Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – SUMMER 2025

Subject Code:2150608 **Date:09-05-2025**

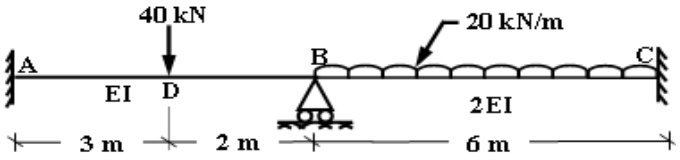
Subject Name:Structural Analysis-II

Time:02:30 PM TO 05:00 PM **Total Marks:70**

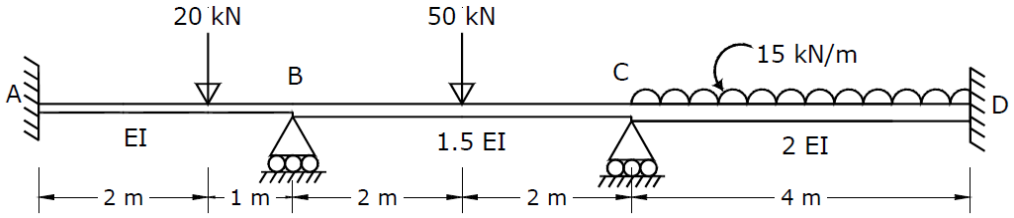
Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Define : Statically determinate Structure, Statically Indeterminate Structure	**03**
	(b)	State Castigation's I and II theorems.	**04**
	(c)	Draw bending moment diagram for the beam as shown in Fig. using Moment Distribution Method *OR* Slope Deflection Method.	**07**

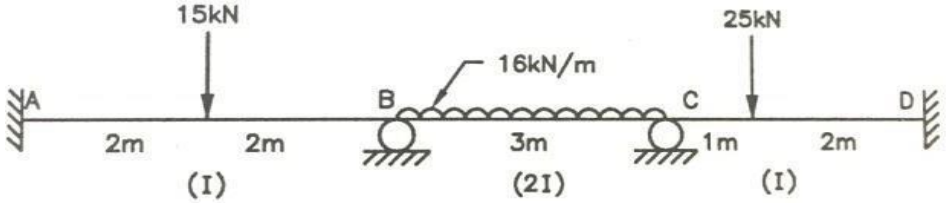


Q.2	**(a)**	Define: Stiffness, Distribution factor, Carry over factor	**03**
	(b)	Write fixed end moments only for following cases :	**04**
		1) Fixed beam AB having point load at centre	
		2) Fixed beam AB having udl on entire span	
	(c)	Write slope deflection equations only for a beam as shown in Fig.	**07**

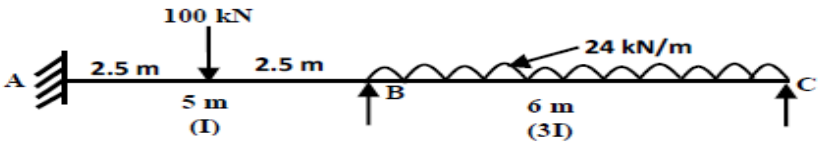


OR

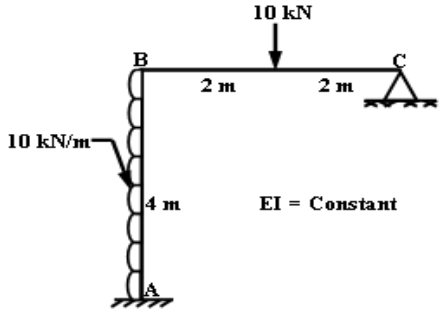
	(c)	Find out distribution factors for the beam as shown in Fig.	**07**



Q.3	**(a)**	Write assumptions made in slope deflection method	**03**
	(b)	Write slope deflection equations for the beam as shown in Fig., if middle support B sink by 3 mm.	**04**



(c) Analyze the frame as shown in the Fig using slope deflection method *OR* Moment distribution Method and draw bending moment diagram only. **07**

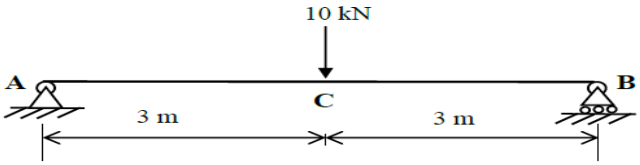


OR

Q.3 **(a)** Define: Sway. What are the causes for Sway in portal frames? **03**

(b) Discuss limitations of Castingliano's 1st Theorem **04**

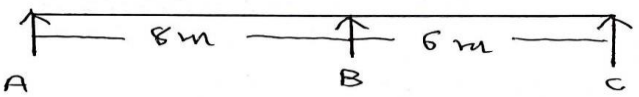
(c) Evaluate the vertical deflection under point C for the beam as shown in the Fig, using Castingliano's theorem. Take EI= constant. **07**



Q.4 **(a)** What is an influence line diagram? Explain its importance in structural analysis. **03**

(b) Explain Castigliano's first *OR* second theorem with example **04**

(c) Draw influence line for reaction at B (R_B) for the 14 mt long two-span beam as shown in Fig . Calculate ordinate at 2 mt interval. **07**



OR

Q.4 **(a)** State and explain the Muller-Breslau's Principle **03**

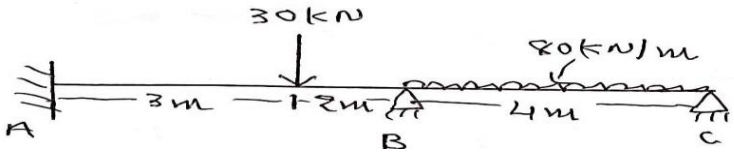
(b) Draw "Restrained Structure" and "Released structure" for a propped cantilever beam. **04**

(c) Draw the Influence line diagram for Reactions at the supports and shear force and bending moments at any section C for a simply supported beam. **07**

Q.5 **(a)** Derive relation between stiffness and flexibility. **03**

(b) Write characteristics of Stiffness matrix *OR* Flexibility method. **04**

(c) Analyze the beam as shown in Fig. by any matrix method and draw bending moment diagram only. **07**



OR

Q.5	**(a)**	Which Matrix method is suitable for general computer programming? Why?	**03**
	(b)	Define: 1) Action and 2) Displacement	**04**
	(c)	For a cantilever beam, show that stiffness and flexibility matrices are reciprocal to each other.	**07**

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