R20 Regulation *Subject code: 3P5AC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech V Semester Supplementary Examinations, July 2024

DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES

(Civil Engineering)

Maximum Marks: 70 Date:24.07.2024 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

IS0456-2000 CODE BOOK IS ALLOWED

	Part-A	CO	Bloom Tx
All the following questions carry equal marks (10X2M=20 Marks)			
1	Explain limit state of serviceability.	1	1
2	Why are over reinforced sections not used in practice?	1	2
3	What is the development length mean?	2	2
4	Give the IS codal provisions on shear reinforcement in beams	2	2
5	What is meant by uniaxially and biaxially eccentrically loaded columns?	3	2
6	Define long and short columns.	3	2
7	Why do we provide corner reinforcement in a two-way slab?	4	2
8	Differentiate the structural behaviour of one-way and two-way slabs.	4	1
9	What are the causes for failure of footing?	5	1
10	When is the combined footing provided?	5	2
	Part-B		
Answer All the following questions. (5X10M=50Marks)			
11	Design a rectangular reinforced concrete beam simply supported on masonry walls 300mm thick with an effective span of 5m to support a service load of 8KN/m and a dead load of 4KN/m without its own weight. Adopt M20 grade concrete and Fe 415 HYSD bars width of support of beam=300mm. [10]	1	4
	OR		
12	a) Distinguish between balanced, over-reinforced and under-reinforced sections in limit state design. Which of these should be recommended in design? [5] b) With neat sketch explain the stress block parameters used in the design of singly reinforced concrete beam as per limit state method. [5]	1	2
13	Design the shear reinforcement for a beam section of width 200 mm and effective depth 500 mm. The factored shear force is 100 kN and it is reinforced with 3 Nos 16 mm diameter bars on the tension side at the critical section. Use M20 concrete and Fe 415 steel. [10]	2	4
	OR		
14	Explain in detail about shear reinforcement, anchorage length and cracks in case of simply support beam with neat sketch. [10]	2	4

15	Design of short column subjected to biaxial bending. Determine the reinforcement for a short column for the following data. Column size: 400mmx600mm, Pu=2000kN Mux= 160kN, Muy=120kN. Use M20 grade concrete and Fe415 grade steel. [10]	3	4
	OR		
16	Design a biaxial eccentric loaded braced circular column deforming in single curvature for the following data: Ultimate load=200kN. Ultimate moment in longer direction at bottom Mux1=178 kNm and at top Mux1= 128kNm. Ultimate moment in shorter direction at bottom Muy1=108 kNm and at top Muy2= 88kNm. Unsupported length of column = 9m. Effective length in long direction lex=8m. Effective length in shorter direction ley=5.8m. Diameter of column = 550mm. Use M25&Fe415 grades. [10]	3	4
17	Design a R.C. slab for a room measuring 5m x 6m size. The slab is simply supported on all the four edges, with corners held down and carries a superimposed load of 30N/m^2. Inclusive of floor finishes etc. Use M20 concrete and Fe415 steel. [10]	4	4
	OR		
18	a) How does one (i) check for deflections of two-way slabs, and (ii) control crack width in two-way slabs? [5] b) Sketch the edge and middle strips of a two-way slab. [5]	4	2
19	Design a reinforced concrete rectangular combined footing for two columns A and B located 3.6 meters apart. The sizes of the columns are 400mm × 400mm and 600mm ×600mm and the loads on them are 1000kN and 1500kN respectively. The projections of footing beyond the axis of the columns A are limited to 590mm. The limiting bearing capacity of the soil is 420 kN/m^2. Use M 15 concrete and Fe 415 steel. [10]	5	4
	OR		
20	Compute the safe bearing capacity of square footing 1.5m x 1.5m located at a depth of 1m below the ground level in a soil of average density 20kN/m^3. $\emptyset$ = 20°, Nc = 17.7, Nq = 7.4 and Nr =5. Assume a suitable factor of safety and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level. [10]	5	4