R22 Regulation *Subject code: 4E5AC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech V Semester Regular/Supplementary Examinations, November 2025

STRUCTURAL ANALYSIS-I

(CE)

Maximum Marks: 60 Date: 22.11.2025 Duration: 3 hours

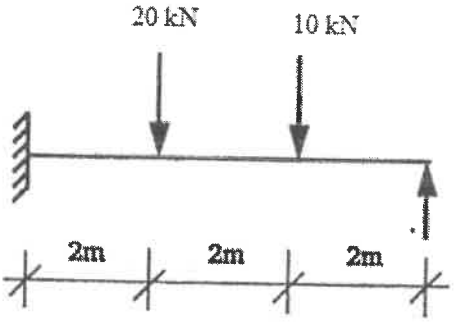
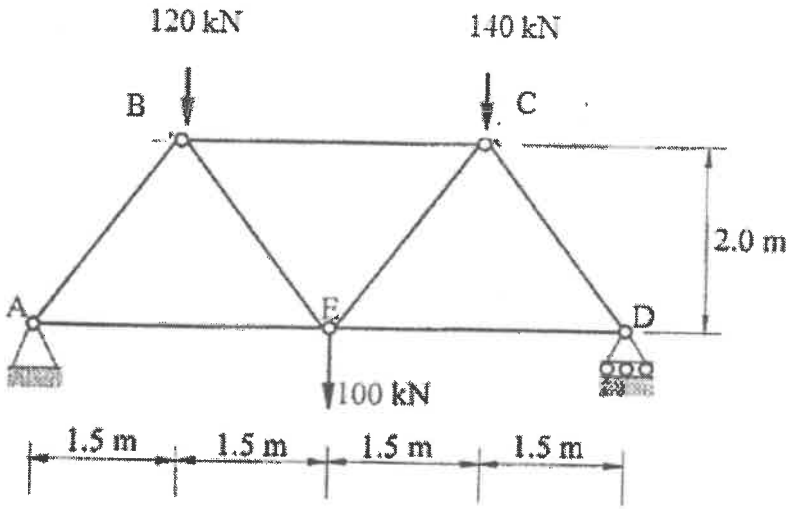
Note:
1. **This question paper contains two parts A and B.**
2. **Part A is compulsory which carries 10 marks. Answer all questions in Part A.**
3. **Part B consists of 5 Units. Answer any one full question from each unit.**
4. **Each question carries 10 marks and may have a, b, c, d as sub questions.**

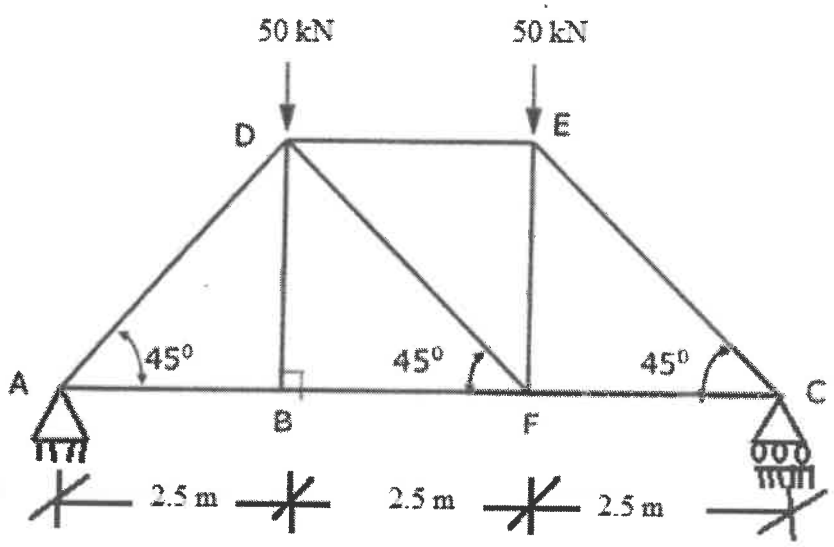
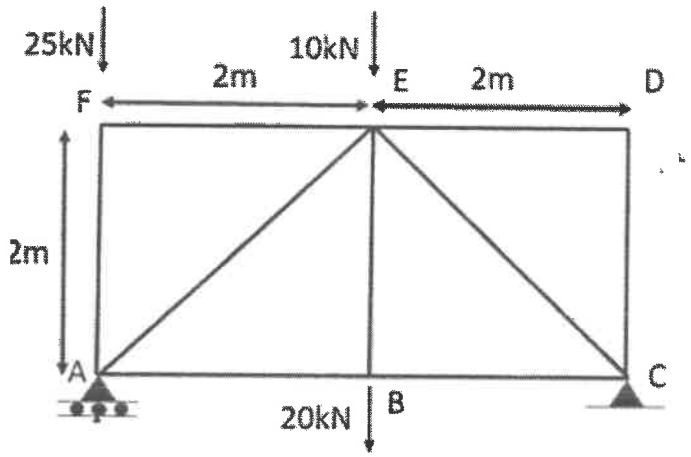
Part-A

