

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2018****Subject Code:2150608****Date:20/11/2018****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.

		MARKS
<b>Q.1</b>	(a) Explain with illustrations the characteristics of flexibility / stiffness matrices.	<b>03</b>
	(b) Derive slope and deflection method equations from first fundamentals.	<b>04</b>
	(c) Analyse the beam as shown in fig.-1 by Moment Distribution Method and draw BMD.	<b>07</b>
<b>Q.2</b>	(a) Explain causes of side-sway in plane frame with illustrations.	<b>03</b>
	(b) A two span simple support continuous beam ABC having AB=5 m and BC = 6m. The span AB is loaded by a point load at centre by 50kN and span BC is loaded by a UDL of 20kN/m over entire span. Analyze the beam by moment distribution method and draw BMD.	<b>04</b>
	(c) Analyse the beam shown in fig.-3 by slope-deflection method and draw BMD. Take EI=constant.	<b>07</b>
<b>OR</b>		
	(c) Analyse the beam shown in fig.-3 by flexibility method and draw BMD.	<b>07</b>
<b>Q.3</b>	(a) Obtain slope-deflection equations for the beam shown in fig.-2.	<b>03</b>
	(b) Calculate the stiffness matrix for the beam shown in fig.-2.	<b>04</b>
	(c) For a two span simple support continuous beam ABC having AB=5m and BC=5m, calculate the ILD ordinates for $R_A$ at every 1m interval.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) (i) Define influence line diagram. (ii) Construct Influence Line Diagrams for Reaction ( $R_A$ ) and bending moment at 2 m from free end for a cantilever beam AB fixed at A and having span 5m.	<b>03</b>
	(b) A UDL of intensity 16 kN/m, 5 m long moving on a beam of 10 m span. Find maximum bending moment at a section 4m from left support.	<b>04</b>
	(c) Three point loads 90 kN, 75 kN and 55 kN equally spaced 3m respectively, cross a girder of 30 m span from left to right, the 55 kN load leading. Calculate absolute maximum bending moment in the beam and its location.	<b>07</b>
<b>Q.4</b>	(a) Explain Castigliano's both theorems.	<b>03</b>
	(b) Calculate the slope at free end B for a cantilever beam AB having length 5m and loaded by a UDL of 30 kN/m over whole span using energy principle.	<b>04</b>

- (c) Fig.-4 shows simply supported beam AB having varying moment of inertia. It is subjected to an eccentric load. Calculate deflection under the load using energy principle. **07**

OR

- Q.4 (a)** Write and explain Muller Breslau's principal. **03**

- (b)** Calculate deflection at B for a cantilever beam AB, fixed at A and free at B, and is acted upon by a UDL of 45 kN/m over whole span using unit load method. Take  $EI = \text{constant}$ . Consider length of  $AB = 3\text{m}$ . **04**

- (c)** A propped cantilever beam of span 7m has fixed support at left end and roller support at right end is loaded by a UDL of 25kN/m up to 3m from left support. Analyze the beam by energy principle and draw BMD. **07**

- Q.5 (a)** Calculate slope-deflection equations for the portal frame as shown in fig.-5. **03**

- (b)** Choosing  $M_A$  and  $M_B$  as redundants, find flexibility matrix for a fixed beam having span of 8m. Take  $EI = \text{Constant}$ . **04**

- (c)** Analyze the portal frame as shown in fig.-5 by flexibility matrix method and draw BMD. **07**

OR

- Q.5 (a)** Define: Stiffness, Distribution Factor, Carry Over Factor. **03**

- (b)** Find distribution factors for the beam shown in fig.-6. **04**

- (c)** Analyze the beam as shown in fig.-6 by stiffness matrix method. **07**

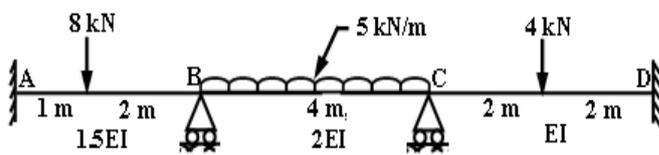


Fig.-1

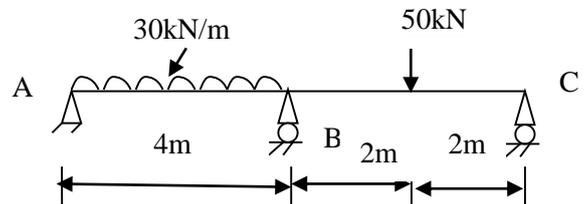


Fig.-2

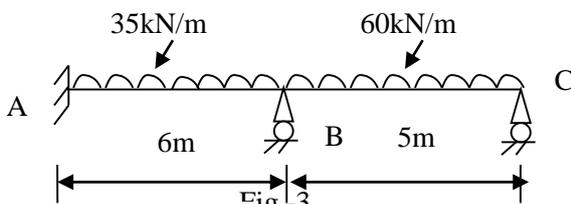


Fig.-3

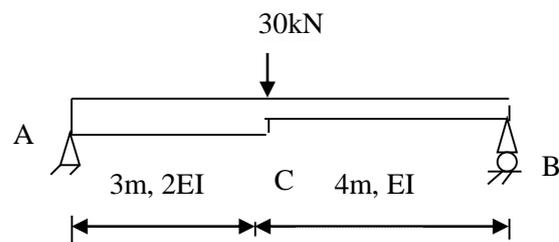


Fig.-4

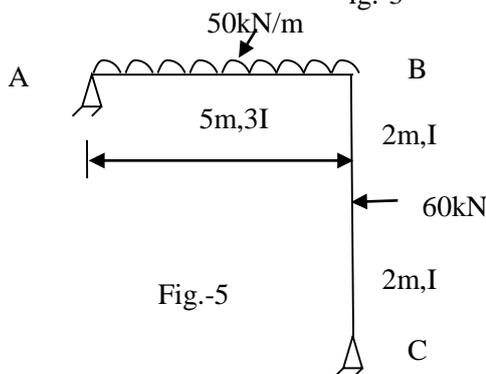


Fig.-5

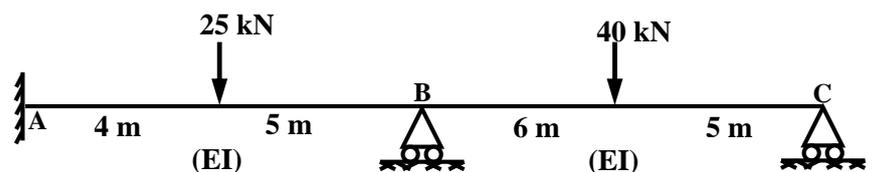


Fig.-6

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