

Name : Syed Waheed Shah

I.D : 7497

Subject : MOS II

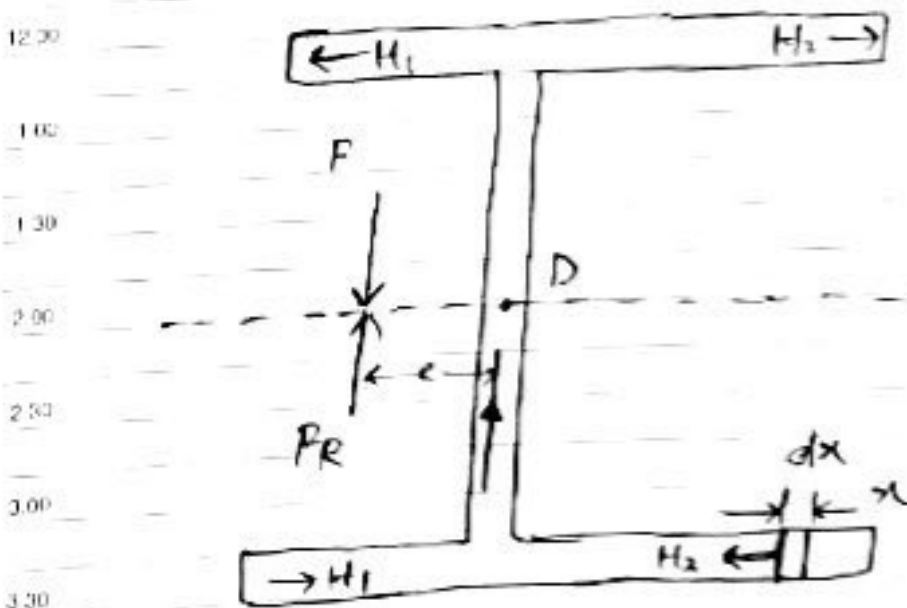
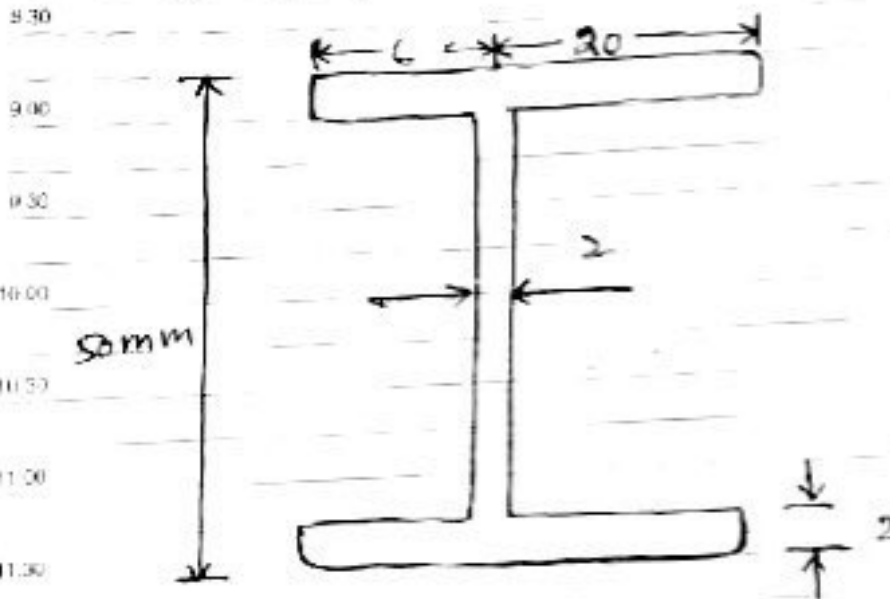
Semester : 10<sup>th</sup>

Teacher : Engr. Saqib

October 2018					November 2018					December 2018					
M	1	2	3	27	28	M	5	12	19	26	M	3	10	17	24
T	2	9	16	23	30	T	6	13	20	27	T	4	11	18	25
W	3	10	17	24	31	W	7	14	21	28	W	5	12	19	26
T	4	11	18	25		T	8	15	22	29	T	6	13	20	27
F	5	12	19	26		F	9	16	23	30	F	7	14	21	28
S	6	13	20	27		S	10	17	24		S	8	15	22	29
S	7	14	21	28		S	11	18	25		S	9	16	23	30

