Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – SUMMER 2024

Subject Code:3150614 Date:23-05-2024

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)**	Calculate SI and KI for the beam shown in Fig.1.	**03**
	(b)	Formulate the stiffness matrix for the beam shown in Fig.1. Also write the stiffness equation.	**04**
	(c)	Solve the stiffness equation and evaluate the reactions and end moments for the beam shown in Fig.1. Draw SFD and BMD for the beam.	**07**
Q.2	**(a)**	Calculate SI and KI for the frame shown in Fig.2.	**03**
	(b)	Formulate the stiffness matrix for the frame shown in Fig.2. Also write the stiffness equation.	**04**
	(c)	Solve the stiffness equation and evaluate the reactions and end moments for the frame shown in Fig.2. Draw SFD and BMD for the frame.	**07**
		OR	
	(c)	With appropriate illustration show that $\mathbf{S= F^{-1}}$.	**07**
Q.3	**(a)**	Derive equation for calculation of slope at A for the beam shown in Fig.3, using Castigliano's first theorem. Consider E= 2 x 10^5 N/mm^2 and I= 3 x 10^8 mm^4.	**03**
	(b)	Solve the equation written in Q.3(a) and calculate slope at A for the beam shown in Fig.3 using Catigliano's first theorem. Consider E= 2 x 10^5 N/mm^2 and I= 3 x 10^8 mm^4.	**04**
	(c)	Calculate deflection at C the beam shown in Fig.3 using Catigliano's first theorem. Consider E= 2 x 10^5 N/mm^2 and I= 3 x 10^8 mm^4.	**07**
		OR	
Q.3	**(a)**	Derive the equation for calculation of horizontal deflection at B for the frame shown inFig.4, using Castiglino's first theorem. Consider E= 2 x 10^5 N/mm^2 and I= 3 x 10^8 mm^4.	**03**
	(b)	Solve the equation written in Q.3(a) OR and calculate horizontal deflection at B for the frame shown in Fig.4 using Castiglino's first theorem. Consider E= 2 x 10^5 N/mm^2 and I= 3 x 10^8 mm^4.	**04**
	(c)	Calculate vertical deflection at B for the frame shown in Fig.4 using Castiglino's first theorem. Consider E= 2 x 10^5 N/mm^2 and I= 3 x 10^8 mm^4.	**07**
Q.4	**(a)**	What is influence line diagram? How it is useful in structural design of bridges?	**03**
	(b)	A udl of 50 kN/m, 5 m long, crosses a girder of 25 m simply supported span. Calculate the maximum shear force and bending moment at a section 6 m from left hand support.	**04**
	(c)	Draw influence line diagrams for the RA, RB, RC FX and MX for the beam shown in Fig.5.	**07**
		OR	
Q.4	**(a)**	Find SI and KI for the two span continuous beam shown in Fig.6. Draw released structure for influence line diagram for RA.	**03**

	(b)	Draw influence line diagram for RA for the two span continuous beam shown in Fig.6. Calculate ordinates of ILD at 1 m interval.	**04**
	(c)	Draw influence line diagram for MB for the two span continuous beam shown in Fig.6. Calculate ordinates of ILD at 1 m interval.	**07**
Q.5	**(a)**	Differentiate between slope deflection method and moment distribution method for analysis of plane frame.	**03**
	(b)	Write slope deflection equation for the frame shown in Fig.7 .	**04**
	(c)	Solve the slope deflection equations and draw BMD for the frame shown in Fig. 7.	**07**

OR

Q.5	**(a)**	Write steps for analysis of plane frame with sway by moment distribution method.	**03**
	(b)	Write the slope deflection equations for the beam shown in Fig.8.	**04**
	(c)	Solve the slope deflection equations and draw BMD for the beam shown in Fig. 8.	**07**

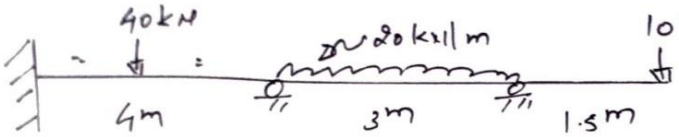


Fig.1.

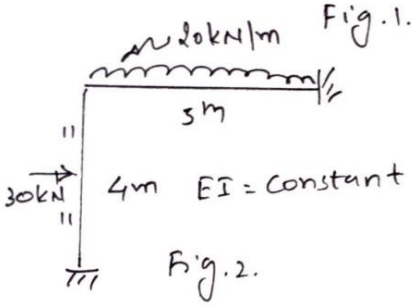


Fig.2.

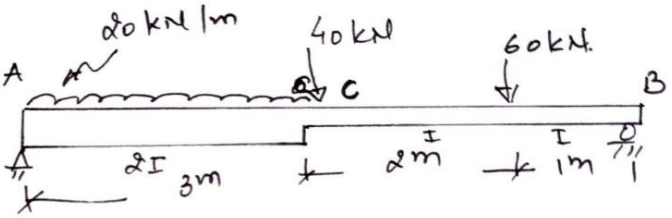


Fig.3.

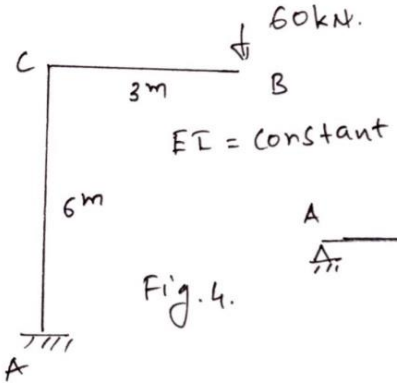


Fig.4.

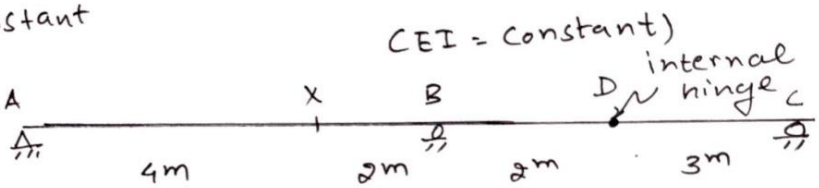
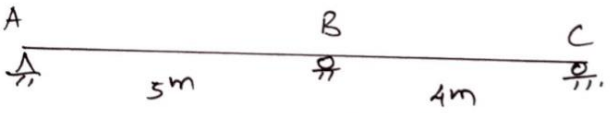


Fig.5.



EI = constant

Fig.6.

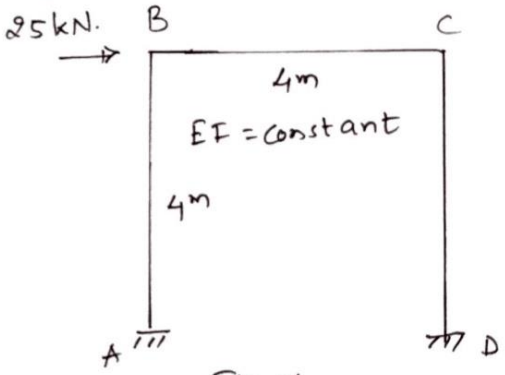
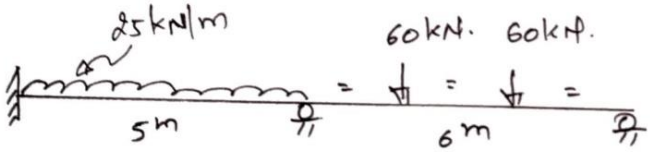


Fig.7.



EI = constant

Fig.8.

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