Total number of printed pages: 02

Programme (UG)/5th Sem/UCE501

2023

SUBJECT NAME: Design of RCC Structures (UCE 501)

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Differentiate between working stress method and limit state method of design. Write the procedure to determine neutral axis depth and ultimate moment of resistance for balanced, under-reinforced and over-reinforced sections in a) WSM and b) LSM.	4 +4 = 8
	b)	A doubly reinforced beam section has a size of 250 X 450 mm total depth. It is reinforced with 3-20 Φ as compression reinforcement and 4-28 Φ as tensile reinforcement. Assume M25 concrete and Fe 415 steel and clear cover as 30 mm. Determine the stresses in concrete, compression steel and tension steel. Also determine: i) allowable moment of resistance and ii) ultimate moment of resistance	12
2.		Define doubly reinforced section. Write the procedures to determine neutral axis depth and ultimate moment of resistance in doubly reinforced beam section. A rectangular beam of 7-m span (c/c), resting on 300 mm wide simple supports, is to carry a uniformly distributed dead load (excluding self-weight) of 15 kN/m, a live load of 20 kN/m and a concentrated dead load of 30 kN placed at the midspan point. Using Fe 415 steel, design the beam section at midspan, given that the size of the beam is limited to 250 mm X 400 mm. Also perform a check for deflection control. Assume that the beam is subjected to moderate exposure condition.	3+17 = 20
3.		Define one way and two way slabs. A restrained concrete slab is of size 4m X 5m is having 2 short edges discontinuous. Design the slab if the live load (excluding self weight) is 5 kN/m^2 and surface finish of 1 kN/m^2. Assume M25 concrete and Fe 415 steel.	20
4.		Why the provision of a minimum stirrup reinforcement is mandatory in all reinforced concrete beams? Assuming the beam in question no. 2 (a), design the beam for shear reinforcement at i) support and ii) at midspan.	2 +18 =20

		Assume M 25 concrete and Fe 415 steel.	
5		Design a 1-way slab, with a clear span of 5 m, simply supported on 230 mm thick walls and subjected to a live load of 3 kN/m^2 and a finish surface of 1 kN/m^2, using Fe 415 steel. Assume that the slab is subjected to a) mild exposure condition and b) very severe exposure, and compare the results.	10+10 =20
6		Write short notes on: a) Slenderness ratio, b) Effective length, and c) Unsupported length of a compression member. Design a circular column having an axial load of 2000 kN. The unsupported length of the column is 3.3 m. Consider both ends of the column as effectively held in positin but not restrained against rotation. Use M25 concrete and Fe 415 steel.	5+15 =20
7		Define isolated and combined footing with figures. Design an isolated footing for a column of size 300 X 450 carrying an axial load of 1750 kN. The safe bearing capacity of the soil is 150 kN/m^2. Use M25 concrete and Fe 415 steel.	4+16 =20