(4)

8:00 am (1) Ans: (a) shear centre location



$$H_2 = \int q \, dA = \int \frac{F A \bar{y}}{I \cdot t} \, dA$$

$$= \frac{F}{I \cdot t} \int A \bar{y} \, dA$$

T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
W	1	11	21	31	W	1	11	21	31	W	1	11	21	31	W	1	11	21	31	W	1	11	21	31	W	1	11	21	31	W	1	11	21	31
F	2	12	22	3	F	2	12	22	3	F	2	12	22	3	F	2	12	22	3	F	2	12	22	3	F	2	12	22	3	F	2	12	22	3
S	3	13	23	4	S	3	13	23	4	S	3	13	23	4	S	3	13	23	4	S	3	13	23	4	S	3	13	23	4	S	3	13	23	4
S	4	14	24	5	S	4	14	24	5	S	4	14	24	5	S	4	14	24	5	S	4	14	24	5	S	4	14	24	5	S	4	14	24	5
S	5	15	25	6	S	5	15	25	6	S	5	15	25	6	S	5	15	25	6	S	5	15	25	6	S	5	15	25	6	S	5	15	25	6

13 Thursday 25/9/20

(15)

$$= \frac{F}{I \cdot t} \int_0^{20} 2(20-x) \times (24 \times x) dx$$

$$= \frac{F}{I \times 2} [19200]$$

$$= 9600 \frac{F}{I}$$

$$H_1 = \frac{F}{2I} \int_0^6 2(6-x) \times 4 \times x dx$$

$$\Rightarrow H_1 = \frac{F}{2I} \times 1728$$

$$H_1 = 864 \frac{F}{I}$$

Taking moment about point D

$$F_R \times e = 2(H_1 - H_2) \times 24$$

$$\Rightarrow = 2 \left( 864 \times \frac{F}{I} - 9600 \times \frac{F}{I} \right) \times 24$$

$$= \dots$$

October 2018						
M	1	8	15	22	29	
T	2	9	16	23	30	
W	3	10	17	24	31	
T	4	11	18			
F	5	12	19			
S	6	13	20			
S	7	14	21			

November 2018						
M	5	12	19	26		
T	6	13	20	27		
W	7	14	21	28		
T	8	15	22	29		
F	9	16	23	30		
S	10	17	24			
S	11	18	25			

December 2018						
M	11	18	25			
T	12	19	26			
W	13	20	27			
T	14	21	28			
F	15	22	29			
S	16	23	30			
S	17	24	31			

# September

WEEK 38

(16)

26/09/18 Saturday 22

8:00 am

$$\Rightarrow F_R \times e = \frac{-419328 F}{I}$$

8:30

9:00

Here  $F_R = F$

9:30

10:00

$$\Rightarrow e = \frac{-419328}{I} \rightarrow \textcircled{A}$$

10:30

11:00

11:30

$$I = 2 \left[ \frac{26 \times 2^3}{12} + 52 \times 25^2 \right] + \frac{2 \times 46^3}{12}$$

12:00

12:30

$$I = 86561.33 \text{ mm}^4$$

1:00

1:30

$$\Rightarrow e = \frac{-419328}{86561.33}$$

2:00

2:30

$$e = -4.84 \text{ mm}$$

3:00

3:30

4:00

4:30

5:00

As the value is negative, it indicates that our assume direction of  $e$  is wrong and it is 4.84 mm to the right side.

①  
Ans. (b)

