

Mapping of course outcomes with Knowledge and Attitude Profile (WK)

	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
CO1	*	*	*	*	*	*		*	
CO2	*	*	*	*	*	*		*	
CO3	*	*	*	*	*	*		*	
CO4	*	*	*	*	*	*		*	

Wks Mapped with the course

WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
*	*	*	*	*	*		*	

Mark Distribution:

Total Marks	CIE Marks	ESE Marks	ESE Duration
100	60	40	2.5 hrs

Continuous Internal Evaluation Pattern:

Attendance	: 5 marks
Continuous Assessment Test	: 25 marks
Project	: 30 marks

SYLLABUS**Module 1 (14 hrs)**

Limit State philosophy as detailed in IS code - Advantages of Limit State Method over other methods - Analysis of singly reinforced rectangular beams - under reinforced, over reinforced and balanced sections - computation of moment of resistance - IS Code provisions for design of beams - Design of singly reinforced rectangular beams – Limit state of collapse in shear – Numerical problems.

Module 2 (14 hrs)

Analysis and design of doubly reinforced rectangular beams - IS Code provisions for design of slabs - Design of cantilever slab subjected to uniformly distributed load - Design of one way and two way slabs subjected to uniformly distributed load for various boundary conditions.

Module 3 (14 hrs)

Bond and development length - Design of RC members for combined bending, shear and torsion - IS Code provisions for design of columns - Types of columns - Design of short Rectangular and circular columns for axial, uniaxial and biaxial bending.

Module 4 (14 hrs)

Foundation types - IS Code provisions for design of footings - Design of axially loaded square and rectangular footing - Serviceability - Modelling and design of a simple framed structure in any structural analysis and design software.

Text Books:

1. Punmia, B. C, Jain A.K and, Jain A.K(2015) . R C C Designs.10th edition. Laxmi Publications Ltd.
2. Ravi Kumar Sharma, Rachit Sharma(2021). Reinforced Concrete Design.BS Publications.
3. Gambhir.M.L.(2006) Fundamentals of Reinforced Concrete Design.Prentice Hall of India Private Limited, New Delhi.

Reference Books:

1. Pillai S.U & Menon D(2009) .Reinforced Concrete Design. Tata McGraw Hill Book Co.
2. Varghese P.C(2008). Limit State Design of Reinforced Concrete. Prentice Hall of India Pvt Ltd.
3. Relevant IS codes (IS 456, IS 875, IS 13920, SP 16, SP 34)

Suggested Project Topics

1. Design of residential building.
2. Design of office building.
3. Design of multistory apartment.
4. Design of shopping complex.
5. Design of industry building.

Assessment and Evaluation for Project Activity

Sl. No	Evaluation for	Allotted Marks
1	Project Planning and Proposal	5
2	Contribution in Progress Presentations and Question Answer Sessions	4
3	Involvement in the project work and Team Work	3
4	Execution and Implementation	10
5	Final Presentations	5
6	Project Quality, Innovation and Creativity	3
Total		30

1. Project Planning and Proposal (5 Marks)
 - Clarity and feasibility of the project plan
 - Research and background understanding
 - Defined objectives and methodology
2. Contribution in Progress Presentation and Question Answer Sessions (4 Marks)
 - Individual contribution to the presentation
 - Effectiveness in answering questions and handling feedback
3. Involvement in the Project Work and Team Work (3 Marks)
 - Active participation and individual contribution
 - Teamwork and collaboration
4. Execution and Implementation (10 Marks)

- Adherence to the project timeline and milestones
 - Application of theoretical knowledge and problem-solving
 - Final Result
5. Final Presentation (5 Marks)
- Quality and clarity of the overall presentation
 - Individual contribution to the presentation
 - Effectiveness in answering questions
6. Project Quality, Innovation, and Creativity (3 Marks)
- Overall quality and technical excellence of the project
 - Innovation and originality in the project
 - Creativity in solutions and approaches

END SEMESTER EXAMINATION – MODEL QUESTION PAPER

Course Code	25UCET403
Course Name	DESIGN OF CONCRETE STRUCTURAL ELEMENTS
Max. Marks: 40	Duration: 2.5 Hours

Part A <i>(Answer all questions. Each question carries 2 marks)</i>				
Qn No.	Question	Marks	CO	BL
1	Summarise the assumptions in limit state of collapse in bending.	2	1	L2
2	Determine the limiting value of tensile stress in an uncracked section of a flexural member made with M25 grade concrete.	2	1	L3
3	Explain the minimum distance between individual bars in slabs as per IS 456:2000.	2	2	L2
4	Outline the factors which influence moments in two way slabs.	2	2	L2
5	Calculate the minimum area of compression reinforcement for a rectangular column of size 300 mm x 450 mm.	2	3	L3
6	Outline the functions of traverse ties in a reinforced concrete column.	2	3	L2
7	Classify the types of deep foundations.	2	4	L2
8	Summarise the governing factors to decide the depth of footing.	2	4	L2
Part B <i>(Answer any one full question from each Module. Each carry 6 marks)</i>				
Module I				
Qn No.	Question	Marks	CO	BL
9	Determine the moment of resistance of a rectangular beam of size 450 x 600 mm which is reinforced with 8 numbers of 20 mm diameter bars. Use M25 concrete and Fe415 steel. Assume effective cover as 50 mm.	6	1	L3
OR				
10	Compute the reinforcements for a cantilever beam which is to be casted monolithically with RC column of size 300 mm wide and 450 mm deep. The clear span of the beam is 1.5 m and working load is 15 kN/m. Adopt M20 grade concrete and Fe415 HYSD bars.	6	1	L3
Module II				
Qn No.	Question	Marks	CO	BL

11	Compute the reinforcements for a doubly reinforced concrete beam of rectangular section using the following data. Effective span = 6 m, Width of beam = 300 mm, Overall depth = 450 mm, Service load (DL+LL) = 50 kNm, Effective cover = 50 mm. Adopt M20 grade concrete and Fe500 grade steel.	6	2	L3
OR				
12	A cantilever beam of size 200 mm x 350 mm supports a uniformly distributed load and is reinforced with 4 bars of 16 mm diameter. If the factored total load is 80 kN, compute (i) the maximum local bond stress. (ii) the anchorage length required. (iii) if the anchorage length provided is 900 mm, the average bond stress. Assume M20 grade concrete and Fe415 HYSD bars.	6	2	L3
Module III				
Qn No.	Question	Marks	CO	BL
13	Compute the reinforcements for a column, 4 m long restrained in position and direction at both ends to carry an axial load of 1600 kN. Use M20 concrete and Fe415 steel.	6	3	L3
OR				
14	A column of size 300 mm x 400 mm with effective span 3.6 m is subjected to an axial load of $P_u = 1100$ kN and $M_u = 150$ kNm about the major axis. Compute the reinforcements using M25 concrete and Fe415 steel. Provide reinforcements on two sides.	6	3	L3
Module IV				
Qn No.	Question	Marks	CO	BL
15	Compute the reinforcements of a concrete footing for a rectangular column 450 mm x 450 mm supporting an ultimate axial load of 1200 kN. Safe bearing capacity of the soil is 150 kN/m^2 . Adopt M25 concrete and Fe500 grade steel.	6	4	L3
OR				
16	A rectangular column 400 mm x 600 mm carries a live load of 2000 kN. The safe bearing capacity of the soil is 150 kN/m^2 . Using M20 concrete and Fe415 steel, compute the reinforcements by adopting rectangular footing to support the column.	6	4	L3
