Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Examination December 2021 (2019 scheme)

Course Code: CET303

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 under reinforced, over reinforced and balanced section in limit state design of RC structures.	(3)
2		What is the purpose of limiting the neutral axis depth in the estimation of the flexural strength of reinforced concrete sections?	(3)
3		Enumerate the situations in which a doubly reinforced section become necessary.	(3)
4		Explain the term development length and explain its significance in RC design. Obtain the expression for it.	(3)
5		Distinguish between one way slab and two way slab**.**	(3)
6		List the different types of staircases based on its geometrical shapes.	(3)
7		Explain the function of transverse ties in a reinforced concrete column? What happens if ties are not provided?	(3)
8		What are uniaxially and biaxially loaded columns?	(3)
9		Explain at what situations a combined footing is recommended.	(3)
10		What are the objectives of earthquake-resistant design of reinforced concrete structures?	(3)

PART B

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

Module -1

11	a)	Explain the term Limit State. Enumerate the different limit states to be considered in reinforced concrete design.	(4)
	b)	A rectangular beam 250mm wide and effective depth 450 mm has 3 bars of 20mm diameter as tension steel. Find the moment of resistance of the section if M20 concrete and Fe 415 grade steel are used. Also determine the limiting moment of resistance of the section.	(10)
12	a)	Why is the partial safety factor for concrete (ɣc) greater than that for reinforcing steel (ɣs) in the consideration of ultimate limit states?	(3)
	b)	Design and detail an RC rectangular section subjected to an udl of 15 kN/m over the entire span. Clear span is 5m. The beam is supported on masonry walls, 230 mm thick on both sides. Assume moderate exposure conditions. Use M 25 grade concrete and Fe 415 grade steel.	(11)

Module -2

13	a)	Explain why and how shear reinforcement is provided in beams	(4)
	b)	Design a simply supported rectangular beam to carry a superimposed load of 30kN/mover a span of 5.5m. Assume support width as 300mm. Maximum overall depth is restricted to 550mm. Use M20 concrete and Fe 415 grade steel.	(10)
14	a)	What are the types of reinforcements used to resist shear?	(2)
	b)	Determine the ultimate moment of resistance of an isolated beam of T-shaped cross-section having a span of 6m and cross sectional dimensions are flange width of 1000mm, flange thickness of 100mm, web width of 250mm and an effective depth of 520mm, having tension reinforcement of 6 x 28mm diameter bars. The materials used are concrete mix of grade M20 and mild steel of grade Fe 415.	(12)

Module -3

15	a)	Explain briefly the need of corner reinforcement in two way restrained slab.	(3)
	b)	Design and detail a simply supported slab for a room of interior dimension 5m x 4m subjected to an imposed load of 8kN/m^2. Thickness of supporting wall is 230 mm. Use M 20 concrete and Fe 415 grade steel	(11)
16	a)	Discuss the various loads to be considered while designing a staircase.	(2)
	b)	Design a staircase to be provided in an office building in two straight opposite flights of 1.35m width connected by a landing for a floor height of 3.3m. The landing which is 1.35m wide spans in the same direction as the stair slab. The rise and tread shall be 150mm and 300mm respectively. The weight of finishes 1kN/m2, live load =5kN/m^2. Use M 20 concrete and Fe 415 grade steel.	(12)

Module -4

17	a)	Explain how interaction curves are used in the design of column.	(4)
	b)	Design a circular column to carry an axial load of 1000 kN. Use M 20 concrete and Fe 415 steel. Draw a longitudinal section and a cross section showing the reinforcement.	(10)
18	a)	Classify the columns separately based on loadings and slenderness ratios.	(4)
	b)	Design a short column subjected to a factored load of 1400 kN and a factored bending moment of 135 kNm about one axis. The column has an unsupported length of 3.6 m. Use M25 concrete and Fe415 grade steel.	(10)

Module -5

19	a)	Distinguish between short term and long term deflection.	(2)
	b)	Design and detail an isolated rectangular footing for a column 400 mm x 600 mm to carry a load of 1500 kN. The SBC of the soil is 180 kN/m2.Use M20 concrete and Fe415 grade steel.	(12)
20	a)	List with sketches the different types of shallow footings.	(2)
	b)	Design a square footing for an axially loaded column of 450 mm x 450 mm size. Load on column is 800kN. The safe bearing capacity of soil is 190kN/m^2. Use M20 concrete and Fe415 steel.	(12)

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