Given data

$$h = 26 \text{ ft} = 312 \text{ in}$$

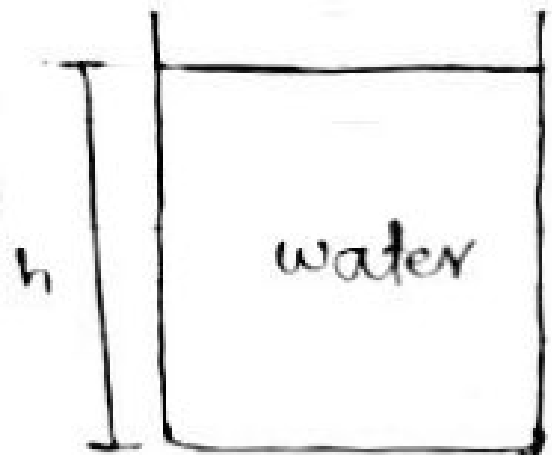
$$\sigma_t = 6000 \text{ PSI}$$

$$\gamma_w = 62.4 \text{ lb/ft}^3 = 0.036 \text{ lb/in}^3$$

Required, thickness =  $t = ?$

As we know the

$$p = \gamma h \quad (\text{for water})$$



$$\Rightarrow \sigma_t = \frac{pD}{2t}$$

$$\sigma_t = \frac{\gamma h D}{2t}$$

$$\Rightarrow t = \frac{\gamma h D}{2\sigma_t}$$

$$= \frac{62.4 \times (26 \times 12) \times D}{2 \times 6000}$$

$$\Rightarrow t = 9.38 \times 10^{-4} D \quad \rightarrow (i)$$



17 Monday

②

Solve for the width (t) of the

Since  $D$  is not given in the question, so  $t$  depends on  $D$ .

For different values of  $D$  we would have different values of  $t$ .

e.g. let take  $D = 22 \text{ ft}$   
 $= 22 \times 12$   
 $= ~~264~~ 264 \text{ in}$

so  $t = 9.38 \times 10^{-4} \times ~~264~~ 264$

$$t = ~~0.248~~ 0.248 \text{ inches}$$

Also we can take any value of  $D$  & consequently calculate  $t$ .

October 2018



3

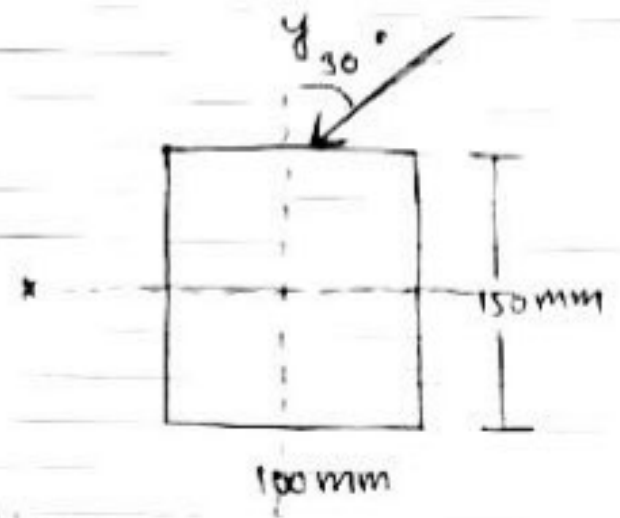
Thursday 20

Ans: (a)

Given data

$$w = 4 \text{ kN/m}$$

$$L = 3 \text{ m}$$



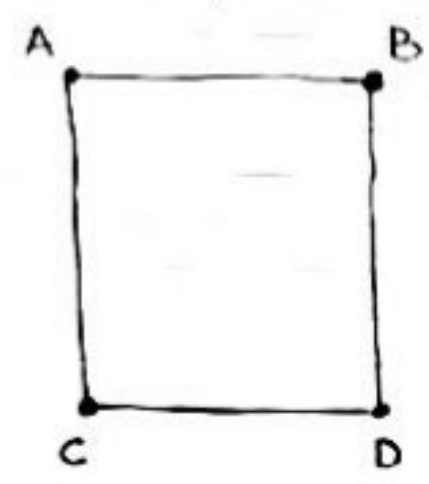
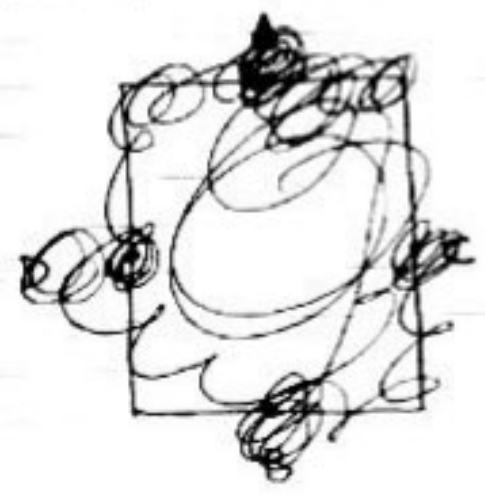
Required:

Maximum Bending

Stress = ?

