U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February 2025 Semester End Main Examinations

Programme: B.E. **Semester: IV**

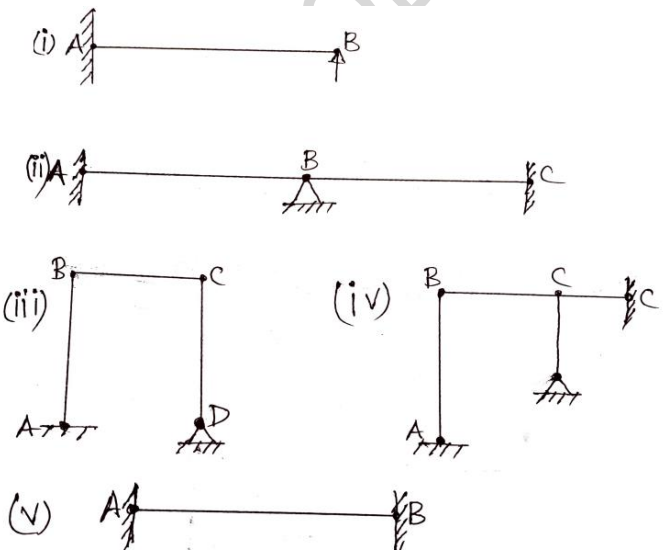
Branch: Civil Engineering **Duration: 3 hrs.**

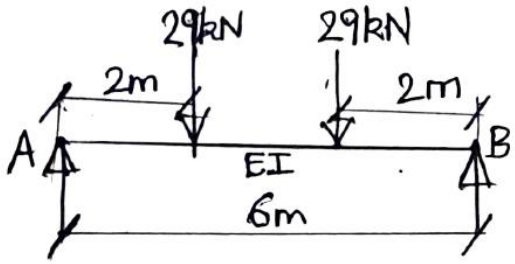
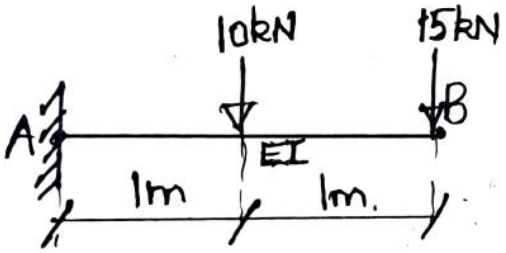
Course Code: 23CV4PCSTA / 22CV4PCSTA **Max Marks: 100**

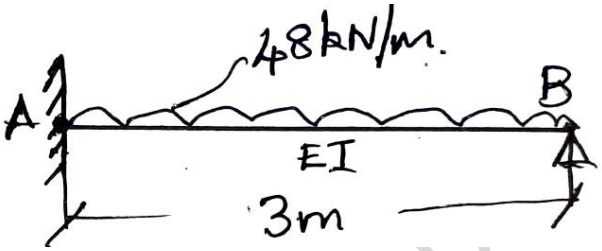
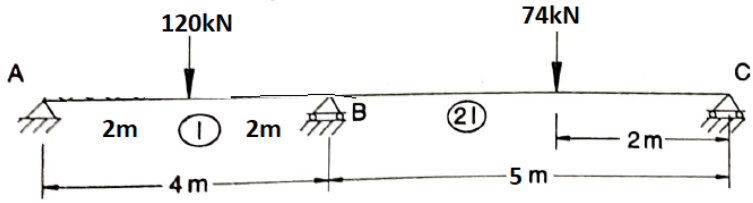
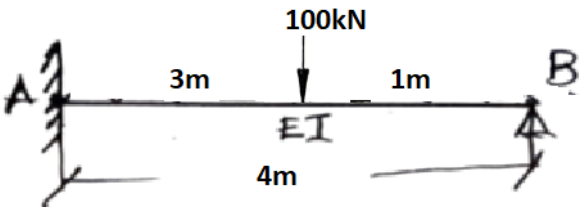
Course: Structural Analysis

