B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024
Fifth Semester
Civil Engineering
20CEPC503 - DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES
Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

		Marks	K-Level	CO
1.	What is meant by Modular ratio?	2	K1	CO1
2.	Differentiate between WSD&LSD.	2	K2	CO1
3.	Write any two advantages of flanged beams.	2	K1	CO2
4.	What is the IS Code provision for maximum spacing of vertical stirrups in RC Beams?	2	K1	CO3
5.	Define Development length.	2	K1	CO3
6.	Differentiate between one way slab & Two way slab.	2	K2	CO4
7.	Sketch the middle and edge strip of a two way slab.	2	K2	CO4
8.	Differentiate between Long & Short column.	2	K2	CO5
9.	What is the need of minimum eccentricity clause for a column design?	2	K1	CO5
10.	What are the governing factors to decide the depth of R.C. Footing?	2	K1	CO6

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a) i) Explain two major limit states.   7   K2   CO1
    ii) Define characteristic strength and design strength of a material.   6   K2   CO1

OR

   b) Design a Doubly reinforced beam of rectangular section of 6m long which carries a service load of 8kN/m and is supported on 230mm wall thickness. Use M20 grade concrete and Fe415 grade steel. Use limit state method.   13   K3   CO1

12. a) Determine the moment of resistance of T section having the following section properties. Width of flange=2500mm, Depth of flange=150mm Width of rib=300mm, Effective depth=800mm, Area of steel=8# 25mm diameter, Use Fe 415 grade steel, M20 concrete.   13   K3   CO2

OR

   b) Determine the area of steel required for a T-beam with the following dimensions. Depth of slab=10mm, breadth of flange=750mm, breadth   13   K3   CO2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

of web=250mm.The total depth=600mm, the beam is subjected to an ultimate moment of resistance of 525KN-m.Use16mm diameter of steel. Fe 415 grade steel, M20 concrete.

13. a) Design the Torsional Reinforcement in a RC Beam, 350 mm wide and 750 mm deep, subjected to an ultimate twisting moment of 140 KN-m, and combined with an ultimate hogging moment of 200 KN-m and an ultimate shear force of 110 KN. Assume M25 concrete and Fe415 steel. *13 K3 CO3*

OR

b) A rectangular beam 350mm wide and 550mm effective depth is reinforced with 6no's of 20mm bars out of which 3bars have been bent up at 45degree. Determine the shear resistance the bent up bars and the additional shear reinforcement required if it is subjected to an ultimate shear force of 300kN.Assume M20 grade of concrete and Fe415 steel bars. *13 K3 CO3*

14. a) Design a one way slab for the following data: Size = 3 m x 9 m, width of the support = 230 mm, live load = 3 kN/Sq.m, floor finish = 1 kN/Sq.m. Use M20 & Fe415 steel. *13 K3 CO4*

OR

b) Design a Two way slab for an office floor to suite the following data: Live load = 4 kN/sq.m, Load due to finishes - 1.5 kN/sq.m, Size of floor =4 m X 6 m, Edge conditions: Two adjacent edges discontinuous. Use M20 & Fe415 steel. *13 K3 CO4*

15. a) Design a column, 4m long restrained in position and direction at both ends to carry an axial load of 1600 kN. Use M20 & Fe415 steel. *13 K3 CO5*

OR

b) Determine the longitudinal steel for a column 400mm x 600mm carrying a axial load of 1600kN and factored moment (Major axis)=120kN-m, factored moment (Minor axis)=90kN-m,use M20 & Fe415 using SP16 method. *13 K3 CO5*

PART - C (1 × 15 = 15 Marks)

16. a) A RCC Column 400x400mm supports an axial service load of 1000kN.The SBC of soil at a site is 200 kN/Sq.m. Design a suitable footing for the column and sketch the reinforcement details. Use M20 & Fe415 steel. *15 K3 CO6*

OR

b) Write down the design steps in detail of a rectangular combined footing. *15 K3 CO6*

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **12861**