Solution:

As the bending moment is maximum at extremes. So we would find stresses at, A, B, C, & D. (as shown)



September  
WEEK 48



21 Friday 20/11/2017

(1)

8:00 am As we know

$$8:30 \quad \sigma = \frac{M_x y}{I_x} + \frac{M_y x}{I_y}$$

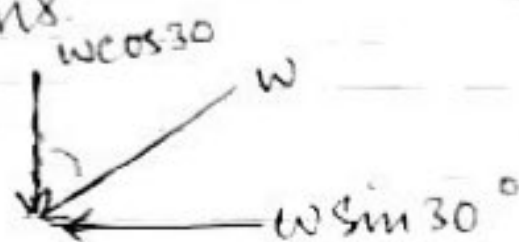
9:00  
9:30 We have to find  $M_x$  &  
10:00  $M_y$

10:30 As per question the  $M_x$  &  $M_y$   
11:00 should be found at the mid.  
11:30

noon As for simply supported  
12:30 we have

$$1:00 \quad M_{mid} = \frac{wl^2}{8} \rightarrow (1)$$

1:30 Now we have to find the  
2:00 components of  $w$  in  $x$  &  
2:30  $y$  directions.



$$3:00 \quad \text{so } M_x = \frac{(w \cos 30^\circ) \times l^2}{8}$$



November 2018

M	5	12	19	26
T	6	13	20	27
W	7	14	21	28



November 2018

M	5	12	19	26	
T	6	13	20	27	
W	7	14	21	28	
T	1	8	15	22	29
F	2	9	16	23	30
S	3	10	17	24	31
S	4	11	18	25	

October  
WEEK 40

National Day Holiday (China)

⑤

Thursday 4

8:00 am

$$\Rightarrow M_x = \frac{(4 \times \cos 30) \times 3^2}{8}$$

8:30

$$M_x = 3.9 \text{ KN-m}$$

9:30

10:00 NOW

10:30

$$M_y = \frac{(4 \times \sin 30) \times 3^2}{8}$$

11:00

11:30

$$M_y = 2.25 \text{ KN-m}$$

Noon

12:30

$M_x$  is causing compression at A & B & tension at C & D

1:00

1:30

$M_y$  is causing compression at B & D & tension at A & C

2:00

2:30

3:00

NOW  $I_x$  &  $I_y$

3:30

$$I_x = \frac{bh^3}{12} = \frac{0.1 \times 0.15^3}{12} = 2.815 \times 10^{-5} \text{ m}^4$$

4:00

4:30

$$I_y = \frac{hb^3}{12} = \frac{0.15 \times 0.1^3}{12} = 1.25 \times 10^{-5} \text{ m}^4$$

5:00

5:30 pm

October

CASIO

(6)

5 Friday

Now extreme stresses at fibers

$$\sigma_x = \frac{M_{xy}}{I_x} = \frac{3.9 \times 0.075}{2.815 \times 10^{-5}}$$

$$\sigma_x = 10390.7 \text{ KN/m}^2$$

$$\sigma_y = \frac{2.25 \times 0.05}{1.25 \times 10^{-5}}$$

$$\sigma_y = 9000 \text{ KN/m}^2$$

Now (taking tension  $\uparrow$ )

$$\text{stress at A} = \frac{M_{xy}}{I_x} + \frac{M_{yx}}{I_y}$$

$$= -10390.7 + 9000$$

$$= -1390.7 \text{ KN/m}^2 \text{ (comp)}$$

$$\text{at B} = \frac{M_{xy}}{I_x} + \frac{M_{yx}}{I_y}$$

$$= -10390.7 - 9000$$

$$\sigma \text{ at B} = -19390.7 \text{ KN/m}^2 \text{ (comp)}$$



August 2018							September 2018							October 2018						
M	2	3	4	5	6	7	M	7	8	9	10	11	12	M	1	2	3	4	5	6
T	1	8	15	22	29		T	13	14	15	16	17	18	T	7	14	21	28		
W							W	19	20	21	22	23	24	W	8	15	22	29		
T	2	9	16	23	30		T	25	26	27	28	29	30	T	9	16	23	30		
F	3	10	17	24	31		F	1	2	3	4	5	6	F	10	17	24	31		
S	4	11	18	25			S	8	15	22	29			S	11	18	25			
S	5	12	19	26			S	9	16	23	30			S	12	19	26			

