Name: **Enrolment No:**	

UPES

End Semester Examination, December 2024

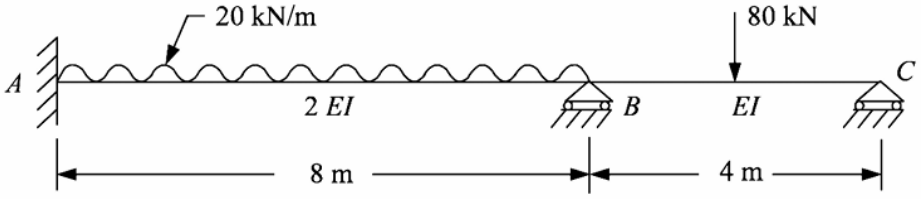
Course: Structural Engineering
Semester: V
Program: B.Tech. Civil Engineering
Time: 03 hrs.
Course Code: CIVL3059 **Max. Marks: 100**

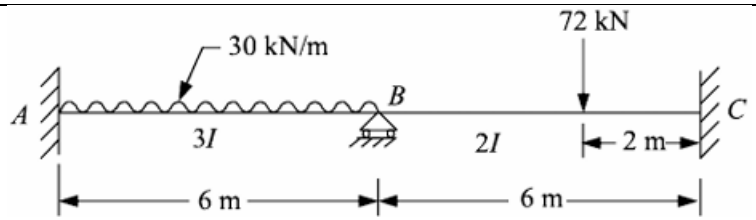
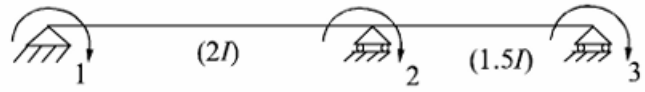
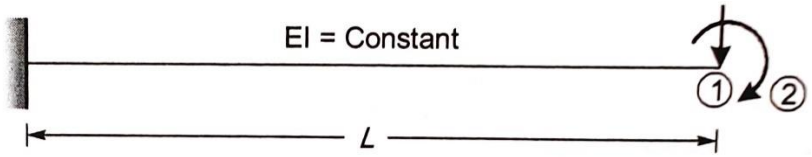
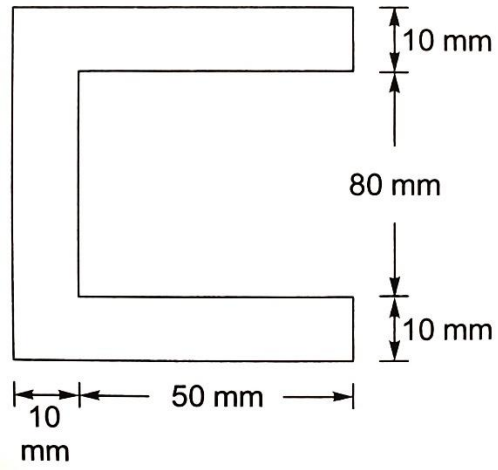
Instructions: 1. Use of only scientific calculator is permitted
2. Assume suitable values for any missing data

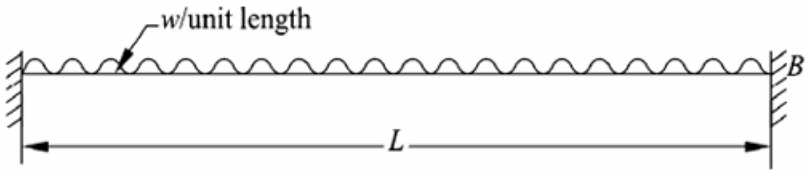
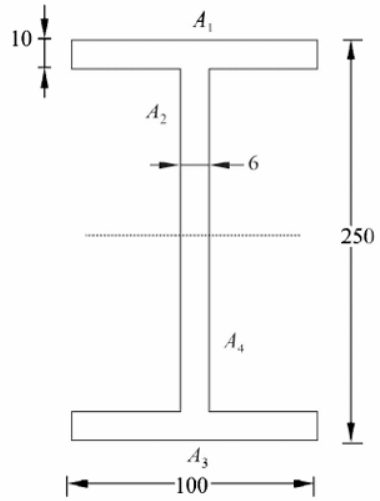
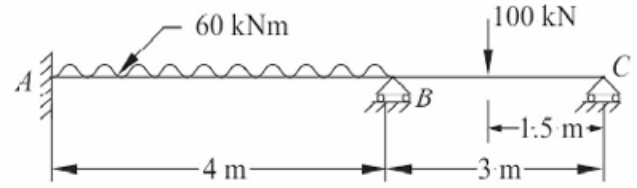
SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q1	Distinguish between force and displacement methods of structural analysis.	**4**	**CO3**
Q2	Enumerate the steps involved in analysing a structure using stiffness matrix method	**4**	**CO3**
Q3	What are the assumptions made in the plastic analysis of steel sections.	**4**	**CO4**
Q4	Define shape factor and explain what it represents.	**4**	**CO4**
Q5	Explain elastic and plastic neutral axis with the help of a suitable example.	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)

Q6	Analyse the continuous beam shown in the figure below using slope deflection method, if the support B sinks by 10 mm. The flexural rigidity of the beam is 4000 kNm^2.  **OR** For the beam shown below, calculte the support moments using moment distribution method. Also, determine support reactions and draw the bending moment diagarm.	**10**	**CO2**

			
Q7	Explain how to develop stiffness matrix. Develop the stiffness matrix for the coordinates shown below. 	**10**	**CO3**
Q8	Explain how to develop flexibility matrix. Develop the flexibility matrix for the coordinates shown below. 	**10**	**CO3**
Q9	Discuss the concept of plastic hinge. Obtain shape factor for a circular section.	**10**	**CO4**
	SECTION-C **(2Qx20M=40 Marks)**		
Q10	(a) For a mild steel beam of rectangular section with b = 200 mm and d = 100 mm, yield stress, fy = 250 MPa, modulus of elasticity, E = 200000MPa, determine the yield moment and plastic moment. (b) Derive shape factor for the cross-section shown below. 	**12+8** **OR** **10+10**	**CO4**

	OR (a) Find the collapse load for the fixed beam shown in the figure below. Plastic moment capacity is M_P throughout.  (b) Determine the shape factor for the I-section shown below.  		
Q11	Use stiffness matrix method to analyse the beam shown below. Find out the support reactions, draw the bending moment diagram and draw the deflected profile of the beam.  		**CO3**

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