Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019
Course Code: CE301
Course Name: DESIGN OF CONCRETE STRUCTURES I

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) A rectangular beam 250mm wide and effective depth 450 mm has 4 bars of   (10)
       20mm diameter. Find the moment of resistance of the section if M20 concrete
       and Fe 415 grade steel are used. As per IS 456:2000 find the limiting moment of
       resistance also.

   b) Explain how the longitudinal reinforcement bent up nearer to the supports   (5)
       contribute to the shear resistance of RC beams?

2 a) Explain the terms Characteristic strength and Characteristic load.   (5)

   b) A 250 mm wide RC beam with 450mm depth is reinforced with 4 numbers 16   (10)
       mm diameter bars of Fe 415 grade steel. Effective cover to reinforcement is
       50mm. The beam is provided with 8 mm diameter 2 legged vertical stirrups at
       160 mmc/c as shear reinforcement. M20 concrete is used. Determine the design
       strength in shear and also its limiting value.

3 a) Design the shear reinforcement for a simply supported RC beam of effective   (10)
       span 5m with width 300mm 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.

   b) Why does the code impose minimum and maximum limits with regard to   (5)
       (i) spacing and (ii) percentage area of flexural reinforcement?

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 4 kN/m.   (15)
      Use M20 concrete and Fe415 steel.

5 a) Design a cantilever slab of span 2m to carry imposed load of 2 kN/m^2 over its   (12)
       entire span. Finish load=0.5 kN/m^2. Use M20 concrete and Fe415 steel. The slab
       is supported by a beam of size 300mmx500mm.

b) Is it correct to model the interior beams in a continuous beam supported slab (3)
system as T beams to determine their flexural strength at all sections?

6 a) Determine the longitudinal reinforcement required for a rectangular beam section (8)
with b=300 mm, d=550mm, Mu=100kNm, Tu=45kNm, Vu=80 kN. Adopt M20
concrete and Fe 415 steel.

   b) Differentiate between one way slabs and two way slabs.   (4)

   c) Draw the reinforcement detailing of a simply supported one way slab   (3)

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

7 Design an interior panel of a continuous slab system with effective dimensions (20)
4m x 5m subjected to a live load of 3 kN/m^2. Use M20 concrete and Fe 415
steel.

8 Design a reinforced concrete column to carry an axial load of 1600 kN. Use M20 (20)
concrete and Fe415 steel. The column has unsupported length of 3m and is
effectively held in position at both the ends, but not restrained against rotation.

9 a) Differentiate between short term and long term deflections of RC beams   (6)

   b) Determine the area of longitudinal steel to be provided in a short column of size (9)
600mm x 600mm subjected to a factored load of 1500 kN. Use M20 concrete and
Fe415 steel.

   c) Sketch the reinforcement detailing of a tread-riser type stair.   (5)

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