9 Tuesday

(8)

Handwritten Lab Report

Ans: (b)

Given

$$L = 16 \text{ ft}$$

$$I_x = 112.6 \text{ in}^4$$

$$I_y = 18.7 \text{ in}^4$$

$$\sigma_c = 12000 \text{ psi}$$

$$\sigma_t = 5000 \text{ psi}$$

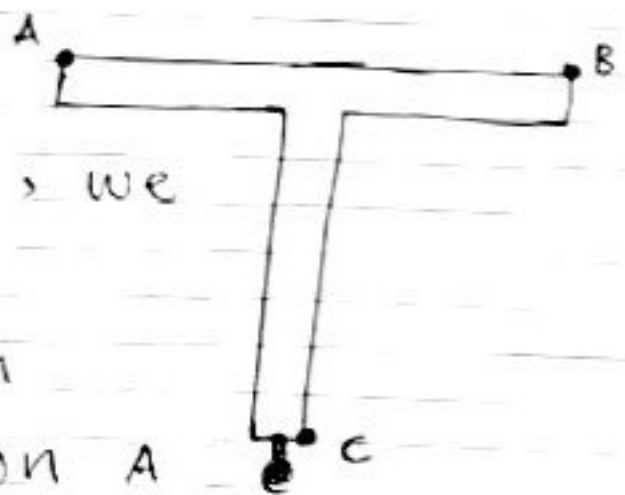
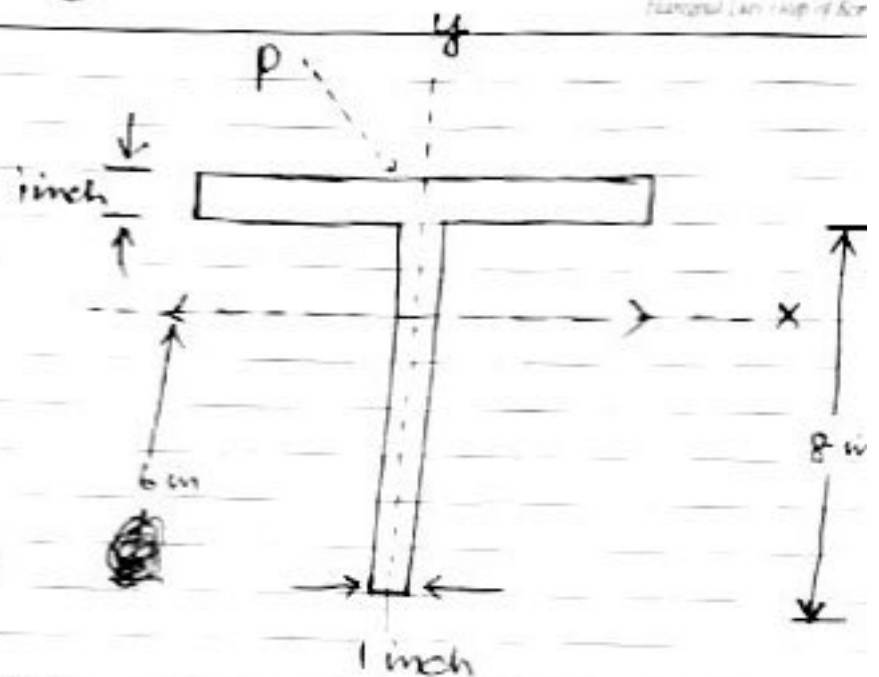
Sol:

By looking to the figure, we can judge that maximum compression would occur on A

& maximum tension at C

at B there will be tension as well as compression, which will reduce the effect of each other.

So we will calculate stresses



S	12	13	26	F	2	9	16	23	30	F	7	14	21	28
6	13	20	27	S	3	10	17	24	S	1	8	15	22	29
7	14	21	28	S	4	11	18	25	S	2	9	16	23	30

(9)

6:00 am at A & C.

