Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER • 2015

Subject Code:170605 **Date: 06/05/2015**

Subject Name: Advanced Structural Analysis (Department Elective – I)

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.**
4. **Take Modulus of elasticity = 200 GPa & Poisson's ratio = 0.25, unless given.**

Q.1 **(a)** What is descritization? Enlist and explain different factors to be considered for the proper descritization. **07**

(b) Explain the terms: Null Matrix, Band matrix and Transpose of a matrix **07**

Q.2 **(a)** Give the advantages and disadvantages of Finite Element Method over other methods. **07**

(b) What is non linearity? Explain geometrical, material and loading non linearity giving appropriate examples. **07**

OR

(b) Write a computer program on analysis of continuous beam using stiffness matrix method using C/C++. **07**

Q.3 Analyse the frame shown in the fig.1 using symmetry. Take I=4.5 x 10^4 m^4 and E= 200 kN/mm^2.Take over hangs of 2 m. **14**

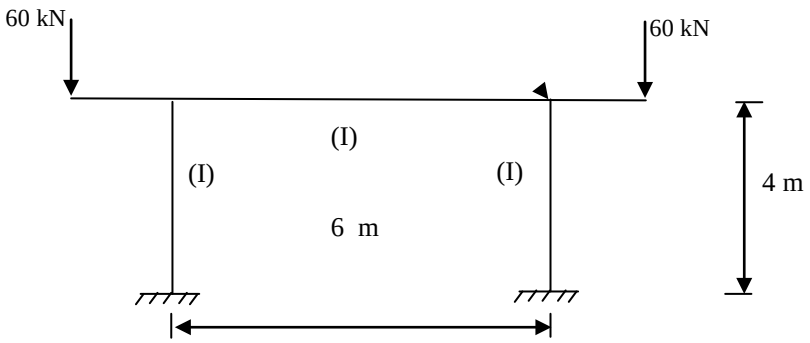

Fig.1

Neglect Axial Deformations

OR

Q.3 Analyse the beam shown in fig.2 using stiffness member approach and plot SF & BM diagrams. Take Young's Modulus E= 210 kN/mm^2 , Moment of InertiaI= 5.2 x 10^4 m^4 **14**

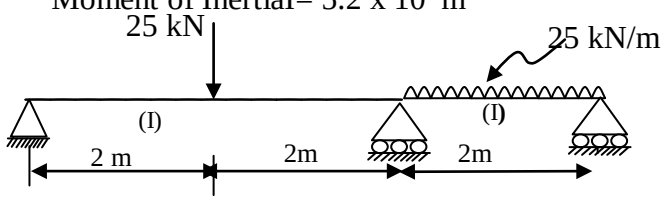

Fig.2

Q.4 **(a)** For a beam shown below, using finite element method, determine: **07**

1. Member end actions 2. Deflection under load.

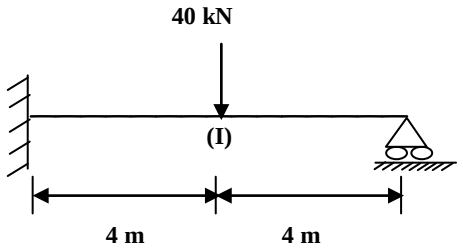

Fig 3

(b) Enlist the steps of FEM Analysis and Explain them. **07**

OR

Q.4 **(a)** Analyse the Bar shown in the fig.4considering 2-noded two elements and 3 noded one element .Compare the results. Bar is of uniform c/s A. **07**

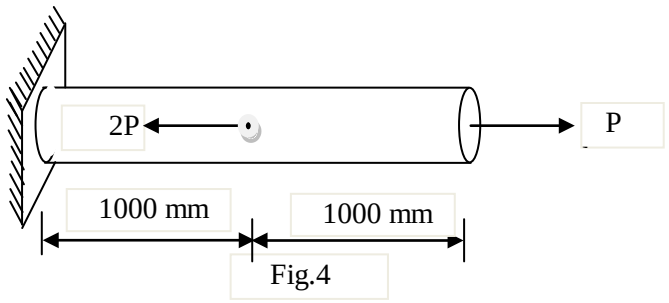

Fig.4

(b) Explain Pascal's triangle. **07**

Q.5 **(a)** Enlist different loading facilities available in the structural analysis professional software. Explain any two loading facilities in detail. **07**

(b) Enlist different pre and post processing facilities available in the structural analysis professional software. **07**

OR

Q.5 **(a)** Analyse plane truss as shown in fig.5 using member stiffness approach. Member BC is subjected to a temperature change of 50°C.Member AC is 3 mm too long before erection. The coefficient of thermal expansion (α) is 0.000012 /°C. Young's Modulus E= 200 Kn/mm^2 , Area (c/s) =1000 mm^2 **14**

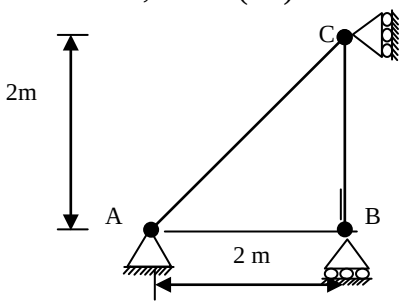

Fig 5

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