1140

Code : 15CE61T

Register Number

DESIGN OF STEEL & MASONRY STRUCTURES

Time : 3 Hours]   **[Max. Marks : 100**

Note :   (i)   Use of IS 800-2007 and steel tables are permitted in the examination hall.

(ii)   Missing data may be assumed suitably.

PART – A

Answer any **five** questions of the following. Each questions carries **five** marks.

1.   State the advantages and disadvantages of steel as a structural material.   5

2.   Mention the importance of load combinations in the design of steel structures.   5

3.   Define the following :   5
     (a)   Pitch
     (b)   Gauge
     (c)   Lap
     (d)   Size of Weld
     (e)   Throat thickness of weld

4.   Mention the different types of failure in beams.   5

5.   Write short note on :   5
     (a)   Net sectional area
     (b)   Slenderness ratio

6.   Differentiate between short column and long column.   5

7.   Differentiate between a slab base and gusseted base.   5

8.   Name the various conditions, for stability of dam. Describe any two of them.   5

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PART – B

Answer any **five** questions of the following. Each question carries **fifteen** marks.

9. Design a Lap joint connecting two plates 100×8 mm & 100×10 mm to transmit a factored load of 150 kN use 16 mm dia. bolts of grade 4.6 and 410 grade plates.   **15**

10. Determine the size and effective length of the side fillets to connect two plates with cross-section 150×10 mm and 100×10 mm and which are subjected to a tension & 100 kN at working load. The ultimate strength of the plate 400 MPa.   **15**

11. Design a simply supported beam of span 5 m carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange the beam is subjected to a dead load of 20 kN/m, and live load 30 kN/m. Assume Fe 410 Grade steel.   **15**

12. Design a tension member to carry a factored tensile load of 100 kN. Use single angle section, use 16 mm dia. bolt, the length of member is 2.5 m. Ultimate stress 410 N/mm^2 yield stress 250 N/mm^2.   **15**

13. Determine the design axial load on the column section ISMB 450 @ 710.2 N/m. Length of column is 4 m and it is hinged at both ends. Assume $f_y = 250$ N/mm^2.   **15**

14. Design a slab base for an ISHB 450 @ 92.5 kg/m carrying an axial load of 1500 kN @ working conditions adopt Fe410 grade steel and M25 concrete. Also, design bolted connection.   **15**

15. A masonry retaining wall trapezoidal in section with vertical face exposed to earth is 1 m wide at top 4 m wide at bottom and 8 m height the surface of earth is horizontal and level with the top of the wall.
Determine the maximum and minimum pressure intensities at the base. Check stability of wall if co-efficient of friction is 0.60.
Density of masonry – 24 kN/m^3
Density of earth – 16 kN/m^3
Angle of repose – 30°
Draw stress diagram below the base of wall.   **15**