UPES
End Semester Examination, May 2023

Course: Design of Concrete Structures   Semester: VI
Program: B.Tech. Civil Engineering   Time   : 03 hrs.
Course Code: CIVL 3062   Max. Marks: 100

Instructions: IS 456:2000 and SP 16:1978 are allowed/provided. Assume necessary data if required.

SECTION A

S. No.		Marks	CO
Q 1	Distinguish between balanced, over-reinforced and under-reinforced sections in limit state design. Which of these should be recommended in design?	4	CO1
Q 2	With neat sketch explain the stress block parameters used in the design of singly reinforced concrete beam as per limit state method.	4	CO1
Q 3	Define development length and derive an expression for development length.	4	CO1
Q 4	What are the advantages and disadvantages of providing large clear cover to reinforcement in flexural members?	4	CO1
Q 5	Differentiate between short columns and long columns in RC construction	4	CO1
SECTION B			
Q 6	Design the shear reinforcement for a simply supported RC beam of effective span 6m with width 300mm and depth 500m, 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	CO2 CO4
Q 7	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. OR Design the column as a rectangular column.	10	CO2 CO4
Q 8	Design and detail a dog-legged stair for a building in which the vertical distance between the floors is 3.6 m. The stair hall measures 2.5 m × 5 m.	10	CO3 CO4
Q 9	A T-beam has the following data: width of flange= 750 mm, Breadth of beam= 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.	10	CO2 CO4

	SECTION-C		
Q 10	Design a reinforced concrete slab 4m x 5m simply supported on all the four sides subjected to a live load of $4kN/m^2$. Use M25 concrete and Fe 415 steel. Assume that the corners of the slab are held down.	**20**	**CO2** **CO4**
Q 11	Design a suitable footing for a reinforced concrete column of size 300mm by 500 mm supporting a factored axial load of 1500 kN. Assume the safe bearing capacity of the soil is $200 \ kN/m^2$. Adopt M20 grade concrete and Fe 415 steel. Sketch the details of reinforcements in the footing. OR Design the footing for a circular column of diameter 500mm.	**20**	**CO3** **CO4**