[Total No. of Questions - 9] [Total No. of Printed Pages - 3]

May-24-0425

CE-501 (Limit State Design of Concrete Structures-I)

B.Tech. 5th (CBCS)

Time : 3 Hours **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt one question each from Section A, B, C & D. Section E is compulsory. Assume the missing data. Use of IS: 456-2000 is allowed.

SECTION - A

1. (a) Discuss the assumptions made in the Working stress method for design of concrete structures. (5)

   (b) Discuss the basic good qualities of concrete. Explain the grading of concrete with design concept. (5)

2. (a) Discuss the Limit State method of design. Draw the stress strain curve of steel and explain. (5)

   (b) Discuss the various design loads to be considered for the design of concrete structures. Explain the concept of factored loads. (5)

SECTION - B

3. Design a reinforced concrete beam of span 5m subjected to udl of 20 kN/m. Use M25 concrete and HYSD Fe415 steel as reinforcement. Keep the width of the beam equal to half the effective depth. (10)

4. Design a two way slab simply supported on all the four edges for a room 6m × 4m clear in size. The superimposed working

load is 4 kN/m^2 for the corners held down. Use M25 mix and Fe 415 grade steel. (10)

SECTION - C

5. A rectangular beam of section 25 cm × 40 cm is subjected to design shear force of 150 kN at the supports. The tensile reinforcement at the supports is 0.5%. Design the shear stirrups at the supports. Also, design the minimum shear reinforcement at the mid span. Use concrete mix of grade M20 and HYSD steel of grade Fe415. (10)

6. Determine the reinforcement required for a beam of size 250 mm x 500 mm subjected to a factored moment of 100kNm, factored shear force of 70 kN and factored torsional moment of 40 kNm. Use concrete mix of grade M20 and HYSD steel of grade Fe415. (10)

SECTION - D

7. Design a straight staircase supported on one side on a wall and on the other-side on a stringer beam. The horizontal span of the stairs is 1.5 m. The rise is 150 mm and the tread of stairs is 280mm. The service live load on stairs is 3.0 kN/m^2 with the weight of finishes of 1.0 kN/m^2. Use M20 mix and Fe 415 grade steel. (10)

8. A short RCC square column is required to carry factored load of 1900 kN. Design the column. Assume $e_{min} < 0.05D$ and use M20 grade of concrete and HYSD steel. (10)

SECTION - E (Compulsory)

9. (a) Discuss the composition of ordinary Portland cement.

   (b) Discuss the importance of admixtures in concrete.

[P.T.O.]

(c) Discuss the difference between nominal mix and design mix.

(d) Explain durability of concrete.

(e) Discuss the principle of Limit state method of design.

(f) List various edge conditions of slabs.

(g) Discuss the meaning of cutoff points in steel.

(h) Discuss the criteria for the design of biaxial columns.

(i) Explain the criteria for design of an open well stair case.

(j) Draw the reinforcement details of singly reinforced section of a beam. (10×2=20)