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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Civil Engineering) (2011 Onwards E-I & II) (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. Briefly explain the following :**

- a. How will you define the degrees of freedom for various elements?
- b. Draw a neat sketch of discretization of a continuum.
- c. What is the principle of virtual work?
- d. Define boundary conditions.
- e. Define dynamic analysis.
- f. What do you mean by discretization?
- g. Evaluate the Integral
- h. What are the locations at which nodes can be positioned during discretization?
- i. Define galerkin's finite element method.
- j. Write the hermite shape functions for beam element.

## SECTION-B

2. Derive the strain displacement relation for a 2 dimensional element.
3. Briefly discuss elimination approach to handle boundary conditions for solution of system of equation.
4. Derive an expression for stiffness matrix for 2 dimensional truss elements.
5. Derive the shape function for 4 noded (2-dimensional) quadrilateral element.
6. Explain in detail the applications of Isoparametric elements in two and three dimensional stress analysis.

## SECTION-C

7. A cantilever beam of span 'L' is subjected to a point load at free end. Derive an equation for the deflection at free end by using Rayleigh Ritz method. Assume polynomial displacement function.
8. Evaluate :  
Using one point and two point Gauss quadrature.
9. Derive element conductivity matrix for one dimensional heat flow element.