Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3150614 Date:05-12-2024

Subject Name:Structural analysis-II

Time:10:30 AM TO 01:00 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.**

			Marks
Q.1	**(a)**	Write the statement and proof of Castingliano's 1st theorem.	**03**
	(b)	Explain any four terms: Stiffness, Distribution factor, Carry over factor, Carry over moment, Flexibility.	**04**
	(c)	Using Castigliano's first theorem, calculate deflection at free end of cantilever beam shown in Figure: 1. Take E =2 x 10^5 N/mm^2 and size of beam as 230x300 mm	**07**
Q.2	**(a)**	Write assumptions made in slope deflection method.	**03**
	(b)	Write the differences between statically determinate and indeterminate structures.	**04**
	(c)	Derive Slope Deflection Equation using fundamentals with usual notations.	**07**
		OR	
	(c)	Draw SFD and BMD diagram for a beam shown in Figure: 2 using Slope and deflection method.	**07**
Q.3	**(a)**	Draw Restrained structure and Released structure for a propped cantilever beam.	**03**
	(b)	Derive Shear equations for portal frames with side sway.	**04**
	(c)	Analyze and Draw the SFD & BMD for the beam shown in Figure: 2 by Moment distribution method	**07**
		OR	
Q.3	**(a)**	Differentiate: Stiffness method and Flexibility method. Which method is suitable for general computer programming? Why?	**03**
	(b)	Write a short note on Castingliano's 2nd Theorem and discuss its uses.	**04**
	(c)	Analyze the beam shown in the Figure: 3 using moment distribution method and draw BMD.	**07**
Q.4	**(a)**	Write assumptions made is cantilever method of approximate analysis.	**03**
	(b)	Determine the reactions at the supports for a propped cantilever beam of length 'l' subjected to a UDL 'w' throughout its span using principle of minimum strain energy.	**04**
	(c)	Analyze a propped cantilever beam subjected to a UDL throughout its span by Flexibility method	**07**
		OR	
Q.4	**(a)**	Define the influence line diagram and give statement of Muller Breslau principle.	**03**
	(b)	Calculate the central deflection for a simply supported beam of length 'l' subjected to a concentrated load of 'w' at centre on its span using Castingliano's 1st Theorem.	**04**

(c) Formulate Flexibility and Stiffness Matrices for a cantilever beam. **07**

Q.5 **(a)** State the characteristics of stiffness matrix. **03**

(b) Draw only Qualitative influence line diagram for following functions of 2 span continuous beam having support reaction RA, RB and RC. The point D is located at center of right span BC **04**

(a) Influence line for RC
(b) Influence line for RA
(c) Influence line for shear at D
(d) Influence line for bending moment at D.

(c) Draw ILD for SF and BM at section D, 4 m from A, for a two span continuous beam as shown in Figure: . 4 **07**

OR

Q.5 **(a)** State the characteristics of flexibility matrix. **03**

(b) A simply supported beam AB has span 6m. Draw influence lines for RA, RB, Vx and Mx for a section X at 2m from left hand support. **04**

(c) Draw influence line diagrams for Va and Vb for a beam shown in Figure: 5 **07**

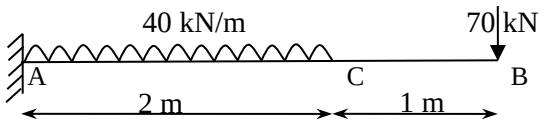

Figure: 1

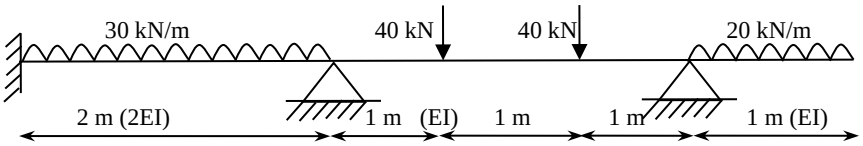

Figure: 2

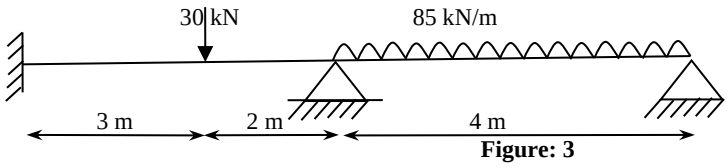

Figure: 3

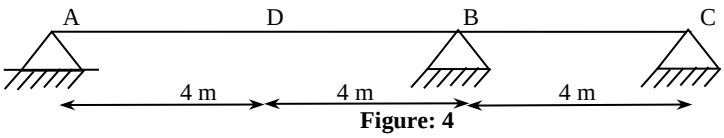

Figure: 4

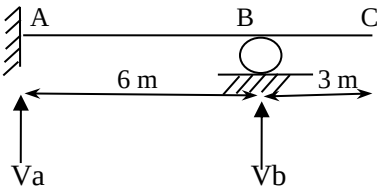

Figure: 5