M.Tech-I Semester (SE)

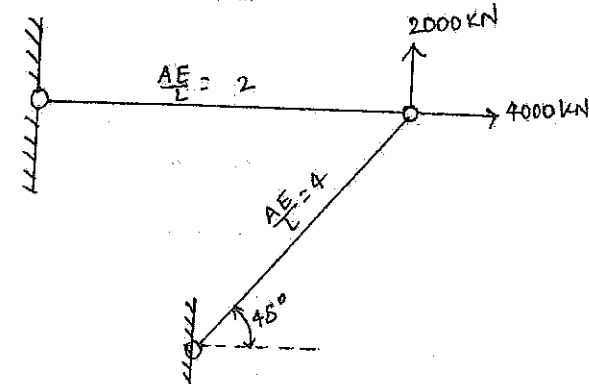COURSE CODE (CREDITS): 13M1WCE131 (3)

COURSE NAME: FINITE ELEMENT METHODS

COURSE INSTRUCTORS: DR. SAURAV

MAX. MARKS: 35

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

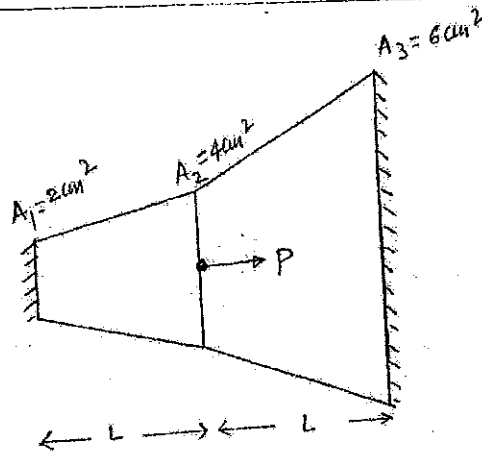| Q.No	Question	CO	Marks
Q1	Deduce an equation to evaluate direct stiffness matrix of a two noded truss member having an angle θ with the horizontal. Find the member forces of the truss as shown in **Fig. 1** by direct stiffness method. $\dfrac{AE}{L}$ Values are indicated besides the member. **Fig. 1**	CO-4	7
Q2	Find direct stiffness matrix and compute the stresses at the various salient points of the system as shown in the **Fig. 2** discretizing the systems into 4 elements. $A_1= 2$ cm^2, $A_2= 4$ cm^2 and $A_3= 6$ cm^2. L= 1 units and E= 1 units. P= 1000 kN	CO-4	7

Fig. 2

Q3.	Determine the shape function for constant strain triangle (CST) using polynomial functions	CO-3	7
Q4.	Explain the following terms clearly i) Nodes, primary nodes, secondary nodes and internal nodes ii) Local coordinates, global coordinates, natural coordinates and area coordinates. iii) Higher order elements and lower order elements. iv) Linear strain triangle (LST) v) Serendipity family members	CO-3	7
Q5.	Compute the value of the central deflection for the simply supported beam subjected to point load P considering the first term of the trigonometric series using Rayleigh Ritz method	CO-2	7