

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018**

**Course Code: CE301**

**Course Name: DESIGN OF CONCRETE STRUCTURES I (CE)**

Max. Marks: 100

Duration: 3 Hours

**Instructions:**

1. *Use of IS 456:2000 is permitted*
2. *Furnish reinforcement detailing of sections designed*

**PART A**

*Answer any two full questions, each carries 15 marks.*

- |   |   | Marks |
|---|---|-------|
| 1 | a) Determine the central concentrated load that can be carried by a simply supported singly reinforced beam of 250 mm x 500 mm reinforced with 4 bars of 20mm diameter with an effective cover of 50mm. Effective span of beam is 5.5m. Use M20 concrete and Fe415 steel.   | (9)   |
|   | b) Differentiate between flexural bond and development bond   | ( 6)  |
| 2 | a) Distinguish between under reinforced and over reinforced sections in reinforced concrete beams.  | (5)   |
|   | b) A 250 mm wide RC beam with 400mm effective depth is reinforced with 3 numbers 20mm diameter bars of Fe 415 grade steel. The beam is provided with 8mm diameter 2 legged vertical stirrups at 150mm/c as shear reinforcement and one of the longitudinal bars is bent up at 45° nearer to support as per IS 456:2000. Determine the design strength of the section in shear if the concrete used is of M20 grade. | (10)  |
| 3 | a) Design the shear reinforcement for a simply supported RC beam of effective span 6m with width 300mm and depth 500mm and carrying a superimposed load of 12kN/m. The beam is reinforced with 4 bars of 20 mm diameter. Use M20 concrete and Fe 415 grade steel. Effective cover to reinforcement 50mm.  | (10)  |
|   | b) What are the advantages and disadvantages of providing large clear cover to reinforcement in flexural members?   | (5)   |

**PART B**

*Answer any two full questions, each carries 15 marks.*

- |   |  |      |
|---|--|------|
| 4 | Design a simply supported beam of span 6m subjected to a live load of 5kN/m. Use M20 concrete and Fe415 steel.   | (15) |
| 5 | Design a simply supported RC slab for a room having inside dimensions 3m x 7.5m. Thickness of supporting wall is 230mm. The Live Load on slab is 2 kN/m <sup>2</sup> . Floor finish 1kN/m <sup>2</sup> . Use M20 concrete and Fe 415 steel.  | (15) |
| 6 | a) Design the shear reinforcement required for a reinforced concrete beam 300 mm x 600 mm to carry a factored moment of 120 kNm, a factored shear force of 100 kN and a factored Torsional moment of 60 kNm. Use M25 concrete and Fe415 steel. Effective cover to reinforcement 50 mm. | (9)  |

- b) Draw the reinforcement detailing of (i) cantilever slab (ii) one way continuous slab (6)

**PART C**

*Answer any two full questions, each carries 20 marks.*

- 7 Design a reinforced concrete slab 4m x 5m simply supported on all the four sides subjected to a live load of  $4\text{kN/m}^2$ . Use M25 concrete and Fe 415 steel. Assume that the corners of the slab are held down. (20)
- 8 Design a short circular column of effective length 3.3m to carry an axial load of 1200 kN. Provide helical reinforcement as transverse reinforcement. Use M25 concrete and Fe415 steel. (20)
- 9 a) Differentiate between short columns and long columns in RC construction (4)
- b) A reinforced concrete beam of size 250 mm x450 mm is provided with 4 bars of 20mm with an effective cover of 50 mm. Bending moment to be resisted is 50kNm. Determine the crack width at point which is the midpoint of tension edge. Adopt M20 concrete and Fe415 steel. (12)
- c) Briefly explain the load distribution in dog legged stair (4)

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