Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER-VII- EXAMINATION –SUMMER-2014

Subject Code: 170605   **Date: 31-05-2014**
Subject Name: Advanced Structural Analysis
Time:02:30pm-05:00pm   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** What is non linearity? Explain Geometrical, Material and Loading non linearity giving appropriate examples.   **07**

   (b) Enlist various steps involved in solution of problem using Finite Element Method and Explain Discretization in details.   **07**

Q.2 **(a)** Determine the Shape functions for Constant Strain Triangle. Use natural Co-ordinate Systems.   **07**

   (b) Explain "Incremental Analysis with Iteration" technique.   **07**

   OR

   (b) Derive the relation for Action or Displacement vector on member axis and Structure axis for Plane frame   **07**

Q.3 Analyse the non prismatic fixed beam shown in **fig-1** by the Stiffness Matrix method using member approach. Find the force and displacement responses. Draw S.F and B.M diagrams. Take EI=80000kNm^2.   **14**

   OR

Q.3 Analyse the three span beam shown in **fig-2** by the Stiffness Matrix method using member approach. Draw B.M diagram. Assume constant flexural rigidity, EI. Use of Symmetry is permitted.   **14**

Q.4 **(a)** Analyse the three Bar Assembly shown in **fig-3** by the Stiffness Matrix method using member approach. Find the support reaction and bar forces. Take A=6cm^2 for each bar.   **07**

   (b) Derive the Shape functions for four Noded Quadrilateral elements.   **07**

   OR

Q.4 **(a)** Explain "Beam with Elastic Supports" in details   **04**

   (b) Analyse the truss shown in **fig-4** by the Stiffness Matrix method using member approach. find joint displacements, support reactions, bar forces and bar elongations. Take EA=6000kN for each bar   **10**

Q.5 **(a)** Analyse the truss shown in **fig-5** by Stiffness Matrix method using member approach. Find support reactions, bar forces. Take AE=60x10^{3}kN.Use of symmetry is permitted.   **07**

   (b) Analyse the frame shown in **fig-6** by Stiffness Matrix member approach. Draw free body diagram of frame, Take AE=8000kN,EI=20000kNm^2 **07**

   OR

Q.5 **(a)** Analyse the portal frame shown in **fig-7** by the Stiffness Matrix method using member approach. Consider the effect of indirect loading in the form of a settlement of 10mm at the support D. Take E=2.5x10^{4}N/mm^2 Find the complete force response and draw B.M diagrams.   **14**
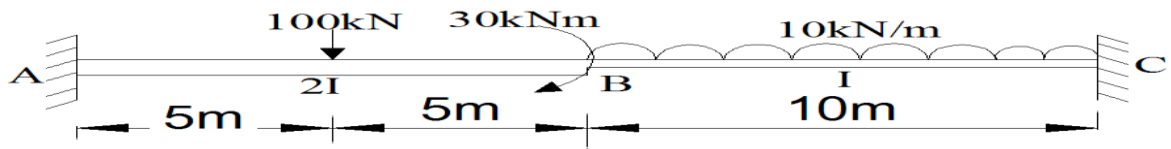
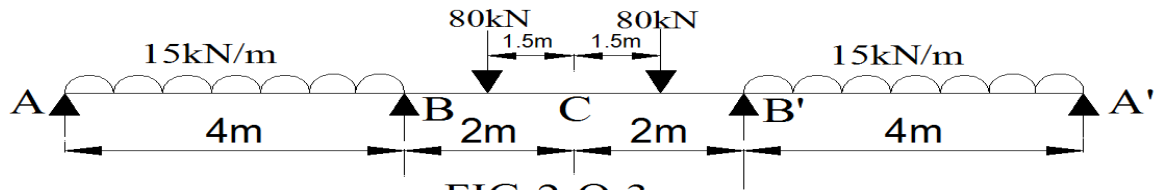*****************************

