

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V(NEW) EXAMINATION – SUMMER 2022****Subject Code:2150608****Date:20/06/2022****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.

		<b>MARKS</b>
<b>Q.1</b>	(a) State Castigliano's first theorem and its usefulness in analysis of structure.	<b>03</b>
	(b) Characteristics of Stiffness Matrix.	<b>04</b>
	(c) Determine the vertical deflection at free end in the overhanging beam as shown in <b>figure 01</b> . Assume constant EI. Use Castigliano's method.	<b>07</b>
<b>Q.2</b>	(a) Write and explain Muller Breslau's principal.	<b>03</b>
	(b) Draw the Qualitative I.L.D for three span continuous beam. <b>figure 02</b> .	<b>04</b>
	(c) Using Castigliano's theorem Find the vertical deflection of point C for the beam shown in <b>figure 03</b> .	<b>07</b>
<b>OR</b>		
	(c) Find the Displacement at C, as shown in <b>figure 04</b> using Castigliano's theorem. $E = 2 \times 10^4 \text{ N/mm}^2$ .	<b>07</b>
<b>Q.3</b>	(a) Define: ILD, Distribution factor, Carry over factor,	<b>03</b>
	(b) For cantilever of span 'l' draw ILD for support reactions and shear force and bending moment at center.	<b>04</b>
	(c) Analyse the portal frame shown in <b>figure 05</b> by slope deflection equation method and draw the bending moment diagram.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Define: Sway. What are the causes for Sway in portal frames?	<b>03</b>
	(b) What is an influence line diagram? Explain its importance in structural analysis.	<b>04</b>
	(c) Determine support moments using slope deflection method for the frame shown in <b>figure 06</b> . Also draw the bending moment diagram.	<b>07</b>
<b>Q.4</b>	(a) Write assumptions made in slope deflection method.	<b>03</b>
	(b) Define Stiffness. Derive relation between stiffness and flexibility.	<b>04</b>
	(c) A simply Supported beam of span L and flexural rigidity EI is subjected to actions as shown in <b>figure 07</b> . Formulate Flexibility and stiffness matrices and show that F.S=1.	<b>07</b>
<b>OR</b>		
<b>Q.4</b>	(a) Differentiate between pre-tensioning and post-tensioning in detail.	<b>03</b>
	(b) Differentiate: Stiffness method and Flexibility method. Which method is suitable for general computer programming? Why?	<b>04</b>
	(c) Formulate flexibility matrix for a cantilever non-prismatic beam shown in <b>figure 08</b> .	<b>07</b>
<b>Q.5</b>	(a) Explain stiffness factor and Distribution factor in Moment distribution method.	<b>03</b>

