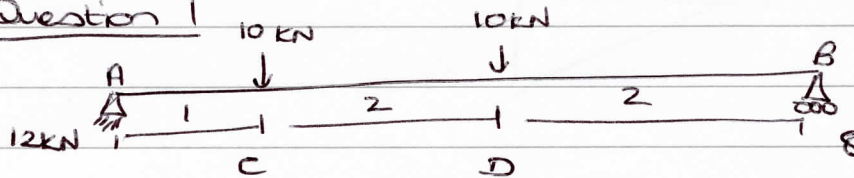


Section A

Question 1



a. $(10 \times 1) + (10 \times 3)$ clockwise.

$B \times 5$ anticlockwise

$10 + 30 = 5B$

$\frac{40}{5} = B$

$B = \underline{\underline{8 \text{ kN}}}$

$A = 10 + 10 = 20 - 8 = \underline{\underline{12 \text{ kN}}}$.

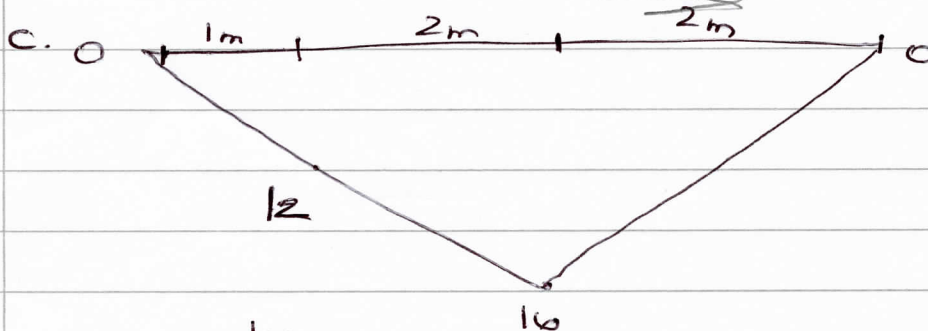
/ 5 marks.

b. $C = (12 \times 1) - (10 \times 0) = \underline{\underline{12 \text{ kN/m}}}$.

$D = 10 \times 2 = 12 \times 3$

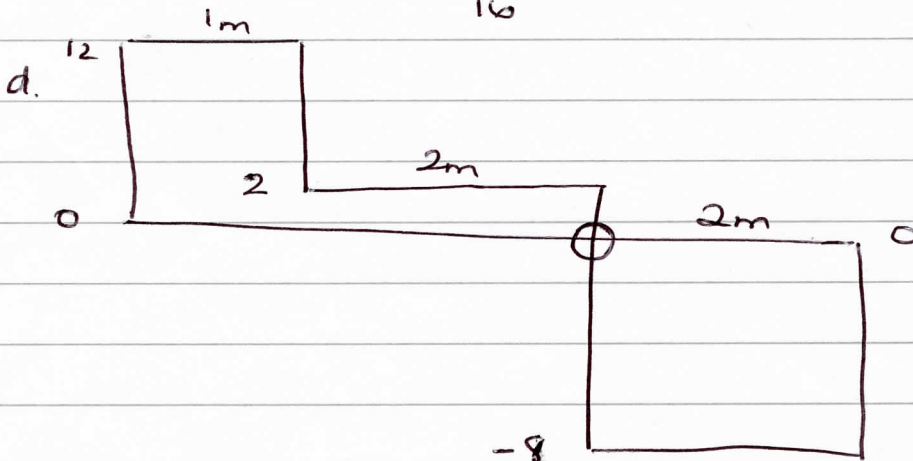
$20 = 36$

$36 - 20 = 16 \text{ kN/m}$



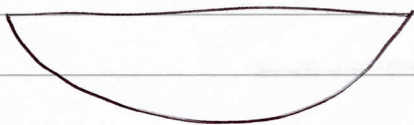
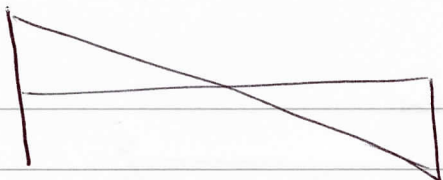
/ 5 marks

