Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Civil Engineering) (2012 to 2017) (Sem.–7,8)

FINITE ELEMENT METHODS

Subject Code : BTCE-807

M.Code : 71866

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a. Draw a sketch of finite element discretization of a domain.

b. What are the disadvantages of finite element analysis?

c. Define weighted Residual Method.

d. What is meant by boundary condition?

e. Define dynamic analysis.

f. What is meant by discretization?

g. Evaluate the Integral $I = \int_{-1}^{1} \left(x^2 + \sin \frac{\pi x}{2} \right) dx$.

h. Differentiate between local and global coordinates.

i. Write short note on 1 point technique and 2 point technique.

j. What is meant by plane stress analysis?

SECTION-B

2. Derive mass matrices for 1 D Bar element and truss element.

3. Evaluate the following :

   a. $\int_{-1}^{+1} (4x + x^4)\, dx$ b. $\int_{-1}^{+1} (2 + 5x + 8x^3)\, dx$

4. Derive stress equilibrium conditions for structural element.

5. Briefly discuss the discretization process and types of elements used for discretization.

6. Define shape function. Derive shape function in terms of Cartesian coordinates.

SECTION-C

7. a. Describe the procedure involved in finite element method.

   b. Write the advantages, disadvantages and applications of FEM.

8. Calculate the stiffness matrix for the element shown in figure. Coordinates are given in mm. Assume plane stress conditions. Take E = 2.1×10^5 N/mm^2, v = 0.25, t = 10mm.

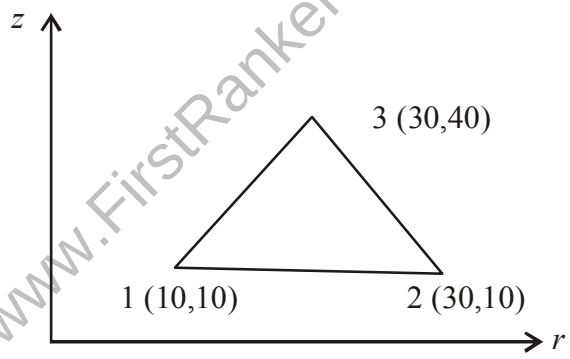

FIG.1

9. Write a short note on the following :

   a. Variational approach

   b. Weighted residual method

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.