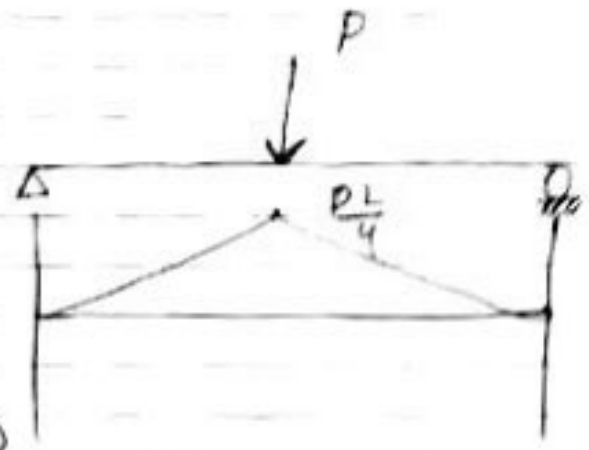
3:30 so

$$\sigma_A = \frac{M_x y}{I_x} + \frac{M_y x}{I_y} \quad (\text{comp})$$

1:00

$$\sigma_C = \frac{M_x y}{I_x} + \frac{M_y x}{I_y} \quad (\text{Tension})$$

1:00 Now  $M_x$  &  $M_y$



4:00 so

$$M_x = \frac{P \cos 60^\circ (16 \times 12)}{4}$$

1:30

$$M_x = 48 P \cos 60^\circ$$

2:30

$$M_y = \frac{P \sin 60^\circ (16 \times 12)}{4}$$

3:00

$$M_y = 48 P \sin 60^\circ$$

4:00 Now

$$\sigma_A = \frac{M_x y}{I_x} + \frac{M_y x}{I_y}$$

5:00

$$\rightarrow 12000 = \frac{48 P \cos 60^\circ \times 3.07}{112.6} + \frac{48 P \sin 60^\circ \times 3}{18.7}$$

6:00 pm

W	4	11	18	25	W	1	8	15	22	29	W	4	11	18	25
T	5	12	19	26	T	2	9	16	23	30	T	5	12	19	26
F	6	13	20	27	F	3	10	17	24	31	F	6	13	20	27
S	7	14	21	28	S	4	11	18	25	S	7	14	21	28	
S	8	15	22	29	S	5	12	19	26	S	8	15	22	29	

10

25 Tuesday 2020/07

Day Following Mid Autumn Festival (H.K.) Harvest Moon Festival (Taiwan) (Eq. of Rome)

Solving the equation

$$\Rightarrow P = 1638.6 \text{ lb}$$

Now

$$\sigma_c = \frac{M_x y}{I_x} + \frac{M_y x}{I_y}$$

$$5000 = \frac{48P \cos 60 \times (5.93)}{112.6} + \frac{48P \sin 60 \times 0.5}{18.7}$$

Solving the equation

$$P = 2104.9 \text{ lb}$$

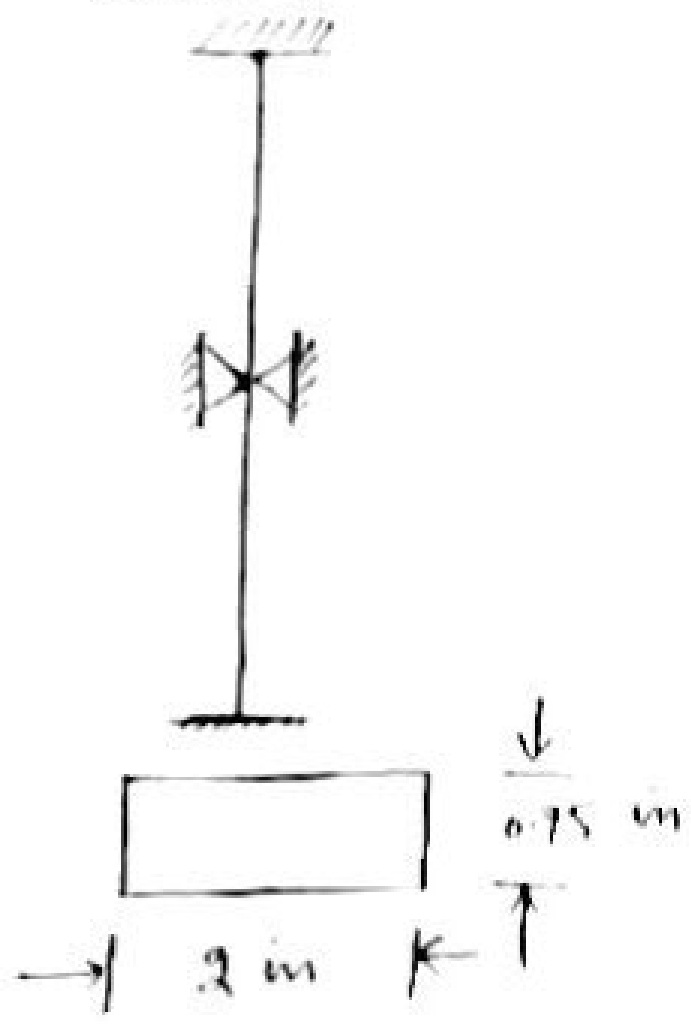
So the maximum load P applied should be 1638.6 lb

