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Question Paper Code : 71783

M.E. DEGREE EXAMINATION, JUNE/JULY 2013.

Second Semester

Structural Engineering

ST 9223/ST 923/UST 9123/10211 SE 202 — STEEL STRUCTURES

(Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term Euler column.
2. Draw a line sketch of industrial frame for a span of 20 m span and mention the components involved.
3. Define the term mechanism. List out possible mechanisms in plastic theory.
4. Distinguish between stiffened and un- stiffened seated connections.
5. Mention the different types of bracing systems adopted for towers.
6. How towers are analyzed as per Indian standards?
7. What precautions to be considered at the time of erection of larger span beams?
8. Mention the tensile strengths of structural steels used in IS and ACI codes.
9. How to control flange curling in tight gauge steel beams?
10. Distinguish between local and later buckling.

PART B — (5 × 16 = 80 marks)

11. (a) Design a suitable purlin section for an industrial building situated in Chennai to support a zinc coated iron sheet for roofing with load of 110 kN/m^2 for the following data: Span of the industrial building 15 m; spacing of truss = 5.5 m; spacing of purlins = 1.6 m; Wind intensity = 2 kN/m^2. (16)

Or

(b) Design a stiffened seated connection between a main beam ISWB 600 and a secondary beam ISMB 450 on one side of the web of the beam. The secondary beam transmit a shear force or 300 kN. (16)

12. (a) A bracket is welded to the steel column 250 mm wide as shown in Fig 1. Calculate the length and size of the fillet weld. (16)

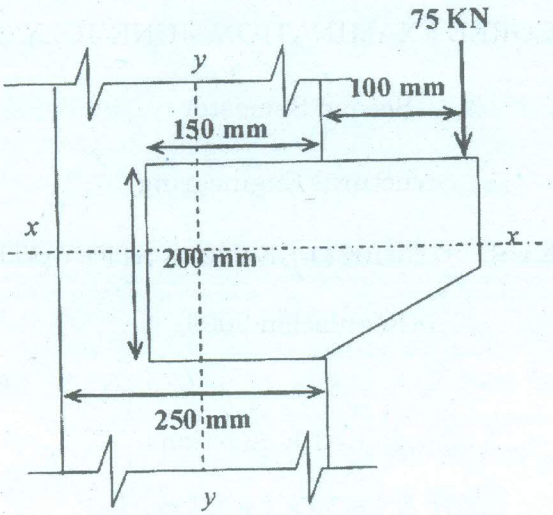

Fig.1

Or

(b) Determine the size of the fillet weld required for the bracket as shown in Fig. 2. The length of the horizontal and vertical welds are 150 mm and 300 mm respectively. (16)

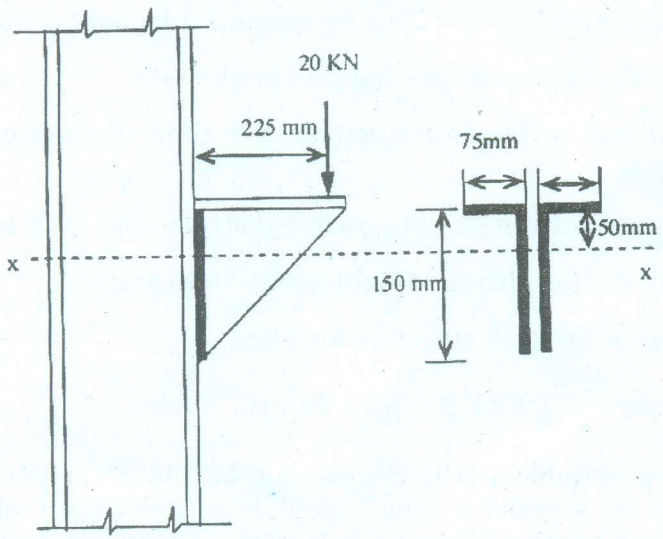

Fig.2

13. (a) (i) List out the assumptions involved in the analysis of transmission line towers. (5)

