PVP 23

Code: 23CE3402

II B.Tech - II Semester – Regular Examinations - MAY 2025

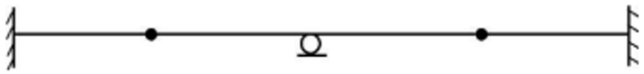
STRUCTURAL ANALYSIS
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

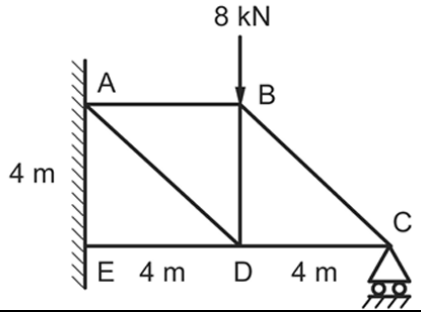
BL – Blooms Level CO – Course Outcome

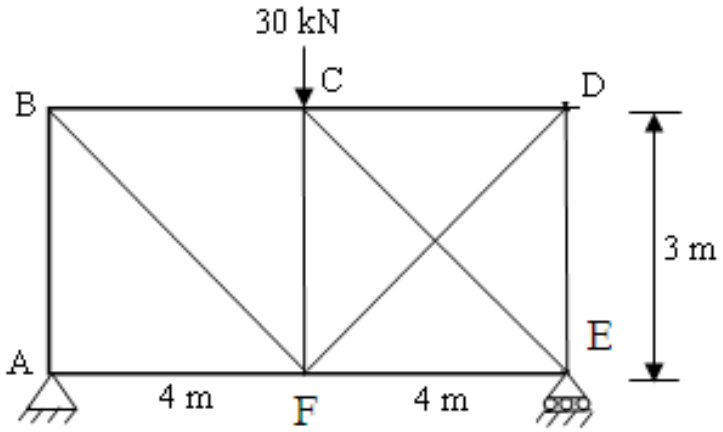
PART – A

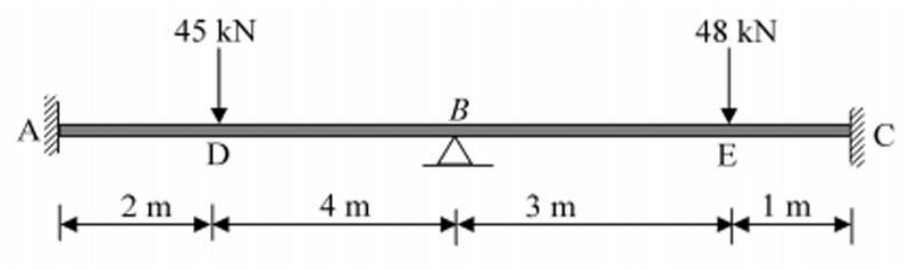
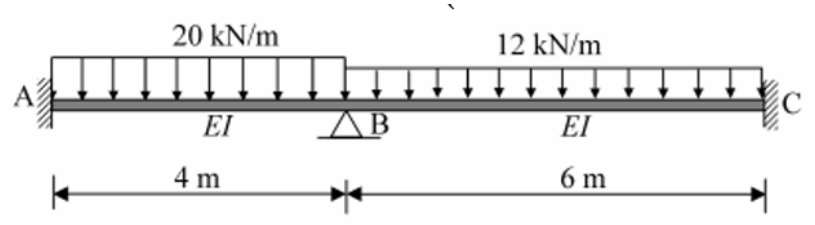
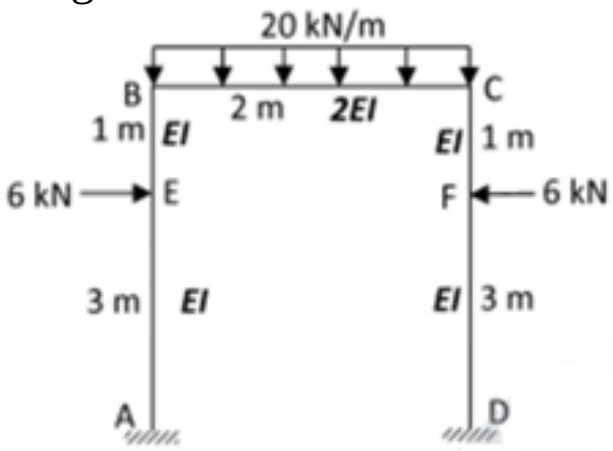
		BL	CO
1.a)	State Castigliano's first theorem.	L1	CO1
1.b)	Define Strain energy.	L1	CO1
1.c)	Determine the kinematic indeterminacy of a single bay portal frame ABCD (support A is fixed, support D is a hinge and joints B and D are pin jointed).	L2	CO2
1.d)	Define static and kinematic indeterminacies.	L1	CO2
1.e)	What is an encastre beam?	L1	CO3
1.f)	Find the degree of indeterminacy of structure given below. 	L2	CO3
1.g)	What are the assumptions made in slope-deflection method?	L1	CO4
1.h)	Write down the slope deflection equation for a beam AB fixed at A and B subjected to a settlement δ at B.	L2	CO4

1.i)	Describe the term distribution factor.	L1	CO5
1.j)	Define carryover factor.	L1	CO5

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Find the strain energy stored by a prismatic rod of length *l*, sectional area *A* and modulus of elasticity *E* subjected to tension *S*.	L3	CO1	5 M
	b)	Derive the expression for strain energy stored in a beam subjected to uniform moment *M*.	L2	CO1	5 M
OR					
3		A cantilever beam of length *l* carries two concentrated loads each of magnitude *P* placed at distances *l/2* and *l* from the fixed end. Find the strain energy stored by the cantilever beam.	L4	CO1	10 M
UNIT-II					
4		Find the forces in the members of the truss as shown in figure. The axial rigidities are same for all the members. 	L4	CO2	10 M
OR					
5		Find the forces in the members of the truss as shown in figure. Sectional area of horizontal, vertical and diagonal members is 4000 mm^2, 3000 mm^2 and 5000 mm^2 respectively. Take	L4	CO2	10 M

	‘E’ is same for all members.  			
	UNIT-III			
6	A fixed beam of 5 m span carries a gradually varying load of 12 kN/m at one end to 32 kN/m at the other end. Find the fixed end moments and reactions at fixed supports.	L4	CO3	10 M
	OR			
7	A continuous beam of ABC of 4 m span each, A is fixed and B, C are pinned is subjected to a clockwise couple of 12 kNm at 1 m from the left support A and UDL of 10 kN/m on BC span. Draw shear force and bending moment diagrams. Take EI = 1000 kNm^2. Use theorem of three moments.	L4	CO3	10 M
	UNIT-IV			
8	A continuous beam ABC consists of span AB = 3 m and BC = 4 m, the ends A and C are fixed. AB and BC carry uniformly distributed loads of intensity 4 kN/m and 5 kN/m respectively. The beam is of uniform section throughout. Draw the bending moment diagram for the beam. Use slope deflection method. Take EI = 7000 kNm^2.	L4	CO4	10 M
	OR			

9	Calculate the bending moments at A, and C for the two-span continuous beam ABC shown in figure. Use slope deflection method. EI is constant. 	L4	CO4	10 M
	UNIT-V			
10	Calculate the bending moments at A, B, and C for the two-span continuous beam ABC shown in figure. EI is constant. Use moment distribution method. 	L4	CO5	10 M
	OR			
11	Analyze the frame as shown in figure by moment distribution method and draw bending moment diagram. 	L4	CO5	10 M