

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**PDDC - SEMESTER-VII • EXAMINATION – SUMMER 2013**

**Subject Code: X-70606**

**Date: 20-05-2013**

**Subject Name: Advanced Structural Analysis**

**Time: 10.30 pm - 01.00 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** (a) Derive Stiffness matrix for a beam with usual notations. **07**  
(b) Explain : [Sm], [RT], {AJ}, {AE}, [SFF], {AM}, [SRF] **07**
- Q.2** (a) Explain advantages of Finite Element Method in detail. **07**  
(b) Write basic steps of F.E.M. and explain any two in detail. **07**
- OR**
- (b) Explain any two different loading facilities in the professional software. **07**
- Q.3** (a) What are the advantages of Stiffness Member approach? Explain in detail. **04**  
(b) Analyse the beam as shown in **Figure-1** below and draw BMD. Use Stiffness Member Approach. **10**
- OR**
- Q.3** Analyse the beam as shown in **Figure-1** if Support B is sinking 10 mm in downward direction. Take  $E = 200 \text{ GPa}$  and  $I = 200 \times 10^6 \text{ mm}^4$ . **14**
- Q.4** (a) Derive Member stiffness Matrix for truss with usual notations. **04**  
(b) Analyse the plane truss as shown in **Figure-2** using stiffness member approach. Calculate Member end actions. **10**
- OR**
- Q.4** Analyse the Plane frame shown in **Figure-3** using Stiffness Member Approach. **14**
- Q.5** (a) Derive Stiffness Matrix for two noded bar element using finite element method. **07**  
(b) Explain convergence criteria in detail also explain need of convergence. **07**
- OR**
- Q.5** (a) Derive Stiffness Matrix for two noded beam element using finite element method. **07**  
(b) Explain convergence criteria in detail. **07**