1

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

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

Veterans' Day (U.S.A.)

12 Monday 316/049

8.00 am
8.30
9.00
9.30
10.00
10.30
11.00
11.30
Noon
12.30
1.00
1.30
2.00
2.30
3.00
3.30
4.00
4.30
5.00
6.00 pm

NAME :- SULEMAN HAKEEM

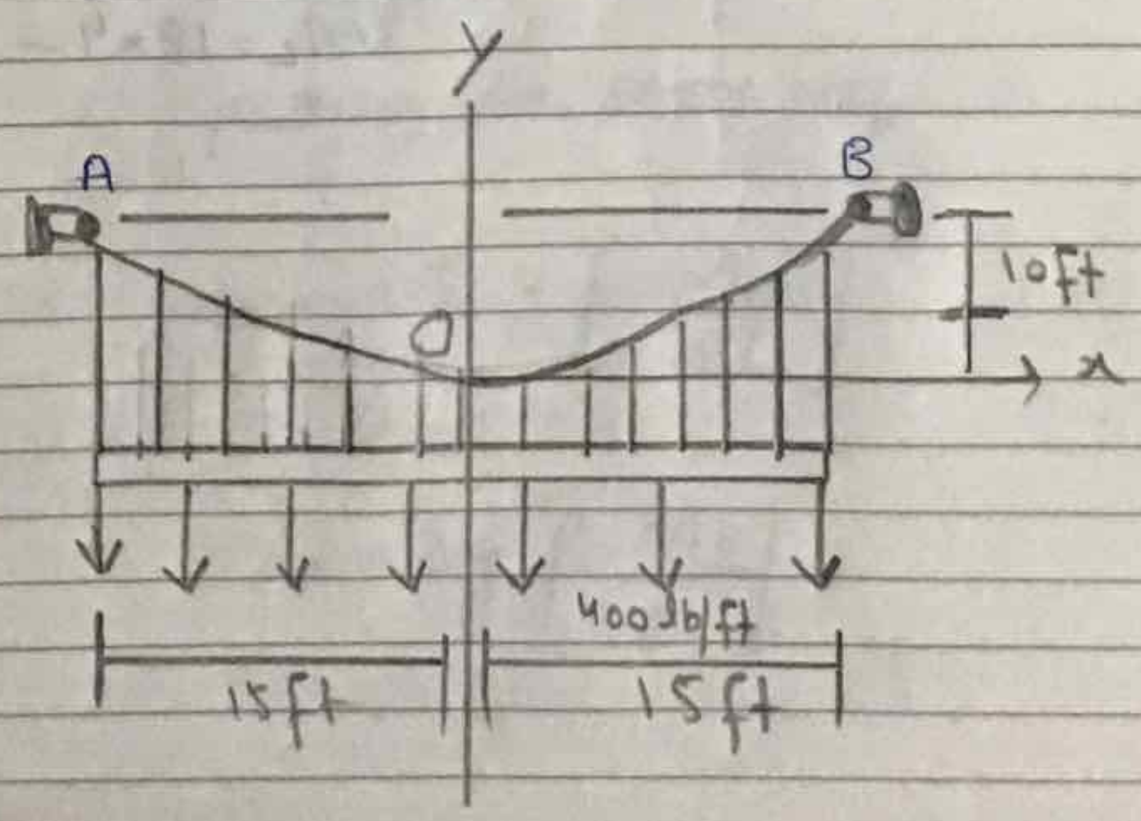
I.D :- 16757

SEC :- B

SEM :- 4th

PAPER :- Structure Analysis I

Q3) The Cable is Subjected to the uniform loading. If the slope of the Cable at point O is zero, determine the equation of the Curve and the force in the Cable?



2

8.00 am

SOLUTION :-

8.30

As we know that

9.00

$$y = \frac{h}{L^2} x^2$$

9.30

10.00

putting values.

