Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–VII • EXAMINATION – SUMMER • 2015

Subject code: X-70606 **Date: 14/05/2015**

Subject Name: Advanced Structural Analysis

Time:02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 Analyse the beam shown in **Figure-1** and draw SFD, BMD. Use Stiffness Member Approach. **14**

Q.2 **(a)** Explain use of Symmetry and Anti-symmetry in analysis of complex structures with suitable example. **07**

(b) Derive $[SMS] = [R_T]^T [SM] [R_T]$ for a plane truss member using usual notations. **07**

OR

(b) Explain any two different loading facilities in the professional software. **07**

Q.3 Analyse the plane truss shown in **Figure-2** using stiffness member approach. Calculate Member end actions. All members have same axial rigidity. **14**

OR

Q.3 Analyse the orthogonal Grid shown in **Figure-3** below and draw SFD, BMD and TMD. Use Stiffness Member Approach. AB=5m, BC=CD= 2m.
Consider GJ = 0.8EI for both members. **14**

Q.4 Analyse the Plane frame shown in **Figure-4** using Stiffness Member Approach. **14**

OR

Q.4 Analyse the composite structure shown in **Figure-5.** Calculate member end actions. **14**
ABC is a rectangular beam section of size 230 x 300 mm with E = 20000 N/mm^2
BD is a steel bar of diameter 25 mm with E = 2 x 10^5 N/mm^2.

Q.5 **(a)** Derive Stiffness Matrix for two noded bar element using finite element method. **07**

(b) Write basic steps of F.E.M. and explain any one in detail. **07**

OR

Q.5 **(a)** Derive Stiffness Matrix for two noded beam element using finite element method. **07**

(b) Derive shape function for Constant Strain Triangle using usual notations. **07**

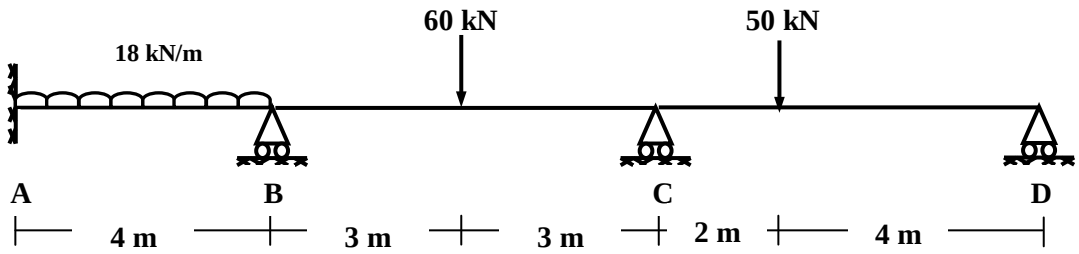

Fig. -1

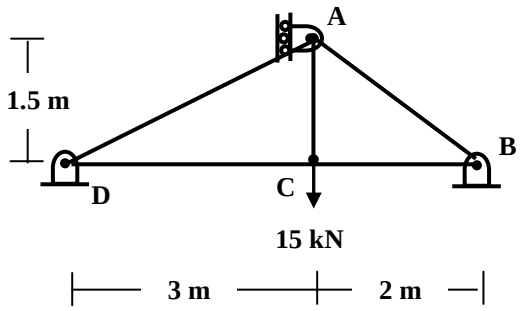

Fig. -2

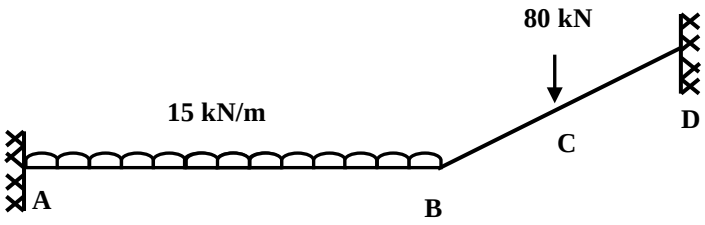

Fig. -3

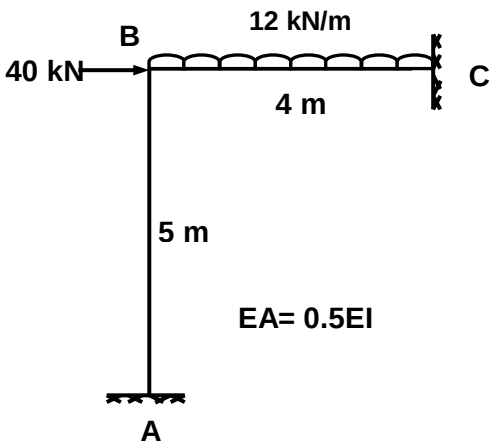

Fig. - 4

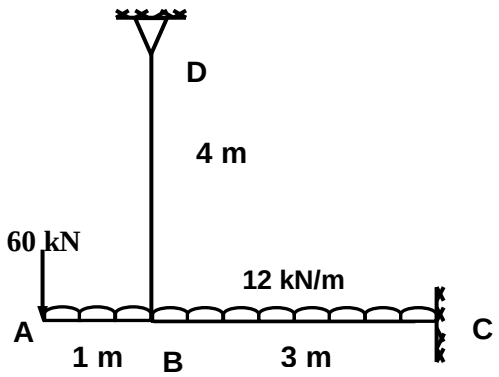

Fig-5