

Code: CEST1

III B.Tech - I Semester – Regular Examinations - November 2015

**DESIGN AND DRAWING OF CONCRETE
STRUCTURES - I
(CIVIL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Use of IS:456-2000 and design charts from SP-16 is allowed.

PART – A

Answer any **ONE** question. 1 x 28 = 28 M

1. Design the flexural reinforcement for the rectangular concrete beam 250mm×450mm simply supported on two masonry walls 300mm thick and 6.5 m apart. The beam has to carry in addition to its own weight a distributed live load of 15kN/m, dead load of 5kN/m and a concentrated dead load of 30kN placed at the mid span point. Assume that the beam is subjected to severe exposure conditions and grade of steel is FE 415 used draw to suitable scale longitudinal section and cross section of the beam. 28 M
2. Design a continuous RC slab for a hall 6.5m and 13.5m long. The slab is supported on RCC beams each 240mm wide which are monolithic. The ends of the slab are supported on walls. 300mm wide. Design the slab for a live load of 2.5 kN/m². Assume the weight of roof finishing equal to

1.0 kN/m². Use M20 concrete and Fe 415 steel. 28 M

- a) Draw the reinforcement of the slab in plan view
- b) Draw cross section of the slab including beams with reinforcement details.

PART – B

Answer any **THREE** questions. All questions carry equal marks. 3 x 14 = 42 M

3. An RC beam has an effective depth of 500mm and breadth of 350mm. It contains 4-25mm bars. If

a) $\sigma_{ck} = 25 \text{ N/mm}^2$ and $\sigma_{sv} = 250 \text{ N/mm}^2$ and 7 M

b) $\sigma_{ck} = 15 \text{ N/mm}^2$ and $\sigma_{sv} = 415 \text{ N/mm}^2$ 7 M

Calculate the shear reinforcement needed for a factored shear force of 350kN.

4. Design a two-way slab for a room 4m × 5m with discontinuous and simply-supported edges on all sides with corners prevented from lifting. The live load is 4 kN/m² and load factor=1.5. Use M-20 grade concrete and Fe-415 grade steel. Sketch the reinforcement details. 14 M

5. Design an axially loaded tied column 400mm x 400mm pinned at both ends with an unsupported length of 3m for carrying a factored load of 2300KN use M20 grade concrete and Fe 415 steel. 14 M

6. a) What are various types of footings? Give design steps for isolated square footing. 7 M

b) Why it is necessary to ensure, by proper proportioning of footing that the bearing pressures underlying all footings in a building are more or less same order of the magnitude.

7 M

7. Design a cantilever staircase consisting of independent steps cantilevering out of the wall. The width of steps is 1.0 m with rise and tread of 175 mm and 250 mm, respectively. The staircase is to support a superimposed load of 3.0 kN/m^2 . Use M20 grade concrete and HYSD steel of grade Fe415 as reinforcement. 14 M