



**B.Tech V Semester Regular/Supplementary Examinations, February 2024**  
**DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES**  
(Civil Engineering)

Maximum Marks: 70

Date:20.02.2024 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.  
IS456 & SP 16 CODE Books are Allowed.

Part-A		CO	Bloom Tx
All the following questions carry equal marks (10x2M=20 Marks)			
1	Under what circumstances beams are to be designed as doubly reinforced?	1	2
2	Explain how the shear resistance of beams are improved.	1	2
3	What is the purpose of development length?	2	2
4	Draw the reinforcement details of a canopy	2	2
5	What is the salient condition for minimum eccentricity of column?	3	1
6	Differentiate between long and short column.	3	2
7	Define Dog legged staircase.	4	2
8	What is the different between one-way slab and two-way slabs?	4	1
9	List any two situations in which combined footings are preferred to isolated footings	5	1
10	Write different types of footing	5	1
Part-B			
Answer All the following questions. (5X10M=50Marks)			Bloom Tx level
11	Design Single reinforced concrete beam simply supported at the edges for a public building with clear span of 4m supported on 200mm solid concrete masonry walls. Live load on slab is $5\text{kN/m}^2$ . Adopt M20 grade concrete and Fe415 HYSD Bars. [10m]	1	4
OR			
12	Explain in detail about limit state design and stress strain diagram [10m]	1	2
13	Explain IS Code Provisions for shear, torsional and bonding reinforcement [10m]	2	2
OR			
14	A RC beam 300x450mm in cross section in reinforced with 3 Nos. 20mm diameter of grade Fe250, with an effective cover of 50mm. The ultimate shear at the section of 138kN. Design the shear reinforcement (i) Using only vertical strips without bending any bar for resisting. (ii) Bending 1 bar dia. 20mm at 45° to resist shear at the section. Assume concrete of grade M20. [10m]	2	4

15	Design a rectangular column of 4.5m unsupported length, restrained in position and direction at both ends, to carry an axial load of 1200 kN. Use M20 grade concrete and Fe415. [10m]	3	4
	OR		
16	Design a short column subjected to biaxial bending. Determine the reinforcement for a short column for the following data. Column size: 450mm x 600mm, $P_u=100\text{kN}$ $M_{ux}=260\text{kN}$ , $M_{uy}=120\text{kN}$ . Use M25 grade concrete and Fe250 grade steel. [10m]	3	4
17	Calculate the reinforcement details of a one-way slab for an office floor which is continuous over tee beam spaced 3.5m intervals. Assuming a live load of $4\text{ kN/m}^2$ . Adopt limit state design. Use M20 grade concrete and Fe415 steel bars. [10m]	4	4
	OR		
18	Design one of the flights of a dog-legged stairs spanning between landing beams using following data Number of steps in a flight = 10 Tread = 300 mm Rise = 150mm Width of landing beams = 300mm. [10m]	4	4
19	A rectangular column 600 x 400 mm carries a load of 800 KN. Design a rectangular footing to support the column. The safe bearing capacity of the soil is $200\text{kN/m}^2$ . Use M20 grade concrete. [10m]	5	4
	OR		
20	Design a combined column footing with a strap beam for two reinforced concrete columns 300 mm x 300 mm size spaced 4m apart and each supporting a fractured axial load of 750 kN. Assume the ultimate bearing capacity of soil at site is $230\text{kN/m}^2$ . Adopt M20 grade concrete and Fe415 HYSD bars. [10m]	5	4