Q.P.Code: 16CE2012 **R16**

Reg. No. | | | | | | | | | | |

SIDDHARTHE INSTITUTE OF ENGINEERING & TECHNOLOGY : PUTTUR
(AUTONOMOUS)
M.Tech. I Year II Semester (R16) Regular Examinations, May/June 2017
FINITE ELEMENT METHODS
(Structural Engineering)
(For Students admitted in 2016 only)

Time: 3 hours **Max. Marks: 60**

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

1. (a) Write and explain the basic steps involved in Finite Element Method. (6M)
   (b) Explain the strain –displacement relations and write them in matrix form. (6M)

OR

2.A beam AB of span 'L' simply supported at ends and carrying a concentrated load P at the centre 'C'. Determine the deflection of mid-point by using Rayleigh-Ritz method and compare with exact solution. (12M)

UNIT-II

3. Derive the shape function for a quadratic one dimensional line element in natural co-ordinate system. (12M)

OR

4. Analyze the given structure in figure.1 using finite element concept. Take E=200µpa

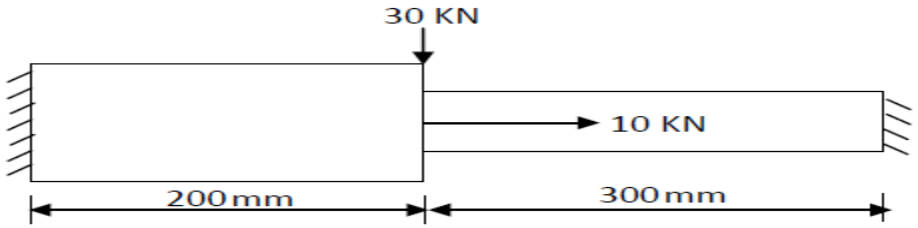

Fig.1

Take moment of inertia as 12 x 10^4 mm^4 and cross sectional area as 1000mm^2. (12M)

UNIT-III

5. (a) Derive the stiffness matrix for 3-noded triangular element (CST element). (6M)
   (b) Derive the expression for consistent load vector due to self weight in 'CST' element. (6M)

OR

6. Calculate the stiffness matrix for the elements shown in figure2

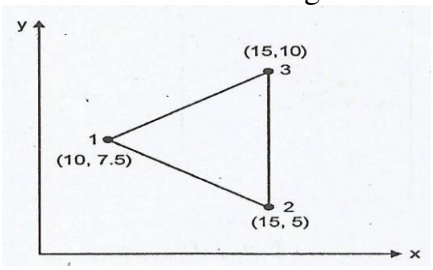

Fig.2

The Co-ordinates are given in units of mm. Assume plane stress conditions. Take E=2.1 x 10^5 N/mm^2, μ=0.25, t=10mm. (12M)

UNIT-IV

7. (a) Define Lagrangian and Serendipity elements with example. (6M)
   (b) State the basic theorems of isoparametric concept. (6M)

OR

8. Derive an expression for 4 - noded isoparametric axisymmetric element. (12M)

UNIT-V

9. Write a brief note on hexahedral solid element with the help of neat sketch. (12M)

OR

10. Explain the term Mindlin's C^0- continuity plate element and briefly explain stiffness matrix formulation for such elements. (12M)

*****END*****