10.30

$$y = \frac{10}{(15)^2} x^2 \Rightarrow 0.044 x^2$$

11.00

Now,

11.30

we know

Noon

$$T_0 = F_H = \frac{w_0 L^2}{2h}$$

12.30

putting values

1.00

$$= \frac{400(15)^2}{2(10)} \Rightarrow 4500 \text{ lb}$$

1.30

2.00

$$F_H = 4.50 \text{ K Ans.}$$

2.30

As,

3.00

$$T_B = T_{max}$$

3.30

So :- $\sqrt{(F_H)^2 + (w_0 L)^2}$

4.00

putting

4.30

$$= \sqrt{(4500)^2 + [(400)(15)]^2}$$

5.00

$$= \sqrt{20250000 + 36000000}$$

6.00 pm

3

$= 7500$ lb

$T_{max} = 7.50$ lb Ans.

Also we know

$$T_B = T_{max} = w_0 L \sqrt{1 + \left(\frac{L}{2h}\right)^2}$$

putting.

$$= 400 \times 15 \sqrt{1 + \left(\frac{15}{2(10)}\right)^2}$$

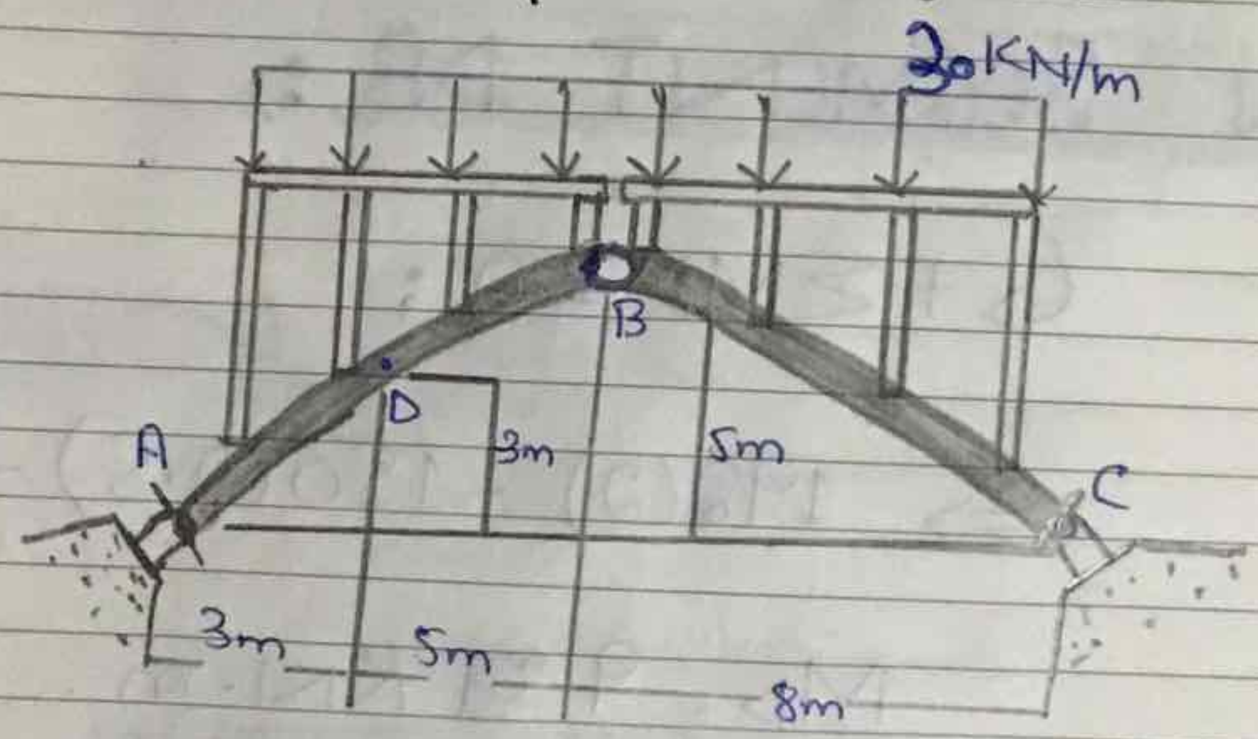
$$= 6000 \times 1.25$$

$$= 7500 \text{ lb}$$

$T_m = 7.50$ K Ans.