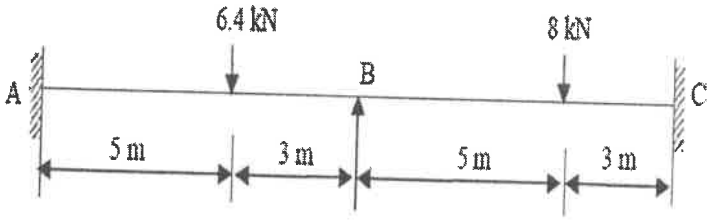
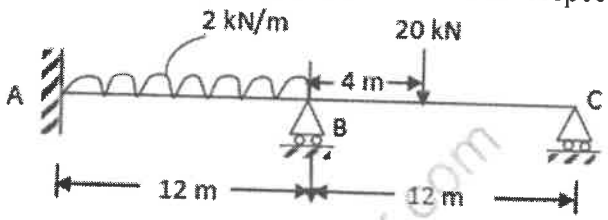
All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	The formula for static indeterminacy for beam is _____.	1M	1	1
b)	A roller support has how many degrees freedom?	1M	1	3
c)	What is imperfect frame?	1M	2	2
d)	Which method is opted to get forces in particular members without analyzing the entire pin jointed frame?	1M	2	2
e)	State Castigliano's First Theorem to find deflection at a point.	1M	3	1
f)	For a simply supported beam with point load at center what is the deflection value at the support?	1M	3	3
g)	Mention a major difference in analysis by slope deflection method and moment distribution method.	1M	4	2
h)	In the moment distribution method, for a member with its far end hinged or pinned, the stiffness is _____	1M	4	1
i)	State weather ILD can be used for statically indeterminate structures?	1M	5	2
j)	Define ILD?	1M	5	3

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	Analyze a fixed beam of 6m span carries a concentrated load of 150 KN at a distance of 1.5 m from the left support. Calculate the BM at mid span and draw BMD.	10M	1	4
	OR			
3	A Propped cantilever beam is as shown in Figure 1. Analyze the beam and Draw SFD and BMD.	10M	1	4

	 **Fig.1**			
4	The pin-jointed frame shown in Figure 2 consists of uniform steel bars. Analyze the section using method of joints and determine the axial forces in the members.  **Fig.2**	10M	2	4
	OR			
5	For the pin-jointed frame shown in Figure 3, analyze and determine: i) The forces in members DE and DF using the method of sections.	10M	2	4

	 **Fig.3**			
6	A pin-jointed truss is given in Figure 4. Determine the vertical displacement of joint E using the unit load method. Each member is with axial rigidity AE= 1.25 x 10^5 kN.  **Fig.4**	10M	3	2
	OR			
7	A three hinged arch has a span of 30 m and a rise of 10 m. The arch carries a UDL of 60 KN/m on the left half of its span. It also carries concentrated loads of 100 KN at 10m from the right end. Determine the horizontal thrust at each support.	10M	3	3
8	Analyze the continuous beam shown in figure 5 by moment distribution method. Draw shear force and bending moment diagram.	10M	4	4

	 **Fig.5**			
	OR			
9	A continuous beam is loaded as shown in figure 6. The support B sinks by 30 mm. Using slope diflection method analyze the beam. Draw BMD. The values of E and I are 200 GPa and 0.2 x 10^9 mm^4 respectively.  **Fig.6**	10M	4	4
10	Determine the Maximum SF and BM of a SS beam carrying a UDL of w KN/m shorter than the Span of beam using ILD.	10M	5	3
	OR			
11	Two concentrated loads of 50 kN and 75 kN separated by 4 m rolls across abeam of span 12m from left to right with 50KN leading the train. Sketch the Maximum SFD and BMD .Also locate the position and calculate the magnitude of the absolute Maximum BM.	10M	5	3