

Roll No

CE - 504**B.E. V Semester**

Examination, June 2015

Structural Design and Drawing-I (RCC)*Time : Three Hours**Maximum Marks : 70*

Note: i) Attempt any five questions, one from each unit. All questions carry equal marks.

ii) Use of IS: 456-2000 is permitted.

iii) Draw reinforcement details wherever required.

iv) Missing data if any, may be suitably assumed.

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UNIT-I

1. a) Discuss various desirable properties of concrete and steel for use in reinforced concrete. 4
- b) Draw a neat sketch of the concrete stress block used in IS 456:2000 for limit state of collapse in flexure. Derive the expression for force of compression for this stress block. 10

OR

Find the moment of resistance of a RC beam 23 cm wide and 45 cm deep. The beam is reinforced with 4-16 mm diameter bars in tension zone. The effective cover to the reinforcement is 40mm, grade of concrete is M20 and grade of steel is Fe 415. 14

UNIT-II

2. Design a rectangular beam for an effective span of 6m. The superimposed load is 50 kN/m and size of the beam is limited to 23 cm × 45 cm overall. Use M20 mix concrete and Fe 415 grade steel. Consider the exposure condition as moderate. 14

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OR

A singly reinforced R.C. beam has an effective depth of 400 mm and a breadth of 250 mm. It contains 4-16 mm bars. For M20 grade concrete and Fe 415 grade steel, calculate the shear reinforcement needed for a factored shear force of 250 kN. 14

UNIT-III

3. Design a simply supported roof slab for a room 8.0 m × 3.5m clear in size if the live load is 4 kN/m². The slab is simply supported on all the four edges. Exposure condition is moderate. Check for deflection also. 14

OR

Design a simply supported circular slab of diameter 5.0 m. The slab is subjected to uniformly distributed load of 4 kN/m². 14

UNIT-IV

4. Design a short column subjected to axial load of 1200 kN. moment in one direction as 60 kN-m and moment in other direction as 40 kN-m. 14

OR

Two columns A and B spaced 4.0 m center to center are carrying axial loads of 1800 kN and 1500 kN respectively. Column A is of size 600mm×600mm and column B is of size 525mm×525mm. Design a combined trapezoidal footing for the columns and sketch the details. Take bearing capacity of soil as 150 kN/m². 14

UNIT-V

5. Design flight of a single flight waist slab staircase for residential building of 3.0 m storey height. Consider the width of flight as 1.0m and the span of flight as 4.5 m. 14

OR

Design a dog-legged staircase to be provided in a residential multistoreyed building. Clear space available is 2.2 m × 4.5 m. Height of each flight is 1.5 m and floor to floor height is 3.0 m. Length of landing on either side along the direction of flight is 0.9 m. 14