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

Question Paper Code : 41008

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fifth Semester

Civil Engineering

080100030 — BASIC STRUCTURAL DESIGN

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Assume suitable data wherever necessary.

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

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. List the different types of loads used in civil engineering practice.

2. What are the basic requirements of a structure?

3. What are the various modes of failure of riveted connections?

4. What is a high strength friction grip bolt? How it is different from a common bolt?

5. List the merits of welded connection.

6. What are the common defects in welds?

7. What are the factors governing the strength of a brick masonry?

8. List the design criterion of a gravity retaining wall.

9. Define 'knot' and wane' in the case of timber structures.

10. List the various criteria by which timer is classified.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the various design philosophies used in structural design.

Or

(b) Explain the various classifications of structural systems with suitable examples.

12. (a) Check the safety of the bolted connection shown in figure Q12a. Edge distance = 50 mm. Vertical distance between bolt centres = 60 mm, horizontal distance between bolt centres = 50 mm. Diameter of bolts is 20 mm. Both are of grade 4.6.

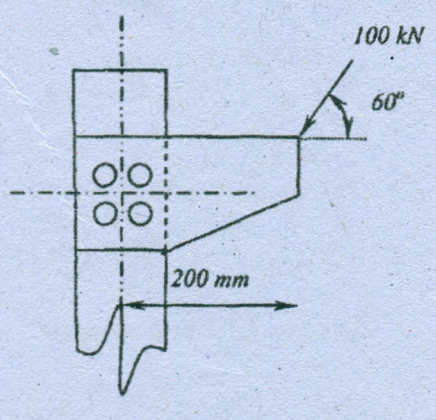

Fig. Q12a

Or

(b) A butt joint under tension is used to connect two 20 mm thick plates using 20 mm diameter bolts as shown in fig Q12b. Determine the efficiency of the joint. Use Fe410 plates and 4.6 grade bolts. Width of plate is 300 mm, thickness of top and bottom cover plates is 12 mm each. Use plates of grade Fe 410.

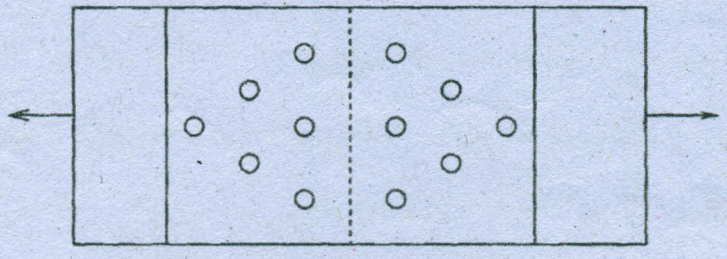

Fig. Q12b

13. (a) Determine the maximum load P that could be resisted by the bracket shown in fig. Q13a. Size of the fillet weld is 6 mm. Thickness of the bracket is 10 mm. Use shop welding and ultimate strength of the weld material is 410 MPa. All the dimensions are in mm.

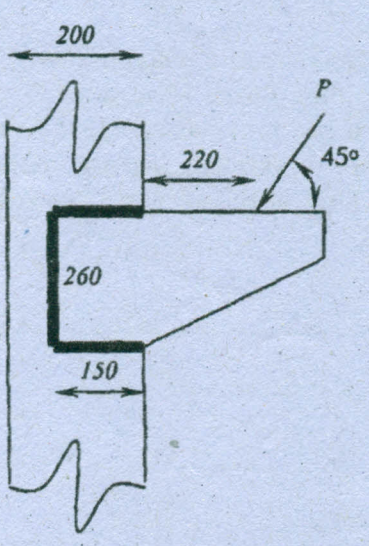

Fig. Q13a

Or

(b) Design a welded joint to connect two plates each of width 140 mm. Thickness of each plate is 12 mm. The joint has to transfer a design load of 200 kN. The plates are of Fe 410 grade. Use

(i) Lap connection

(ii) Single cover Butt connection and cover plate of 10 mm thickness. (8 + 8)

14. (a) Determine the allowable axial load on a brick masonry pier with effective dimension 300 mm × 600 mm constructed in brick work 1:5 in cement mortar using modular bricks. The height of pier between top of footing and to the bottom of the beam and slab is 6 m. The strength of the brick unit is 10 MPa.

Or

(b) A masonry dam 6 m high is 1.5 m wide at top and 4.5 m wide at the bottom, with vertical water face. Determine the normal stresses at the toe and heel for reservoir empty and reservoir full conditions. The weight density of masonry is 2400 kN/m^3 and c=1.

15. (a) A timber compression member is 150 mm × 60 mm in section. The member is 2 m long. The member is subjected to a compressive load of 18 kN and a bending moment of 0.9 kNm. Check the safety of the column. Timber is of Group B, Grade I and outside location.

Or

(b) A flitched beam consists of a wooden joist 150 mm wide and 300 mm deep strengthened by steel plates 12 mm thick and 300 mm deep one on either side of the joist. If the maximum stress in the wooden joist is 7 MPa, find the corresponding maximum stress attained in steel. Find also the moment of resistance of the section. Take Es = 20 Ew.
