1100CET303112402

JYOTHI ENGG. COLLEGE LIBRARY THRISSUR EDUCATIONAL TRUST LEAD KINDLY LIGHT CHERUTHURUTHY

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S5 (S,FE) (FT/WP), (S3 PT) Examination May 2025 (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	Define the limit state and explain the primary objective of Limit state design in RCC.	3
2	Why do concrete and steel have different partial safety factors in the limit state design of RCC structures?	3
3	What are the consequences of neglecting to provide adequate shear reinforcement in reinforced concrete beam.	3
4	Define Development length and illustrate the equation for development length for a bar in tension.	3
5	Explain the importance of reinforcement spacing and cover in slabs.	3
6	Explain the classification of stair on the basis of its structural behaviour.	3
7	Define slenderness ratio. Explain the significance of slenderness ratio in the RCC column design	3
8	How does spiral reinforcement influence the column's load carrying capacity?	3
9	Define raft footing. In what circumstances we do prefer raft footing.	3
10	What are the objectives of earthquake resistant design of RCC structure.	3

PART B

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

Module -1

11	a)	Enumerate the different limit states to be considered in reinforced concrete design.	4
	b)	A rectangular beam 250mm wide and effective depth 450mm has 4 bars of	10

16mm diameter as tension steel. Find the moment of resistance of the section if M20 concrete and Fe415 grade steel are used. Also determine the limiting moment of resistance of the section.

12 a) With neat sketch explain the stress block parameters used in the design of singly reinforced concrete beam as per limit state method. 4

b) Design a simply supported beam of span 6m subjected to a live load of 5kN/m. Use M20 concrete and Fe 415 steel. 10

Module -2

13 a) What are the benefits of using doubly reinforced concrete beams in construction projects? 2

b) Design a simply supported rectangular beam to carry a superimposed load of 30 kN/m over 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. 12

14 a) Explain the different modes of shear failures in RCC beams. 3

b) A T-beam of effective flange width 1200mm, flange thickness 120mm, web width 300mm has an effective depth of 600mm and is reinforced with 6 bars of 28mm diameter. Find the moment of resistance. Use M20 concrete and Fe 415 steel. 11

Module -3

15 a) Design a slab 3.5mx 4 m in clear size supported on 250mm thick wall on four sides and corners are held down. The live load on slab 2kN/m^2. Use M20 concrete and Fe415 steel. 14

16 a) Define the following: i) Tread ii) Balusters 2

b) Design a dog legged stair for the following data: Rise = 150mm, Tread = 300mm, No. of steps in a flight = 12, width of the landing = 150mm. Use M20 concrete and Fe 415 grade steel. Assume service live load of 4kN/m^2 and stairs to be supported on 250mm thick masonry wall at outer edges of landing parallel to risers. 12

Module -4

17 a) Categorize the column based on the type of loading condition 4

b) Design a circular column of length 4m, to carry an axial load of 1100 kN. Use 10

M20 concrete and Fe 415 grade steel.

18 a) Give the design steps for a short column subjected to biaxial bending. 4

b) Design a square column of length 3m, effectively held in position and restrained against rotation to carry a factored load of 1100 kN and a factored moment of 100 kNm. Use M20 concrete and Fe 415 grade steel. 10

Module -5

19 a) Design a rectangular isolated footing of uniform thickness for a reinforced column having a vertical load of 600kN having size 400x600mm. The safe bearing capacity of the soil is 150kN/m^2. Use M25 concrete and Fe415 steel. 14

20 a) Explain an ordinary moment resisting frame and special moment resisting frame 4

b) A simply supported beam 0f 300mmx 600mm spans over 8m and is reinforced with 4 bars of 25mm diameter on the tension side and 2 bars of 12mm diameter on compression side at an effective depth of 550mm. The beam is subjected to a service load moment of 140kNm at the centre of span. Assuming M20 grade concrete and Fe 415 steel check the beam for the serviceability limit state of cracking. 10

***