November 2022

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.]

PART – A

1.   Define modular ratio.

2.   What are the advantages of limit state method?

3.   Define T-beam and Lintel.

4.   What is the necessity of providing shear reinforcement?

5.   Define one-way slab and two-way slab.

6.   State any three types of staircases.

7.   Define short column and long column.

8.   State the minimum thickness and area for the footings.

9.   Write any three types of rolled steel section.

10.   State the classification of cross sections in a compression member.

PART – B

11.   (a)   A simply supported beam of rectangular section 230mm x 500mm overall in size. It is provided with a 4 Nos. of 20mm dia. bars in tension zone with an effective cover of 40mm. Find the moment of resistance of the section. Use M20 grade of concrete and Fe 415 steel. Use limit state method.

(Or)

(b)   Design a cantilever beam for a clear projection of 3m subjected to an udl of 20kN/m . Concrete grade M20 and steel grade Fe 415 are used.

[Turn over..

185/503—1

12. (a) An R.C T-beam section has a flange of 1600mm x 100mm size and a web of 300mmx660mm size (overall). It has to resist a design moment of 850kN.m M20 grade concrete is used. Design the tension reinforcement for the beam using Fe 415 grade steel bars.

(Or)

(b) The maximum factored shear force at support of a T-beam is 215 kN. The breadth of web and effective depth are 300mm and 600mm respectively. It is reinforced with 3 nos. of 16mm bars at support. M20 and Fe 415 are used. Design the shear reinforcement.

13. (a) Design a simply supported roof slab for a library hall of 3.5m x 12m Clear size using M20 grade concrete and Fe 415 grade steel. Width of walls all-round is 230mm. No access is provided to the roof. Weight of weathering course is 1.20 kN/m^2.

(Or)

(b) Design a simply supported roof slab for a watchman cabin of clear size 2m x 3m. The thickness of walls all-round is 200mm. The corners of the slab are not held down. Use M20 grade concrete and Fe250 steel by limit state method. There is no access to the roof. A weathering course of weight 1kN/m^2 is to be provided over the slab.

14. (a) Design a short square column using M20 grade concrete and Fe 500 steel to carry an axial load of 1200 kN by limit state method.

(Or)

(b) Design a square R.C footing of uniform thickness for a R.C. Column of 300mm x 300mm size, carrying an axial load of 1000 kN, using M20 grade concrete and Fe 415 grade steel reinforcement. The safe bearing capacity is 150kN/m^2.

15. (a) Design a single angle section for a tension member of a roof truss to carry a factored tensile force of 200 kN. The length of the member is 2.5m.

(Or)

(b) Design a simple steel beam to resist a bending moment of 120 kNm. The yield stress of the section is 250 MPa and fu=410N/mm^2. Select a suitable section.