/ 5 marks



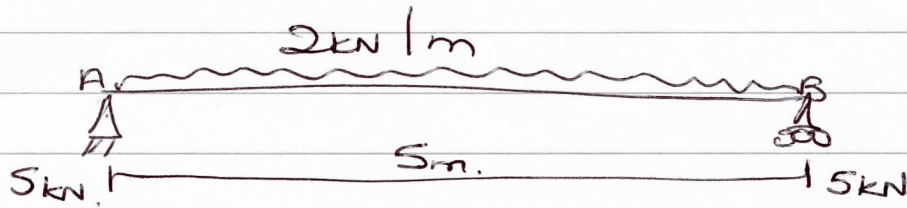
/ 5 marks

a.



/Smakes

Question 2



a. $2 \times 5 \times 2.5 = B \times 5$
 $25 = 5B$
 $B = \frac{25}{5} = \underline{\underline{5 \text{ kN}}}$

$A = 2 \times 5 = A + 5$
 $10 = A + 5$

$10 - 5 = A = \underline{\underline{5 \text{ kN}}}$

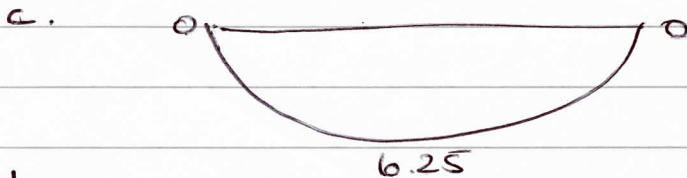
/5 marks

b. $\frac{1}{2}$ way along beam.

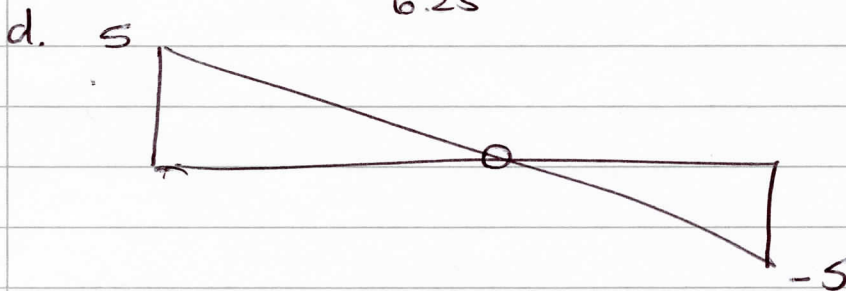
$2 \times 2.5 \times 1.25 \text{ anti.} = 5 \times 2.5$
 $6.25 \qquad \qquad \qquad 12.5$

$12.5 - 6.25 = \underline{\underline{6.25 \text{ kN/m}}}$

/5 marks



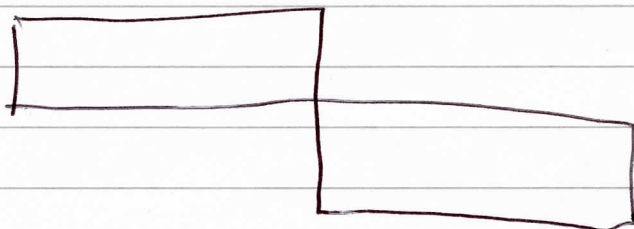
/5 marks



/5 marks



bending



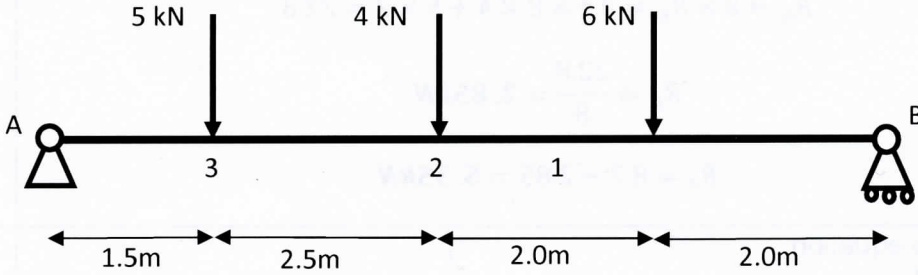
shear force.