(4)

Q4) The three - hinged Spandrel arch is Subjected to the uniform load of 30 KN/m. Determine the internal moment in the arch at point D?



SOLUTION:-

MEMBER AB :,

$\circlearrowleft + \Sigma M_A = 0$

$\therefore 30 \times 8 = 240$

$\Rightarrow B_x(5) + B_y(8) + 240(4) = 0$

MEMBER BC :,

$\circlearrowleft + \Sigma M_C = 0$

5

8.00 am

$\Rightarrow -B_x(5) + B_y(8) + 240(4) = 0$

8.30

9.00 **Now Solving:-**

9.30

$B_x = 192$ K.N , $B_y = 0$

10.00

10.30 **NOW SEGMENT DB :-**

11.00

11.30 $\circlearrowleft + \Sigma M_D = 0$;

Noon

$\Rightarrow 192(2) - 150(2.5) - M_D = 0$

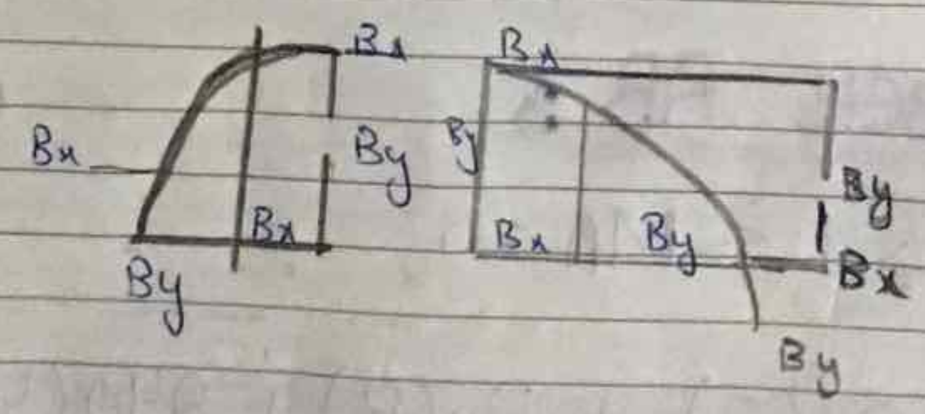
12.30

1.00 $M_D = 9$ [redacted] KN.m.

1.30 **FIGURE :-**

2.00

2.30



3.00

3.30

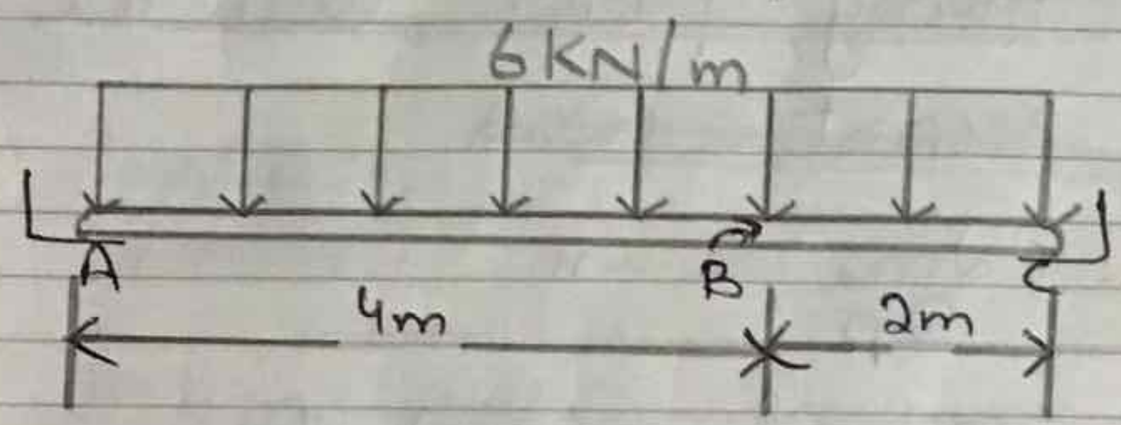
4.00

4.30

5.00

6.00 pm

Q2) Determine the slope and displacement at point B. Assume the Support .....?



