

Roll No.

Total No. of Questions : 09]

[Total No. of Pages : 04

B.Tech. (Sem. - 5th)

STRUCTURAL ANALYSIS - II

SUBJECT CODE : CE - 305

Paper ID : [A0614]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

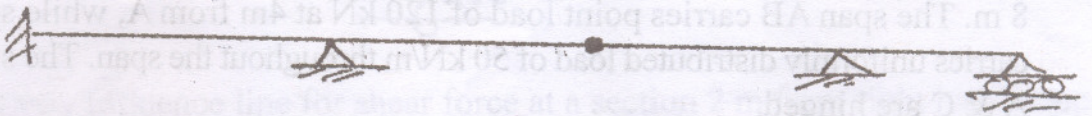
- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A

Q1)

(10 × 2 = 20)

- a) Find degree of indeterminacy for the beam for general case of loading



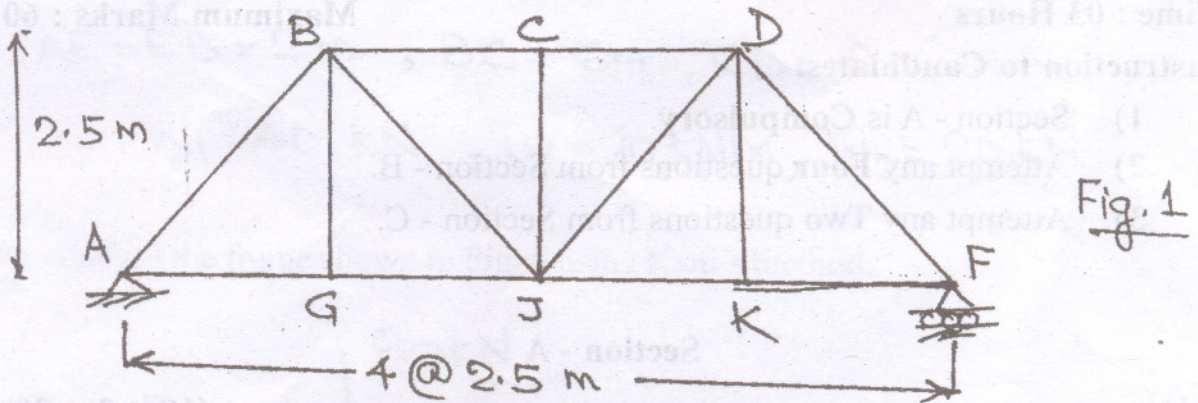
- b) "A continuous beam is essentially a statically indeterminate structure." Give your comments.
- c) Define relative stiffness.
- d) What is the main difference in portal method & cantilever method?
- e) Draw diagram to show 2 types of substitute frames.
- f) 'If in a frame, axis of symmetry passes through the columns (interior), it is sufficient to analyze half the frame in respect of Kani's method'. Give your comments.
- g) What is Tension Coefficient?
- h) Where & how influence lines are used?
- i) What is the value of fixing moment in a fixed beam carrying central load of 10kN and having span 2 m?
- j) Define Clapeyron's theorem of three moments.

Section - B

(4 × 5 = 20)

Q2) The frame shown in figure 1 consists of 4 panels each 2.5 m wide. The cross-sectional area of members is such that when the frame carries equal loads at panel points of the lower chord, stresses in all tension members is 100 N/mm^2 and stresses in all compression members is 90 N/mm^2 . Determine the relative movement between the joints C & K in the direction CK.

Take $E = 2 \times 10^5 \text{ N/mm}^2$



Q3) A continuous beam ABC consists of two spans AB & BC of lengths 6 m and 8 m. The span AB carries point load of 120 kN at 4m from A, while span BC carries uniformly distributed load of 50 kN/m throughout the span. The supports A & C are hinged.

Draw S.F. & B.M. Diagrams.

Q4) Analyse the two storey three bay frame shown in Fig. 2 by cantilever method. Determine B.M. & draw B.M. Diagram Assume interior columns to have twice as much area as exterior columns.

