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

Enrolment No.

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE-SEM-VII EXAMINATION Nov/Dec-2011** 

Date:29/11/2011

## Subject code: 170605 Subject Name: Advanced Structural Analysis (EP-I) Time:10.30 am-1.00 pm

## **Total Marks: 70**

07

- **Instructions**: 1. Attempt all questions.
  - Make suitable assumptions wherever necessary. 2.
  - Figures to the right indicate full marks. 3.
  - 4. Take  $E=2x10^8 \text{ kN/m}^2$ ,  $I=1.5x10^{-5} \text{ m}^4$ ,  $A=0.003 \text{ m}^2$ ,  $G=0.8x10^8 \text{ kN/m}^2$  and  $J=3.0 \times 10^{-5} \text{ m}^4 \text{ if not given.}$

#### Explain the concept of symmetry & antisymmetry giving appropriate examples. 07 Q-1 (a) Enlist different loading facilities available in the structural analysis professional 07 (b)software that you have learned. Explain any two loading facilities in detail.

- Q-2 (a) Explain the concept of rotation of axes and derive relation  $A_{M}=R_{T}A_{S}$ 07
  - Enlist steps involved in FEM analysis and explain any two in detail. 07 (b)

OR

- What is non linearity? Explain geometrical, material and loading non linearity (b) 07 giving appropriate examples.
- Q-3 Analyse the beam shown in fig.1 using stiffness member approach and plot SF & 14 BM diagrams. In addition to loading consider effect due to sinking of support at B by 5 mm.

### OR

- Analyse a truss show in fig.2.to find displacements and member end forces Q-3 14 using stiffness memoer approach and symmetry. The values in bracket shows cross sectional area of respective member.
- Analyse a plane rame as shown in the fig.3 using stiffness member approach and 14 Q-4 find displacements only.

OR

- Formulate rearranged SJ matrix for the grid shown in the fig.4. Q-4 (a)
  - Create an input file multiply. in to store elements of  $S_{FF}^{-1}$  matrix and load vector (b) 07  $A_{FC}$ . Write a C++ OOP program capable to read stored data from input file, carry out matrix multiplication using a separate function and to store results as  $D_F$ matrix.
- Write an input file using appropriate commands of a Professional Software you Q-5 (a) 04 have learned, that can handle modeling and analysis of the truss shown in the fig.2.
  - (b) For the column shown in the fig.5, determine nodal displacement and stress in 10 each element using finite element method.

OR

- Explain plane stress and plain stain problems giving example of real life structure. Q-5 (a) 04 Give the constitution relationship for both the cases.
  - Analyse the beam shown in the fig.6 to determine the slope at both the supports (b) 10 using FEM.

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