

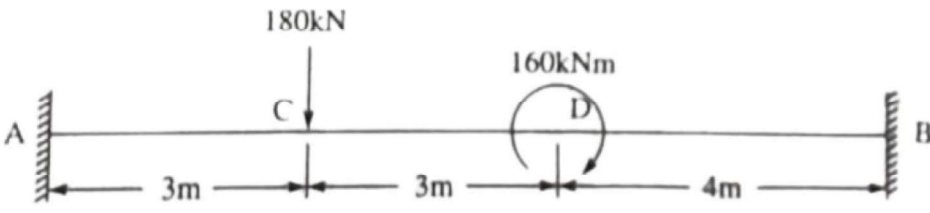
**III B. Tech I Semester Supplementary Examinations, April/May -2025**  
**STRUCTURAL ANALYSIS**  
 (CIVIL ENGINEERING)

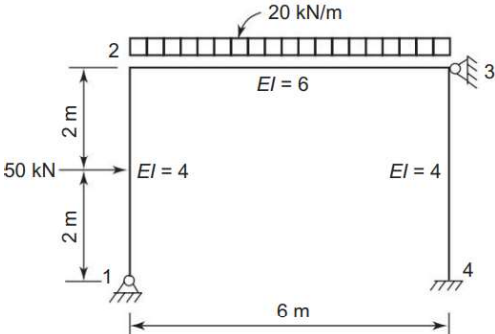
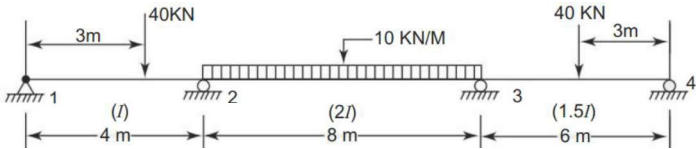
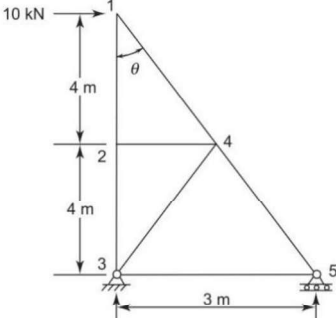
Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**  
 All Questions Carry Equal Marks

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<b>UNIT-I</b>			
1.	a)	A cantilever AB of length $L$ carries a point load $W$ at its free end. If the cantilever is propped at $C$ , distant $3L/4$ from the fixed end, find the prop reaction, assuming that there is no deflection at $C$ . Also, draw the B.M and S.F. diagrams for the propped cantilever.	[7M]
	b)	A fixed beam AB of span 6 m carries point loads 150 kN and 200 kN at distances 2 m and 4 m from the left end. If the left and the right supports sink by 15 mm and 7 mm respectively, find the fixing moments at the supports. Find also the reactions at the supports. Draw also the bending moment diagram for the beam. Take $EI = 6000 \text{ kNm}^2$ .	[7M]
(OR)			
2.	a)	A propped cantilever of length $2l$ carries a uniformly distributed load of $w$ per unit length for a distance $l$ from the fixed end. Determine the reactions at the supports and draw S.F. and B.M. diagrams.	[7M]
	b)	Find the fixing moments at the supports and draw the bending moment diagram for the fixed beam shown in Fig. 1 if $B$ sinks by 10 mm. Take $E = 200 \text{ kN/mm}^2$ and $I = 2.75 \times 10^7 \text{ mm}^4$ .	[7M]
 <p align="center">Fig. 1.</p>			
<b>UNIT-II</b>			
3.	a)	A continuous beam ABC has two equal spans of 5 m each. It is fixed at support A, and simply supported at B and C. The span AB carries a uniformly distributed load of 20 kN/m, while span BC carries a concentrated load of 50 kN at mid-span. Support B sinks by 10 mm. Take $EI = 4 \times 10^7 \text{ kNm}^2$ . Using the slope-deflection method: (a) Determine the support moments at A, B, and C. (b) Draw the shear force and bending moment diagrams for the beam.	[7M]
	b)	Evaluate the end moments of the members of the portal frame of Fig. 2 using the moment distribution method. The relative values of $EI$ are shown along the members.	[7M]

		 <p style="text-align: center;">Fig. 2.</p>	
		(OR)	
4.	a)	<p>A single-storey, single-bay portal frame ABCD is fixed at supports A and D. The horizontal span AB=4 m, vertical columns AD and BC are each 3 m tall. A point load of 40 kN acts vertically downward at mid-span of beam BC. Assume the frame is restrained against side sway. All members have the same flexural rigidity <math>EI</math>.</p> <p>Using the slope-deflection method,</p> <p>(a) Determine the moments at the joints A, B, C, and D.</p> <p>(b) Draw the bending moment diagram for the frame.</p>	[7M]
	b)	<p>Determine the support moments for the continuous beam shown in Fig. 3 using the moment distribution method. <math>E</math> is constant and <math>I</math> values are as indicated on the beam.</p>  <p style="text-align: center;">Fig. 3.</p>	[7M]
		<b>UNIT-III</b>	
5.	a)	<p>Using method of joints, find the forces in members of the truss shown in Fig. 4.</p>  <p style="text-align: center;">Fig. 4.</p>	[7M]
	b)	<p>Using tension coefficients method, find the forces in members of the truss shown in Fig. 5.</p>	[7M]

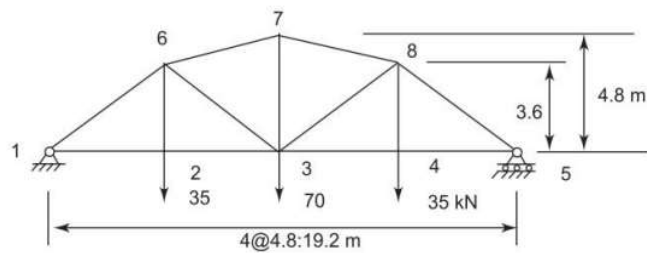


Fig. 5.