GIVEN DATA :-

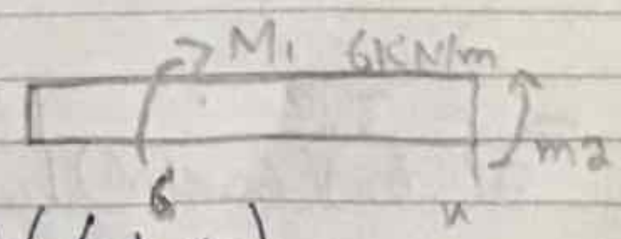
$E = 200$ GPa

$I = 60 \times 10^6$ mm^4

REQUIRED :-

Slope and displacement = ?

SOLUTION :-



$$m_1 - m_2 = \frac{1}{2}(x_2)(6 + x_1)$$

$$m_1 - m + 6 \quad \frac{6x_2 + x_1^2}{2}$$

7

8.00 am

8.30 $m = -m' + 3x^2 + \frac{x_2^2}{2}$

9.00

9.30 taking partial derivative

10.00 with respect to m

10.30 $\frac{\partial m_2}{\partial p} = -x$

11.00 $\Delta B = \int_0^2 m\frac{(\partial m)}{\partial p}\frac{dx}{\varepsilon}$

11.30

Noon

12.30 $= \int_0^6 \frac{-3x^2(-x)\,dx}{EI} + \int_0^4 \frac{-3x^2(-x)\,dx}{EI}$

1.00

1.30 $\Delta B = \frac{-3x^2}{4EI}\Big|_0^6 + \frac{-3x^4}{4EI}\Big|_0^4$

2.00

2.30 put values of E and I.

3.00

3.30 $= \frac{-3x^2}{2(200)(60\times10^6)}\Big|_0^6 + \frac{-3x^4}{4000(60\times10^6)}\Big|_0^4$

4.00

4.30 $= \frac{-216\ KN\cdot ft^3}{4.8\times10^{10}} + \frac{-614.4\ KN\cdot ft^3}{4.8\times10^{10}}$

5.00

6.00 pm

$$= -4.5 \times 10^{-9} + (-1.28 \times 10^{-8})$$

$$\boxed{\Delta B = 5.76 \times 10^{-10} \text{ inch}}$$

Displacement.

Now

SLOPE :-

$$m + \frac{1}{2} x (6x_1) = 0$$

$$m = -\frac{1}{2} x \ (6x_2) = 3x^2$$

So ;

$$\frac{\partial m_1}{\partial m_1} = 0$$

$$m_1 - m_2 - \frac{1}{2} (x_2)(6 + x_2)$$

$$m = -m' + 3x^2 + x_2^2/2$$

$$\frac{\partial m_2}{\partial m_1} = -1$$

$$= \int_0^6 \frac{-3x^2 \ 0 dx}{EI} + \int_0^{10} \left(-2 + 6x^2 + \frac{x^2}{2}\right) dx$$

$$= 0 + \left(-x + \frac{6x^3}{3} + \frac{x^3}{6}\right)\Big|_0^{10} \left(\frac{1}{EI}\right)$$

8.00 am

8.30

$$= \frac{1}{200 \times (60 \times 10^6)} \left(-x + \frac{6x^3}{3} + \frac{x^3}{6} \right) \Big|_0^{10}$$

9.00

9.30

10.00

$$\boxed{\Rightarrow \quad \theta = 4.125 \times 10^{-7} \text{ inch}}$$

Ans.

10.30

11.00

Q 1) Determine the verticle ....?

11.30

Noon

GIVEN DATA :-

12.30

uniform load = 4K/ft

1.00

$E = 2.9 \times 10^3$ Ksi

1.30

$I = 600 \text{ in}^4$

TO FIND :-

2.00

vertical displacement = ?

