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Question Paper Code : 71578

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Fifth Semester

Civil Engineering

CE 6505 — DESIGN OF REINFORCED CONCRETE ELEMENTS

(Regulations 2013)

Time : Three hours Maximum : 100 marks

(Use Code Book IS 456 — 2000, Design Charts and Relevant Tables of SP 16)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write any two assumptions of limit state method.
2. Distinguish between under reinforced and over reinforced sections.
3. What is the advantage of two way slabs over one way slab?
4. Mention any two advantages of introducing compression steel in reinforced concrete beams.
5. How to overcome torsion on beams?
6. What do you understand by development length of bar?
7. Distinguish between braced and unbraced columns.
8. Name any two methods used for design of long columns.
9. What is punching shear in RCC footing?
10. What is one way and two way shear in footing?

PART B — (5 × 16 = 80 marks)

11. (a) Design a rectangular RC beam in flexure and shear when it is simply supported on masonry walls 300 mm thick and 5 m apart (centre to centre) to support a distributed live load of 8 kN/m and a dead load of 6 kN/m in addition to its own weight. Materials used are M20 grade of concrete and Fe 415 steel bars. Adopt working stress method of design.

Or

(b) Design the roof slab for a Hall size 4 m × 10 m by working stress method using M20 concrete and Fe 415 steel. The slab simply resting on 230 mm thick brick walls all around. Take the live load on the slab as 1.5 kN/m^2 and finish load as 2.25 kN/m^2.

12. (a) Design a two way slab for the following data:

Size = 7 m × 5 m

Width of the support = 300 mm

Edge condition = two short edges are discontinuous, live load = 5 kN/m^2

Floor finish as 1 kN/m^2

Use M20 concrete and Fe 415 steel.

Or

(b) A T beam slab floor of an office comprises of a slab 150 mm thick spanning between ribs spaced at 3 m centres. The effective span of the beam is 8 m. Live load on floor is 4 kN/m^2. Using M20 grade concrete and Fe 415 HYSD bars, design one of the intermediate T beams.

13. (a) Design the reinforcements required for a rectangular beam section with the following data

Use M20 concrete and Fe 415 steel. Adopt limit state design method.

Size of the beam = 400mm × 800 mm

Factored shear force = 100 kN

Factored tension = 50 kN

Factored bending moment = 120 kNm.

Or

(b) Design a rectangular beam section of 250 mm width and 500 mm overall depth subjected to ultimate values of bending moment of 40 kN-m, shear force of 40 kN, Torsion moment of 30 kN-m. Adopt effective cover of 50mm on top and bottom. Use M20 concrete and Fe 415 steel.

14. (a) Design the reinforcements in a circular column of diameter 300 mm to support a service axial load of 800 kN. The column has an unsupported length of 3 m and is braced against side away. The column is reinforced with helical ties. Adopt M20 grade concrete and Fe 415 HYSD bars.

Or

(b) Design the reinforcement in a short column 400 mm x 400 mm at the corner of a multistorey building to support an axial factored load of 1500 kN together with biaxial moments of 50 kNm acting in perpendicular planes. Adopt M20 grade concrete and Fe 415 HYSD bars.

15. (a) A rectangular RCC column of size 400 mm × 600 mm carrying an axial load of 1800 kN. If the safe bearing capacity of the soil is 150 kN/m^2. Design a suitable footing. Use M20 concrete and Fe 415 steel.

Or

(b) Design a suitable footing for a 500 mm × 500 mm square column transferring 100 kN axial load and a moment of 35 kN-m. The safe bearing capacity of soil is 190 kN/m^2 Use M 20 concrete and Fe 415 steel. Adopt limit state design method.