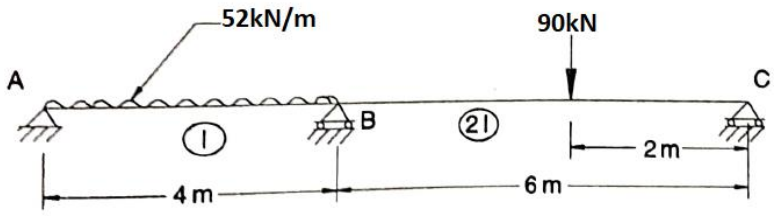
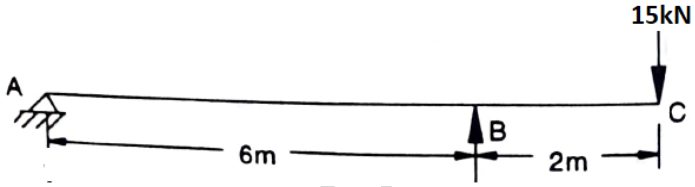
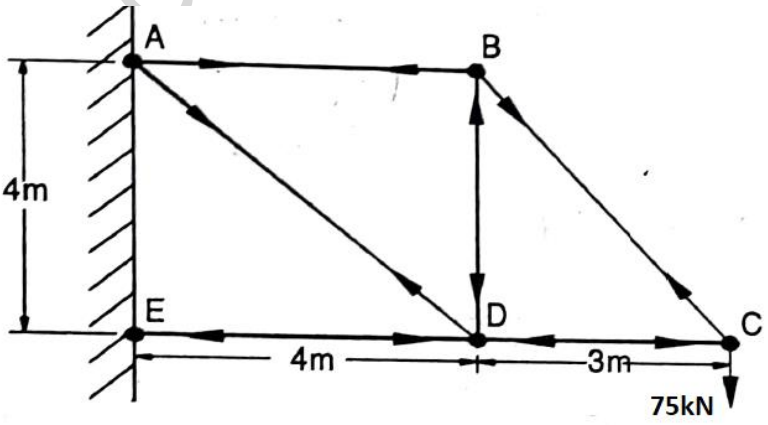
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Briefly explain : Structural Forms, Loads, Conditions of equilibrium, Compatibility conditions.	CO 1	PO1, PO2,	10
	b)	Derive the Governing differential equation of elastic curve	CO 1	PO1,PO2,	10
		OR			
2	a)	Determine the Static and Kinematic indeterminacy for the following cases 	CO 1	PO1,PO2	10
	b)	Explain the steps for determining the deflection in beams as per Macaulay's double integration method.	CO 1	PO1,PO2	10
		UNIT - II			
3	a)	Determine the deflection at the midspan and slopes at the supports of a simply supported beam having a span "L" subjected to a point load "P" by moment area method.	CO 1	PO1,PO2,	10

		b)	Determine the deflection at the and slope at the free end of a cantilever beam having a span "L" subjected to a uniformly distributed load w kN/m by conjugate beam method.	***CO*** 1	***PO1,PO2,***	**10**
			OR			
	4	a)	Determine the deflection at mid span and slope at the supports by moment area method for the beam shown in Fig 1.  Fig1	***CO*** 1	***PO1,PO2,***	**10**
		b)	Determine the deflection and slope at the free by conjugate beam method for the beam shown in Fig 2.  Fig2	***CO*** 1	***PO1,PO2,***	**10**
			UNIT - III			
	5	a)	Show that the parabolic shape is a funicular shape for a three hinged arch subjected to a uniformly distributed load over its entire span.	***CO*** 1	***PO1, PO2,***	**10**
		b)	A cable is supported between two points 160 m apart at the same level. It carries a uniformly distributed load of 72 kN/m over the entire span. If the dip of the cable is 12 m, determine the sectional area of the cable if the permissible tensile stress in the cable is 18000 kN/m^2.	***CO*** 1	***PO1,PO2,***	**10**
			OR			
	6	a)	A Suspension cable has a span of 190 m and a central dip of 18 m. It carries a load of 11kN/m over the entire span. Calculate the maximum and minimum tension in the cable. Find the horizontal and vertical forces in each pier under the following cases.	***CO*** 1	***PO1,PO2,***	**10**

			a) If the cable is passes over a frictionless smooth pully on the top of the pier with back stay inclined at 27° to the horizontal. If the cable is supported by saddles which are stayed by wires inclined at 36° to the horizontal.			
		b)	A Three hinged parabolic arch of 55 m span, having supports at different levels. The crown of the arch is 7 m from left support and 5 m from right support. The arch carries a uniformly distributed load of 42 kN/m over the portion left of the crown and a point load 70 kN at 20 m from left support. Determine the horizontal thrust developed. Also find the bending moment, normal thrust and radial shear at 10 m from the left support	***CO*** 1	***PO1,PO2,***	**10**
			UNIT - IV			
	7	a)	Determine the support reaction at B and analyze the beam shown in Fig 3 by consistent deformation method.  Fig 3	***CO*** 1	***PO1,PO2,***	**10**
		b)	Analyse the beam shown in Fig 4 by Clayperons' theorem of three moments. Support B sinks by 5mm . EI=4000kN-m^2  Fig 4	***CO*** 1	***PO1,PO2,***	**10**
			OR			
	8	a)	Determine the support reaction at B and analyze the beam shown in Fig 3 by consistent deformation method.  Fig 3	***CO*** 1	***PO1,PO2,***	**10**

		b)	Analyse the beam shown in Fig 4 by Clayperons' theorem of three moments.  Fig 4	*CO* 1	*PO1,P O2,*	**10**
			UNIT - V			
	9	a)	Explain Strain energy and complimentary strain energy. Derive the expression for Strain energy due to bending	*CO* 2	*PO1,P O2,*	**12**
		b)	Adopting unit load method determine the deflection at the mid span of a simply supported beam having span L =3m and subjected to UDL of 41kN/m over the entire span.	*CO* 2	*PO1,P O2,*	**08**
			OR			
	10	a)	Adopting strain energy methods determine the deflection at point C in the beam shown in Fig 5. EI= Constant for AB and BC  Fig5	*CO* 2	*PO1,P O2,* *PO3*	**10**
		b)	Determine the deflection at point 'D' in the truss shown in Fig 6 by unit load method. Cross section area of all members are 1200mm^2. Take E =200GPa.  Fig6	*CO* 2	*PO1,P O2,* *PO3*	**10**

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