Roll No.											

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 15-12-2025 **Time:** 1.00pm to 04.00pm

School: SOE	**Program:** B.Tech Civil Engineering	
Course Code : CIV3003	**Course Name:** Design of RCC Structural Elements	
Semester: V	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**CO7**
Marks	**4**	**17**	**17**	**14**	**14**	**20**	**14**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

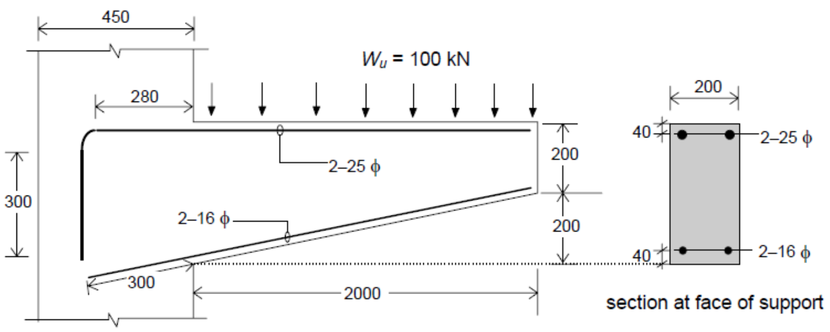
Part A

Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M

1.	List any 2 tests on fresh concrete and 2 tests on hardened concrete.	2 Marks	L1	CO1
2.	What is the difference between structural analysis and structural design?	2 Marks	L1	CO1
3.	Write the equation to calculate depth of neutral axis.	2 Marks	L1	CO2
4.	How do you calculate maximum reinforcement for a beam?	2 Marks	L1	CO3
5.	List the different modes of cracking for a beam.	2 Marks	L1	CO4
6.	What is the criteria for calculating maximum spacing of shear reinforcement?	2 Marks	L1	CO4
7.	What are the different mechanisms of bond resistance?	2 Marks	L1	CO5
8.	List any 4 factors influencing bond strength.	2 Marks	L1	CO5
9.	What is the difference between a column and pedestal?	2 Marks	L1	CO7
10.	How do you calculate the minimum eccentricity in a column?	2 Marks	L1	CO7

Part B

Answer the Questions. **Total Marks 80M**

11.	a.	A reinforced concrete beam of rectangular section 250 mm wide is reinforced with 3 bars of 20 mm dia at an effective depth of 520 mm. The beam has to resist a factored shear force of 280 kN at the support section. Assuming M25 concrete and Fe415 bars, design the vertical stirrups for the section.	10 Marks	L3	CO4
		Or			
12.	a.	A reinforced concrete beam has a support section with a width of 400 mm and effective depth of 700 mm. The support section is reinforced with 5 bars of 25 mm diameter at an effective depth of 700 mm. One bar is bent up at 45°. Additionally, 8 mm diameter 2-legged stirrups at a spacing of 200 mm are provided as shear reinforcement. Using M30 grade concrete and Fe415 HYSD bars, estimate the shear strength of the support section.	10 Marks	L3	CO4
13.	a.	A simply supported beam having a width of 250 mm and effective depth of 400 mm, is reinforced with 3 bars of 20 mm diameter. Calculate the anchorage length required. If the length provided is 1100 mm, calculate the average bond stress. Assume M25 grade of concrete and Fe500 grade steel.	10 Marks	L3	CO5
		Or			
14.	a.	Check the adequacy of the anchorage provided for the longitudinal bars in the cantilever beam shown in figure. Assume M25 concrete and Fe415 HYSD bars 	10 Marks	L3	CO5
15.	a.	Design the reinforcement in a column of size 400mm x 500mm, subjected to an axial service load of 1500kN. The effective length in both directions is 3.5m. Use M25 concrete and Fe500 steel.	10 Marks	L3	CO7
		Or			
16.	c.	Design the longitudinal reinforcement in a circular column of diameter 500mm subjected to a factored load of 1800kN and a factored moment of 200kNm. Assume M25 concrete and Fe500 steel.	10 Marks	L3	CO7

17.	a.	A simply supported rectangular beam needs to be designed for an office building. The beam has a clear distance between supports of 3.5 meters, with 250 mm wide masonry walls at each end. It must carry a superimposed live load of 9kN/m. The design must use M25 grade concrete and HYSD Fe415 reinforcement.	15 Marks	L3	CO3
Or					
18.	a.	A corridor beam in a residential building has a clear span of 2.8 meters with 200 mm thick supporting walls. It supports a live load of 4.5kN/m. Design the beam using M25 concrete and Fe500 steel, providing the required longitudinal reinforcement.	15 Marks	L3	CO3

19.	a.	A rectangular concrete beam measures 300 mm in width and 600 mm in total depth. It is reinforced with 1800 mm^2 of tensile steel and 600 mm^2 of compressive steel, both placed at an effective cover of 55 mm. Calculate the ultimate moment capacity of the section using M25 concrete and Fe415 grade steel.	15 Marks	L3	CO2
Or					
20.	a.	A doubly reinforced concrete beam section is 275 mm wide and 525 mm deep. It contains 2000 mm^2 of tension steel and 450 mm^2 of compression steel, both at an effective cover of 50 mm. Determine the section's ultimate moment of resistance, assuming M25 concrete and Fe500 steel.	15 Marks	L3	CO2

21.	a.	Design a one-way continuous slab for an office floor with a center-to-center span of 3.8 meters and total length of 15 meters continuous over 4 spans. The slab carries a live load of 4 kN/m^2 and floor finish of 1.2 kN/m^2. Use M25 concrete and Fe415 steel.	20 Marks	L3	CO6
Or					
22.	a.	Design the roof slab with clear internal dimensions of 5m × 6m with the shorter edge discontinuous. The slab is subjected to a load of 10 kN/m^2 in addition to sel-weight. Use M35 concrete and Fe415 steel, considering both serviceability and ultimate limit states.	20 Marks	L3	CO6