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Question Paper Code : 57179

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Civil Engineering

CE 6505 – DESIGN OF REINFORCED CONCRETE ELEMENTS

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Write any two assumptions are made in elastic theory method.
2. What is the formula used to find the critical neutral axis in working stress method ?
3. Write any two guidelines to select the cross sectional dimensions of reinforced concrete beams.
4. Enumerate the advantages of flanged beams.
5. What is the importance of anchorage value of bends.
6. Define shear friction.
7. Write any two salient assumptions are made in the limit state design of columns.
8. What are the important limitations of slender columns ?
9. Why the dowel bars are provided in footing ?
10. What is the necessity of providing combined footings ?

PART – B (5 × 16 = 80 Marks)

11. (a) A Reinforced concrete rectangular beam is supported on two walls 750 mm thick, spaced at a clear distance of 6 m. The beam carries a super imposed load of 30 kN/m. Design the beam in working stress method. M20 grade concrete Fe 250 bars. Draw reinforcement details. **(16)**

OR

(b) Design one way simply supported slab on a clear span of 4 m, the width of the supports being 300 mm. The dead load on the slab may be taken as 1000 N/ m^2 excluding its self weight. The live load on the slab is 2000 N/m^2. Use M 20 grade concrete and Fe 415 grade steel. Adopt working stress method. **(16)**

12. (a) 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 M 20 grade and Fe 415 HYSD bars. Design one of the intermediate tee beams. Use limit state method. **(16)**

OR

(b) Design a two way slab for an office floor size 3.5 m × 4.5 m with discontinuous and simply supported edges on all the sides with the corners prevented from lifting and supporting a service live load of 4.4 kN/m^2. Adopt M 20 grade and Fe 415 HYSD bars. **(16)**

13. (a) (i) Explain the terms Diagonal tension and bond stress with reference to R.C beams. **(6)**

(ii) Obtain an expression for calculation of bond stress and shear stress in case of reinforced concrete beams of rectangular section with tensile steel of diameter (Φ). Also obtain relationship between bond stress and shear stress. **(10)**

OR

(b) A beam of rectangular section is reinforced with 6 nos of 18 mm diameter bars in tension and is supported on an effective span of 5 m, the beam being 300 mm wide and 700 mm deep. The beam carries a uniformly distributed load of 42 kN/m. Design the shear reinforcement considering no bars are bent up for shear. Assume $\sigma_{sv} = 230$ N/mm^2, $\tau_c = 0.30$ N/mm^2 and $f_y = 415$ N/mm^2. **(16)**

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 sway. The column is reinforced with helical ties. The materials to be used are M 25 grade of concrete and HYSD steel bars of grade Fe 415. **(16)**

OR

(b) Design the reinforcements in a short column 400 mm × 400 mm at the corner of a multistoreyed building to support an axial factored load of 1500 kN, together with biaxial moments of 50 kN.m acting in perpendicular planes. Adopt M 20 grade of concrete and steel grade Fe415 HYSD bars. **(16)**

15. (a) Design a reinforced concrete footing for a rectangular column of section 300 mm × 500 mm supporting an axial factored load of 1500 kN The safe bearing capacity of the soil at site is 185 kN/m^2. Adopt M 20 grade of concrete and HYSD steel bars of grade Fe 415. **(16)**

OR

(b) Design a combined column footing with a strap beam for two reinforced concrete columns 300 mm × 300 mm size spaced 4 m apart and each supporting a factored axial load of 750 kN. Assume the ultimate bearing capacity of soil at site as 225 kN/m^2. Adopt M 20 grade of concrete and steel grade Fe415 HYSD bars. **(16)**

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