Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– V (New) EXAMINATION – WINTER 2019

Subject Code: 2150608 **Date: 21/11/2019**

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.**

Q.1	**(a)**	Define: (i) Influence line diagrams (ii) Absolute maximum bending moment (iii) Distribution factor	**03**
	(b)	Find stiffness matrix for beam shown in fig.1.	**04**
	(c)	Calculate the vertical displacement at free end using unit load method for the cantilever bent as shown in the fig.2.	**07**
Q.2	**(a)**	Give characteristics of stiffness and flexibility Matrix.	**03**
	(b)	A cantilever beam of 5m has fixed support at A and B is free end. Draw ILD for support reactions, shear force and bending moment at 2 m from support A.	**04**
	(c)	Find the matrices: $[A_D]$, $[A_{DL}]$, [S] and [D] with usual notations for the beam shown in fig.3, using Stiffness method.	**07**
		OR	
	(c)	Find the matrices: $[D_Q]$, $[D_{QL}]$, [F] and [Q] with usual notations for the beam shown in fig.3. Use Flexibility method assuming reactive moment at A (M_A) and bending moment at B (M_B) as redundant.	**07**
Q.3	**(a)**	Define:Sway. What are the causes for Sway in portal frames?	**03**
	(b)	Using Castigliano's first theorem find slope at free end of cantilever beam of span 5 m subjected to UDL of 30 kN/m throughout the span.	**04**
	(c)	Draw bending moment diagram for the frame shown in fig. 4 using Moment Distribution Method.	**07**
		OR	
Q.3	**(a)**	Find flexibility matrix for the beam shown in fig. 1	**03**
	(b)	State and explain the Muller-Breslau's Principle with suitable example.	**04**
	(c)	Draw bending moment diagrams for the frame shown in fig. 4 using Slope Deflection Method.	**07**
Q.4	**(a)**	State Castiglione's first and second theorem with its usefulness.	**03**
	(b)	Derive slope-deflection equations from first principles.	**04**
	(c)	Three point loads 70 kN, 60 kN and 50 kN equally spaced 3m respectively, cross a girder of 12 m span from left to right, with the 50 kN load as leading load. Calculate maximum shear force (positive and negative), and bending moment at a section 5m from left end.	**07**
		OR	
Q.4	**(a)**	Find distribution factors for frame shown in fig.6.	**03**
	(b)	A UDL of 12 kN/m and 5m length crosses a simply supported beam of 10 m span from left to right. Find maximum B.M at section 4 m from left support.	**04**
	(c)	Draw influence line diagram for propped cantilever beam AB of span 6 m for support reactions (R_A , R_B, M_A). Calculate ordinate at 2 m interval.	**07**
Q.5	**(a)**	Write slope deflection equations for the beam shown in fig. 5, if middle support sink by 3 mm.	**03**
	(b)	Using flexibility method find M_A for propped cantilever beam subjected to UDL 30 kN/m for the whole span. Consider M_A as redundant. EI is constant.	**04**

(c) Find support reactions of the frame shown in fig. 6 using Castigliano's theorem. **07**

OR

Q.5 **(a)** Draw possible released beam for statically indeterminate beam shown in fig.3 **03**

(b) A propped cantilever beam of span 6 m is subjected to UDL of 50 kN/m throughout the span. Using Castilgliano's theorem find support reactions. **04**

(c) Analyse truss shown in fig. 7 by stiffness Method. AE is constant for all members **07**

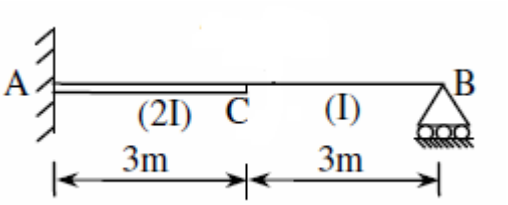

Fig. 1

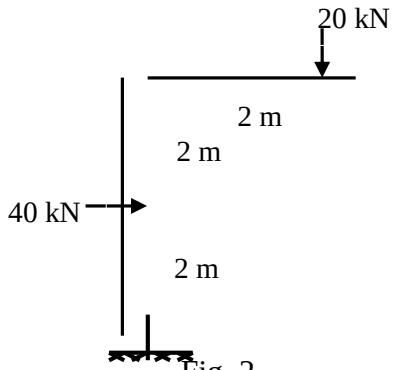

Fig. 2

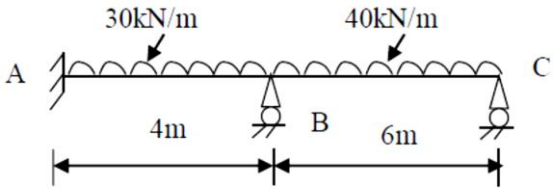

Fig.3

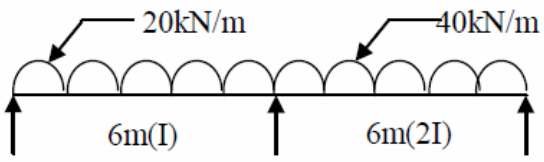

Fig.5

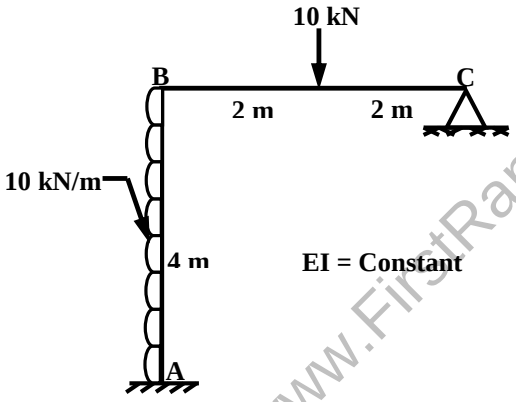

Fig.4

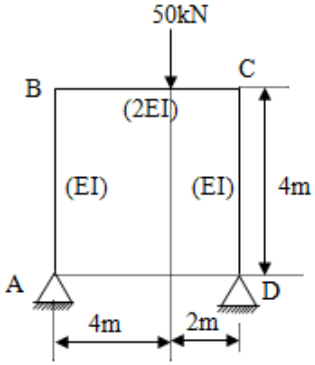

Fig. 6

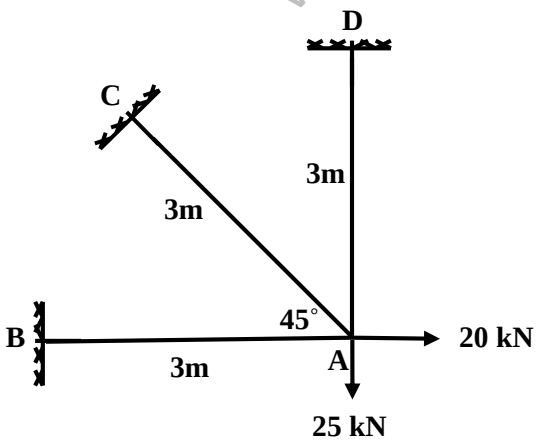

Fig. 7