

B

1100CET303112401

Pages: 3

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S5 (R, S) / S5 (WP) (R) / S3 (PT) (S,FE) Examination November 2024 (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 | Interpret the following terms in limit state design: a. Limit state of collapse, b. Limit state of serviceability | 3 |
| 2 | With neat sketch explain the stress block parameters used in the design of singly reinforced concrete beam as per limit state method. | 3 |
| 3 | What are the key factors influencing the shear capacity of an RCC beam | 3 |
| 4 | What is meant by curtailment of reinforcement? How does it affect the structural integrity of a building? | 3 |
| 5 | Differentiate between one way slab and two-way slab | 3 |
| 6 | Explain the loads that are to be considered in the design of a staircase | 3 |
| 7 | Elucidate the concept of column effective length. | 3 |
| 8 | List out the functions of transverse reinforcement in columns. | 3 |
| 9 | Explain the factors influencing the selection of a combined footing. | 3 |
| 10 | Explain the importance of ductility in earthquake resistant design. | 3 |

PART B

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

Module -1

- | | | |
|----|--|----|
| 11 | a) Distinguish between balanced, over-reinforced and under-reinforced limit state design. | 6 |
| | b) Find the ultimate bearing capacity of a rectangular beam of 300mm width and 600 depth, reinforced with 3 bars of 20mm diameter of Fe 415 steel. Take M25 concrete. Assume 30mm nominal cover. Also determine the limiting moment of resistance. | 8 |
| 12 | a) Define characteristic load and characteristic strength. | 4 |
| | b) Design a cantilever beam of effective span 3.5m carrying a superimposed load of 4kN/m. Assume M20 grade concrete and Fe415 steel. | 10 |

Module -2

- 13 a) Explain the purpose of providing doubly reinforced beams in RCC. 2
b) Design a simply supported rectangular beam of span 5m to carry a factored moment of 150kNm. Assume support width as 300mm. Maximum overall depth is restricted to 550mm. Use M20 concrete and Fe 415 grade steel. 12
- 14 a) Enumerate the advantages and disadvantages of using T beams 6
b) Design the shear reinforcement for a simply supported RC beam of effective span 5m with width 250mm and effective depth 400mm and carrying a superimposed load of 10 kN/m. The beam is reinforced with 3 bars of 20 mm diameter. Use M20 concrete and Fe 415 grade steel. 8

Module -3

- 15 a) Explain the impact of restraint on slab deflection. 2
b) Design and detail a simply supported slab for a room of interior dimension 5mx4m subjected to an imposed load of 8kN/m². Thickness of the supporting wall is 230mm. Use M20 concrete and Fe415 grade steel. 12
- 16 a) Explain the geometrical classification of stair. 2
b) The main stair of an office building has to be located in a stair room measuring 3.5m x 5.5m. The vertical distance between floors is 3.75m. Design a dog-legged stair for a live load of 2000N/m². Use M20 concrete and Fe415 grade steel. 12

Module -4

- 17 a) Classify the column based on the slenderness ratio. 4
b) Design a column of length 4m to carry a factored load of 1300 kN. Use M20 concrete and Fe 415 grade steel. Design the lateral ties also. Sketch the reinforcement 10
- 18 a) Explain the significance of interaction curve in column design. 4
b) Design a short circular column with helical reinforcement of diameter 50cm and length 3m to carry a factored load of 1200 kN and a factored moment of 120 kNm. Use M20 concrete and Fe 415 grade steel. 10

Module -5

- 19 a) Design an isolated footing of uniform thickness for an axially loaded column of 450x450mm size. The safe bearing capacity of the soil is 180kN/m². Load on the column is 800kN. Use M20 concrete and Fe 415 grade steel. 14

- 20 a) Explain the procedure for estimation of flexural crack width in reinforced concrete slabs as per Indian standards. 5
- b) A doubly reinforced beam of rectangular section 250mm wide and 550mm overall depth is reinforced with 4 bars of 22mm diameter on tension side and 2 bars of 16mm diameter at compression side. The effective cover is 50mm. The beam spans over 8m. If M20 concrete and Fe 415 HYSD bars are used, check the deflection control using empirical method. 9
