

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

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Fifth Semester B.E. Degree Examinations, February 2025

DESIGN OF RCC STRUCTURES

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. Missing data, if any, may be suitably assumed
 3. Use of IS 456-2000 and SP-16 permitted

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<u>Module-1</u>			
1.	a. Distinguish between working stress method and limit state method of RC sections.	10	(1 : 1 : 1.2.1)
	b. Elaborate on the design philosophy and principles of limit state method of RCC design.	10	(1 : 1 : 1.2.1)
(OR)			
2.	A RCC beam 200 mm wide and 450 mm deep is reinforced with 3 numbers of 16 mm diameter bars of grade Fe415 steel on tension side with an effective cover of 50 mm over an effective span of 5 m. Determine the Long-term deflection if it carries service load 10 kN/m. use M20 grade of concrete and Fe415 steel. Take (i) Ultimate shrinkage strain =0.0003 (ii) Creep coefficient =1.6	20	(3 : 1 : 2.1.3)
<u>Module-2</u>			
3.	a. A RCC rectangular beam of 200 mm wide and 400 mm effective depth is reinforced with 3 bars of 16 mm diameter. Calculate the ultimate moment of resistance of the beam. Also find uniformly distributed load which the beam can carry safely over the span of 5 m. Use M20 grade of concrete and Fe 415 steel.	10	(3 : 2: 2.1.3)
	b. Calculate the ultimate moment of resistance of the beam section 250 mm wide and 500 mm deep. It is reinforced with 6 bars of 20 mm diameter as tension reinforcement and 2 bars of 20 mm diameter as compression steel. Using M20 concrete and Fe250 steel. Effective cover provided is 40 mm on both sides.	10	(3 : 2 : 2.1.3)
(OR)			
4.	a. Find the ultimate moment of resistance of T beam has a web width 300 mm, flange thickness 120 mm and effective depth 580 mm. The beam is reinforced with 8 bars of 20 mm diameter. The effective span of beam is 3.6 m. Use M20 grade of concrete and Fe 415 steel.	10	(3 : 2 : 2.1.3)
	b. A RCC beam 250 mm wide and 450 mm deep, is reinforced with 3-20 mm diameter of grade 415 steel on tension side with an effective cover of 50 mm. If the shear reinforcement of 2 legged 8 mm stirrups of spacing 160 mm c/c is provided at a section. Determine the design strength of the section. Use M20 grade concrete and Fe415 steel.	10	(3 : 2 : 2.1.3)

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

Module-3

5. Design a simply supported beam of span 5 m carries a live load of 12 kN/m. Use M20 grade of concrete and Fe415 steel. Check for the shear and deflection. **20 (3 :3: 3.1.4)**

(OR)

6. Design a doubly reinforced beam 230 mm × 600 mm over an effective span of 5 m. The super imposed load on the beam is 50 kN/m. Effective cover to reinforcement is taken as 50 mm. Use M20 concrete and Fe 415 steel. **20 (3 :3: 3.1.4)**

Module-4

7. A room has a clear dimension 3 m × 9 m supported on wall having thickness 230 mm. The live load on the slab is 3 kN/m² and Floor finishing load 1 kN/m². Use M20 Grade and Fe415 steel. Design the slab. **20 (3 :4 : 3.1.4)**

(OR)

8. Design a dog-legged staircase for an office floor room measuring 3 × 6 m, clear vertical distance between the floors is 3.5 m. The stairs are supported on supported on 230 mm thick wall. Take live load of 4 kN/m². Use M-20 grade of concrete and Fe-415 steel. **20 (3 :4 : 3.1.4)**

Module-5

9. Design the reinforcement for a column of size 300 mm × 400 mm having an effective length 3.6 m. A factored load of 1000 kN and a factored moment of 150 kN-m about the major axis of the column. Use M25 grade of concrete and Fe 415 steel, provide the reinforcement (i) On two sides (ii) On all the four sides. Assume cover of 60 mm **20 (3 :5 : 3.1.4)**

(OR)

10. Design a square footing for the column of size 450 mm × 450 mm supports an axil load of 850 kN. The SBC of the soil at site is 190 kN/m². Adopt M-20 grade of concrete and Fe-415 steel, sketch the reinforcement details. **20 (3 :5: 3.1.4)**

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