R 8141

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Fifth Semester

Civil Engineering

CE 332 — STRUCTURAL DESIGN — I

ne : Three hours Maximum : 100 marks

Answer ALL questions.

Use of IS-800-1984 IS-875-1987 and steel tables are permitted.

PART A — (10 × 2 = 20 marks)

1. State the objectives of structural design.

2. Define allowable stress and ultimate stress.

3. Write Unwin's formula.

4. Sketch an unstiffened seat connection.

5. How will you calculate net section area in chain riveting?

6. What are the functions of a 'Lacing system' provided in built up columns?

7. Write the expressions for Maximum permissible shear and bearing stress as per IS code.

8. What do you understand by 'economical depth' of plate girder? Write an expression for this depth.

9. Briefly explain 'seasoning' of timber.

10. Sketch any two types of Flitched beam sections.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the various loads to be considered in structural design. (10)

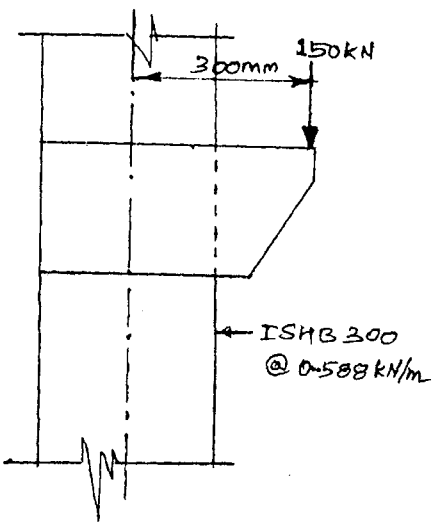
(ii) List the advantages of structural steel elements. (6)

Or

(b) (i) Explain with neat sketches the use of any five type of Indian standard rolled steel sections. (10)

(ii) Briefly discuss the application of cold formed (light gauge) steel structural elements. (6)

12. (a) Design a bracket connection shown in Figure 1 carrying an eccentric load of 150 kN at an eccentricity of 300 mm. (16)



Or

(b) (i) Two plates of 14 mm thick are joined by

(1) single 'V' butt weld and

(2) double 'V' butt weld. Determine the strength of welded joint in tension in each case. The effective length of weld is 200 mm. (8)

(ii) The horizontal tie member of a roof truss is carrying a pull of 120 kN on side and 50 kN on the other side. It is designed with 2 ISA 80 mm × 50 mm × 10 mm angles. Design the suitable welded connection. (8)

13. (a) The main tie of a roof truss has to carry a load of 800 kN. Design

(i) a suitable double angle section

(ii) a suitable riveted connection to join the member to the gusset plate.

Or

(b) Design a built up column section to carry an axial load of 800 kN. Adopt channel sections with battens. The length of column is 6 m and the ends and effectively held in position but not restrained against rotation.

14. (a) An ISLB 600 @ 955 N/m has been used as a simply supported beam over 4.20 m span. The ends of the beam are restrained against torsion but not against lateral bending. Determine the safe uniform load that the beam can carry. Assume f_y = 340 N/mm^2.

Or

(b) A plate girder has to be designed for the following data :

Span of Girder = 14 m

D.L. including self weight = 56 kN/m

L.L. (super imposed) = 60 kN/m

Concentrated loads = 2 Nos of 800 kN, 4 m from each supports

Yield stress = 250 Mpa

Design the mid span section and check the stresses.

15. (a) Design a SAL wood column to carry an axial load of 300 kN. The unsupported length is 4 m. The section should be

(i) Solid

(ii) Built up solid.

Or

(b) A simply supported timber beam has an effective span of 7.20 m. It carries a UDL of 42 kN/m inclusive of its own weight. The beam is made of DEODAR wood. Design a built up section and check its strength and stiffness.