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FIG-1-Q-3

FIG-2-Q-3

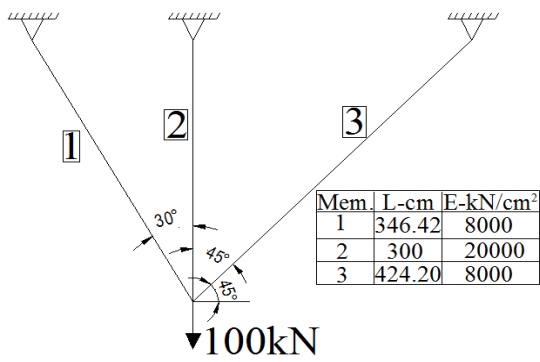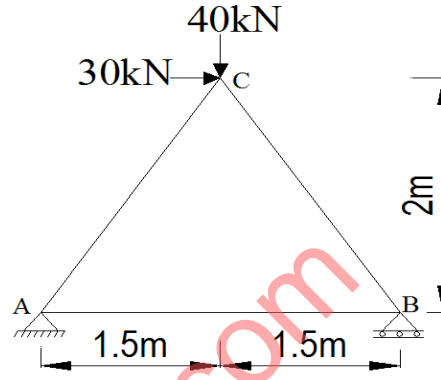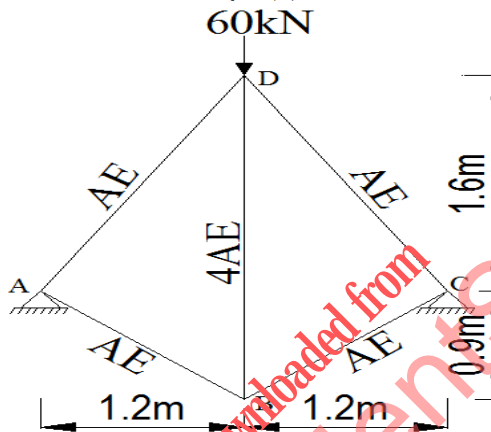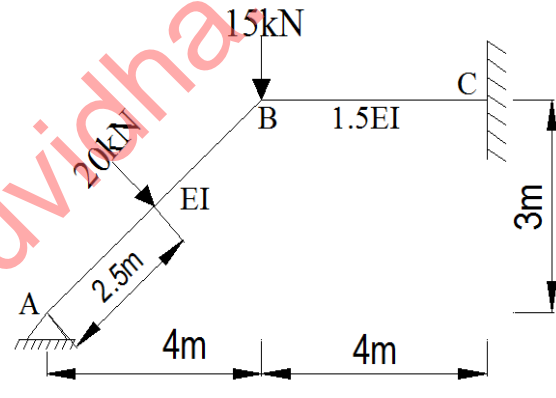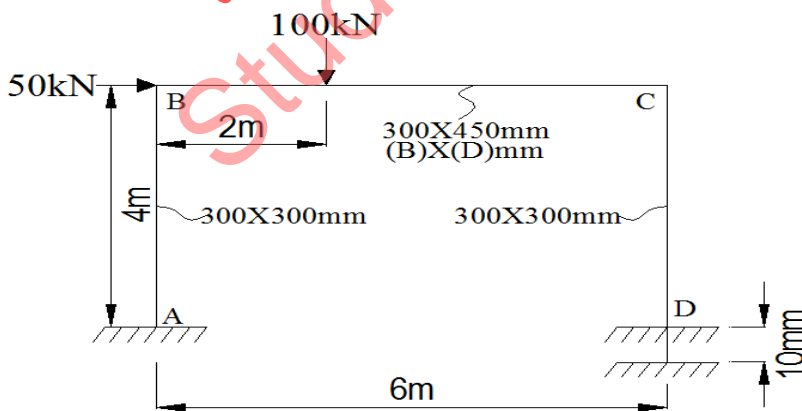| Mem.	L-cm	E-kN/cm²
1	346.42	8000
2	300	20000
3	424.20	8000

FIG-3-Q-4(a)

FIG-4-Q-4(b)

FIG-5-Q-5(a)

FIG-6-Q-5(b)

FIG-7-Q-5(a)

(PAGE 2 OF 2)

2