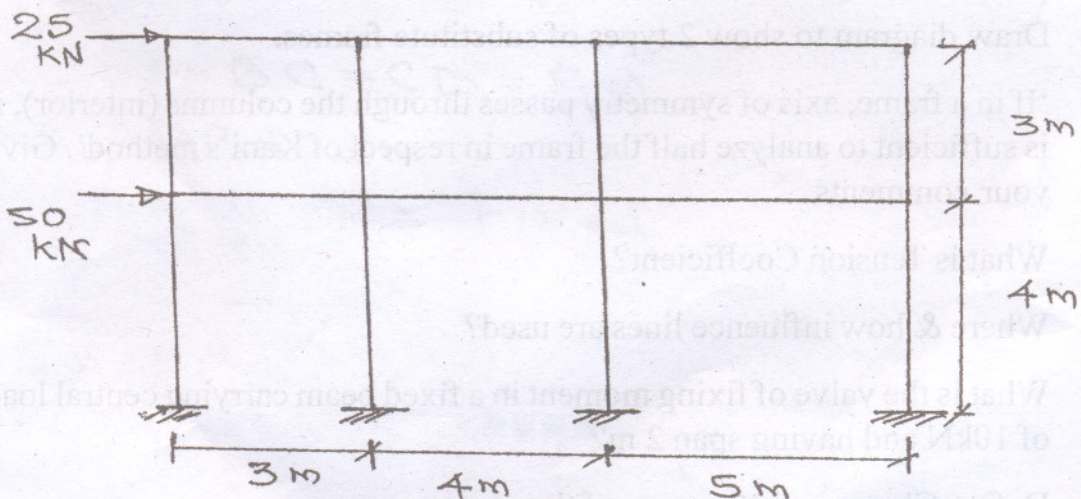


Fig. 2

Q5) Analyse the space frame shown in Fig. 3 by method of tension coefficients.

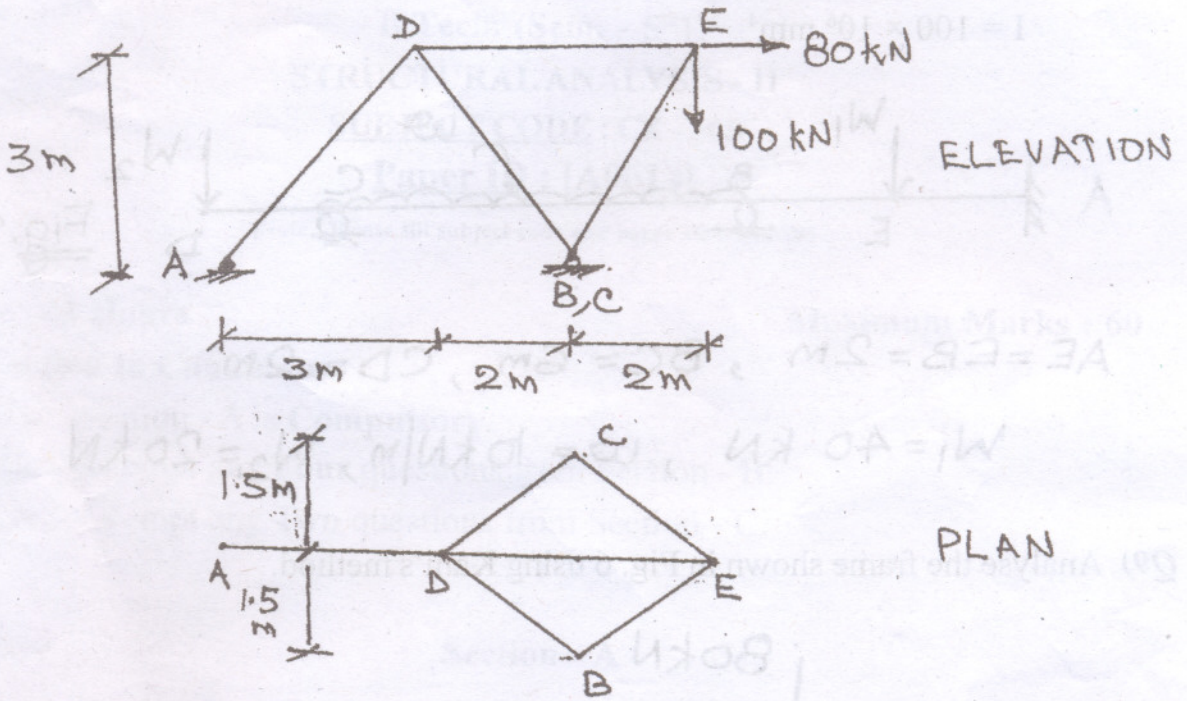


Figure 3

Q6) Draw Influence line for shear force at a section 2 m from right hand support of a simply supported beam having 10 m span. Determine value of S.F. when a udl of 5 m long is placed with its one end 2 m from left hand support.

