PRN No.		PAPER CODE	$\cup 313 - 222 (RE)$

December 2023 (REEXAM)

T.Y.B.TECH (SEMESTER - I)

COURSE NAME: STRUCTURAL DESIGN AND DRAWING I	Branch: CIVIL ENGINEERING	COURSE CODE:	CVUA31202

(PATTERN 2020)

Time: [2 Hrs.]

[Max. Marks: 60]

(*) Instructions to candidates:
1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data wherever required**
4) **All questions are compulsory. Solve any two sub questions each from each Question 1 ,2, 3,4,5,and 6 respectively**
5) **Use of IS 456:2000 and Interaction Curves are allowed**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) A RC beam section of size 300 mm x 700 mm effective depth is reinforced with 3 bars of 20 mm diameter. The span of the beam is 5 m. Classify the type of the section. Assume M20 grade concrete and Fe 415 steel.	[5]	CO1	Apply
	b) A RC beam section of size 300 mm x 700 mm effective depth is reinforced with 3 bars of 20 mm diameter. The span of the beam is 5 m. Determine the uniformly distributed load that can be applied on the beam. Assume M20 grade concrete and Fe 415 steel.	[5]	CO1	Apply
	c) A RC beam section of size 300 mm x 700 mm effective depth is reinforced with 3 bars of 20 mm diameter. The span of the beam is 5 m. Determine the moment of resistance of the section. Assume M20 grade concrete and Fe 415 steel.	[5]	CO1	Apply
Q2	a)A simply supported beam AB of span 4.5 m carries an UDL of 25 kN/m including its self-weight. Design the suitable singly reinforced rectangular section for flexure.	[5]	CO2	Apply
	b) Draw Stress-Strain curves for concrete in Limit State Method and explain the same with the associated values.	[5]	CO2	Apply
	c) A simply supported beam over a span of 6 m carries a UDL of 40 kN/m throughout the span if the size of the beam is restricted to 230 mm x 525 mm (overall depth). Design the suitable reinforcement for the beam using LSM. Assume M20 grade concrete, Fe 415 steel and f_{sc}=353 MPa.	[5]	CO2	Apply

Q3.	a) Calculate the development length for 16 mm diameter bar in compression and tension as per the provision of IS 456:2000. Use M20 grade concrete and Fe 415 steel.	[5]	CO3	Apply
	b) Determine the shear strength of concrete for M 30 grade concrete and Fe 415 steel. The percentage of tension reinforcement s 0.67%. Width of the section is 300 mm and effective depth is 600 mm.	[5]	CO3	Apply
	c) Determine the spacing of minimum shear reinforcement for a rectangular section of 230 mm width and 500 mm effective depth. Assume M20 grade concrete and Fe 500 steel.	[5]	CO3	Apply
Q.4	a) Design a cantilever slab projecting 1.2 m from the support using M20 grade concrete and Fe 415 steel. Superimposed load including finishing as 2.5 kN/m².	[5]	CO4	Apply
	b) A five span continuous slab is subjected to ultimate dead load of 6 kN/m and ultimate live load of 3 kN/m. Determine the maximum positive bending moment and maximum negative bending moment using the coefficients given in IS 456:2000. The spacing of the beams s 4 m center to center.	[5]	CO4	Apply
	c) Design a two way slab of size 3.5 m x 5 m with all edges discontinuous. Live load= 4 kN/m², Floor Finish=1 kN/m². Use M20 grade concrete and Fe 415 steel.	[5]	CO4	Apply
Q.5	a) Design an axially loaded column 400mm x 450mm pinned at both the ends. Unsupported length of column is 3meter and it carries a service load of 2500 kN. Assume M30 grade concrete and Fe 415 steel.	[5]	CO5	Apply
	b) Design a circular column to carry an axial load of 2000 kN. Unsupported length of column is 4 meter. Assume M20 grade concrete and Fe 415 steel.	[5]	CO5	Apply
	c) Design the reinforcement for a short column 300mm x 600 mm; ultimate axial load on column is 1400 kN and ultimate bending moment is 60 kN-m about major axis of bending. Unsupported length of column is 4.5m and effective length is 2.75m. Use M30 grade concrete and Fe415 grade of steel.	[5]	CO5	Apply
Q.6)	a) Compute the size of pad footing for the data given below 1.Axial load on the column = 1300 kN 2.Column size = 230mm x650mm 3.Safe bearing capacity of soil= 250kN/m² Also find factored upward soil pressure.	[5]	CO6	Apply
	b) Check the pad footing with following data for two way shear: 1. Size of footing =2370mm x2000mm 2. Effective depth of footing = 570 mm 3. Size of column = 230mmx 600mm 4. Factored upward soil pressure = 300kN/m². Assume M30 grade of concrete and Fe415 grade of steel.	[5]	CO6	Apply
	c) Compute the size of isolated rectangular sloped footing for the column size of 230mm x 650mm, carrying an axil load of 1500 kN. The SBC of soil is 250 kN/m². The offset from the face of column is 50mm. Use M30 grade of concrete and Fe415 grade of steel.	[5]	CO6	Apply