

22402

23242

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) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following: 10**
- a) State the expression for Direct Stress and Bending Stress with neat sketch.
 - b) State the Equation for slope and deflection for cantilever beam of span L subjected to udl over entire span.
 - c) State the principle of superposition with one example.
 - d) Define the core of a section, sketch resultant stress diagram if load acts on the boundary of core of section.
 - e) State the effect of continuity in case of continuous beam.
 - f) Define symmetrical portal frame with neat sketch.
 - g) Define carry over moment and stiffness factor.
 - h) State the condition for redundant and non-redundant frames.

P.T.O.

2. Attempt any THREE of the following:**12**

- a) Draw stress distribution diagram for
 - i) $\sigma_a > \sigma_b$
 - ii) $\sigma_a = \sigma_b$
 - iii) $\sigma_a < \sigma_b$
- b) State with expression four conditions of stability of dam.
- c) A hollow circular column having external diameter 500 mm and internal diameter 300 mm carries an vertical load of 200KN acting at an eccentricity of 60 mm from C.G. Calculate maximum and minimum stress developed.
- d) A Tall chimney, Hollow square in cross section is 2 m $\times$ 2 m externally and 0.5 m thickness of wall. It is subjected to uniform horizontal wind pressure 1.25 KPa on one of its faces. The unit weight of masonry is 20KN/m³. Determine the maximum height of chimney for no tension anywhere in the base.

3. Attempt any THREE of the following:**12**

- a) A beam of span 3 m is simply supported and carries u.d.l. of W kN/m. If the slope at the ends does not exceed 1° degree. Find the maximum deflection.
- b) A uniform beam AB of span 6 m fixed A and B. It is loaded with u.d.l. of 4KN/m over the entire span in addition to a concentrated load of 12 KN at 4 m from support A. Determine the support moments.
- c) A fixed beam of span 6 m carries a central point load of 120 KN using first principle. Calculate the fixed end moments.
- d) State the advantage and disadvantage of fixed beam.

4. Attempt any THREE of the following:

12

- a) State Clapeyron's theorem of three moment for same and different EL. Also state the meaning of each term involved.
- b) Using theorem of three moment, draw SFD for a continuous beam as shown in Fig. No. 1 having negative B.M. at support B as 66.14 KN/m

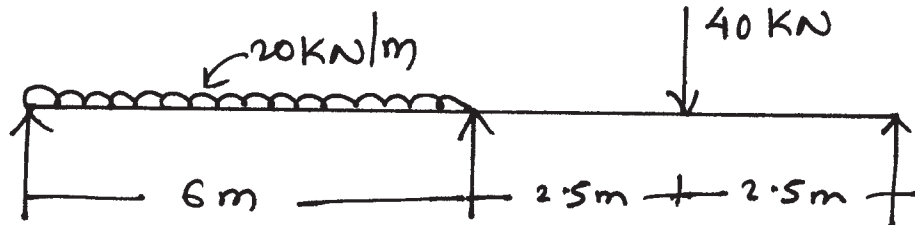


Fig. No. 1

- c) State the assumptions for analysis of perfect frame.
- d) Calculate support moments and draw BMD of a beam as shown in Fig. No. 2. Use moment distribution method.

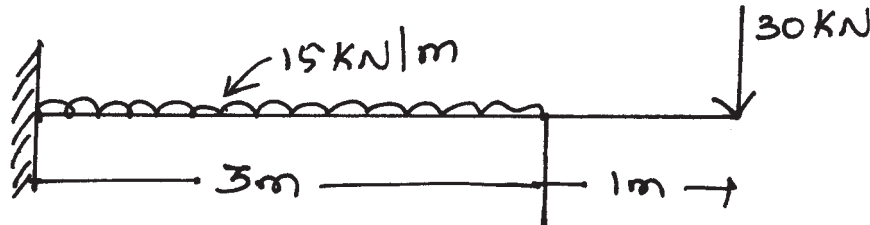


Fig. No. 2

- e) Calculate distribution factor for the members OA, OB, OC and OD for the joint 'O' as shown in Fig. No. 3.

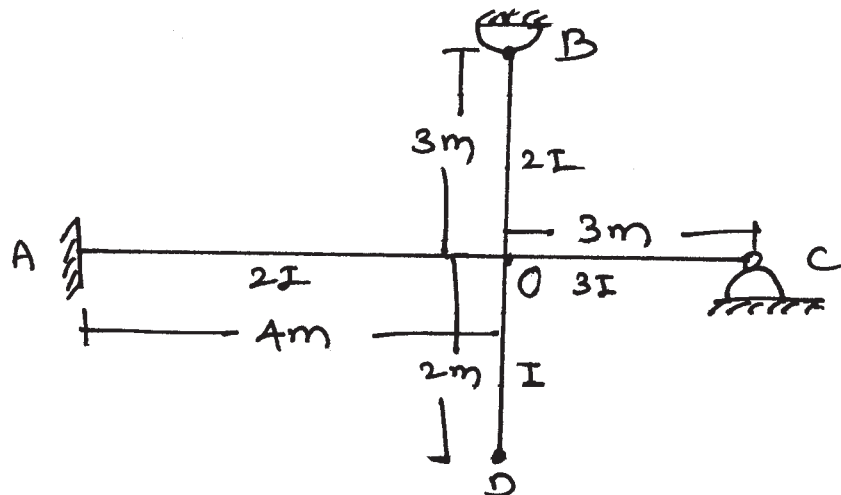


Fig. No. 3

P.T.O.