2.30

SOLUTION :-

3.00

3.30

Now Verticle moments

4.00

4.30

5.00

6.00 pm

Labour Thanksgiving Day (Japan)

Finding moments

$\circlearrowleft^{+} \quad \Sigma M_A = 0$

$-4(10)(5) + C_y(8)$

$C_y = 25$ Kip

$\Sigma F_y = 0 \uparrow^{+}$

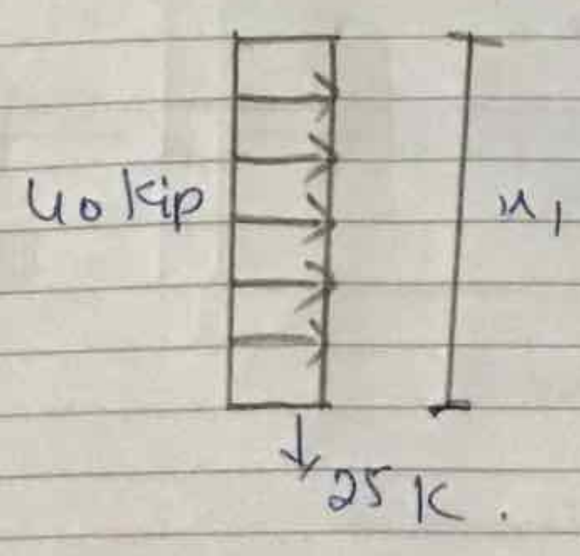
$25 + A_y = 0$

$A_y = -25$ Kips.

$\Sigma F_x = 0 \rightarrow^{+}$

$40 - A_x = 0 \Rightarrow A_x = 40$ K.

Taking Sections.



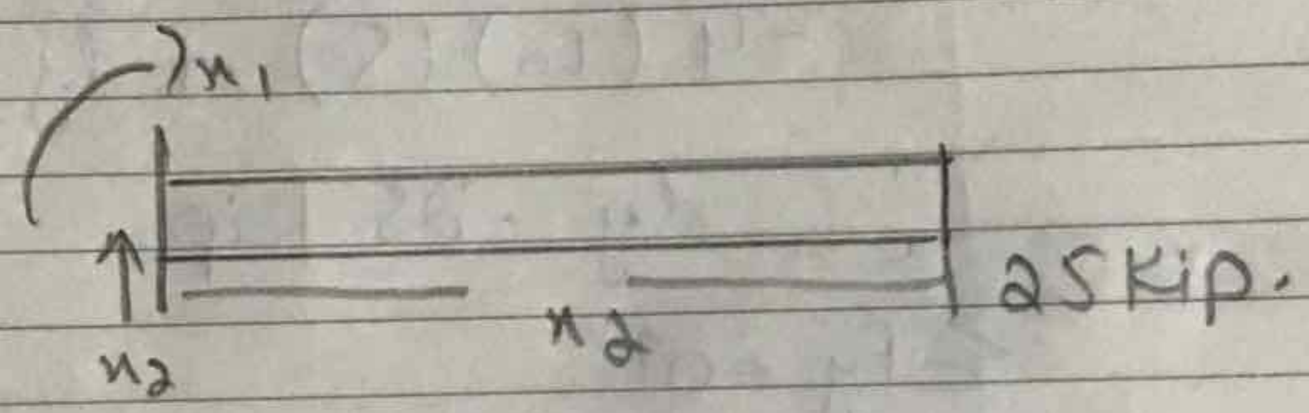
$\Rightarrow$ Real moments.

