R16

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech IV Year I Semester Supplementary Examinations Nov 2020
FINITE ELEMENT METHODS IN CIVIL ENGINEERING
(CIVIL ENGINEERING)

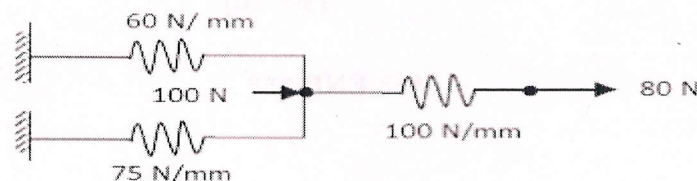Time: 3 hours   Max. Marks: 60

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

UNIT-I

1 Using Rayleigh – Ritz method determine the expression for maximum displacement, when the Simply supported beam subjected to udl load entire span. Also, compare it with the standard expression.   **12M**

OR

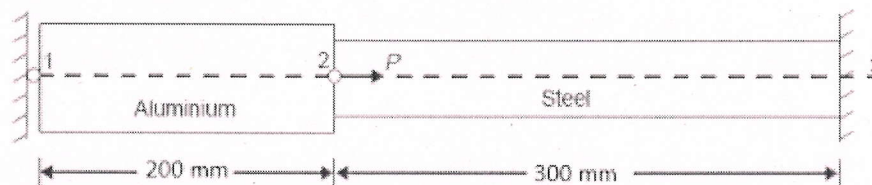2 Determine the displacements of nodes of the spring system shown in figure below.   **12M**

UNIT-II

3 An axial load 4×10^5 N is applied to a bar at node 2, Determine the nodal displacements, stresses in each material and support reactions   **12M**

   A1 = 1000 mm^2 A2 = 1500 mm^2
   L1 = 200 mm L2 = 300 mm
   E1 = 0.7×10^5 N/mm^2 E2 = 2×10^5 N/mm^2

OR

4 a Explain the following: **7M**
      Isopar ametric element, sub-parametric element and super parametric element.
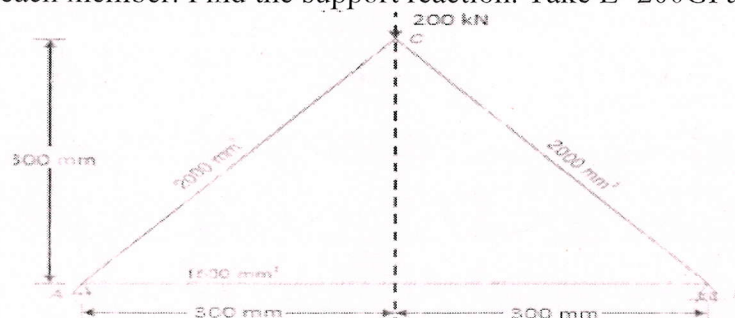   b Geometric invariance   **5M**

UNIT-III

5 Derive element stiffness matrix for a CST element.   **12M**

OR

6 Explain in details convergent and compatibility requirements in FEM.   **12M**

UNIT-IV

7 For the three bar truss element as show in figure. Determine the nodal displacements and the stresses in each member. Find the support reaction. Take E=200GPa.   **12M**
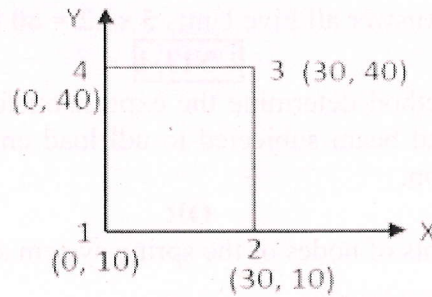
OR

8   a   Explain the plane stress condition.   **6M**

     b   In a plane strain condition ζx = 150MPa, ζy= 100MPa, E=2X105 MPa and poissons   **6M**

       ratio µ =0.25.Find the values of ζz, εx, εy

UNIT-V

9   Derive the Jacobian matrix for 4-noded Iso-parametric axi-symmetric element.   **12M**

OR

10   For the element shown in figure below, assemble Jacobian matrix for the point   **12M**
     (0.57735, 0.57735).

*** END ***