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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Regular and Supplementary Examination December 2022 (2019 Scheme)

Course Code: CET 303

Course Name: DESIGN OF CONCRETE STRUCTURES

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1		Explain how design loads are estimated in limit state design?	(3)
2		Why should there be limiting values for the amount of tensile reinforcement provided in beams?	(3)
3		Define bond. What are the different types of bond in concrete?	(3)
4		What are the different types of shear reinforcement in beams?	(3)
5		Differentiate between one way and two way slabs.	(3)
6		Explain how effective span of stair slab is calculated as per IS 456:2000.	(3)
7		Differentiate between long columns and short columns.	(3)
8		What is an interaction curve? What is its significance in column design?	(3)
9		What is a strap footing? Under what circumstances is it used?	(3)
10		What are the design requirements of beam column joints in earthquake resistant design?	(3)

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Define partial safety factor. Why is partial safety factor for concrete greater than that of steel?	(4)
	b)	A singly reinforced beam 200mm wide has an effective depth of 400mm. It is reinforced with 3#16mm diameter HYSD bars of Fe415 grade. Determine the moment of resistance of the section, if M20 concrete is used.	(10)
12	a)	Define limit state. What are the objectives of limit state design?	(3)
	b)	Design a singly reinforced rectangular beam simply supported over an effective span 7m. The beam has to support a live load of 20kN/m. Use M20 concrete and Fe415 grade steel. Assume moderate exposure conditions.	(11)

Module -2

13	a)	What are the various modes of shear failure in beams?	(3)
	b)	Design the reinforcement for a reinforced concrete beam 300mm wide and	(11)

400mm deep to support a superimposed bending moment of 150kNm. Use M20 concrete and Fe415 grade steel.

14 a) How is torsional reinforcement provided in beams? (2)

b) Determine the moment of resistance of a T beam with effective width of flange 740mm, depth of flange 80mm, web width 240mm and effective depth 400mm. The tensile steel reinforcement provided is 5#20mm diameter bars. Use M15 concrete and mild steel reinforcement. (12)

Module -3

15 a) Explain the behaviour of restrained and unrestrained two-way slabs. (3)

b) Design a reinforced concrete slab for a room of inside dimensions 3m x 7m. The thickness of supporting wall is 300mm. The live load on slab is taken as 2kN/m^2 and floor finish is 1.5kN/m^2. Use M20 concrete and Fe415 grade steel. (11)

16 a) Define the terms: (i) Flight (ii) Landing (2)

b) Design a dog legged stair case for a residential building hall measuring 2.2m x 4.7m. The width of the landing is 1m which spans in same direction as the stair slab. The distance between floor to floor is 3.3m. The rise and tread may be taken as 150mm and 270mm respectively. The weight of floor finish is 1kN/m^2. The materials used are M20 grade concrete and Fe415 grade steel. (12)

Module -4

17 a) Classify columns based on type of loading and eccentricity. (4)

b) Design a circular column with helical reinforcement to carry an axial load of 1000kN. Use M20 concrete and Fe 415 steel. (10)

18 a) What are the functions of transverse reinforcement in columns? (4)

b) Design the reinforcement for a rectangular column 250 x 350mm subjected to an ultimate load of 1200kN and ultimate moment of 60kNm with respect to the major axis. Use M20 concrete and Fe415 grade steel. Take effective cover as 50mm. (10)

Module -5

19 a) Design a reinforced concrete footing for a rectangular column 400mm x 600mm bearing a load of 600kN. Safe bearing capacity of the soil is 120kN/m^2. Adopt M20 concrete and Fe415 grade steel. (14)

20 a) How is crack width determined for RC sections? (3)

b) A cantilever of span 3.5m is 300mm x 600mm and is subjected to a maximum bending moment of 125kNm. The beam is reinforced with 4#20mm diameter bars on the tension side at an effective cover of 50mm. Use M20 concrete and Fe415, check the beam for limit state of deflection. (11)

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