

B.Tech II Year II Semester (R09) Supplementary Examinations May/June 2017

**STRUCTURAL ANALYSIS - I**

(Civil Engineering)

Time: 3 hours

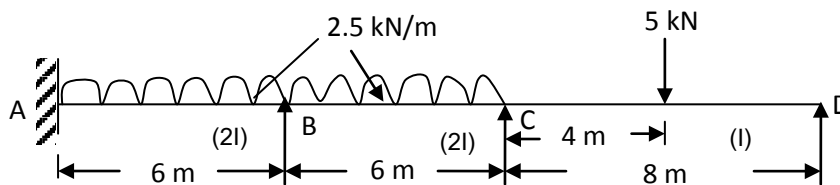
Max. Marks: 70

Answer any FIVE questions  
All questions carry equal marks

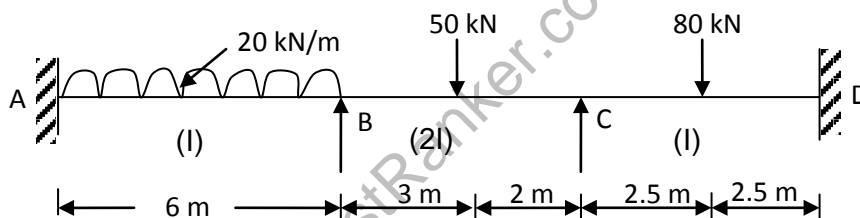
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- 1 A beam AB of uniform section and 8 m span built in at ends. A uniformly distributed load of 4 kN/m runs over left half of the span and concentrated load 10 kN at right quarter of the beam. Determine the fixing moments at the ends and reactions. Sketch the bending moment and shear force diagram.

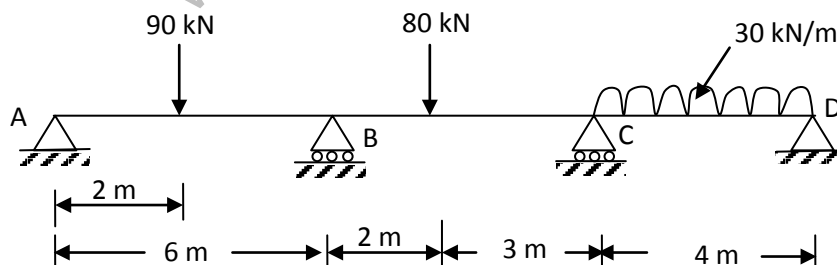
- 2 A continuous beam ABCD is loaded as shown in figure below. Find the fixed end moments by Claperon's theorem of three moments. Take  $E = 20 \text{ GPa}$  and  $I = 1500 \times 10^6 \text{ mm}^4$ .



- 3 A continuous beam ABCD is loaded as shown in figure below. Using slope deflection method, determine bending moments at supports and sketch the bending moment diagram.



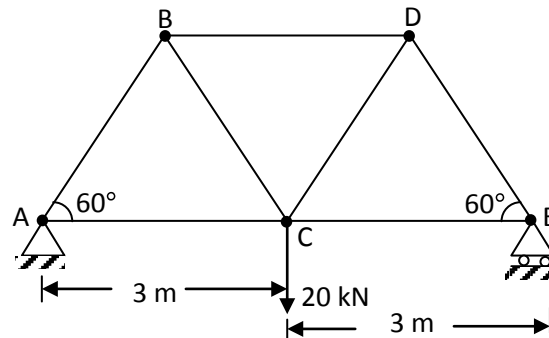
- 4 A continuous beam ABCD is loaded as shown in figure below. The support B sinks by 10 mm below the levels of A, C and D. Assume  $E = 200 \text{ GPa}$  and  $I = 32 \times 10^6 \text{ mm}^4$  for all the members. Use moment distribution method. Draw the bending moment diagram.



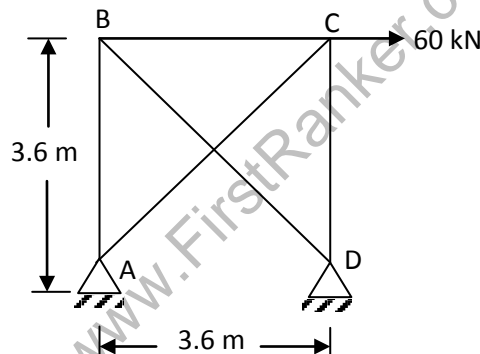
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- 5 A truss is loaded as shown in figure below. The area of all the members is  $500 \times 10^{-6} \text{ m}^2$  and  $E = 200 \text{ GPa}$ . Find the vertical and horizontal components of a joint D of the truss by energy method.



- 6 Four point loads 100 kN, 160 kN, 160 kN and 80 kN spaced 2 m between consecutive loads move on a girder of 30 m span, from left to right with 100 kN load leading. Determine the maximum bending moment at a point 12 m from left support. Also determine position and value of absolute maximum bending moment.
- 7 (a) A simply supported beam has a span of 24 m. A uniformly distributed load of intensity 20 kN/m of 6 m long cross the girder. Using influence line diagram find the maximum shear force at a section 9 m from left support.
- (b) Two wheel loads 20 kN and 8 kN at a fixed distance of 2 m, cross a beam of 10 m span. Draw influence line diagram for bending moment and shear force for a point 4 m left abutment. Find the maximum bending moment and shear force at that point.
- 8 Determine the forces in members of truss shown in figure below. AE is constant for all the members.



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