R18 Regulation *Subject code:* 2P5AB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, June 2022
Design of Reinforced Cement Concrete Structures
Civil Engineering

Maximum Marks: 70 Date:04.07.2022 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.
Note: IS 456:2000 code book is allowed

Part-A

All the following questions carry equal marks **(10x2M=20 Marks)**

1 Differentiate between under reinforced and over reinforced section?
2 Is modulus of rupture of concrete equal to its direct tensile strength?
3 What is primary torsion and secondary torsion with examples?
4 What is the significance of development length in RCC members?
5 What are the code limits for minimum and maximum reinforcement in column?
6 Write the advantages of helically reinforced columns?
7 Explain the different boundary conditions for two-way slab
8 How do you check for shear in slabs
9 Distinguish between (i) allowable soil pressure, (ii) gross soil pressure
10 Illustrate between dog-legged and open well stair case?

Part-B

Answer All the following questions. **(10M X 5=50Marks)**

11 A singly reinforced beam 280mm wide and 400mm deep to the center of reinforced with 4 bars of 18 mm diameter. Determine the depth of neutral axis and maximum stress in concrete when the stress in steel is 180N/mm^2. Take m = 13.33. (10M)

OR

12 Design the flexural reinforcement for the beam of size limited to 250mm x 400mm and that it has to carry, and additional concentrated load of 30kN placed at the mid-span including udl of 20kN/m for span of 5m. Assume that the beam is subjected to moderate exposure conditions (10M)

13 Design the torsional reinforcement in a rectangular beam section, 350mm wide and 750mm deep, subjected to an ultimate twisting (hogging) bending moment of 200 kN-m and an ultimate shear of 110kN. Assume M25 concrete and Fe415 steel and mild exposure conditions (10M)

OR

14 A simply supported RC beam of section 300 mm × 500 mm (effective depth) is subjected to an ultimate shear force of 150 kN at the supports. The beam is reinforced with 4 bars of 20 mm diameter. Design the shear reinforcement. Sketch the shear reinforcement details. Use M 20 concrete and Fe 415 steel. (10M)

15 Design an axially loaded tied column with an unsupported length of 3 m. The column is fixed at

one end and pinned at the other end. The column has to carry a factored load of 2200 kN Use M 25 grade concrete and Fe 415 grade steel. Sketch the reinforcement details (10M)

OR

16 A) Write the design procedure for a uni-axially loaded rectangular column. (7M)
B) What is the difference between short column and long column. (3M)

17 A RCC slab is built integrally with its supports and consists of two equal spans, each with clear span of 5m. The service live load is 5.1kN/m^2, fck= 28Mpa and fy = 420Mpa. Design the slab. (10M)

OR

18 A) Design a simply supported slab to cover a room with internal dimensions of 4m X 5m and 230mm thick brick walls all around. Assume a live load of 3 kN/m^2 and a floor finish of 1 kN/m^2. Use M20 concrete and fe415 steel. Assume that the slab corners are free to lift up. Assume mild exposure conditions. (5M)
B) State the advantages of the continuous slab? (5M)

19 Design the footing for a rectangular column 300 mm × 450 mm subjected to an axial load of 900 kN. Assume the bearing capacity of soil is 180 kN/m^2 . Use M 20 concrete and Fe 415 steel. (10M)

OR

20 Describe briefly load transfer mechanism in two column combined footing? (10M)