R22 Regulation *Subject code:4E5AB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, April 2026

DESIGN OF REINFORCED CONCRETE STRUCTURES

(CE)

Maximum Marks: 60 Date:17.04.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 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.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	Mention the situations in which a doubly reinforced beam becomes necessary	1M	1	L1
b)	What are the advantageous of limit state method of design?	1M	1	L1
c)	What is a canopy area in a building?	1M	2	L1
d)	What is a bond beam in construction?	1M	2	L1
e)	What are the functions of distribution of bars in slabs	1M	3	L1
f)	Name the two types into which the slab types of stair case can be broadly divided into	1M	3	L1
g)	What is the minimum no of bars required for a column	1M	4	L1
h)	What do you mean by column and mention different types of columns?	1M	4	L1
i)	What is the minimum cover size in design of footings	1M	5	L1
j)	List the different types of piles	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Define the term Partial safety factor as used in limit state design. Identify the various factors and state the values recommended in IS 456.	10M	1	L3
	OR			
3	Design a rectangular beam for an effective span of 6m.The-superimposed load is 80kN/m and size of the beam is limited to 30cm x70cm. Use M20 mix and Fe415 grade steel.	10M	1	L5
4	A rectangular beam 240 mm wide and 450 mm effective depth is reinforced with 3 bars of 20 mm dia. at supports. Design the shear reinforcement if it carries a shear of 80kN at service state. Use M20 concrete and Fe 415 steel. Also determine the nominal shear stirrups at mid-span.	10M	2	L5
	OR			

5	The flange of a T beam is 90 cm x12cm and web below is 30cm x 40cm. It is reinforced with 4-25 mm plus 4-12mm Fe 415 steel bars in tension at an effective cover of 50mm. Determine the shear reinforcement needed for a shear force of 250kN (i) If the mix is M20 and (ii) if the mix is M25. Take load factor = 1.5.	10M	2	L3
6	Design a continuous RC slab for a hall 7m and 14m long. The slab is supported on RCC beams each 300mm wide which are monolithic. The ends of the slab are supported on walls 300mm wide. Design the slab for a live load of 3 kN/m^2. Assume the weight of roof finishing equal to 1.0 kN/m^2. Use M20 concrete and Fe 415 steel.	10M	3	L5
	OR			
7	Design a dog-legged stair case for an office building for the following details: Space available for stair = 3.0 m x 6 m. The vertical distance between the floors = 3 m. Live load = 3500 N/m^2. Use M20 concrete and Fe415 steel.	10M	3	L5
8	Design a rectangular column of 5m unsupported length, restrained in position and direction at both ends to carry an axial load of 1000kN. Use M20 concrete and Fe415 steel.	10M	4	L5
	OR			
9	Design a short column under biaxial bending with the following data. Unsupported length of column = 3.5m Size of column 400mm x 400mm Factored load= 1300kN Factored moment Mux =190kNm Muy = 110kNm M25 concrete and Fe 415 steel are used.	10M	4	L5
10	Design a suitable footing for a reinforced concrete column of size 300 mm by 500 mm supporting a factored axial load of 1500 kN. Assume the safe bearing capacity of the soil as 200 kN/m^2 . Adopt M-20 grade concrete and Fe-415 HYSD bars.	10M	5	L5
	OR			
11	Design an isolated pad footing for a column 300 mm x 500 mm reinforced with 6 numbers of 25 mm diameter bars subjected to a factored load of 2000 KN. Safe bearing capacity of the soil is 150 kPa. Concrete of grade M25 concrete and HYSD steel of grade Fe415 are used.	10M	5	L5

Note:Code book IS 456-2000 is allowed