CBCS SCHEME

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USN | | | | | | | | | | |

15CV664

Sixth Semester B.E. Degree Examination, June/July 2018
Finite Element Method

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain plane stress and plane strain problems with example. Also give constitutive laws for these cases. **(08 Marks)**

b. Mention the advantages and disadvantages of finite element method. **(08 Marks)**

OR

2 a. Explain the basic steps involved in the finite element method **(08 Marks)**

b. Write a short note on the following :
i) Principle of minimum potential energy
ii) Rayleigh–Ritz method. **(08 Marks)**

Module-2

3 a. Explain the following terms :
i) Natural co-ordinate
ii) Local co-ordinates
iii) Global co-ordinate
iv) Element aspect ratio. **(08 Marks)**

b. Discuss the convergence and compatibility requirements for a good displacement function FEM. **(08 Marks)**

OR

4 a. List the finite element shapes used to descritise one, two and three dimensional structures. **(06 Marks)**

b. Using Lagrangian method, obtain the shape function for :
i) 3 – noded bar element
ii) 5 – noded bar element. **(10 Marks)**

Module-3

5 a. Determine the shape function for a constant strain triangular [CST] element using natural co-ordinates. **(10 Marks)**

b. Using "Serendipity Concept", generate the shape functions for 4 noded rectangular element as shown in Fig.Q5(b). **(06 Marks)**

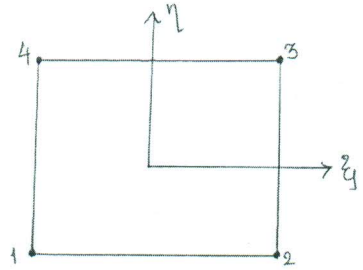

Fig.Q5(b)

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OR

6 For given truss in Fig.Q6, determine nodal displacement and stress in each element. Take modulus of elasticity as 200GPa. Area of members AC = CB = 2000mm^2. AB = 1500mm^2. **(16 Marks)**

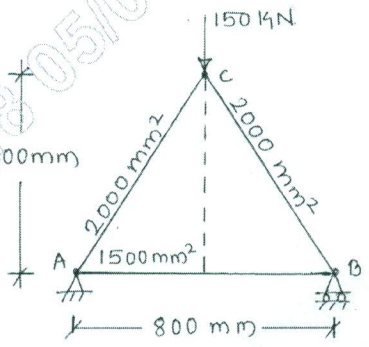

Fig.Q6

Module-4

7 a. Explain isoparametric, super parametric and subparametric elements with neat sketches. **(09 Marks)**

b. Obtain consistant nodal vector due to the loads acting on the beam as shown in Fig.Q7(b). **(07 Marks)**

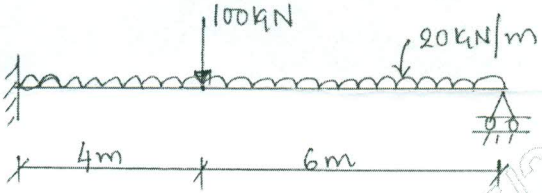

Fig.Q7(b)

OR

8 Evaluate the Jacobian matrix for the elements shown in Fig.Q8(i) and Q8(ii). **(16 Marks)**

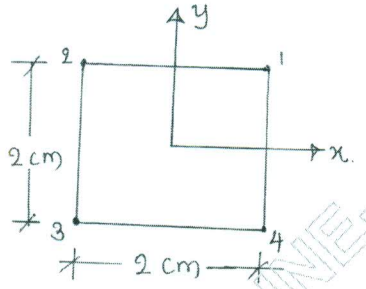

Fig.Q8(i)

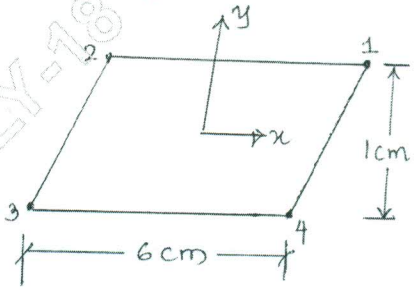

Fig.Q8(ii)

Module-5

9 a. Explain the structure of computer program for FEM analysis. **(08 Marks)**

b. Explain material and geometric non – linearities. **(08 Marks)**

OR

10 a. List the desirable features of FEM packages. **(10 Marks)**

b. Write a brief note on pre and post processing. **(06 Marks)**

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