(OR)

6. a) Using method of joints, find the forces in members of the truss shown in Fig. 6. [7M]

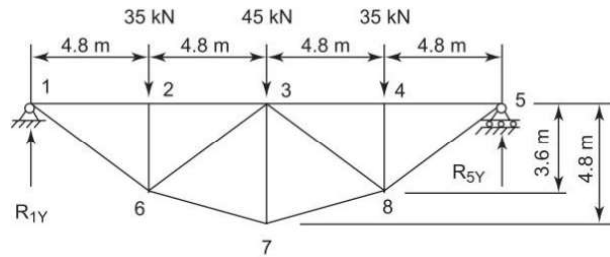


Fig. 6.

- b) Using method of sections, find the forces in members 2-3, 7-11, 7-12 of the truss shown in Fig. 7. [7M]

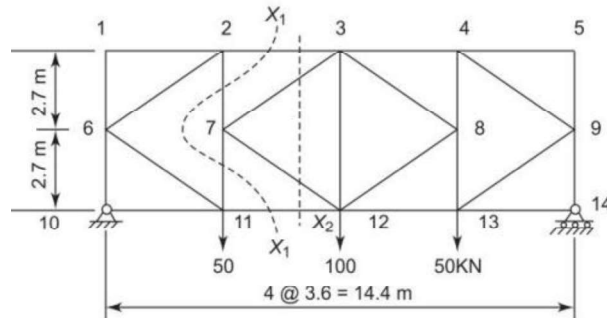


Fig. 7.

#### UNIT-IV

7. a) The load system shown in Fig. 8 crosses a girder 25 m span with the 120 kN load leading. Determine the value of (i) Maximum B.M. at a section 8 m from the left end of the girder and (ii) Absolute maximum B.M. on the girder. [7M]

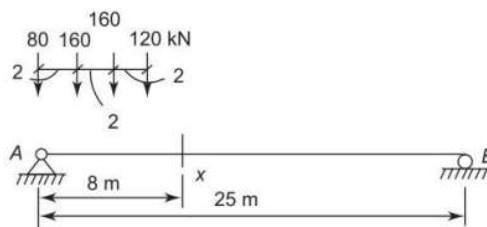
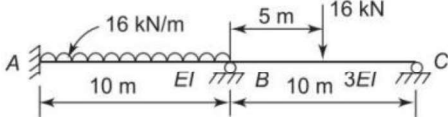
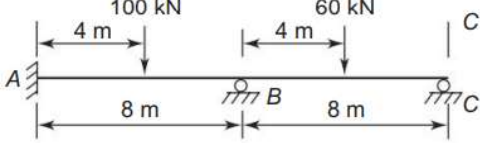
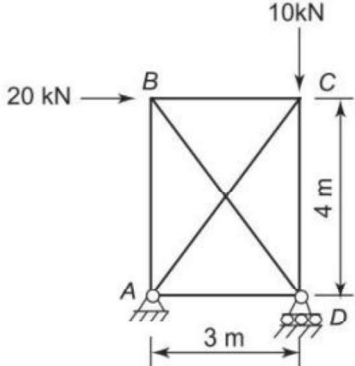
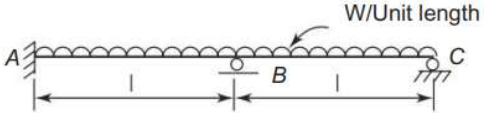


Fig. 8.

- b) A uniformly distributed load of 40 kN/m longer than the span rolls over a girder of 30 m span. Using I.L. diagram for S.F. and B.M. determine the maximum S.F. and B.M. at a section 12 m from left-hand support A. [7M]

(OR)

8.	a)	Two point loads 40 kN and 60 kN spaced 6 m apart cross a girder of 16 m span with 40 kN load leading from left to right. Construct the maximum S.F. and B.M. diagrams stating the absolute maximum values.	[7M]
	b)	A girder simply supported has a span of 24 m. A u.d.l. of intensity 20 kN/m and 6 m long crosses the girder. Using I.L. diagrams find the maximum S.F. and B.M. at a section 9 m from the left support.	[7M]
		<b>UNIT-V</b>	
9.	a)	Using the flexibility method analyse the continuous beam shown in Fig. 9. The value of $EI$ for each span is as indicated.	[7M]
		 <p style="text-align: center;">Fig. 9.</p>	
	b)	Using the stiffness method, analyse the continuous beam given in Fig. 10. Consider that under the given loading the support B sinks by $300/EI$ and support C by $200/EI$ .	[7M]
		 <p style="text-align: center;">Fig. 10.</p>	
		(OR)	
10.	a)	Using the flexibility method, analyse the pin-jointed frame in Fig. 11. The cross-sectional areas $A$ and $E$ for all members is the same.	[7M]
		 <p style="text-align: center;">Fig. 11.</p>	
	b)	Using the stiffness method of analysis analyse the continuous beam given in Fig. 12.	[7M]
		 <p style="text-align: center;">Fig. 12.</p>	

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