


Name:			
Enrolment No:			
UPES End Semester Examination, May 2024			
Course: Design of Concrete Structure Semester: VI Program: B.Tech. Civil Engineering Course Code: CIVL3062		Time: 03 hrs. Max. Marks: 100	
Instructions: 1. Use of the codes IS 456 and SP 16 are permitted in the examination. 2. Assume any missing data suitably.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Enumerate how partial safety factor for load, for material strength and difference between the cube strength and strength of concrete in a structure is incorporated in the design formula for limit state design.	4	CO1
Q 2	Briefly explain the mild, moderate, severe and very severe exposure conditions. Also, write down the allowed crack width for each of the above exposure condition as per the Indian standard.	4	CO2
Q 3	List the various shear carrying mechanisms in a reinforced concrete beam.	4	CO2
Q 4	(a) Distinguish between a one-way and two-way slab. (b) A one-way slab having overall depth of 200 mm is supported over two brick walls of thickness 200 mm. The clear span between the wall is 3.5 m. Determine the effective span of the slab.	2+2	CO3
Q 5	Distinguish between short column and slender column. What role does the lateral tie play in a column?	2+2	CO1
SECTION B (4Qx10M= 40 Marks)			
Q 6	Determine the percentage of tension reinforcement required for a beam of width 300 mm and effective depth of 600 mm carrying a factored moment of 185 kNm. Assume M20 grade of concrete and Fe415 grade of steel.	10	CO2
Q 7	A rectangular beam is to be simply supported on two walls of thickness 125 mm with a clear span of 6 m. The characteristic live load of 12 kN/m	10	CO3

	is acting on the beam. Assuming M20 grade of concrete and Fe415 grade of steel design a suitable section.		
Q 8	<p>A beam is simply supported over a span of 5 m and carries a factored load of 160 kN/m. The beam has width and effective depth of 350 mm and 550 mm respectively. Assuming M20 and Fe415 grade of steel, design the beam for shear using vertical stirrups.</p> <p style="text-align: center;">OR</p> <p>Design a simply supported RCC slab for a roof of a hall 4m x 10m (inside dimensions) with 230 mm wall along the long sides. Assume a live load of 4kN/m², floor finish of 1kN/m², Fe415 grade of steel and M20 grade of concrete.</p>	10	CO3
Q 9	<p>Design the reinforcement for a column of size 400 mm × 600 mm, subjected to an axial load of 2000 kN under service dead and live loads. The column has an unsupported length of 3 m and is braced against sideway in both directions. Use M20 and Fe415 grade of steel.</p>	10	CO4
SECTION-C (2Qx20M=40 Marks)			
Q 10	<p>Design a reinforced concrete slab of 6.3 m × 4.5 m simply supported on all four sides. It has to carry a characteristic live load of 10 kN/m² in addition to its dead weight. Assume M25 grade of concrete and Fe415 grade of steel. Also, assume mild exposure condition.</p> <p style="text-align: center;">OR</p> <p>A room 17.5 m × 10 m has brick walls all around and it is to be covered with a reinforced concrete slab supported on the walls and on central beams in the E-W and N-S directions along the middle of the room. The slab has to carry a live load of 4kN/m². Assume the grade of concrete and steel to be M25 and Fe415 respectively and mild exposure condition. The slabs are restrained on top of the walls by brick masonry built above it. Design the slab.</p>	20	CO4
Q 11	<p>Investigate the safety of a reinforced concrete column of 600 mm × 300 mm under uniaxial eccentric compression with respect to the minor axis, considering factored axial load of 1400 kN and factored moment of 200 kNm. Assume a clear cover of 40 mm and d'/D = 0.2. If you find the section is unsafe, propose a suitable modification to the reinforcement provided. If required the chart provided may be made use of.</p>	20	CO4

