777 Register No.:

April 2024

Time – Three hours
(Maximum Marks: 100)

[N.B. 1. Answer all questions under Part-A. Each question carries 3 marks.
2. Answer all the questions either (A) or (B) in Part-B. Each question carries 14 marks.
3. Use of IS 456, IS 800, Structural Engineering Handbook and Steel Tables approved by the board are permitted.
4. Assume suitable data, if necessary.]

PART – A

1. When doubly reinforced beams are provided?
2. Define Neutral axis.
3. Write the advantages of T-beam.
4. Write about shear strength of bent-up bars.
5. Differentiate one-way slab and two-way slab
6. What is torsion reinforcement?
7. Differentiate short column and long column.
8. Write short note on punching shear.
9. Differentiate tension member and compression member for steel sections.
10. What are the different types of weld?

PART – B

11. (a) The cross section of the beam is 300 mm x 500 mm (effective) subjected to a bending moment of 90kNm. It is reinforced with 4 Nos. of 16 mm dia. bars as tension reinforcement. Use M20 grade concrete and Fe415 grade steel. State whether the section is safe or not?

(Or)

(b) A cantilever beam is subjected to a factored bending moment of 100 kNm. The breadth of the beam is 250 mm. Determine the effective depth and area of tension steel required for the beam if M25 grade concrete and Fe415 grade steel are used.

[Turn over.....

12. (a) A R.C T-beam section has a flange of 1600mm x 100mm size and a web of 300mm x 650mm size (overall). It has to resist a design moment of 800 kNm.Use M25 grade concrete and Fe500 grade steel bars. Design the tension reinforcement for the beam.

(Or)

(b) A simply supported rectangular beam of 300mm x 600mm overall size is reinforced with 4Nos. of 16mm dia. Fe415 grade steel bars as tension reinforcement at its mid span with a clear cover of 25mm. It carries an imposed load of 17 kN/m over an effective span of 7m. One bar is curtailed at a distance of 500mm from the centre of supports. Use M20 grade concrete. Design the shear reinforcement for the support section by limit state method.

13. (a) A waist slab is supported by a landing beam at its ends. Horizontal distance between beams is 3m and vertical distance between beams is 1.5m. The tread is 260mm and rise 150mm. The live load is 3kN/m^2 and floor finish is 0.8 kN/m^2. Design the waist slab using M20 concrete and Fe415 steel.

(Or)

(b) A rectangular RC slab panel discontinuous and restrained all round, has effective spans of 3m x 5m. Design the slab for a live load of 2.5 kN/m^2 and floor finish of 0.6 kN/m^2. Use M20 and Fe415. All corners are held down.

14. (a) Design a short circular column with helical ties using M25 grade concrete and Fe500 steel to carry an axial load of 1500 kN by limit state method.Take Effective length of column is 3m

(Or)

(b) A RC circular column of 350mm diameter, carrying an axial load of 500kN is to be provided with a square footing at uniform thickness on a soil of safe bearing capacity 150kN/m^2. Concrete grade M25 and steel grade Fe500 are to be used. Determine the size of footing and the thickness of footing required for the limit state of collapse in flexure.

15. (a) Determine the design axial load capacity of the column ISHB 300 @ 577 N/m (58.8 kg/m) if the length of the column is 4m and its both ends are fixed. Take f_y=400 MPa.

(Or)

(b) Design a simply supported beam of 7m effective span carrying a UDL of 50 kN/m. The depth of beam should not exceed 600mm. The compression flange of the beam is laterally supported by floor construction.
