



CBCS SCHEME - Make-Up Exam

BCV601

Sixth Semester B.E/B.Tech. Degree Examination, June/July 2025 Design of RCC Structures

Time: 3 hrs.

Max. Marks: 100

Note:

1. Answer any **FIVE** full questions, choosing **ONE** full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.
3. Assume suitable additional data, if necessary.
4. Use of IS456-2000, SP-16 is permitted.

Module - 1			M	L	C
1	a.	Compare working Stress Method and Limit State Method.	10	L2	CO1
	b.	Explain : (i) Characteristic strength. (ii) Design strength (iii) Characteristic load (iv) Design load	10	L2	CO1
OR					
2	a.	Explain the terms : Balanced, Under reinforced and over reinforced sections in Limit State method.	6	L2	CO1
	b.	A rectangular section beam 200 mm wide by 450 mm overall depth is reinforced with 3 bars of 16 mm diameter at an effective depth of 420 mm. Two hanger bars of 12 mm diameter are provided at the compression face. The effective span of the beam is 5 m. The beam supports a service live load of 10 kN/m. If $f_{ck} = 20 \text{ N/mm}^2$ and $f_y = 415 \text{ N/mm}^2$. Compute (i) Short Term Deflection (ii) Long Term Deflections according to IS code specifications.	14	L3	CO1
Module - 2					
3	a.	Prove $x_u = 0.48 d$ from properties of Balanced section of steel grade - Fe-415.	5	L5	CO2

b.	A Rectangular beam of size 200 mm width, 450 mm effective depth is reinforced with 3 Nos of 16 mm diameter bars. Interpret the following cases : Case (i) : Safe moment of Resistance of the section Case (ii) : Safe moment of Resistance of the section, if steel increases to 3 Nos of 20 mm diameter bars. Case (iii) : Strain in steel for both cases (i) and (ii). Use M-20 grade of concrete and Fe-415 grade of steel.	15	L5	CO2
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OR

4	a. What are the situations where doubly reinforced beams are used in structural design?	4	L1	CO2
	b. Determine the ultimate Flexural strength of T-beam for the following section properties : Width of flange = 800 mm Width of Rib = 300 mm Depth of Flange = 150 mm Effective depth = 420 mm Area of steel = 1470 mm^2 M-25 grade of concrete and Fe-415 grade of steel.	16	L5	CO2

Module – 3

5	Design a singly reinforced beam of clear span 5 m to support a working live load 12 kN/m. Adopt M-20 grade of concrete and Fe-415 grade of HYSD bars. Sketch the reinforcement details.	20	L5	CO3
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OR

6	Design a Doubly reinforced concrete beam of rectangular section using the following data : Effective span = 8 m Working live load = 30 kN/m Overall depth restricted to 650 mm Width of beam = 300 mm M-20 grade of concrete and Fe-415 grade of steel. Sketch the reinforcement details.	20	L5	CO3
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Module - 4						
7		Design a RCC slab for a room size $4\text{m} \times 5\text{m}$. The slab is supported all around on wall of width 300 mm. The slab has to carry a live load of 4 kN/m^2 and floor finish 1 KN/m^2 . Use M-20 grade of concrete and Fe-415 grade of steel. Assume corners are held down. Sketch the reinforcement details.	20	L5	CO4	
OR						
8		Design one of the flights of stairs of a school building spanning between landing beams to suit the following data : Type of stair case-Dog-legged Number of steps in flight = 12 Tread = $T = 300 \text{ mm}$ Riser = $R = 160 \text{ mm}$ Width of landing beams = 400 mm Materials M20 grade of concrete and Fe-415 grade of steel. Also show the reinforcement details.	20	L5	CO4	
Module - 5						
9		A short column located at the corner of a building is subjected to an factored axial load of 2000 KN together with factored moments of 75 kN-m and 60 kN-m acting in perpendicular planes. The size of column is fixed as $450 \text{ mm} \times 450 \text{ mm}$. Adopting M-20 grade of concrete and Fe-415 grade of steel. Design suitable reinforcements in column section.	20	L3	CO5	
OR						
10		A RCC column of size $400 \text{ mm} \times 400 \text{ mm}$ supports an axial service load of 1000 kN . The safe bearing capacity of soil at site is 200 kN/m^2 . Adopting M-20 grade of concrete and Fe-415 grade of steel. Design suitable footing for the column and sketch the details of reinforcements.	20	L3	CO5	

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