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B.Tech. 4th Semester (Civil) F-Scheme Examination,  
May-2018

STRUCTURAL ANALYSIS-II

Paper-CE-202F

Time allowed : 3 hours ] [ Maximum marks : 100

Note: Question No. 1 is compulsory. Students have to attempt five questions in total at least one question from each section. All questions carry equal marks.

1. (i) Kinematic Indeterminacies.
- (ii) Castigliano's theorems.
- (iii) Mention the causes for sway in portal frames.
- (iv) Find the horizontal reaction for uniformly loaded cable.
- (v) What is the effect of temperature rise on three hinge arch? 5×4=20

Section-A

2. Three wheel loads 60 kN, 40 kN and 50 kN spaced at 2 m and 20 m respectively roll on girder of span 20 m from the left to right with 60 kN load leading. Find the maximum bending moment and shear force that can occur at a section 8 m from the left support. 20

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3. Analyse the beam loaded as shown in Fig. 1.1. Using slope deflection method. The moments of inertia of the span section are  $1.5 I$  for AB and  $I$  for BC. Draw the bending moment and shear force diagram. 20

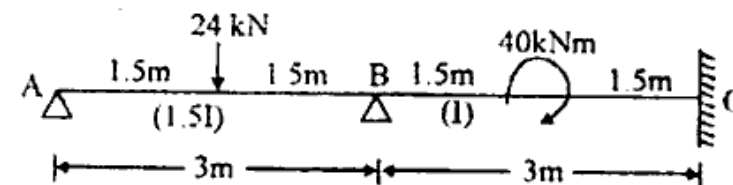


Fig.1.1

Section-B

4. A three-hinged parabolic arch of span 40 m and rise 10 m carries concentrated load 20 kN and 150 kN at distances 8 m and 16 m from the left end and a uniformly distributed load of 50 kN per m on the right half of the span. Find the horizontal thrust. Find also bending moment normal thrust and radial shear at a section 8 m from the left end. 20
5. Draw the bending moment and shearing force diagram for the beam as shown in Fig. 1.2. 20

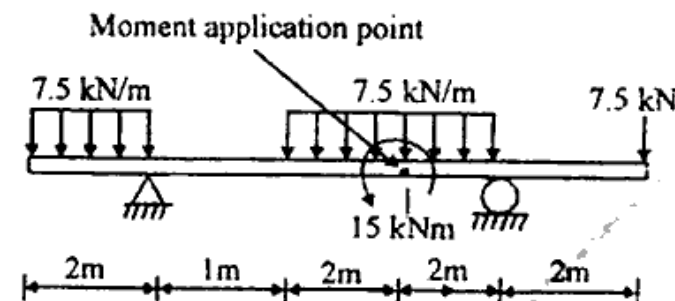


Fig. 1.2

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Section-C

6. A cable of span 120 m and dip 15 m is subjected to a rise in temperature of 25°C. If the co-efficient of thermal expansion of the cable material is  $12 \times 10^{-6}/^{\circ}\text{C}$ , determine the increase in the dip of the cable. What are the changes in reactions and maximum tension, if the cable carries a load of 28 kN/m ? 20
7. A beam of angle section 150 mm × 100 mm × 10 mm is simply supported over a span of 1.6 m with 150 mm leg vertical. A uniformly distributed vertical load of 10 kN/m is applied throughout the span. Determine :  
 (i) maximum bending stress  
 (ii) direction of neutral axis  
 (iii) Deflection at the centre. Take  $E = 210 \text{ GN/m}^2$  20

Section-D

8. Determine the forces in all the members of truss as shown in Fig 1.3 by method of section. 20

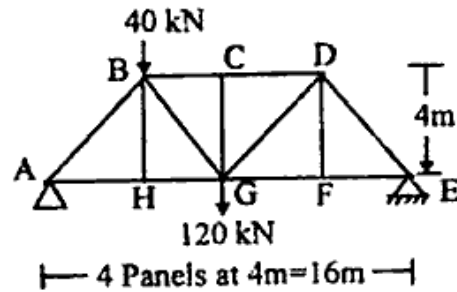


Fig. 1.3

9. Analyse the frame as shown in Fig. 1.4 using the method tension-coefficient. 20

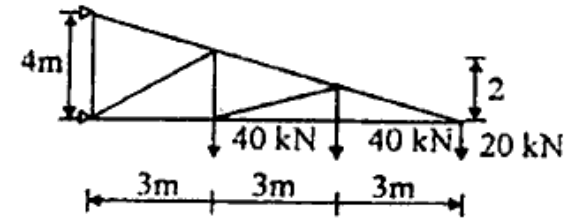


Fig. 1.4