/5 marks

SOLUTIONS

(to accompany the examination paper sent to the external examiner
but NOT to be seen by students)

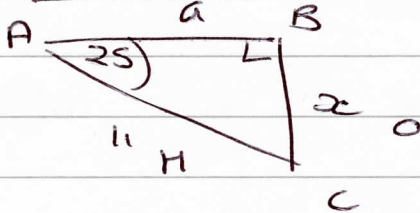
Programme:	Built Environment Portfolio	Level:	4
Module:	Engineering Mathematics and Structures		
Author:	J. A. Ferriz Papi	Pages:	

Q 1	Question	Marks
a)	 $R_A + R_B = 5 + 4 + 6 = 15$ $M_B \rightarrow 6 \times 2 + 4 \times 4 + 5 \times 6.5 = R_A \times 8$ $12 + 16 + 32.5 = 8R_A$ $R_A = \frac{60.5}{8} = 7.5625 \text{ kN}$ $R_B = 15 - 7.5625 = 7.4375 \text{ kN}$	7
b)	Shear forces In B: 7.4375kN In 1: 7.4375 – 6 = 1.4375kN In 2: 1.4375 – 4 = -2.5625kN In 3: -2.5625 – 5 = -7.5625kN In A: -7.5625kN Bending moments In B: 0 In 3: 7.4375 x 2 = 14.875 In 2: 7.4375 x 4 – 6 x 2 = 17.75 In 1: 7.4375 x 6.5 – 6 x 4.5 – 4 x 2.5 = 11.34375 In A: 7.4375 x 8 – 6 x 6 – 4 x 4 – 5 x 1.5 = 0	7
c)	Drawings	7
d)	No the maximum bending moment should be 16kN.m and it is 17.75 in point 2	4

Section B

m/s	Velocity
m/s ²	Acceleration
N	Force
N	Weight
kg	Mass

Question 2



$$\sin 25 = \frac{x}{11}$$

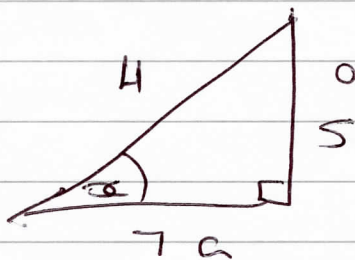
$$x = \sin 25 \times 11$$

$$= 0.4226 \times 11$$

$$x = 4.6488$$

$$4.65 \text{ cm}$$

Question 3



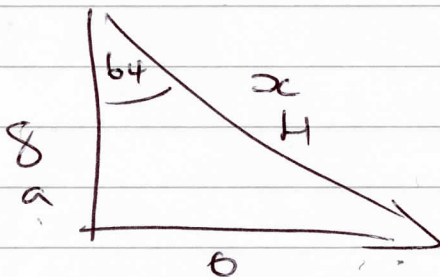
$$\tan x = \frac{5}{7}$$

$$\tan x = 0.7142857143$$

$$x = 35.537$$

$$35.5^\circ$$

Question 4



$$\cos 64 = \frac{6}{H}$$

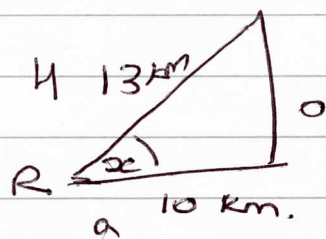
$$H = \frac{6}{\cos 64}$$

$$H = \frac{6}{0.43837}$$

$$H = 13.688$$

$$13.7 \text{ cm}$$

Question 5



$$\cos x = \frac{10}{13} = 0.769$$

$$x = \underline{\underline{39.715^\circ}}$$

$$(39.7^\circ)$$