Q.P. Code: 20CE1005 **R20**

**Reg. No:** | | | | | | | | | | |

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**

(AUTONOMOUS)

**M.Tech I Year II Semester Regular Examinations November-2021**

**FEM IN STRUCTURAL ENGINEERING**

(Structural Engineering)

Time: 3 hours Max. Marks: 60

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

**UNIT-I**

| | | | | |
|---|---|---|---|---|
| 1 | **a** | What are the merits, demerits and limitations of Finite Element Methods? | **L1** | **6M** |
| | **b** | Explain in detail finite element method procedure with an example. | **L2** | **6M** |

**OR**

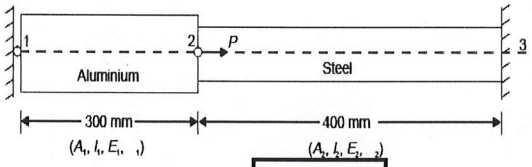
| | | | | |
|---|---|---|---|---|
| 2 | | Using Rayleigh – Ritz method determine the expression for maximum displacement, when The cantilever beam subjected to point W,KN at the free end. Also, compare it with the standard expression. | **L3** | **12M** |

**UNIT-II**

| | | | | |
|---|---|---|---|---|
| 3 | | Briefly explain shape function and derive shape function for 1D – two noded line element. | **L2** | **12M** |

**OR**

| | | | | |
|---|---|---|---|---|
| 4 | | Determine the nodal displacements at node 2, stresses in each material and element stiffness matrix for each element as shown in Fig., due to applied force P = 400 × 103N. A1 = 2400 mm2 & A2 = 1200 mm2 L1 = 300 mm & L2 = 400 mm E1 = 0.7 × 105 N/mm2 & E2 = 2 × 105 N/mm2 | **L3** | **12M** |




**UNIT-III**

| | | | | |
|---|---|---|---|---|
| 5 | | Derive shape functions for four noded rectangular elements. Use natural co-ordinate system. | **L3** | **12M** |

**OR**

| | | | | |
|---|---|---|---|---|
| 6 | | Derive the strain-displacement matrix for CST element. | **L1** | **12M** |

**UNIT-IV**

| | | | | |
|---|---|---|---|---|
| 7 | | Derive the strain-displacement matrix for 4-Noded isoparametric quadrilateral element. | **L2** | **12M** |

**OR**

| | | | | |
|---|---|---|---|---|
| 8 | | Derive the shape function for 4-Noded isoparametric quadrilateral element. | **L2** | **12M** |

**UNIT-V**

| | | | | |
|---|---|---|---|---|
| 9 | | Explain the basic theory of plate bending. | **L1** | **12M** |

**OR**

| | | | | |
|---|---|---|---|---|
| 10 | | Explain the basic relationships in plate bending theory. | **L2** | **12M** |

*** END ***