R13

Code No: 115AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech III Year I Semester Examinations, February/March - 2016
REINFORCED CONCRETE STRUCTURES DESIGN AND DRAWING
(Common to CE, CEE)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks

Part- A

(25 Marks)

1.a) Differentiate between the working stress and limit state methods of design. [2]
b) Using the stress block parameters, derive the expression for the distance of the line of action of the compressive force from extreme compression fibre of the section. [3]
c) What are the different types of bond failures of RCC members? [2]
d) Explain the factors influencing the deflections of RCC beams. [3]
e) Distinguish between the one-way and two-way slabs. [2]
f) What are the main parameters influencing the thickness of a two-way slab? [3]
g) Explain the classification of columns based on type of reinforcement. [2]
h) Explain the structural behavior of short columns and long columns. [3]
i) What are the different types of footings? [2]
j) Why is it desirable to eliminate eccentricity in loading on a footing? [3]

Part-B

(50 Marks)

2. An RCC beam of span 4.5 m and cross-section 300 mm× 500 mm (overall depth) is reinforced with 4 bars of 16 mm on compression side. Determine the area of the tension reinforcement required to be provided. Also find the safe uniformly distributed load the beam can carry in addition to the self-weight. Assume a clear cover of 40 mm on both tension and compression sides. Adopt M25 grade of concrete and Fe415 steel. [10]

OR

3. A Tee-beam slab floor consists of a RC slab of 125 mm thick spanning between the ribs spaced at 3 m centre-to-centre. The effective span of the beam is 6 m. The service live load acting on the floor is 3 kN/m^2 and the floor finish is 1 kN/m^2. Design one of the intermediate T-beams. Use M25 grade of concrete and Fe415 steel. [10]

4. A rectangular reinforced concrete beam of size 300 mm×550 mm overall depth is subjected to an ultimate moment of 125 kNm, a factored shear force of 75 kN and a factored torsional moment of 45 kNm. Design the longitudinal and shear reinforcement. Use M25 concrete and Fe415 steel. [10]

OR

5. A RC simply supported beam of span 5 m and cross-section 300 mm × 500 mm (Overall depth) is reinforced with 4 bars of 22 mm diameter at a clear cover of 40 mm. The beam is subjected to an imposed live load of 30 kN/m over the entire span and dead load of 15 kN/m. Determine the short term deflection and long term deflections of the beam. Use M 25 grade concrete and Fe 415 steel. [10]

6. Design a two-way RC slab of clear dimensions 4 m × 6 m with all edges continuous. The slab is subjected to a live load of 4 kN/m^2 and floor finish of 1.5 kN/m^2. Assume the width of the supports is 300 mm. Use M20 grade concrete and Fe415 steel. Sketch the reinforcement details. [10]

OR

7. Design an RCC roof slab covering an area of 8 m × 12 m supported by a 300 mm thick masonry wall all around and equally spaced intermediate beams of 300 mm wide along the 8 m direction at 3 m c/c. The slab is subjected to a live load of 4 kN/m^2 and a dead load of 1 kN/m^2 in addition to self-weight. Use M 20 grade concrete and Fe 415 steel. [10]

8. A column of cross-section 450 mm × 450 mm has an effective length of 5.1 m, is subjected to a factored axial load of 1000 kN along with factored moments 100 kNm and 75 kNm about the two centroidal axes. Design the reinforcement of the column. Use M20 grade concrete and Fe 415 steel. [10]

OR

9. Design the reinforcement of a column of cross-section 450 mm × 500 mm. Use the following data: L_{ex} = 6 m, L_{ey} = 5.7 m, P_u = 1800 kN, M_{ux} = 75 kNm at top and 60 kNm at bottom and M_{uy} = 60 kNm at top and 45 kNm at bottom. The column is bent into double curvature. Adopt M 30 grade concrete and Fe 415 steel. [10]

10. Design a square footing to support a column of size 500 mm × 500 mm subjected to an axial load of 1500 kN. Adopt the safe bearing capacity of the soil is 175 kN/m^2. Use M25 grade of concrete and Fe 415 steel. [10]

OR

11. Design a RCC combined footing for two columns located 4 m apart. The sizes of the columns are 450 mm × 450 mm and 500 mm × 500 mm and transferring axial loads 800 kN and 1000 kN respectively. The centre of 450 mm column is 0.5 m from the property line. The safe bearing capacity of the soil is 180 kN/m^2. Use M 25 grade concrete and Fe 415 steel. [10]

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