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

Question Paper Code: 51P02

M.E. DEGREE EXAMINATION, APRIL 2019

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)

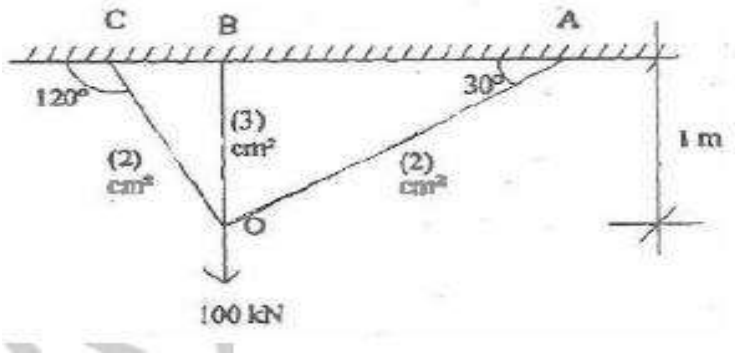
1. (a) Determine the expression for deflection and bending moment in a simply supported beam subjected to uniformly distributed load over entire span. Find the deflection and moment at mid span and compare with exact solution Rayleigh-Ritz method. Use CO1- App (20)

$$y = a_1 \sin\left(\frac{\pi x}{l}\right) + a_2 \sin\left(\frac{3\pi x}{l}\right)$$

Or

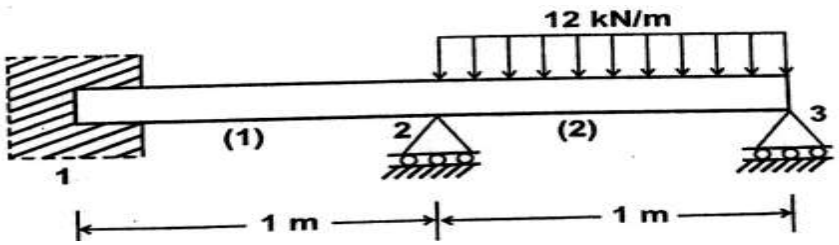
(b) A simply supported beam carries uniformly distributed load over the entire span. Calculate the bending moment and deflection. Assume EI is constant and compare the results with other solution. CO1- App (20)

2. (a) Calculate the force in the members of the truss as shown in fig. Take E=200 GPa CO2 -App (20)



Or

(b) For the beam and loading as shown in figure. Calculate the slopes at nodes 2 and 3 and the vertical deflection at the mid-point of the distributed load. Take E=200 GPa and I=4x10-6 m^4 — CO2- App — (20)



3. (a) Develop Strain-Displacement matrix for axisymmetric triangular element. — CO3-App — (20)

Or

(b) Develop shape function for axisymmetric triangular elements . — CO3-App — (20)

4. (a) Write the mathematical formulation for a steady state heat transfer conduction problem and derive the stiffness and force matrices for the same. — CO4- App — (20)

Or

(b) A furnace wall is made up of three layers, inside layer with thermal conductivity 8.5 W/mK, the middle layer with conductivity 0.25 W/mK, the outer layer with conductivity 0.08 W/mK. The respective thicknesses of the inner, middle and outer layer are 25 cm, 5 cm and 3 cm respectively. The inside temperature of the wall is 600 and outside of the wall is exposed to atmospheric air at 30 with heat transfer coefficient of 45 W/m2K. Determine the nodal temperatures. — CO4- App — (20)

5. (a) How to do volume meshing in finite element analysis? Explain in details. — CO5- U — (20)

Or

(b) How to extract the result from ANSYS software with post processing explains in details. — CO5- U — (20)
