

D-180259**B. Tech. EXAMINATION, 2018**

Semester V (CBS)

STRUCTURAL ANALYSIS-II

CE-502

Time : 3 Hours

Maximum Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt one question from each Sections A, B, C and D. Section E is compulsory.

Section A

- (a) State and explain method of consistent deformations. What is its importance in structural analysis ? 6
- (b) A prismatic propped cantilever AB is loaded with a concentrated load P at each third point. Using the method of consistent deformation, determine the reaction at the prop B. 6

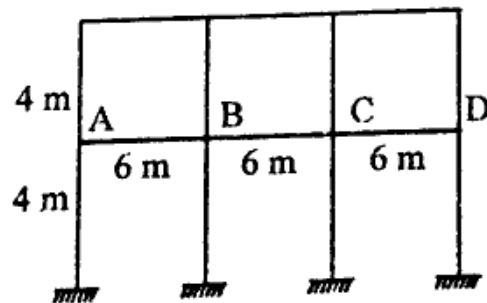
2. (a) State and explain Muller-Breslau Principle. Explain how is it helpful in qualitative plot of influence lines. 6
- (b) Compute the ordinates, at intervals of 2.5 m, of the influence line for moment at A of a prismatic propped cantilever AB. 6

Section B

3. (a) Derive slope-deflection equations, stating clearly the assumptions made in deriving these. 6
- (b) At left end of a member AB = 9 m with partial fixity, the rotation is 0.01 radian clockwise and the settlement is 20 mm. At the right end of the member, the rotation is 0.0075 radian counter-clockwise and the settlement is 15 mm. If the moment of inertia is $180 \times 10^6 \text{ mm}^4$ and Young's modulus is $2 \times 10^5 \text{ MPa}$, calculate the support reactions. The member carries a load of 90 kN at 3 m from the left end A. 6
4. (a) What is sway correction factor ? Derive it for a single bay-single storey portal frame. 6
- (b) Derive the expressions for Carryover factor and Stiffness of a beam. 6

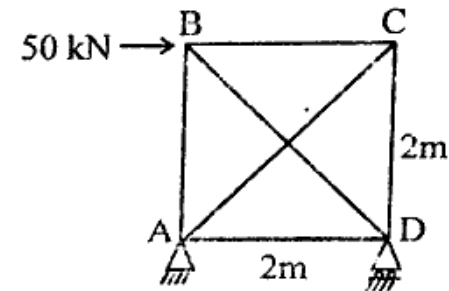
Section C

5. (a) What is a substitute frame ? Draw a typical multistorey frame and draw a substitute frame for the analysis of 2nd storey. Also, show typical live loads for finding : Design positive moment at mid-span of a beam, design negative moment at mid-span of a beam and design negative moment in a beam near column. 6
- (b) State and explain clearly the assumptions made in the Portal method and Cantilever method for the approximate analysis of multistorey frames subjected to horizontal forces. Also compare the two methods. <https://www.hptuonline.com> 6
6. In a multistoreyed building, the frame shown below are spaced at 4 m intervals. Dead load from the slab is 3 kN/m^2 and the live load is 5 kN/m^2 . Analyze the beam BC for mid-span positive bending moment. Self weight of the beams may be ignored. Use two-cycle method. 12

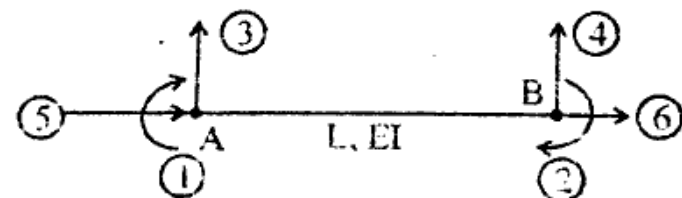


Section D

7. (a) Bring out clearly the similarities and dissimilarities of the flexibility and stiffness matrix methods of structural analysis. 6
- (b) Analyze the pin-jointed frame shown below by flexibility method. Hence determine the force in member AC. All members have the same cross-sectional area. (



8. (a) Define the flexibility and stiffness with respect to axial, transverse, bending and torsional displacements. 6
- (b) Develop the stiffness matrix for the end-loaded prismatic member AB with reference to the coordinates shown below : 6



Section E

9. (a) State clearly Castigliano's theorems.
(b) Define an influence line. State its uses.
(c) Differentiate clearly between Carryover factor and Distribution factor.
(d) Define a substitute frame. Why substitute frame method is also known as two cycle method ?
(e) Clearly differentiate between member and global coordinates.
(f) Define statically determinate and statically indeterminate structures. $2 \times 6 = 12$

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