Hall Ticket No | | | | | | | | | | | Question Paper Code: ACE008

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech V Semester End Examinations (Supplementary) - January, 2019

Regulation: IARE – R16

STRUCTURAL ANALYSIS

Time: 3 Hours **(CE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Explain briefly about truss, different types of trusses based on geometrical configuration and arrangements of bars with neat sketches. **[7M]**

   (b) Find the forces in the Pratt-truss loaded as shown in Figure 1 **[7M]**

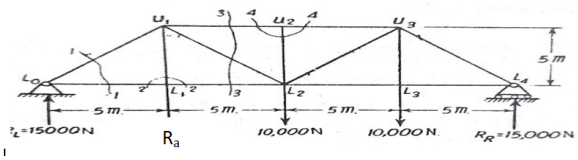

Figure 1

2. (a) Explain in detail about zero force members. What are the assumptions used to determine the bar force in truss? **[7M]**

   (b) Find the forces in all members of a truss as shown in Figure 2 **[7M]**

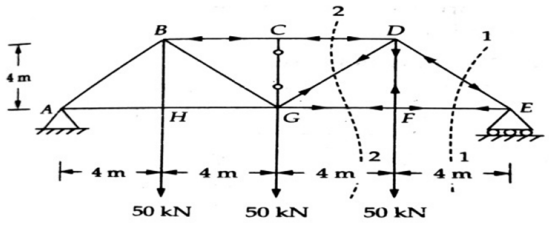

Figure 2

UNIT – II

3. (a) A uniformly distributed load of 40 kN/m covers left hand half of span of parabolic arch, span 36 m and central rise 8 m. Determine the position and magnitude of maximum bending moment. Also find shear and normal thrust at the section. Assume that moment of inertia at a section varies as secant of slope at the section. Neglect effect of rib shortening. **[7M]**

   (b) Write the expression for the horizontal thrust of a two-hinged arch under the effects of temperature, rib-shortening and support yielding? Explain the effects of each on the horizontal thrust. **[7M]**

4. (a) Define an arch. How an arch differs from beam. Explain briefly about three hinged arches and two hinged arches. **[7M]**

   (b) A three hinged parabolic arch 60m span has abutments at unequal level. The highest point of the arch is at 12m and 3m from two abutments as shown in Figure 3. Find the horizontal thrust and bending moment at D due to loading shown in Figure 3. **[7M]**

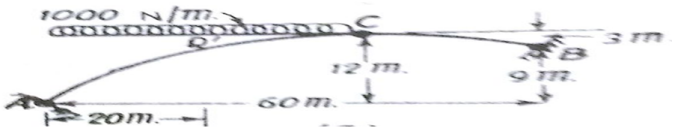

Figure 3

UNIT – III

5. (a) Analyse the propped cantilever shown in Figure 4 and draw the shear force and bending moment diagram. **[7M]**

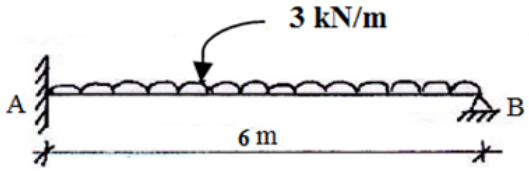

Figure 4

   (b) Analyse the fixed beam shown in Figure 5 and draw the shear force and bending moment diagrams. **[7M]**

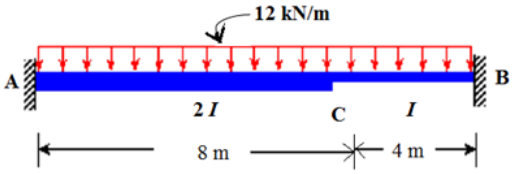

Figure 5

6. (a) State Clapeyron's theorem. Explain in detail Clapeyron's theorem of three moments. **[7M]**

(b) A continuous beam ABC of constant moment of inertia carries a load of 10000N in span AB and a central clockwise moment of 30000 N-m in span BC as shown in Figure 6. Span AB = 10m and Span BC = 10m. Find the support moment and plot S.F and B.M diagrams of the beam. **[7M]**

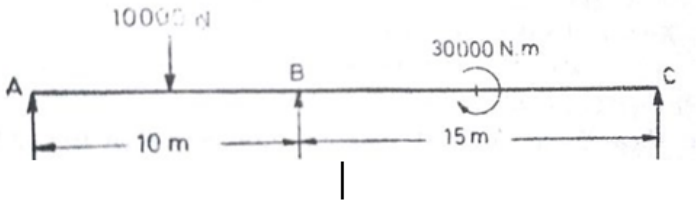

Figure 6

UNIT – IV

7. (a) Define continuous beam with neat sketch. What are the equilibrium equations for a continuous beam? **[7M]**

(b) Analyse the portal frame shown in Figure 7 by moment distribution method. **[7M]**

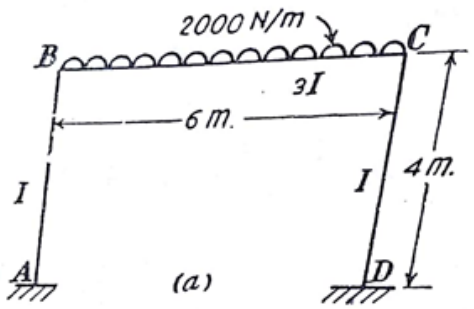

Figure 7

8. (a) Analyse the continuous beam ABCD shown in Figure 8 using moment distribution method and draw shear force, bending moment diagrams. Assume moment of inertia of the spans as 2IAB= IBC =2ICD. **[7M]**

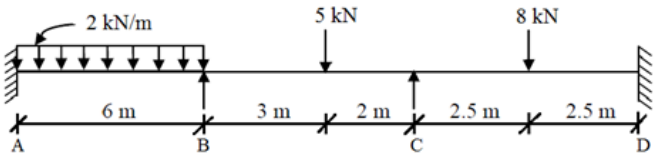

Figure 8

(b) Analyse the portal frame shown in Figure 9 using moment distribution method and draw the bending moment diagram and deflected shape of the frame. Take EI constant for all the members. **[7M]**

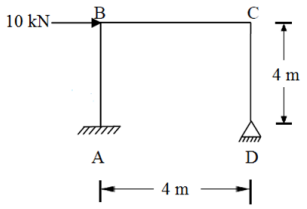

Figure 9

UNIT – V

9. (a) A single rolling load of 100 kN moves on a girder of span 20 m. Construct the influence lines for shear force and bending moment for a section 5 m from the left support. **[7M]**

(b) Draw the influence line diagram for shear force and bending moment for a section at 5 m from the left support of a simply supported beam, 20 long. Hence, calculate the maximum bending moment and shear force at the section, due to an uniformly distributed rolling load of intensity 10 kN/m for a length of 8 m. **[7M]**

10. (a) Define the term absolute maximum bending moment. How is the maximum bending moment determined in case of rolling loads? **[7M]**

(b) Two point loads of 6000N and 3000N spaced 4m apart cross a girder of 10m span from left to right, with smaller load leading as shown in the Figure 10. Construct the max shear force and bending moment diagrams. Find the position and amount of absolute maximum bending moment. **[7M]**

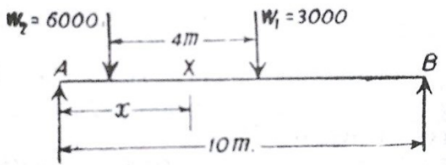

Figure 10

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