Section - C

(2 × 10 = 20)

Q7) A portal frame ABCD shown in fig 4. Find support reactions and bending moment in the frame using slope deflection method. Draw B.M. Diagram.

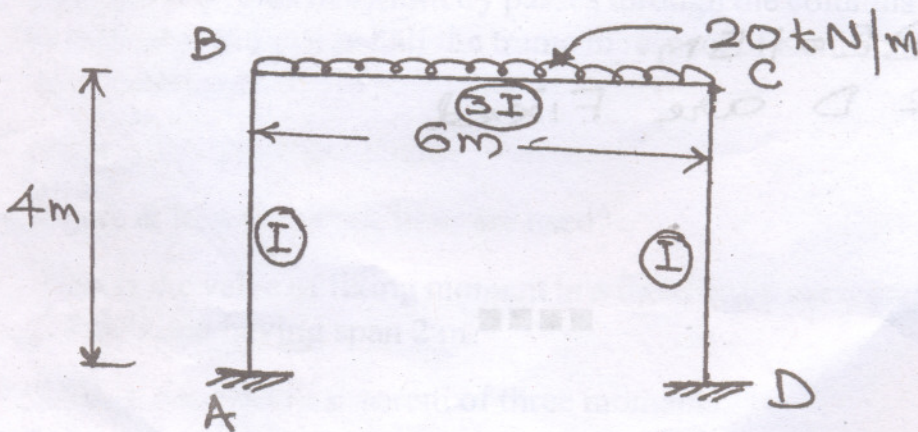
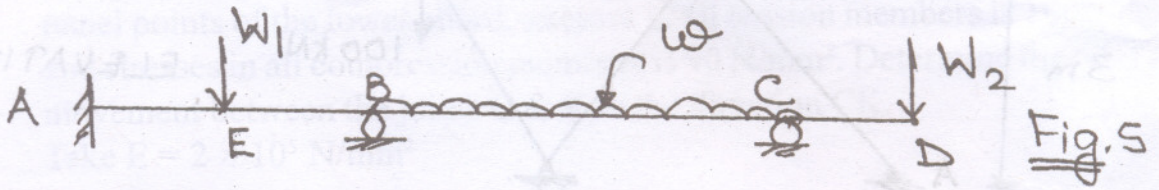


Fig. 4

Q8) For a continuous beam shown in Fig 5, Determine the support moments using moment distribution method. Support B sinks by 10 mm.

$$E = 2 \times 10^5 \text{ N/mm}^2$$

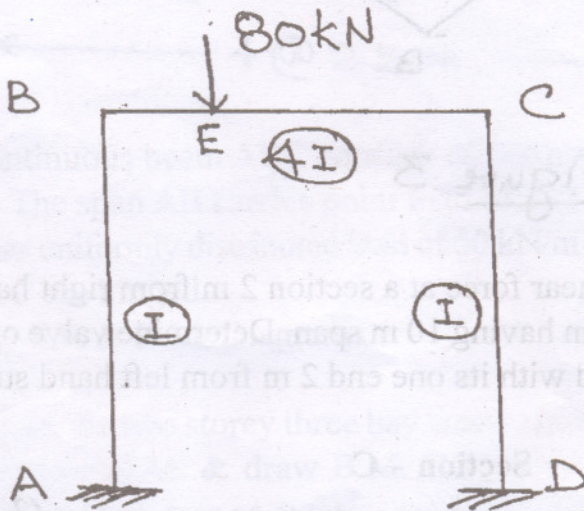
$$I = 100 \times 10^6 \text{ mm}^4$$



$$AE = EB = 2 \text{ m}, \quad BC = 6 \text{ m}, \quad CD = 2 \text{ m}$$

$$W_1 = 40 \text{ kN}, \quad w = 10 \text{ kN/m}, \quad W_2 = 20 \text{ kN}$$

Q9) Analyse the frame shown in Fig. 6 using Kani's method.



$$AB = BC = CD = 5 \text{ m}$$

$$BE = 1.5 \text{ m}$$

A & D are Fixed