(ii) Types of loads to be considered in the analysis of transmission line towers. (5)

(iii) List the various bracings patters used in the analysis of transmission line towers. (6)

Or

(b) A self supporting steel chimney is 100 m height and its diameter at top is 2.5 m. Design the following (i) thickness of the plates for the chimney (ii) base plate (iii) Lugs (iv) Anchor bolts. The wind pressure on steel chimney at different elevations are as follows : up to 30 m height 1.75 kN/m^2 ; at 40 m height 1.52 kN/m^2 ; at 50 m height 1.6 kN/m^2 ; at 60 m height 1.63 kN/m^2 at 70 m height 1.68 kN/m^2 ; at 80 m height 1.70 kN/m^2 ; at 90 m height 1.73 kN/m^2 ; at 100 m height 1.76 kN/m^2. (16)

14. (a) Figure 3 shows an annealed mild steel cantilever beam and the associated results obtained from a load test. Calculate the values of Young's modulus and yield stress for the material. Also calculate the expected value of ultimate load, the extreme fibre strain at the support when the beam is supporting 10 kg. When load reaches the ultimate load, over what distance does the region of plasticity extend. (16)

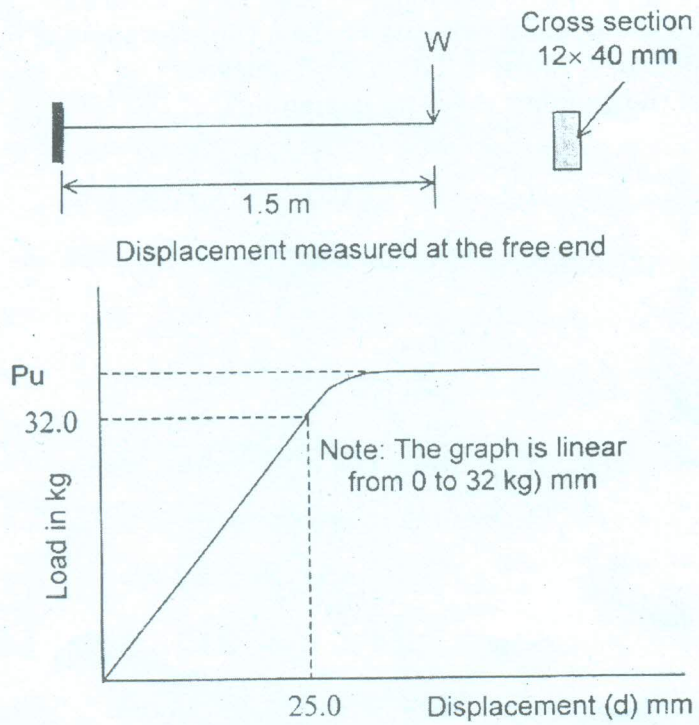

Fig. 3

Or

(b) Determine the collapse load for a frame carrying a crane girder as shown if Fig. 4.

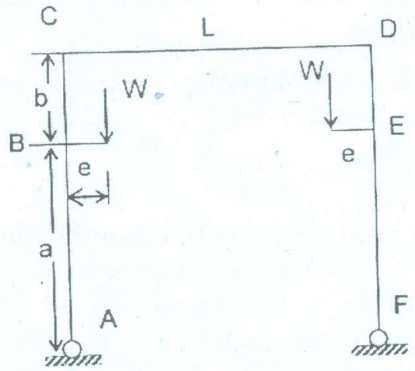

Fig. 4

15. (a) Calculate the axial capacity of the a thin rectangular hollow section of size 120 mm × 180 mm has a wall thickness of 1.4 mm and a radius of 6 mm. The effective length of the member is 3.3 m. Assuming f_y = 250 MPa.

Or

(b) Calculate the flexural capacity of the a thin rectangular hollow section of size 150 mm × 280 mm has a wall thickness of 1.8 mm. The effective length of the member is 5.2 m. Assuming f_y = 200 MPa.