Hall Ticket Number:

Code No. : 31003

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (Civil Engg.) III Year I-Semester (Main) Examinations, Nov./Dec.-2016

Theory of Structures-I

Time: 3 hours Max. Marks: 70

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. What is the degree of freedom of a hinge if placed anywhere in a fixed beam?
2. Differentiate between absolute stiffness and relative stiffness.
3. Write the assumptions made the in slope deflection method.
4. In a continuous beam ABC, if the support C is simply supported, write the simplified slope-deflection equation for span BC with general notations.
5. Write the expression for displacement factor of a single bay single storey symmetrical portal frame with fixed ends.
6. What is the distinct advantage of Kani's method over Hardy Cross method of moment distribution?
7. When do we perform approximate analysis?
8. Define normal thrust and radial shear at any section of an arch.
9. Explain how the change in temperature is considered in the analysis of redundant pin jointed plane frames.
10. Explain the advantages of unit load method in structural analysis.

Part-B (5 × 10 = 50 Marks)

11. a) How is the internal and external static indeterminacy of a pin jointed plane frame is calculated. Explain with an example. [3]

    b) Analyse the beam shown in Fig.1 using moment distribution method and draw the bending moment diagram. [7]

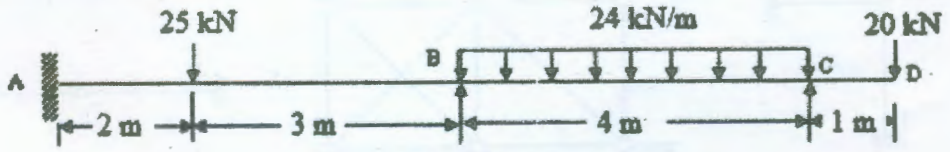

Figure 1

12. a) What are the limitations of the slope deflection method? [3]

    b) Analyse the frame shown in Fig. 2 using slope deflection method and draw the bending moment diagram. [7]

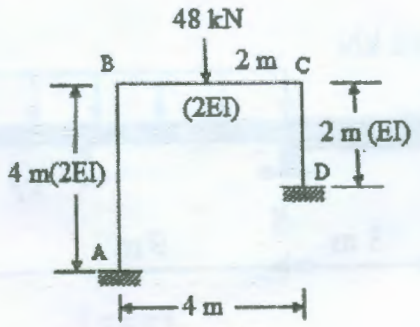

Figure 2

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13. a) Under what conditions the sway analyses of frames are performed? Explain with examples. [3]

b) A continuous beam ABCD is hinged at A and is on roller supports at B and C. CD is overhanging. Span AB = 4.0m, BC = 6.0m and CD = 1.5m. The span AB carries a point load of 32 kN at a distance of 1.0 m from support A. Span BC carries a uniformly distributed load of 10 kN/m over the entire span. On CD there is a point load of 25 kN at a distance of 1.0 m from C. Analyse the beam using Kani's method and draw the Bending moment diagram. Assume same EI for the entire beam. [7]

14. a) Write the assumptions made in Portal method of analysis of frames for lateral loads. [3]

b) A three hinged parabolic arch of span 50m and rise 5m carries a uniformly distributed load of 25 kN/m over the left half of the span and a point load of 40 kN at a distance of 10 m from the right support. Find the bending moment, normal thrust and radial shear at left quarter span point. Also draw the bending moment diagram. [7]

15. a) State and explain Castigliano's first theorem. [3]

b) Find the forces in the members of the truss shown in Fig. 3. Assume AE is same for all the members. [7]

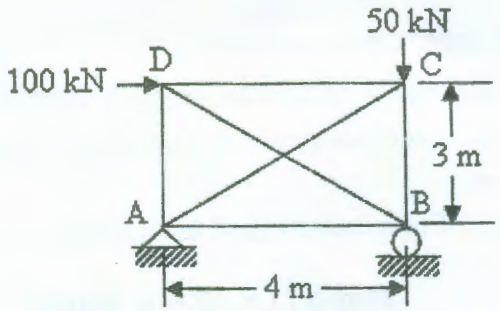

Figure 3

16. a) Determine the degree of redundancy and degree of freedom for the structures shown in Fig.4 [3]

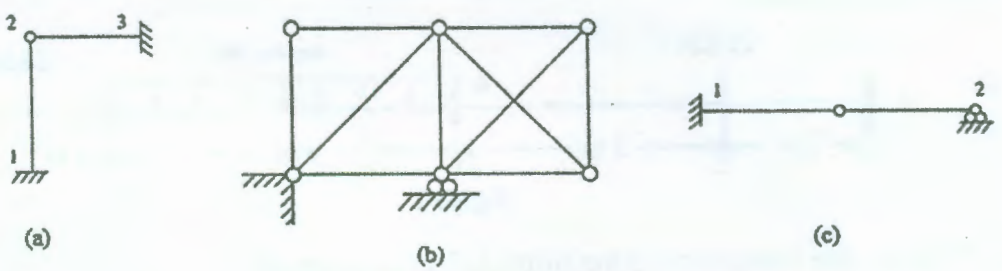

Figure 4

b) Analyse the beam shown in Fig. 5 by slope deflection method and draw bending moment diagram. [7]

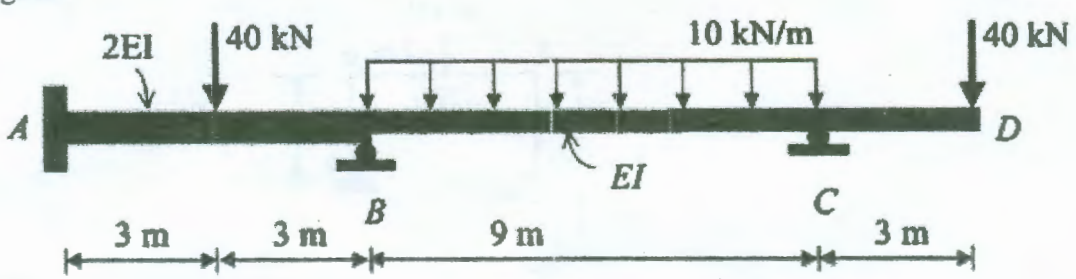

Figure 5

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17. Answer any ***two*** of the following:

a) For the frame shown in Fig.6, determine the rotation contribution and displacement factors. [5]

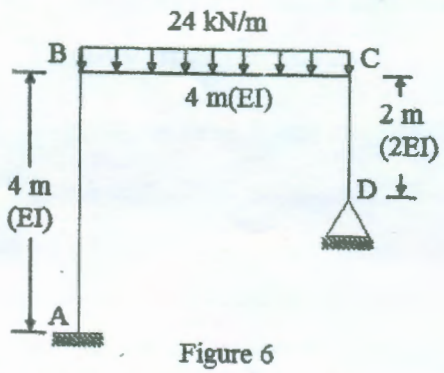

Figure 6

b) A two hinged parabolic arch has a span of 40 m. and central rise of 10 m. The moment of inertia at any section is equal to secant of moment of inertia at the crown. Determine the bending moment at the crown when arch carries a UDL of 30 KN/m over the central half of the span. [5]

c) A simply supported beam of span 10.0m carries a uniformly distributed load 20 kN/m over the left half of the span. Find the deflection at the centre of the span using Castigliano's theorem. Assume EI = 1000 kNm^2. [5]