U.S.N.										

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

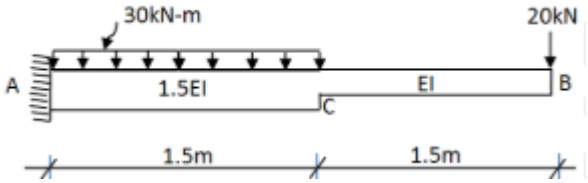
Autonomous Institute Affiliated to VTU

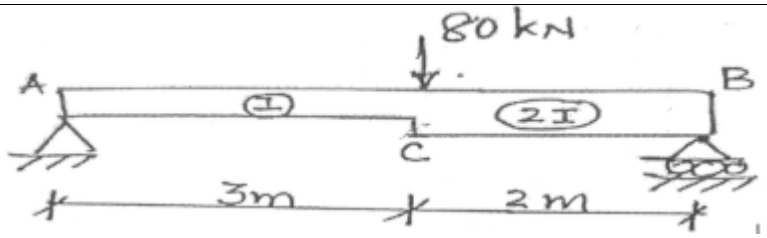
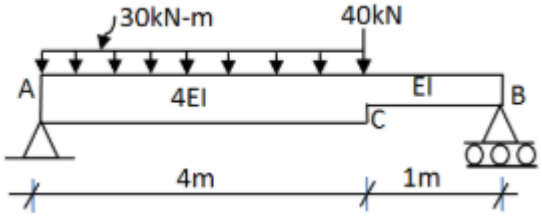
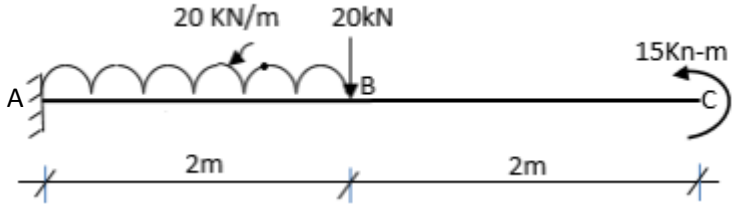
August 2024 Semester End Main Examinations

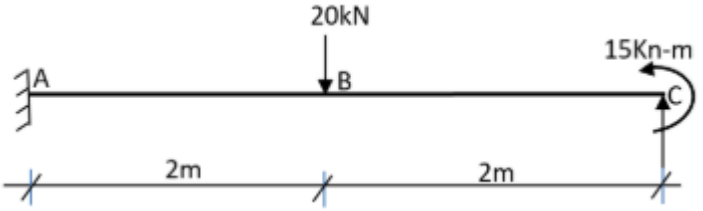
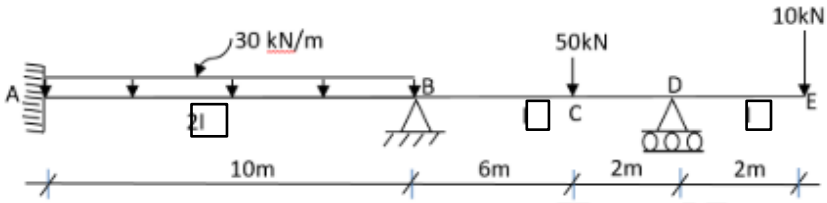
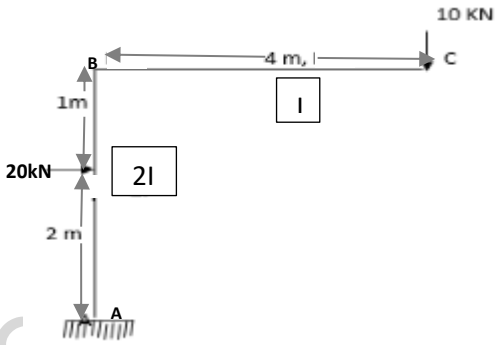
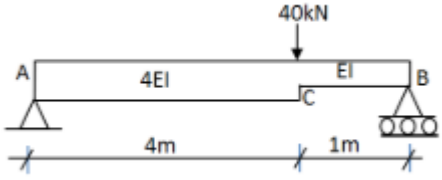
Programme: B.E. **Semester: IV**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 22CV4PCSTA **Max Marks: 100**
Course: STRUCTURAL ANALYSIS

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)	Explain statically determinate and statically indeterminate structures with examples	*C01*	*PO1*	**06**
	b)	A simply supported beam of span 10 m carries a point load of 20 KN at 4m from left support and a point load of 40 KN at 3m from right support. Find the deflection under the 40 KN load using Macaulay's method. Assume EI is constant.	*CO1*	*PO1*	**10**
	c)	Determine the static and kinematic indeterminacies of structures shown in fig.1 below.  Fig-1	*C01*	*PO1*	**04**
		UNIT - II			
2	a)	Find the maximum deflection and maximum slope for the beam shown in fig 2 below using the moment area method. Take E=200 GPa, I=1.2x10^8 mm ^{4}  Fig-2	*CO1*	*PO1*	**10**
	b)	State moment area theorems.	*CO1*	*PO1*	**02**
	c)	Determine the deflection under the 80kN load for the beam shown in fig 3 using conjugate beam method.	*CO1*	*PO1,2*	**08**

			 Fig-3			
			OR			
	3	a)	Find the slope and deflection at point 'C' for the beam shown in fig 4 below using conjugate beam method. Take E=200GPa, I=1.2x10^8 mm ^{4}  Fig-4	*CO2*	*PO2*	**10**
		b)	Analyze the beam shown in fig 5., below for slope and deflection at the point C Take EI= 2.5 x 10^4 kN-m^2. Use moment area method.  Fig-5	*CO2*	*PO1,2*	**10**
			UNIT - III			
	4	a)	A three hinged parabolic arch of span 40 m with a central rise of 10 m, carries an udl of 30 kN/m over the left half of the arch and a point load of 40 kN at right quarter span point. Find the reactions, normal thrust, radial shear and bending moment at left quarter span point.	*CO2*	*PO1,2*	**12**
		b)	A cable is supported from two points A and B which are 80m apart. B is 6m below A, the lowest point on the cable is 10m below B. The cable supports a udl of intensity 24kN/m over the entire span. Calculate maximum tension in the cable. If the cable passes over a roller on the top of pier at the end A and anchored, Find the forces transmitted to the pier. Assume anchor cable is inclined at 32^0 with respect to the horizontal.	*CO2*	*PO1,2*	**08**
			UNIT - 1V			
	5	a)	Analyze the propped cantilever shown in fig.6, below by consistent deformation method.	*CO2*	*PO1,2*	**06**

			 Fig-6			
		b)	Using the theorem of three moments analyze the continuous beam shown in fig.7, below. Support B sinks by 10 mm. Take E=200 kN/mm^2, I=1.8 x 10^8 mm^4. Draw BMD, SFD showing all salient values.  Fig-7	*CO2*	*PO2*	**14**
			UNIT - V			
	6	a)	Determine the horizontal and vertical displacement at point C of the rigid frame shown in fig 8 using Castigliano's theorem. Take EI=`10x10^3 KN-m^2  Fig-8	*CO2*	*PO1,2*	**15**
		b)	State and explain Castigliano's first theorem.	*CO2*	*PO1,2*	**05**
			OR			
	7	a)	Derive the expression for strain energy due to bending.	*CO2*	*PO1,2*	**05**
		b)	A non-prismatic simply supported beam ACB is loaded as shown in fig 9 below. Determine deflection below the load by using strain energy method. Take I = 5000 cm^4, E = 2 x 10^5 N/mm^2.  Fig-9	*CO2*	*PO1,2*	**15**

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