$\circlearrowleft^{+} \Sigma M_1 = 0.$

00 am
.30
.00
9.30
0.00
10.30
11.00

$$-40(x_1) + 4x_1\left(\frac{4'}{2}\right) + M_1 = 0.$$

$$M_1 = 40x_1 - 2x_1.$$

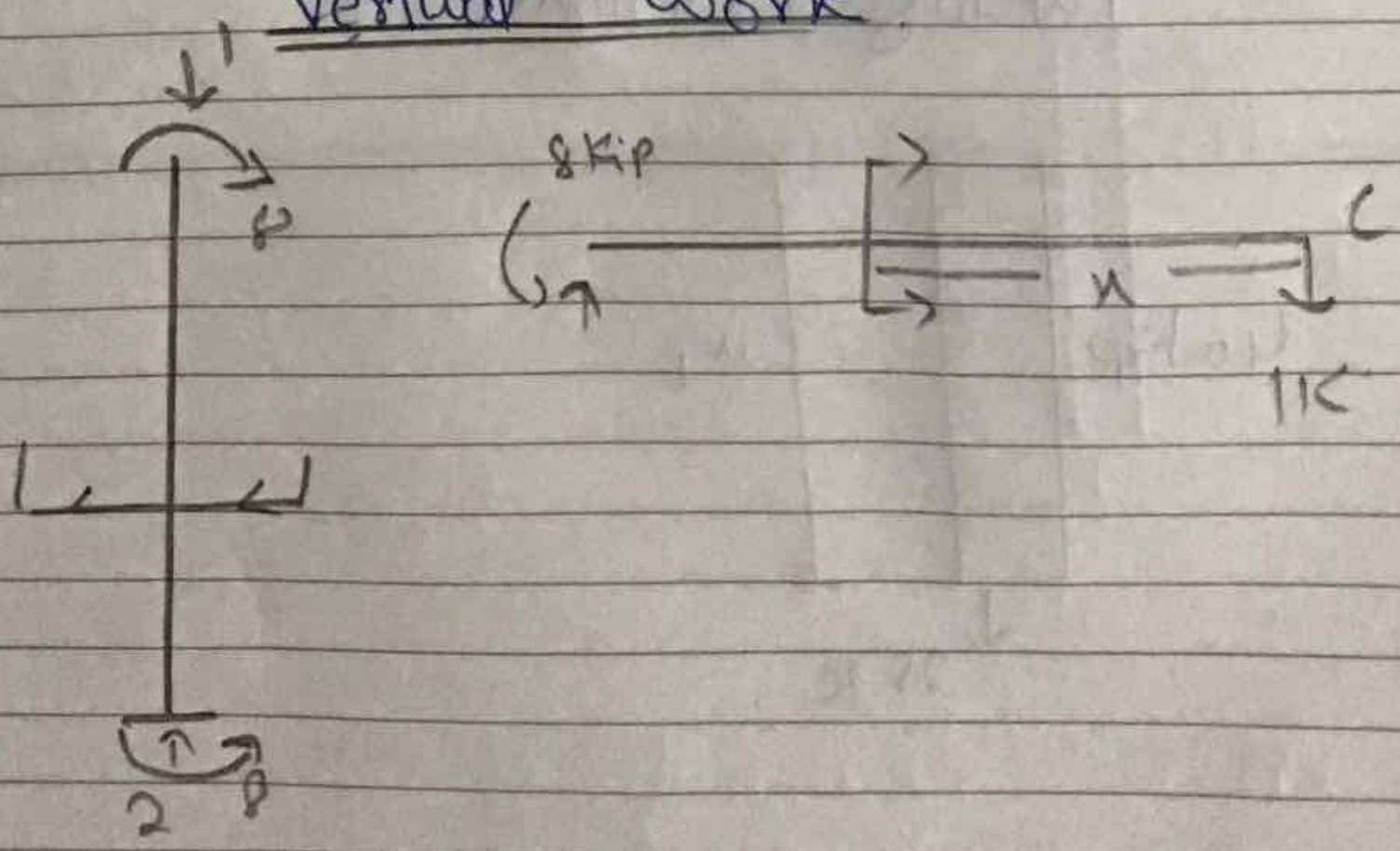


$$-25(x_2) + M_2 = 0$$

$$M_2 = 25x_2 \text{ Kips}.$$

2 Now

vertual work



8.00 am Members BA CB

8.30 origin B C

9.00 limit 0-10 0-8

9.30 m 8 x.

10.00

10.30 By vertual work method

11.00

11.30 $1 \cdot 0 = \int_0^{10} \frac{(2x^2)(8)}{EI} dx + \int_0^{e} \frac{(0)(x)}{EI}$

Noon

12.30 $'' = \frac{16x^3}{3} \Big|_0^{10} + 0$

1.00 $1 \cdot 0 = \frac{16 \times 1000}{3} / EI$

1.30

2.00 $= \frac{0333.33}{EI} = \frac{0333.33}{29 \times 10^3 \times 600}$

2.30

3.00 $= 3.06 \times 10^{-4}$ in.

Ans.

3.30

4.00

4.30

5.00