Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2022

Subject Code:3150614 Date:13-01-2023

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 differences between statically determinate and indeterminate structures.	**03**
	(b)	Write the statement and proof of Castingliano's 1st theorem.	**04**
	(c)	Discuss Castingliano's second theorem to solve an indeterminate truss.	**07**
Q.2	**(a)**	Define: 1)Action and 2)Displacement	**03**
	(b)	Define: 1) Distribution Factor 2) Relative stiffness 3)stiffness 4)Carryover factor	**04**
	(c)	A bent up bar of 100 mm diameter is shown in figure-1.Find vertical deflection at point D using Castingliano's first theorem. Take $E=2 \times 10^5 N/mm^2$	**07**
		OR	
	(c)	Calculate the horizontal displacements of the end B of a semicircular arch shown in the figure-2 using Castingliano's first theorem. Take $EI=6 \times 10^{13}$ Nmm^2	**07**
Q.3	**(a)**	Discuss the uses of slope deflection method.	**03**
	(b)	Draw influence line diagrams for support reactions of a simply supported beam.	**04**
	(c)	For a cantilever beam, show that stiffness and flexibility matrices are reciprocal to each other.	**07**
		OR	
Q.3	**(a)**	Draw Restrained structure and Released structure for a propped cantilever beam.	**03**
	(b)	What is a portal frame? Discuss the causes of sway in a portal frame..	**04**
	(c)	Formulate Flexibility and Stiffness Matrices for a cantilever beam .	**07**
Q.4	**(a)**	Define Influence line diagram. Discuss its use.	**03**
	(b)	Write a short note on Castingliano's 2nd Theorem and discuss its uses.	**04**
	(c)	Analyze a propped cantilever beam subjected to a udl throughout its span by Flexibility method.	**07**
		OR	
Q.4	**(a)**	Derive Shear equations for portal frames with side sway	**03**
	(b)	State and Explain Muller-Breslau's Principle	**04**
	(c)	A three span continuous beam ABCD is shown in the figure-3. Write slope deflection equations only if the support A settles by 10mm,B settles by 30mm and C by 20mm.	**07**

Q.5	**(a)**	Explain Fictitious load method used to solve deflection problems	**03**
	(b)	Write the differences between Stiffness and Flexibility matrix methods.	**04**
	(c)	Analyze the frame shown in figure-4 by Moment distribution method	**07**

OR

Q.5	**(a)**	Enlist various categories of framed structures	**03**
	(b)	A simply supported beam AB has span 8m.Draw influence lines for shear force and bending moment at a section X at 3m from left hand support.	**04**
	(c)	Draw influence line diagrams for Va and Vb for a beam shown in figure-5	**07**

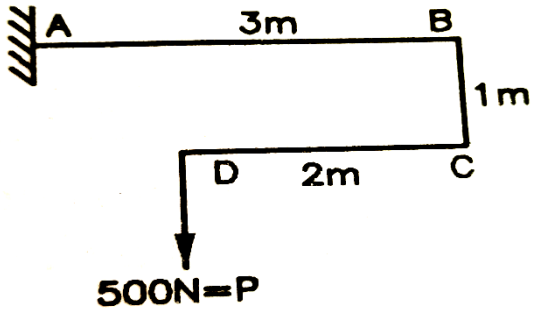

Figure-1

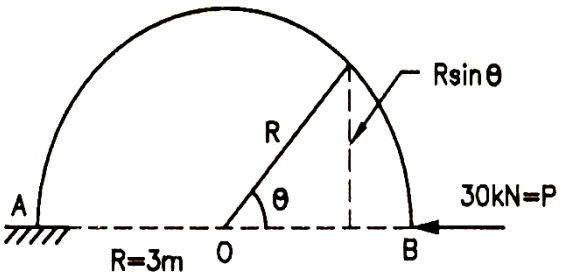

Figure-2

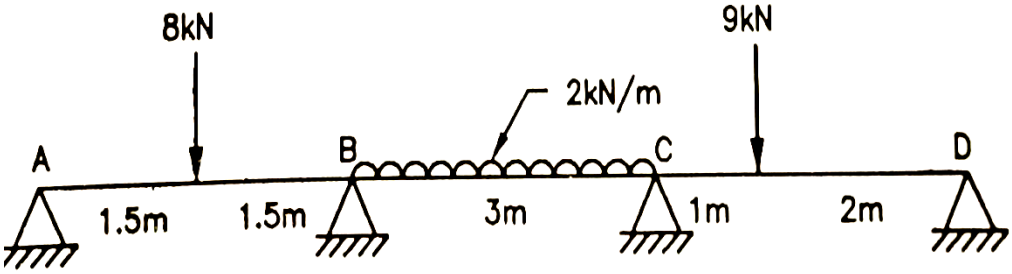

Figure-3

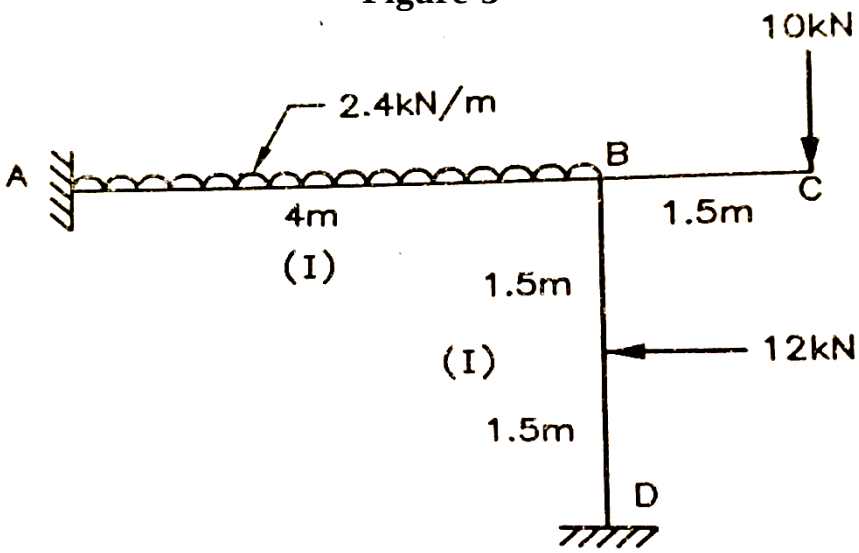

Figure-4

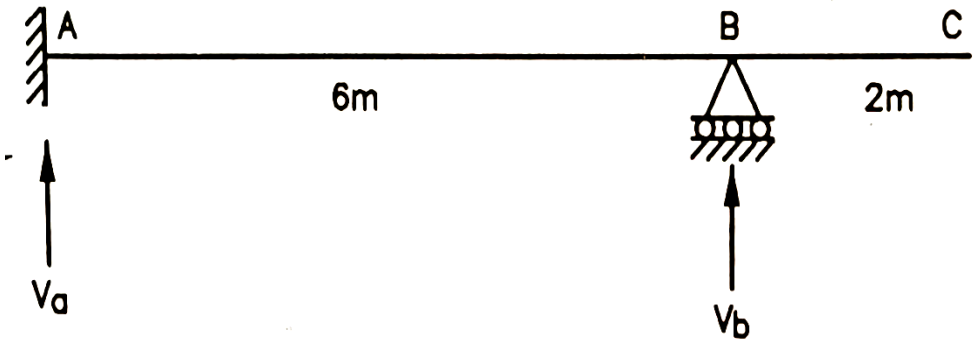

Figure-5

****