Code: 9A01403 R09

B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2015/2016

STRUCTURAL ANALYSIS - I

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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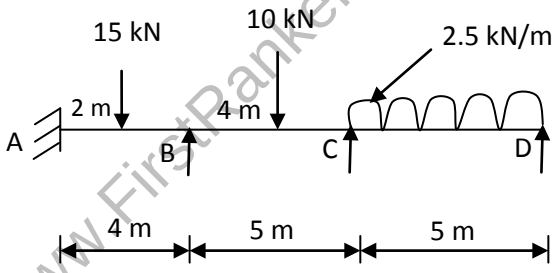
1 A beam AB of span 6 m is subjected to two point loads of 20 kN and 15 kN at distance of 2 m and 4 m from A. Calculate the fixing moments at A and B. Draw the bending moment and shear force diagram.

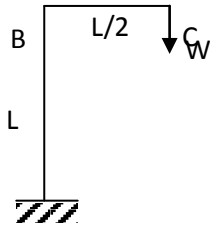
2 A beam of ABCD is continuous over three spans AB = 6 m, BC = 8 m and CD = 6 m. The beam AB and BC is subjected to uniformly distributed load of 2.0 kN/m, where as there is central point load of 10 kN in CD. The moment of inertia of AB and CD is 2I and that of BC is I. The ends A and D are fixed. During loading the support B sinks down by 10 mm. Find the fixed end moments using theorem of three moments. Take E = 200 Gpa and I = 600 x 10^6 mm^4.

3 A continuous beam ABCD over three spans AB = 7 m, BC = 4 m and CD = 6 m. The beam AB and BC is subjected to UDL of 1.5 kN/m, where as there is central load of 5 kN in CD. The end A and B is fixed at both ends. Analyze the structure by slope deflection method and draw the bending moment diagram.

4 A continuous beam ABCD is, simply supported at its ends and is propped at the same level B and C is shown in figure below. If the support B settles by 10 mm, analyze the beam by moment distribution method.



5 A rigid cantilever frame shown in the figure below carries a load of W at free end. Assuming a constant value of EI. Determine the vertical and horizontal displacement at free end C.



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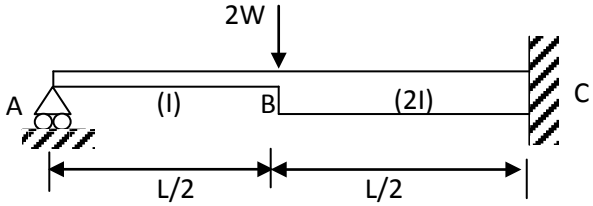
6 (a) A uniformly distributed load of 20 kN/m covering a length of 3 m crosses a girder of span 10 m. Find the maximum shear force and bending moment at a section 4 m from left hand support.

(b) Determine the maximum bending moment developed anywhere on the girder of span 15 m due to two rolling loads 150 kN and 100 kN spaced 4 m apart with the 100 kN load leading passing over the order. Find equivalent UDL to give same maximum bending moment.

7 (a) Three wheel loads 20, 80 and 80 kN, spaced 4 m apart from each other, with the 20 kN load in the lead, pass over a simply supported beam of span 20 m. Determine the maximum shear force and bending moment at a point 8 m from the left-hand support. Consider that the loading can move in either direction with the 20 kN load in the lead.

(b) A girder simply supported has a span of 26 m. A uniformly distributed load of intensity 20 kN/m and 5 m long cross the girder. Using ILD, find the maximum shear force at a section 9 m from left support.

8 Using Castiglione's second theorem, determine the prop reaction of the cantilever beam shown in figure below.



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