Total No. of Questions : 8]

SEAT No. :

P4416

[Total No. of Pages : 2

[4860] - 1032
M.E. (Civil - Structures)
FINITE ELEMENT ANALYSIS
(2013 Credit Course) (Semester - II)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five questions from eight questions.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non-programmable calculator.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain principle of minimum potential energy. **[5]**

b) Explain physical significance of variational approach for analysis of beam. **[5]**

Q2) a) Explain the displacement model for 2D rectangular element using polynomial function. **[6]**

b) Explain use of pascals triangle in formulation of polynomial function. **[4]**

Q3) a) Explain & Derive stiffness vector for Constant strain triangle (CST). **[5]**

b) Write the convergence requirement regarding selection of element. **[5]**

Q4) a) Derive shape function using natural coordinates for one dimensional bar element. **[4]**

b) Derive stiffness matrix for truss element. **[6]**

Q5) A truss as shown in figure 1, is loaded at point C, with 20 kN force. The members AC, AB, CB are made of steel are of same cross-section. Write the global stiffness matrix for the truss. Hence write the Force displacement matrix. **[10]**

P.T.O.

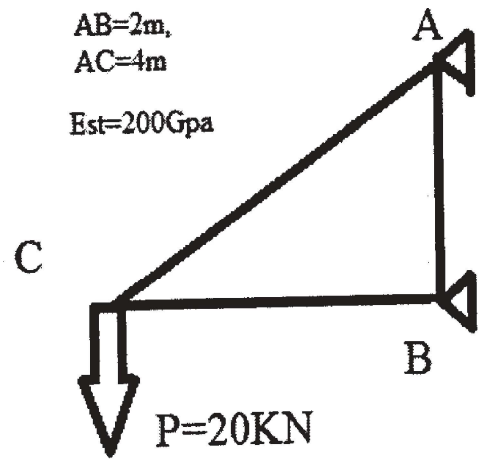

Fig 1

Q6) a) Explain Iso parametric elements. **[4]**

b) Explain ACM plate bending element. **[6]**

Q7) a) Sketch various 2D and 3D isoparametric elements, state its application with suitable engineering example. **[6]**

b) Draw elements for cylindrical shell with all structural details. **[4]**

Q8) a) Explain shape function for geometry for a typical curved shell element. **[5]**

b) Write the strain Displacement Matrix for the curved shell element. **[5]**