Ans.

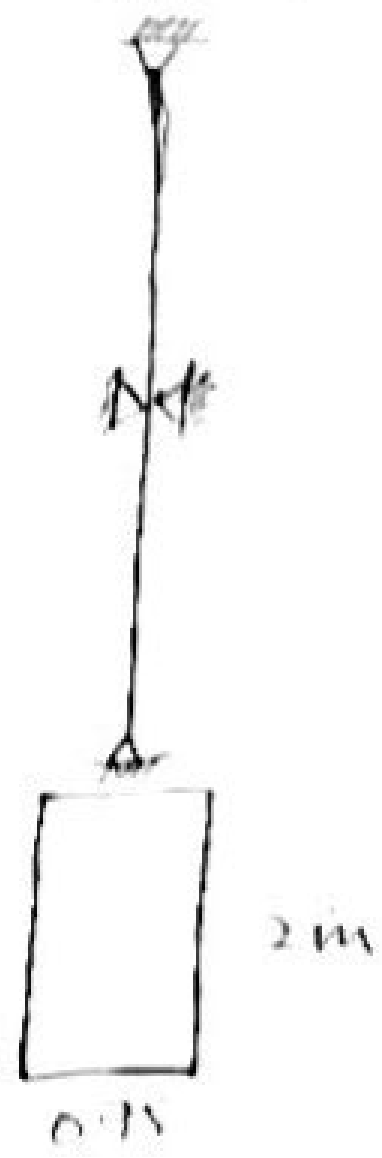
$L = 10 \text{ ft}$

Sol. According to the given data & conditions of the supports, it is not clear that in which direction, the column will buckle. So we will analyse both cases.

Case-I



Case-II



(12)

Friday 28

for case-1

$$P_{cr} = \frac{n\pi^2 EI}{L_e^2}$$

Here for case-1

$$n = 2, E = 10.3 \times 10^6 \text{ psi}$$

$$I = \frac{0.75 \times 2^3}{12} = 0.5 \text{ in}^4$$

$$L_e = 0.5L = 0.5 \times 16 \times 12$$
$$= 96 \text{ ft}$$

~~$$L_e = 16 \times 12 = 192 \text{ ft}$$~~

$$\Rightarrow P_{cr} = \frac{2 \times 3.14^2 \times 10.3 \times 10^6 \times 0.5}{96^2}$$

$$P_{cr} = 11019.3 \text{ lbs} = 11.01 \text{ Kip}$$

Now for case-2

$$n = 1, E = 10.3 \times 10^6 \text{ psi}$$

$$I = \frac{2 \times 0.75^3}{12} = 0.0703 \text{ in}^4$$

$$L_e = L = 16 \times 12 = 192$$





Saturday 27/2/2013

S	1	8	15	22	29	S	4	11	18	25	S	7	14	21	28
S	2	9	16	23	30	S	5	12	19	26	S	8	15	22	29

(13)

$$\Rightarrow P_{cr} = \frac{2 \times 3.14^2 \times 10.3 \times 10^6 \times 0.0703}{192^2}$$

~~$\Rightarrow P_{cr} = 387.8 \text{ lbs} = 0.387 \text{ kips}$~~

$$\Rightarrow P_{cr} = 387.8 \text{ lbs} = 0.387 \text{ kips}$$

SO

$$\text{Safe load} = \frac{0.387}{2} = 0.2 \text{ kip}$$