

6. (a) State the effective span for determining the longitudinal supported stairs as per (10)

(b) Describe any transversely supported stairs with sketches. (10)

7. Design a short rectangular column in concrete subjected to an axial load of 1500 kN and bending moment of 250 kNm. Adopt M30 concrete and Fe500 grade steel. (20)

8. Design the footing for the column subjected to an axial force of 1000 kN and moment of 100 kNm. Assume unit weight of soil as 200 kN/m³. Use M20 concrete and Fe415 steel for the footing. Note that moment is reversible. (20)

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23393

**M. Tech. 1st Sem. Civil Engg.
(Specialisation in Structural
Design) Examination-
December, 2016**

DESIGN OF STRUCTURES-I

Paper : MTSD-104

Time : 3 hours

Max. Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note: Attempt any **five** questions. All questions carry equal marks. Use of IS : 456 is allowed. Use of Steel Table is allowed. Use of IS 800-1984 or 2007, IS 875-1987 and IS 801-1975 is allowed. Assume suitable date whenever necessary.

1. (a) Using a lug angle, design a suitable riveted end connection for an angle

ISA 110×10 mm thick, using 20 mm diameter rivets. (10)

(b) Design completely a built up column composed of two channel sections placed back to back and carrying an axial load of 1500 kN. The column length is 6m and it is fixed in position at both ends and restrained against rotation at one end. Take $f_y = 250 \text{ N/mm}^2$ (10)

2. Design an I-section purlin for the following data:
Spacing of roof rafter: 5m
Spacing of purlin: 2.1 m
Pitch of roof: 1 in 5
Weight of G.I. sheet: 137 N/m²
Wind load intensity normal to roof: 1750 N/m² (20)

3. (a) An equal angle of 75mm × 75mm @11.0 kg/m is subjected to a load of 180 kN, whose line of action passes through the centroid of the section, which is at a distance of 22.2mm from the heel. The angle is to be welded to a gusset plate. If the size of the

weld is to be 8mm, find the length of the side fillet weld. (10)

(b) What are the different types of weld? Explain with neat sketch. (10)

4. (a) Design a pin to connect two pairs of parallel eye bars of size 200×50mm. The space between the inner pairs is 75mm apart. Take $f_y = 250 \text{ N/mm}^2$. (10)

(b) Design a double bolted lap joint for a plate of 20mm thickness to carry its full load. (10)

5. The slab of a residential building of size 5m x 8m is simply supported on all the four sides on 210mm walls. Assuming an imposed load of 2 kN/m² and load due to finishes of 1.0 kN/m², design the floor slab. Use M25 concrete and Fe415 steel. Assume mild exposure. (20)