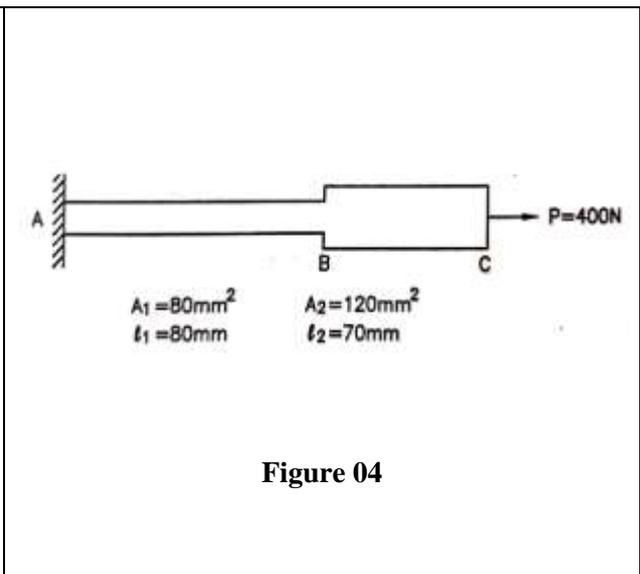
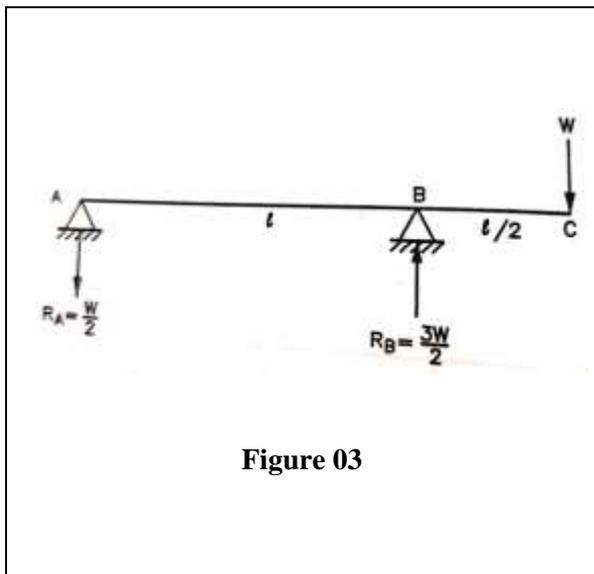
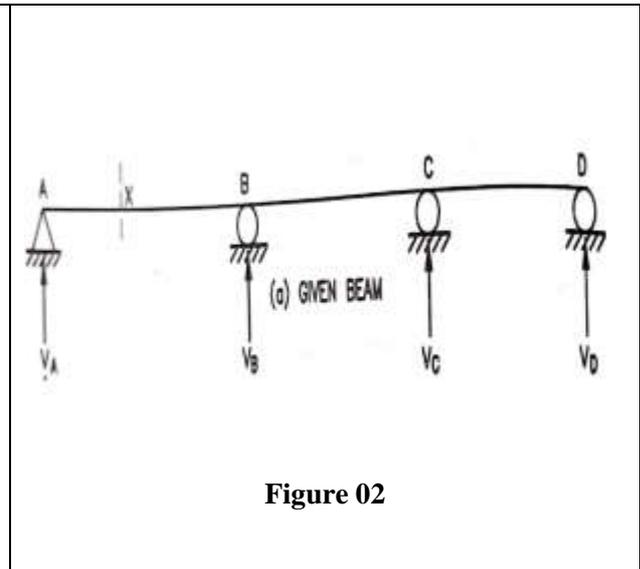
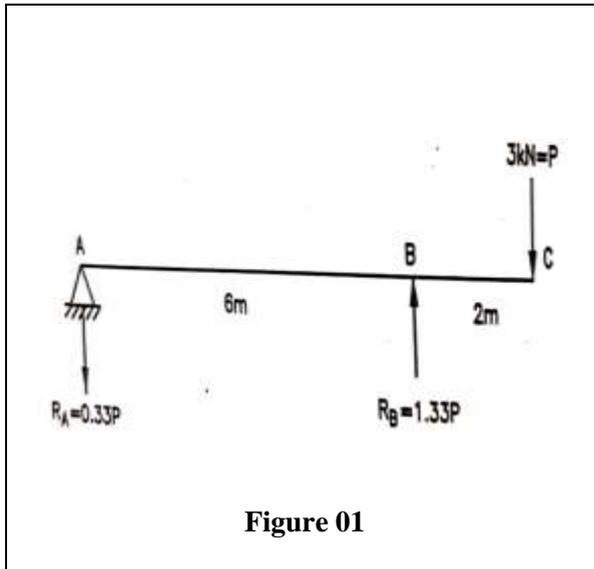
- (b) Generate the flexibility matrix for the simply supported beam AB with the coordinates shown in **figure 09**. 04
- (c) Analyse the frame ABCD loaded as shown in **figure 10**. and plot B.M. diagram. Also draw deflected shape of the structure. 07

OR

- Q.5**
- (a) State Castigliano's second theorem and its usefulness in analysis of structure. 03
  - (b) What is qualitative influence line and quantitative influence line? 04
  - (c) Determine the support moment for a continuous beam shown in **figure 11**. By moment distribution method. Also draw bending moment diagram. 07

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**FIGURES**



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