5. Attempt any TWO of the following:

12

- a) A simply supported beam of span 6 m carries a point load of 18kN and 60kN at 1 m and 4 m from left support. Calculate the deflection below 18kN load using Macaulay's method. Also determine the slope below 60 kN load. Take $E = 200 \text{ GPa}$ and $I = 0.733 \times 10^{-4} \text{ m}^4$.
- b) A cantilever ABCD is fixed at A and carries a u.d.l. of 20 kN/m on portion AB and a point load of 20kN at C, such that $AB = 4 \text{ m}$, $BC = CD = 2 \text{ m}$. Find the deflection at B and slope at C in terms of EI.
- c) A continuous beam ABCD is loaded and supported as shown in Fig. No. 4. Using three moments theorem. Calculate support moment and draw B.M. Diagram.

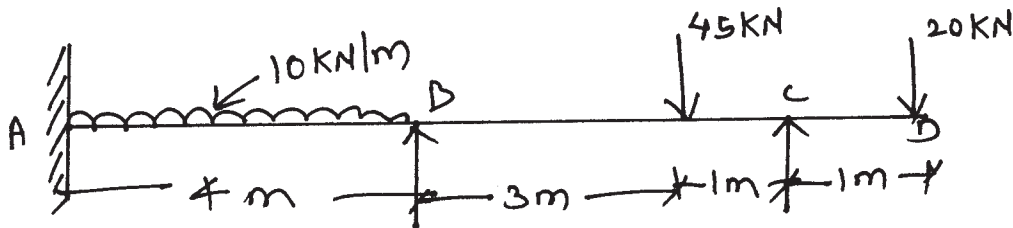


Fig. No. 4

6. Attempt any TWO of the following:

12

- a) Determine Support moment by moment distribution method for a given continuous beam as shown in Fig. No. 5.

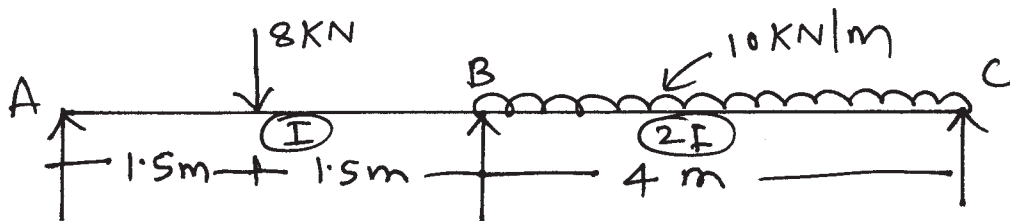


Fig. No. 5

- b) A cantilever truss as shown in Fig. No. 6. Find the forces in the member BF, EC, EF and FC method of Joint.

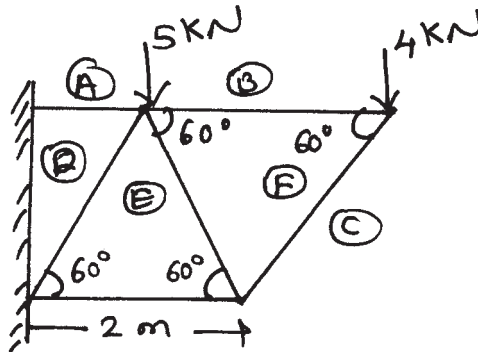


Fig. No. 6

- c) Determine the forces in any six members of the truss as shown in Fig. No. 7. Tabulate the results using method of section.

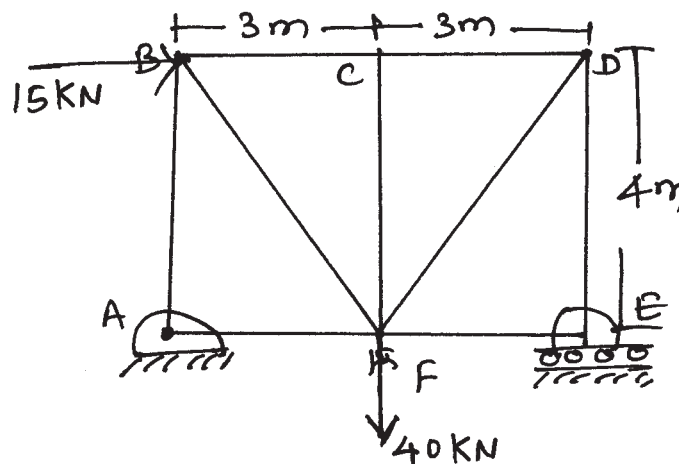


Fig. No. 7