Total No. of Questions : 6]

SEAT No. :

P4188

[Total No. of Pages : 2

[4960]-46

M.E. (Civil Structures)

FINITE ELEMENT METHOD

(2008 Pattern) (Semester - II)

Time : 4 Hour] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any two questions from each section.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of non programmable calculator is allowed.***
6) ***Assume suitable data, if necessary***

SECTION - I

Q1) a) Using potential energy approach derive stiffness matrix for a beam element. **[10]**

b) A bar element, with axial displacement 'x' as degree of freedom at end nodes, derive [K] for element using Polynomial displacement function. **[10]**

c) Explain variational methods and their applications in finite element analysis. **[5]**

Q2) a) Determine the shape function for the Linear Strain Triangular (LST) element. Use polynomial functions. **[16]**

b) Explain with suitable examples compatible and completeness requirements of displacement functions. **[9]**

Q3) a) Using serendipity concept find shape functions for a 8 noded quadratic seredipity family element. **[10]**

b) What is derivative transformation? How is it carried out with the help of a Jacobian? Where is such a transformation required in FEM? **[15]**

P.T.O.

SECTION - II

Q4) a) Explain strain-displacement and stress-strain relationships for triangular problem. Hence, derive necessary matrices for formulation of stiffness matrix of triangular axisymmetric element. **[18]**

b) Explain the method of finding shape function for a hexahedral element using natural coordinates. **[7]**

Q5) a) Explain Midlin's theory of plate bending? **[7]**

b) Write displacement functions for both ACM and BFS elements. Verify conformity of both the elements. **[18]**

Q6) a) Explain the concept of degenerated solid elements by suitable examples. **[10]**

b) Explain membrane and bending actions in shell elements. How these two states of stresses are considered in formulating [K] for shell element.**[15]**