17422

21415

4 Hours / 100 Marks **Seat No.** | | | | | | | | |

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.

Marks

1. (A) Attempt any SIX : **12**

(a) Define eccentric load and state its effect on section.

(b) Define slope and deflection of a beam.

(c) State relation among bending moment slope, deflection and radius of curvature.

(d) State max, deflection and slope for a simply supported beam of span 'L' carries a point load 'W' at its center.

(e) State the boundary conditions for fixed end w.r.t. slope and deflection.

(f) Define carry over factor and distribution factor.

(g) Giving diagram, define symmetrical portal frame.

(h) List out different types of roof trusses. Any four.

(B) Attempt any TWO : **8**

(a) Draw resultant stress diagrams for $\sigma_o < \sigma_b$, $\sigma_o = \sigma_b$, $\sigma_o > \sigma_b$.

(b) Define core of section and state middle third rule.

(c) (i) State assumptions made in analysis of roof stress. – Any four.

(ii) Define redundant frame and state its condition.

P.T.O.

2. Attempt any FOUR : **16**

(a) A tie member 120 mm wide carries an eccentric load of 140 kN at an eccentricity of 7 mm in a plane bisecting the thickness. Find out minimum thickness of tie, if the permissible tensile stress is 100 MPa.

(b) A masonry wall 10 m height, 3 m wide and 1.5 m thick weighs 900 kN subjected to wind pressure of 1200 N/m^2. Find maximum and minimum stress intensities induced at the base.

(c) Calculate dimensions of core of section for hollow rectangular section having inside dimension as 250 mm × 450 mm with 25 mm wall thickness. Show it on the sketch.

(d) A wooden cantilever beam of span 1.5 m has cross section 100 mm × 200 mm deep. Find the slope and deflection at free end when a point load of 10 kN is applied at 0.5 m from free end. Take E = 90 kN/mm^2.

(e) A cantilever of span 'L' carries udl 'w' over entire span and a point load W at free end. Find maximum slope and deflection of a beam.

(f) (i) State effect of continuity in case of continuous beam.

(ii) State the concept of zero span.

3. Attempt any FOUR : **16**

(a) State the boundary conditions for free end and hinged end w.r.t. slope and deflection.

(b) A cantilever of 130 mm × 180 mm deep projects 2 m out of wall carries point load of 30 kN at 1 m from free end. Find slope and deflection below point load. Take E = 105 kN/mm^2.

(c) State how net BM is find out for a fixed beam using superposition theorem. Explain it with sketch.

(d) Using first principle find fixed end moment for a fixed beam carrying point load at mid span.

(e) Explain with sketch, perfect and imperfect frames.

(f) Using method of section find the forces in the member BC, BE & FE of the frame as shown in figure-1.

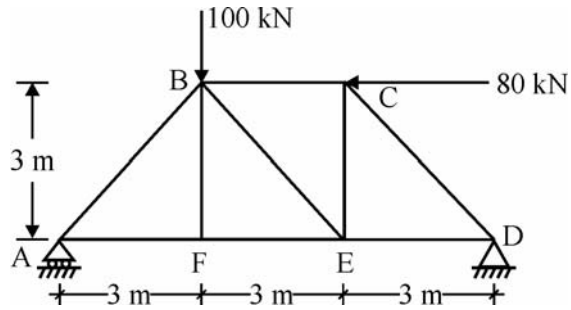

Fig. – 1

4. Attempt any FOUR : **16**

(a) Explain the Clapeyron's theorem and define each term used for equal and unequal M.I.

(b) Determine the support moment and draw only S.F.D. for the beam shown in fig.-3 using three moment theorem.

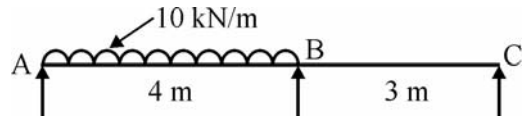

Fig. – 3

(c) A beam ABC simply supported at A, B and C, AB = 6 m and carries udl of 12 kN/m for entire length. BC = 4 m and carries a point load of 12 kN at 1 m from C. Calculate support moments by three moment theorem.

(d) Define stiffness of beam and state stiffness factors for beam with far end fixed and simply supported end.

(e) Determine the distribution factors for the support B & C for the beam shown in fig.-4.

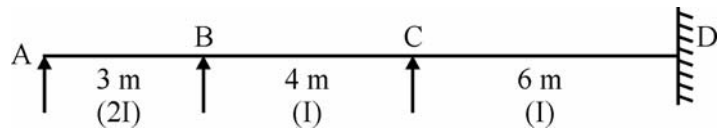

Fig. – 4

(f) Calculate the support moment for the beam shown in fig.-5 using moment distribution method. SFD & BMD is not required.

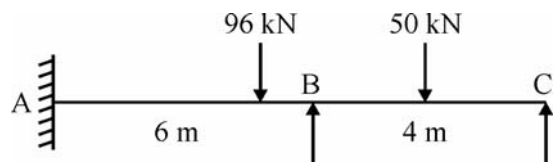

Fig. – 5

5. Attempt any TWO : **16**

(a) A circular chimney having external diameter three times internal diameter and 8 m height. It is subjected to wind pressure 1500 Pa. Weight of masonry 20 kN/m^3. Calculate external and internal diameter so that no tension will be developed in the masonry. Sketch the stress distribution diagram. Take coefficient of wind resistance as 0.67.

(b) A continuous beam of uniform rigidity is fixed at A and simply supported at B and C. AB = 6 m and carries udl of 40 kN/m and BC = 8 m carries 80 kN point load at its mid-span. Using moment distribution method calculate the support moment and draw BMD.

(c) Using method of joints, find the forces in the members AB, BF, CE and ED of the truss given in fig.-2. Tabulate the result.

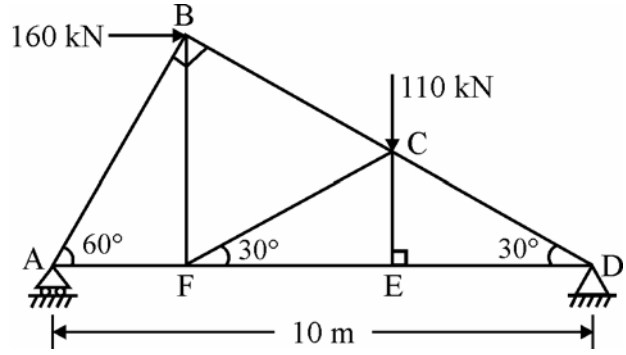

Fig. – 2

6. Attempt any TWO : **16**

(a) A simply supported beam of 6 m span carries an Udl of 20 kN/m over entire beam and a point load of 60 kN at 2 m from right hand support using Macaulay's method, locate the point of maximum deflection and find its value in terms of EI.

(b) A fixed beam of span 8 m carries 5 kN/m udl over entire length along with a point load of 40 kN at 2 m from left hand support. Find net BM at point load and draw BMD and SFD.

(c) A continuous beam ABC is simply supported at A, B & C. AB = 5 m and carries udl of 40 kN/m, BC = 4 m and carries point load at 2 m from C of 50 kN. Draw BMD and SFD. Using Clapeyron's theorem of moments.

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