

PRN No.	
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PAPER CODE	U 314 - 222 (ESE)
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(AY:2024-25) December 2024 (ENDSEM) EXAM
SY /TY/B.TECH (SEMESTER - I)

COURSE NAME: STRUCTURAL DESIGN AND DRAWING - I COURSE CODE: CVUA31202
BRANCH: CIVIL ENGINEERING
T.Y (B.Tech) PATTERN 2020

Time: [1Hr 30 Min]

[Max. Marks: 40]

(*) Instructions to candidates:

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

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Calculate moment of resistance for a section 300mm × 450mm deep. Four bars of 16 mm diameter are provided on tension side only. Effective cover is 40mm, Assume M30 concrete and Fe 415 steel.	[4]	CO1	Analysis
	b) A doubly reinforced beam of size 230 mm X 540 mm (overall) is reinforced with 2, 12mm# bars on compression side and 4, 20 mm # bars on tension side. Effective cover on both the sides is 40 mm. Compute the depth of neutral axis.	[4]	CO1	Analysis
	c) Determine the limiting moment of resistance of singly reinforced rectangular section having width of 300 mm and effective depth 560 mm. Assume M30 concrete and Fe 415 steel.	[4]	CO1	Analysis
Q2	a) Design the suitable reinforcement for a simple beam of span 4 m carrying a factored bending moment of 100 kN-m. Use M20 grade concrete and Fe 500 steel. Check for deflection and development length is not expected.	[4]	CO2	Analysis
	b) A singly reinforced rectangular beam is subjected to a B.M. 36 kN-m at working loads. The width of beam is 230 mm. Find the depth and area of reinforcement for balanced design.	[4]	CO2	Analysis
	c) Design the suitable reinforcement for a Tee beam subjected to a factored bending moment of 400 kN-m. Assume M20 concrete and Fe 415 steel. bf= 1650 mm, Df=100 mm, bw= 150 mm and effective depth of 500 mm.	[4]	CO2	Analysis
Q3	a) Determine equivalent shear force and bending moment for a	[2]	CO3	Analysis

	<p>rectangular beam of 300 mm width and 500 mm effective depth subjected to ultimate B.M. 50kN-m, Ultimate Shear Force 50 kN and ultimate torsional moment 50 kN-m.</p> <p>OR</p>			
	<p>b) Design the minimum shear reinforcement for a rectangular beam of size 300 mm X 560 mm (effective Depth). Use M30 concrete and Fe 415 steel</p>	[2]	CO3	Analysis
	<p>c) Determine the shear strength of rectangular RCC beam of 230 mm width and 460 mm effective depth. The flexural reinforcement on tension side is 1.1 and the spacing of 2 legged 8 mm # stirrups is 200 mm center to center. Assume M20 concrete and Fe 415 steel.</p>	[4]	CO3	Analysis
Q4	<p>a) A three span one-way continuous slab of span 4m each is subjected to ultimate load of 8 kN/m. The depth of the slab is 175 mm. Determine the shear force at the supports using IS code method. Assume M20 concrete and Fe 415 steel.</p> <p>OR</p>	[2]	CO4	Analysis
	<p>b) Compute the ultimate load acting on the 200 mm thick waist slab. Live load=5 kN/m², FF=1kN/m². Tread=300 mm and Rise=150 mm.</p>	[2]	CO4	Analysis
	<p>c) A three span one-way continuous slab of span 4m each is subjected to ultimate load of 8 kN/m. The depth of the slab is 175 mm. Determine the support bending moments and span bending moments using IS code method. Assume M20 concrete and Fe 415 steel.</p>	[4]	CO4	Analysis
Q.5	<p>a) Determine the spacing of lateral ties for an axially loaded column of size 500 mm X 500 mm subjected to a factored load of 1300 kN. The column is reinforced with 4, 22 mm # bars.</p> <p>OR</p>	[2]	CO5	Analysis
	<p>a) b) Determine the minimum eccentricity for the column of size 400 mm X 500 mm. Effective length of the column is 2750 mm. Assume M20 concrete and Fe 415 steel.</p>	[2]	CO5	Analysis
	<p>c) Compute the percentage steel in concrete column of size 300 mm X 500 mm subjected to $P_u = 1500$ kN and $M_{ux} = 60$ kN-m. Assume M30 concrete and Fe 415 steel. Assume $d/d = 0.1$. Use interaction curves provided in SP 16.</p>	[4]	CO5	Analysis
Q.6	<p>a) Determine the area of isolated pad footing required to transfer the 1000 kN load (ultimate) of the column safely on to the soil if safe bearing capacity of soil is 200 kN/sq.m.</p> <p>OR</p>	[2]	CO6	Analysis
	<p>b) Compute the permissible shear stress at the critical section of the footing for checking two-way shear for a column of 230 mm X 500 mm.</p>	[2]	CO6	Analysis
	<p>c) Compute the factored upward soil pressure for a pad footing supporting an ultimate load of 1000 kN. The column is of the size 230 mm X 500 mm. Safe bearing capacity of soil is 300 kN/sq.m.</p>	[4]	CO6	Analysis