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**Question Paper Code : 31007**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Civil Engineering

080100030 – BASIC STRUCTURAL DESIGN

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

(IS 456, IS 883 and IS 1905 code books are permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List various design methods adopted in the design of steel structures.
2. Distinguish between a beam and an arch.
3. List the advantages of bolted connections.
4. What are the different types of failure of a bolted connection?
5. Under what circumstances are slot and plug welds used?
6. What is meant by moment resistant welded connection?
7. Define slenderness ratio of a masonry wall.
8. Give examples of non load bearing wall.
9. Define 'knot' and 'wane' in the case of timber structures.
10. List the various criteria by which timber is classified.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the basic requirements of a structure with examples.

Or

- (b) Explain the various types of load in civil engineering practice.

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.

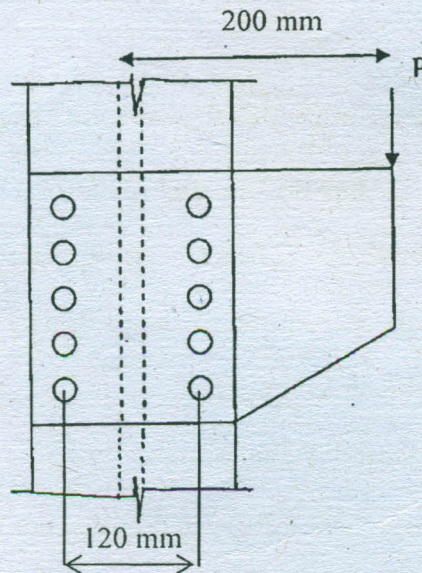


Figure 12 (b)

13. (a) A tie member of a roof truss consists of 2 ISA 90 × 60 × 10 mm. The angles are connected on either side of 12 mm gusset plates and the member is subjected to an axial pull of 234 kN at working state. Design the welded connection assuming the welding is to be made in the workshop.

Or

- (b) An eccentric fillet welded connection is made by connecting a 12 mm thick bracket plate to the flange of an ISHB 300 @ 618 N/m column such that the moment is developed at right angles to the plane of the weld. Fillet welding is on both sides of bracket plate. The bracket carries a working load of 100 kN at an eccentricity of 150 mm. Design a suitable fillet weld for the bracket and check for the stresses induced.

14. (a) Determine the allowable axial load per metre length of a 20cm solid wall. Height of the wall from plinth to slab is 3.6m wall is continuous. Length between cross walls is 5m. Basic stress of masonry is 0.55 MPa.

Or

- (b) A masonry dam 8m high and 2m wide at the top has vertical water face. Find the base width of the dam if no tension is to develop. Take unit weight of masonry as 22 kg/cu.m. neglect uplift pressure. Also investigate the stability of the dam section taking  $\mu = 0.7$ . and maximum allowable compressive stress as 180 kN/sqm.
15. (a) A timber compression member is 150 mm  $\times$  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  $E_s = 20 E_w$ .