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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)**B.Tech IV Year I Semester Regular Examinations February-2022**
FINITE ELEMENTS METHODS

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

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|---|--|----|----|
| 1 | a Define Finite element method in Engineering. | L1 | 2M |
| | b Write the expression for element stiffness matrix of a beam. | L1 | 2M |
| | c Define shape function. | L1 | 2M |
| | d Write short notes on generation of stiffness matrix. | L1 | 2M |
| | e Define iso-parametric elements. | L1 | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

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| 2 | What are the advantages, disadvantages and applications of FEM | L1 | 10M |
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OR

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| 3 | Derive strain -displacement relationship in matrix form | L2 | 10M |
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UNIT-II

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| 4 | Define 2-D elements and explain the Iso Parametric element, sub-parametric element and super parametric elements in FEM. | L1 | 10M |
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| 5 | Determine the shape functions N_1, N_2, N_3 at interior point 'p' for triangular element with local coordinates $P(3, 1.5)$ and global coordinates $(1, 3), (3, 4)$ and $(4, 6)$. | L2 | 10M |
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UNIT-III

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| 6 | Derive the shape functions for 1-D three noded bar element. | L2 | 10M |
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| 7 | Differentiate between CST and LST elements. | L2 | 10M |
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UNIT-IV

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| 8 | Determine the shape function for the rectangular element which has local coordinates $\xi=0.4$ and $\eta=0.2$. The Global co-ordinates are $(2, 2), (3, 4), (8, 6)$ and $(4, 5)$. All dimensions are in mm. | L2 | 10M |
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| 9 | For a given triangular element with nodes of coordinates $A(2, 3), B(5, 2), C(3, 4)$. the interior point in a triangle is $P(4, 5)$. Calculate shape functions N_1, N_2, N_3 . | L2 | 10M |
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UNIT-V

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| 10 | Derive the expression for Iso-parametric formulation for CST element. | L2 | 10M |
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OR

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| 11 | Derive the shape function for 4-noded Iso-parametric quadrilateral element. | L2 | 10M |
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END