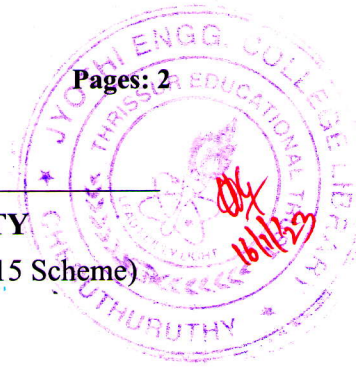Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Fifth Semester B.Tech Degree (S, FE) Examination January 2023 (2015 Scheme)

Course Code: CE301

Course Name: DESIGN OF CONCRETE STRUCTURES I

Max. Marks: 100   Duration: 3 Hours

Use of IS 456-2000 is permitted

PART A

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

1	a)	State the assumptions made in limit state of collapse in flexure	(2)
	b)	Derive the expression for moment of resistance of a rectangular section reinforced in the tension side only	(6)
	c)	Calculate the moment of resistance of a rectangular beam of cross section 300 mm x 550 mm reinforced with 4 Nos of 16mm dia bars in the tension side. Use M20 grade concrete and Fe 415 steel.	(7)
2	a)	Explain briefly the shear distribution in a homogeneous rectangular beam section and also in a reinforced rectangular beam section	(4)
	b)	How vertical stirrups help in carrying shear?	(3)
	c)	Design the shear reinforcement for beam with details given in (Qn 1.c) if it is simply supported over a span of 5m and carries UDL of 50 kN/m including self weight.	(8)
3	a)	Discuss the importance of development length and anchorage in the design of RC structures.	(3)
	b)	A simply supported beam 300 mm x500 mm has 3,16 mm diameter bars going into the support. If the shear force at the support is 100 kN at working loads. Determine the anchorage length. Assume M20 mix and Fe 415 steel	(8)
	c)	What is the effect of varying the percentage of steel on the moment of resitance of RC structures.	(4)

PART B

Answer any two full questions, each carries 15 marks.

4	Design a doubly reinforced rectangular beam for a simply supported beam having clear span of 6m and carrying a uniformly distributed load of 50 kN/m	(15)

and a central concentrated load of 100 kN. The depth of the beam is limited to 500 mm. Use M20 concrete and Fe415 steel.

5 a) Determine the moment of resistance of a T beam with flange width -1000 mm, (10) Depth of flange-110 mm, Overall depth-500 mm, effective cover-50mm, width of web-300 mm, Ast- 5, 25 mm bars, Use M20 concrete and Fe415 steel.

  b) How do you account for torsion in the design of RC beams as per IS 456 2000 (5)

6 a) Illustrate the structural behaviour of one way and two way slab with the help of (3) neat sketches

  b) Design a simply supported roof slab for a room 8m x 3.5 m clear size for a (12) superimposed live load of 4kN/m^2. Use M20 concrete and Fe415 steel

PART C
Answer any two full questions, each carries 20 marks.

7 a) Design a two way slab over a class room 4.5m x 6m with 230 mm brick walls (15) around. The live load on the slab is of 5kN/m^2 . Use M20 concrete and Fe 415 steel . Assume that the slab corners are prevented from lifting up

  b) Explain the procedure for calculating the width of crack as per IS 456 2000 (5)

8 a) Explain the terms (i) slenderness ratio (ii) effective length (iii) unsupported (5) length of a compression member

  b) Enumerate the functions of transverse reinforcement in a reinforced concrete (3) column

  c) Design a reinforced concrete spiral column to carry a factored axial load of (12) 2000 kN. The column has an unsupported length of 3.5 m and is braced against side sway. Use M25 concrete and Fe 415 steel .

9 a) Explain the importance of serviceability limit states in the structural design of (2) reinforced concrete members

  b) Calculate the short term deflection in a cantilever beam of cross section 250 (14) mm x 400 mm and span 3m. The maximum bending moment in the beam under service loads is 150 kNm. The beam is reinforced with 3, 16 mm diameter bars on the tension side. Assume M20 concrete and Fe 415 steel.

  c) Describe the common geometrical configuration of stair cases . (4)

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