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25226

4 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Answer each next main Question on a new page.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
(7) Use of Steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. **Attempt any FIVE of the following:** **10**
- a) State the expression for relationship between bending moment, slope and deflection.
 - b) Define perfect and imperfect frame.
 - c) Define fixed Beam.
 - d) Define carry over moment and stiffness factor.
 - e) Enlist any four types of Trusses.
 - f) Draw a sketch of portal frame symmetrical and having one bay and three storey.
 - g) Define slope and deflection of a beam.

P.T.O.

2. Attempt any THREE of the following: 12

- A simply supported beam carries udl at 5 kN/m over entire span. Find maximum slope and maximum deflection.
Take $E = 2 \times 10^5 \text{ N/mm}^2$ $I = 2 \times 10^8 \text{ mm}^4$.
- What are the boundary conditions for simply supported, cantilever and fixed beams.
- A fixed beam of span 6 m carries an udl of 20 kN/m over entire span. Find fixed end moment from first principle and draw BMD.
- Calculate the support moments of continuous beam simply supported at A, B and C. Span AB = 4 m span BC is 5 m. Span AB carries point load 75 kN at 1.5 m from A and span BC carries udl of 25 kN/m. Use three moment theorem.

3. Attempt any THREE of the following: 12

- State and explain Clapeyron's theorem of moments.
- State advantages and disadvantages of fixed beam over simply supported beam.
- Determine distribution factors for a simply supported beam continuous over support B and C and simply supported at A and D.

$$AB = BC = CD = 6 \text{ m and}$$

$$I_{AB} = I, \quad I_{BC} = 2I \text{ and } I_{CD} = 1.5 I.$$

- State the four assumptions made in analysis of simple frame.

4. Attempt any THREE of the following: 12

- Draw sketches of any four types of trusses.
- Calculate fixed end moment for the fixed beam shown in Figure No. 1.

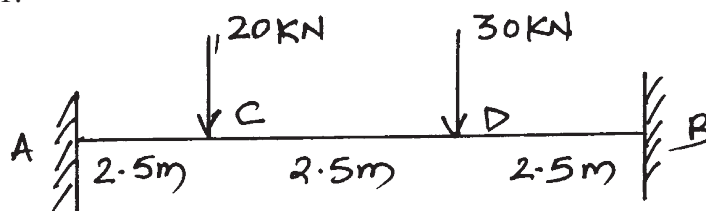


Fig. No. 1

- c) Explain the concept of imaginary span.
- d) A continuous beam ABC 10 m long rests on three supports A, B and C at same level and loaded as shown in Figure No. 2. Determine support moments and draw BMD. Use moment distribution method.

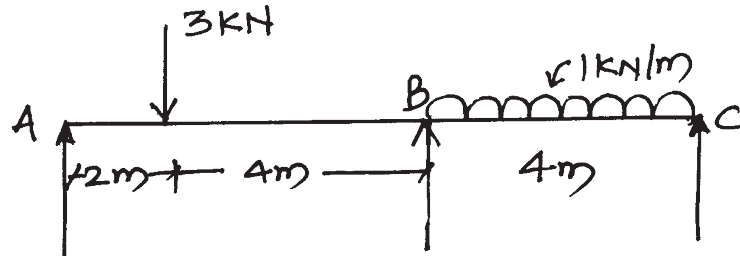


Fig. No. 2

- e) Calculate deflection under point load of simply supported beam shown in Figure No. 3. Take EI – constant. Use Macaulay's method.

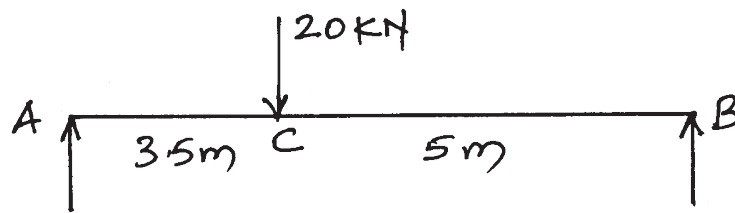


Fig. No. 3

5. Attempt any TWO of the following:

12

- a) A continuous beam ABC is fixed at A and supported at B and C such that $AB = 6$ m, $BC = 5$ m. Span BC carries a udl of 45 kN/m. Calculate support moments using Clapeyron's theorem and draw B.M. diagram.
- b) Explain radius of curvature and stiffness of beam. Also draw a sketch of elastic curve for a beam subjected to central point load.
- c) A cantilever beam 2 m long carries a udl of 10 kN/m over 1 m from fixed end and a point load of 20 kN at free end. Calculate maximum slope and deflection.

6. Attempt any TWO of the following:

12

- a) Determine forces in members AB, AD, DE use method of joints. Refer Figure No. 4.

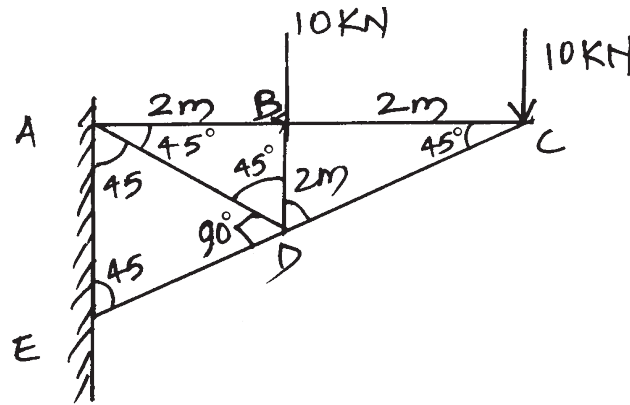


Fig. No. 4

- b) Determine forces in AB, BC and CD by using method of section Refer Figure No. 5.

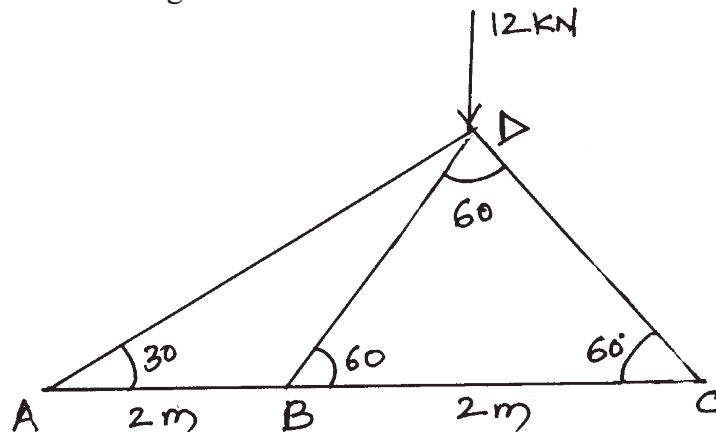


Fig. No. 5

- c) Explain the procedure of moment distribution method.
