R20 Regulation *Subject code:3P5AC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, June/July 2023

DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES

(Civil Engineering)

Maximum Marks: 70 Date:28.06.2023 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 which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

IS:456 CODE BOOK IS ALLOWED.

Part-A

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

1 What is a singly reinforced beam?
2 What is characteristic load?
3 How do you provide minimum shear reinforcements?
4 What is Equilibrium Torsion?
5 When do you provide eccentrically loaded columns?
6 What is bi-axial column?
7 Distinguish between one-way and two way slabs.
8 Explain maximum depth of neutral axis.
9 List the causes of failure of foundation.
10 What are the assumptions made in the design of footings?

Part-B

Answer All the following questions. (10MX 5=50Marks)

11 A. Differentiate between working stress method and limit state method. (5 marks)
B. Explain the limit state philosophy as detailed in the current IS code. (5 Marks)

OR

12 Determine the moment of resistance of a singly reinforced beam 160 mm x 300 mm effective section, if the stress in steel and concrete are not to exceed 140 N/mm^2 and 5 N/mm^2. Effective span of the beam is 5m and the beam carries 4 numbers of 16mm diameter bars. (10 Marks)

13 A RC beam is 280 mm x 550 mm overall. It carries 4 number of 46 mm diameters bars in compression and 5 number of 25 mm bars in tension, each at an effective cover of 30 mm. Determine the shear capacity of concrete beam if grade of concrete is M35 and grade of steel is Fe500. (10 Marks)

OR

14 A. Discuss the design procedure of shear reinforcement. (6 Marks)
B. Write short notes on bond, development length and relevant IS code. (4 Marks)

15 Design a rectangular column of 4 m unsupported length, restrained in position and direction at both the ends, to carry a factored axial load of 1000 kN. Use M20 concrete and Fe 415 steel. (10 Marks)

OR

16 Discuss in detail uniaxial bending and biaxial bending of columns and discuss the interaction diagrams of different steel and concrete materials. (10 Marks)

17 Discuss the stepwise procedure for the design of continuous rectangular slabs subjected to UDL based on IS code method. (10 Marks)

OR

18 Design a one-way slab with a clear span of 5 m, simply supported on 230 mm thick masonry walls and subjected to a live load of 4 kN/m² and a surface finish of 1 kN/mm². Assume Fe 415 steel. Assume that the slab is subjected to moderate exposure conditions. (10 Marks)

19 Design a reinforced concrete footing for a column of section 350 mm × 350 mm which is subjected to an axial load of 1000 kN and uniaxial moment of 350 kNm at service state. Consider weight of soil =20 kN/m^3, angle of repose = 30°, allowable bearing capacity of soil =150 kN/m^2 Concrete of grade M20 and steel of grade Fe 415. (10 Marks)

OR

20 Design a Rectangular isolated footing of uniform thickness for RC column of size 450 mm × 600 mm to carry a vertical load of 600 kN. The safe bearing capacity of the soil may be taken as 120 kN/m^2. Use M20 concrete and Fe 4I5 grade steel. Use limit state method. (10 Marks)