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**E Reg. No. :**

**Question Paper Code: 51P12**

M.E. DEGREE EXAMINATION, NOV 2017

First Semester

CAD / CAM

15PCD102 - ADVANCED FINITE ELEMENT ANALYSIS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

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| 1. | (a) | Explain the step by step procedure of FEA.  | CO1- U | (20) |
|  |  | Or |  |  |
|  | (b) | Find the approximate deflection of a simply supported beam under a uniformly distributed load ‘P’ throughout its span. By applying Galerking and Least Square Residual Method. | CO1- U | (20) |
|  |  |  |  |  |
| 2. | (a) | Consider the bar shown in figure axial force P = 30KN is applied as shown. Determine the nodal displacement, stresses in each element and reaction forces. | CO2 -App | (20) |
|  |  | Or |  |  |
|  | (b) | Calculate the displacements and slopes at the nodes for the beam shown in figure. Find the moment at the midpoint of element 1.  | CO2- App | (20) |
|  |  |  |  |  |
| 3. | (a) | Develop the element strain displacement matrix and element stiffness matrix of a CST element  | CO3-Ana | (20) |
|  |  | Or |  |  |
|  | (b) | Develop the shape function derivation for a two-dimensional quadratic element. | CO3- Ana | (20) |
|  |  |  |  |  |
| 4. | (a) | Derive the stiffness matrix and load vectors for fluid mechanics in two dimensional finite element. | CO4- App | (20) |
|  |  | Or |  |  |
|  | (b) | Derive the shape function for fluid mechanics in two dimensional finite elements. | CO4- App | (20) |
|  |  |  |  |  |
| 5. | (a) | Explain the term degenerate element. | CO5- U | (20) |
|  |  | Or |  |  |
|  | (b) | Write a finite element code in the programming language of your choice to find out the circumference of a circle.  | CO5- U | (20) |
|  |  |  |  |  |