

ENCE 353 Midterm 1, Open Notes and Open Book

Name : _____

Exam Format and Grading. Partial credit will be given for partially correct answers, so please show all your working.

Question	Points	Score
1	5	
2	5	
3	10	
Total	20	

Question 1: 5 points

Consider the S-shaped beam structure shown in Figure 1.

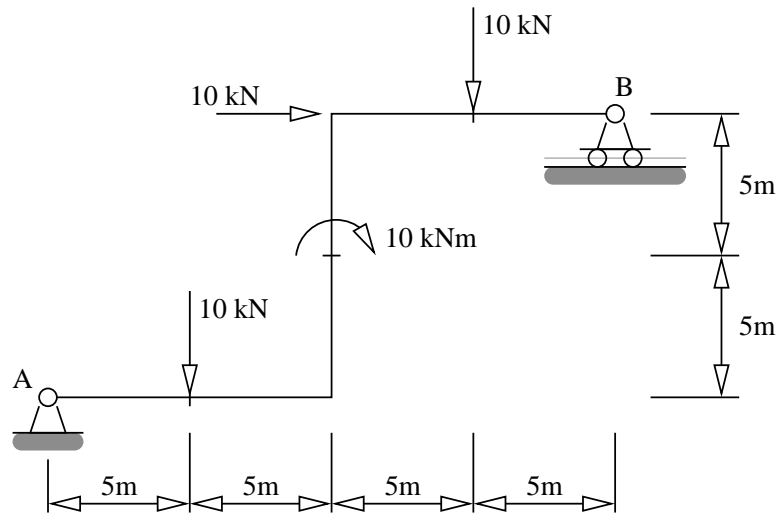


Figure 1: S-shaped beam structure.

Compute the horizontal and vertical components of the reactions at points A and B.

Question 2: 5 points

In class we derived the formula that relates the distribution of bending moment in a beam, $M(x)$, to the distribution of shear force, $V(x)$, i.e.,

$$V(x) = \left[\frac{dM(x)}{dx} \right]. \quad (1)$$

[2a] One assumption used the derivation of this formula is that “plane sections remain plane.” Draw and label a diagram that illustrates the concept of “plane sections remain plane.”

[2b] Suppose that a simply supported beam has a point load at its midpoint. Create a simple diagram that shows the distribution of shear force and bending moment along the beam. Clearly indicate on the diagram all points where equation 1 **does not** apply.

Question 3: 10 points

Consider the three-span beam structure shown in Figure 2.

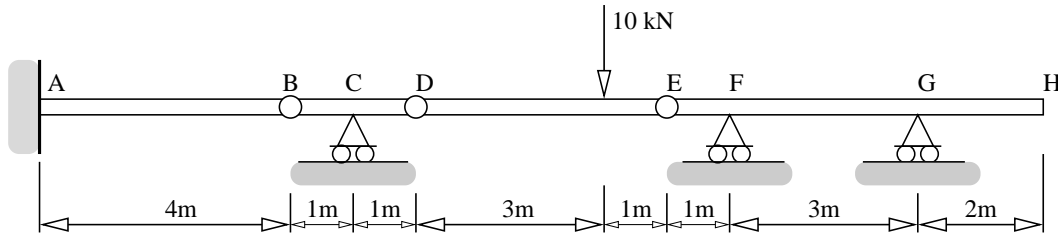


Figure 2: Three-span beam structure.

The cantilever is fully-fixed to the wall at Point A. Points B, D and E are hinges.

[3a] Compute the degree of indeterminacy for the three-span beam.

[3b] Compute the reactions at points A, C, F and G.

[3c] Compute and draw the shear force and bending moment diagram along the beam.