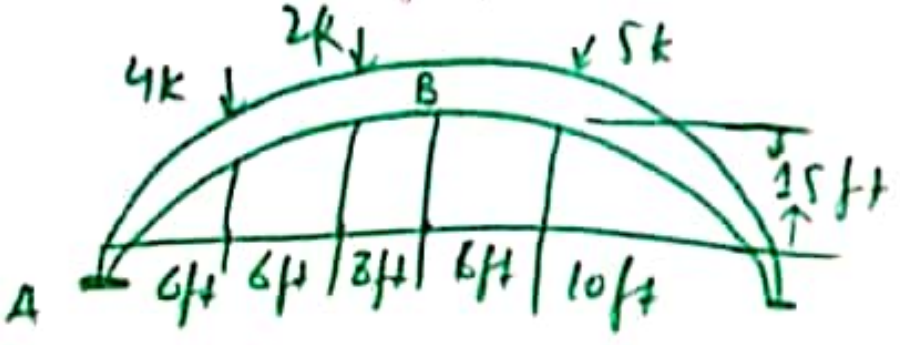
$$= 3(30)\sqrt{1+\left(\frac{30}{3(10)}\right)^2}$$

$$F_{max} = 127.2 \text{ k}$$

Each hanger carries 5 ft of w_0

$$T = (3 \text{ k/ft})(5) = 10 \text{ k}$$

Q ⇒ 2 :-



- Entire Arch :-

$$C_y - \Sigma M_A = 0;$$

$$-4(6) - 3(12) - 5(30) + C_y(40) = 0$$

$$C_y = 5.5 \text{ k}$$

$+\uparrow \Sigma f_y = 0;$

$A_y + 5.25 - 4 - 3 - 5 = 0$

$A_y = 6.75\ k$

$\xrightarrow{+} \Sigma F_x = 0;$

$A_x = 0$

Section BC

$\circlearrowleft + \Sigma M_B = 0;$

$-5(10) - T(15) + 5.05(20) = 0$

$T = 3.67\ k$