

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**  
(MID SEMESTER EXAMINATION SP/2025)

CLASS: BTECH  
BRANCH: CIVIL & ENVIRONMENTAL ENGINEERING

SEMESTER : IV/ADD  
SESSION : SP/2025

SUBJECT: CE207 STRUCTURAL ANALYSIS - II

TIME: 02 Hours

FULL MARKS: 25

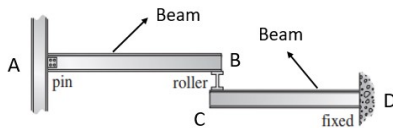
**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

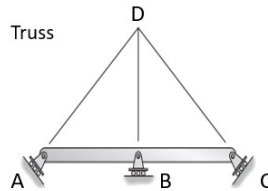
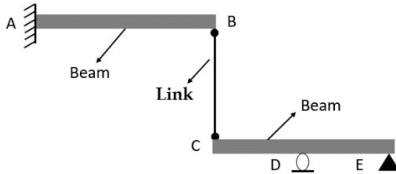
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|--|-----|---|---------------------|
| Q.1(a) Explain briefly about the advantages and disadvantages of statically indeterminate structures.          | [2] | 1 | BL<br>K1, K2,<br>K3 |
| Q.1(b) Calculate the degree of static indeterminacy for the frame shown and classify it as stable or unstable. | [3] | 1 | K1, K2,<br>K3       |



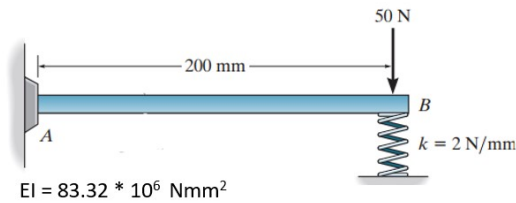
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| Q.2(a) Calculate the degree of static indeterminacy for the following structures and classify these structures as stable or unstable. | [2] | 1 | K1, K2,<br>K3 |
|---|-----|---|---------------|



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| Q.2(b) | [3] | 1 | K1, K2,<br>K3 |
|--------|-----|---|---------------|



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|---|-----|---|---------------|
| Q.3(a) Write a short note on the differences between force method and displacement method of analysis.  | [2] | 1 | K1, K2,<br>K3 |
| Q.3(b) Calculate the unknown reactions/forces (Vertical reaction- $R_A$ , Horizontal reaction- $H_A$ , Moment- $M_A$ , Force in spring- $F_B$ ) for the beam shown below using the method of consistent deformation (Force Method). Take the spring force ( $F_B$ ) as redundant. | [3] | 2 | K4            |



PTO

Q.4(a) Draw the influence line diagram (Qualitative) using the Muller-Breslau Principle for vertical reaction at C for the beam shown below. [2] 2 K4

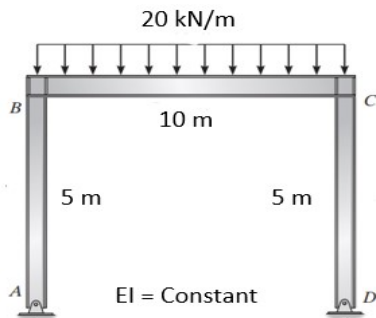


Q.4(b) Draw the influence line diagram (both Qualitative and Quantitative) using the Muller-Breslau Principle for the vertical reaction at B for the beam shown below. Plot the numerical values at locations A, C, B. [3] 2 K4



Q.5(a) What is Principle of Superposition and when it is valid? [2] 2 K1, K2, K3

Q.5(b) Calculate the unknown reactions (Vertical reactions- $R_A$  &  $R_D$ , Horizontal reactions- $H_A$  &  $H_D$ ) for the frame shown below using the method of consistent deformation (Force Method). Take the reaction  $H_D$  as redundant. [3] 2 K4



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