Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 31008

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fifth Semester

Civil Engineering

080100030 — BASIC STRUCTURAL DESIGN

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

Assume suitable data wherever necessary.

Use of IS 800-2007, IS 883-1994 and IS 1905-1987 are permitted.

PART A — (10 × 2 = 20 marks)

1. How are structures classified based on their functions?

2. What are the features of the load and resistance factor design?

3. What are the reasons for riveting to become obsolete?

4. What is the major difference between a joint with black bolts and a joint with HSFG bolts?

5. Under what circumstances are slot and plug welds used?

6. What is meant by moment resistant welded connection?

7. State the two conditions for which the stability of any proposed masonry dam is to be examined?

8. List the important functions of bed stones.

9. What are the factors that influence the factor of safety in timber?

10. What is the use of modular ratio in the analysis of flitched beams?

PART B — (5 × 16 = 80 marks)

11. (a) Illustrate briefly various stages of iterative structural design process with the help of a flow chart.

Or

(b) Explain briefly the steps involved in the computation of design wind pressure on the proposed building to be constructed at some distance from the base of the hill.

12. (a) Two plates 10 mm and 18 mm thick are to be joined by double cover butt joint. Design the joint for the following data.

Factored design load = 750 kN

Bolt diameter = 20mm

Grade of steel = Fe 410

Grade of bolts = 4.6

Cover plates 2 (one on each side) = 8 mm thick.

Or

(b) Determine the safe load that can be carried by the joint shown in figure 12.(b). The bolts used are 20 mm diameter of grade 4.6. The thickness of flange of I section is 9.1 mm and that of the plate is 10 mm. The edge distance of bolts is 40 mm and the pitch of bolts is 80 mm.

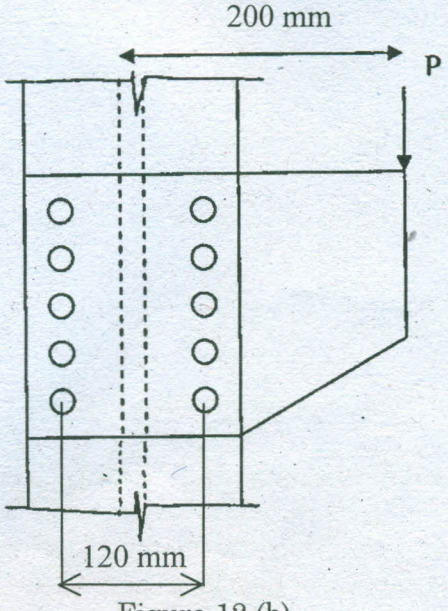

Figure 12 (b)

13. (a) A joist cutting is used as a bracket to support a factored load of 200 kN. It is welded to the column flange as shown in figure 13 (a). Compute the size of the fillet weld.

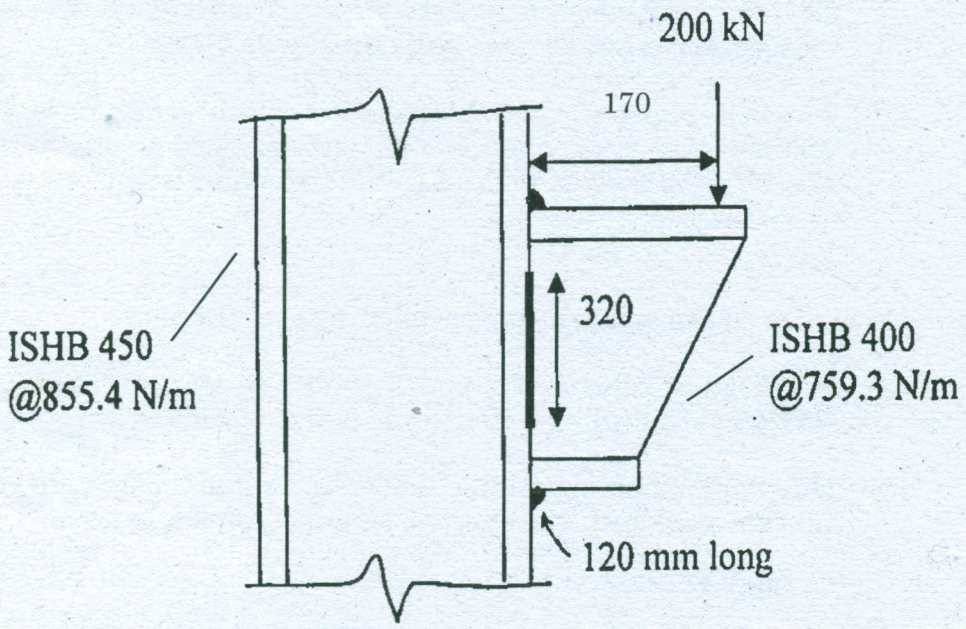

Figure 13 (a)

Or

(b) Design a connection to join two plates of size 250 mm × 12 mm of grade Fe 410 to mobilize full plate tensile strength in shop fillet welds, if

(i) a lap joint is used

(ii) a double cover butt joint is used. (8 + 8)

14. (a) In a brick masonry wall of a room, 5 m long, 300 mm thick and 3.5 m high, there are three window openings 0.9 m wide and 1.5 m high. The piers between the windows are 200 mm wide each. If the load per metre length of the wall at lintel level is 40 kN/m, determine what minimum mortar strength must be used in the pier. Strength of the bricks may be taken as 9 MPa.

Or

(b) Design a gravity retaining wall, 5m high with vertical back to retain a dry cohesionless backfill of unit weight 18 kN/m^3 and angle of shearing resistance 30° Find also the factor of safety against sliding using the angle of friction between base of the wall and the foundation as 30°. The width of wall is 1 m at the top. The wall is to be constructed of brick masonry having unit weight of 20 kN/m^3. Use Rankine's theory.

15. (a) How is the moment of resistance determined for the following arrangements of flitched beams? (8 + 8)

(i) Two steel plates of equal thickness are attached, one at the top and the other at the bottom of a rectangular timber beam. The width of each plate is equal to the width of the timber beam.

(ii) Two steel plates of equal thickness are attached, one at the left side and the other at right side of a rectangular timber beam. The height of each plate is equal to the depth of the timber beam.

Or

(b) Design the timber columns for the following specifications. (8 + 8)

(i) Rectangular column of group B timber in an open shed carrying 550 kN axial load. The effective length of column is 3 m.

(ii) Circular column of group A timber in an interior location carrying 300 kN axial load. The effective length of column is 3.5 m.

———————