Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019
Course Code: CE301
Course Name: DESIGN OF CONCRETE STRUCTURES I
Use of IS 456:2000 is permitted

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions, each carries 15 marks.

Marks

1 a) Distinguish between balanced, over-reinforced and under-reinforced sections in limit state design. Which of these should be recommended in design?   (5)

   b) Find the moment of resistance of a singly reinforced concrete beam of 200 mm width and 400 mm effective depth, reinforced with 4 bars of 16 mm diameter of Fe415 steel. Take M20 concrete. Redesign the beam if necessary.   (10)

2 a) With neat sketch explain the stress block parameters used in the design of singly reinforced concrete beam as per limit state method.   (5)

   b) Design the shear reinforcement for a beam with b= 350 mm, d= 550 mm, V_u= 125 kN, f_{ck}= 25 N/mm^2, f_y= 415 N/mm^2. Percentage of steel is 1.67 percent.   (10)

3 a) A simply supported beam, 300 mm wide and 600 mm effective depth carries a uniformly distributed load of 74 kN/m including its own weight over an effective span of 6 m. The reinforcement consists of 5 bars of 25 mm diameter. Out of these, two bars can be safely bent up at 1 m distance from the support. Design shear reinforcement for the beam.   (10)

   b) Define development length and derive an expression for development length.   (5)

PART B
Answer any two full questions, each carries 15 marks.

4 a) What are the situations that demand double reinforcement in beams? Compare the stress strain distributions in singly reinforced and doubly reinforced beams.   (5)

   b) Determine the moment of resistance of beam having width b of 350 mm, depth of 900 mm with a cover of 50 mm. Beam is reinforced with 5 tension reinforcements of 20 mm HYSD bars (Fe 415) and 2 compression reinforcements of 20 mm Fe 415 steel. Grade of concrete is M15.   (10)

5   Design a simply supported RCC slab for a roof of a hall 4 m × 10 m (inside   (15)
dimensions) with 230 mm walls all around. Assume a live load of 4 kN/m^2 and
finish 1 kN/m^2. Use M 25 concrete and Fe 415 steel.

6 a) Differentiate between one way slab and two way slab.   (5)

    b) A T-beam has the following data: width of flange= 750 mm, Breadth of beam= (10)
250 mm, Effective depth= 500 mm, Thickness of flange= 90 mm. Determine the
limiting moment of resistance of the beam. Use M20 concrete and Fe415 steel.

PART C
Answer any two full questions, each carries20 marks.

7 a) Design a reinforced concrete slab 6.3 × 4.5 m simply supported on all the four (15)
sides. It has to carry a characteristic live load of 10 kN/m^2 in addition to its dead
weight. Assume M25 concrete and Fe 415 steel; also assume mild exposure
conditions.

    b) Explain the procedure for estimation of flexural crack width in reinforced (5)
concrete members as per IS456.

8 a) Design and detail a dog-legged stair for a building in which the vertical distance (15)
between the floors is 3.6 m. The stair hall measures 2.5 m × 5 m. The live load
may be taken as 2500 N/m^2. Assume that stair is supported at outer edges. Use
M20 concrete and Fe415 steel.

    b) Sketch typical reinforcement detail in tread-riser type stairs.   (5)

9 a) Design a circular short column to carry an axial load of 1000 kN using helical (12)
reinforcement. Use M20 concrete and Fe 415 steel.

    b) How does one (a) check for deflections of two way slabs, and (b) control crack (8)
width in two way slabs?

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