



<b>Department of Civil Engineering</b>	
<b>B.E/ B.Tech/ M.E/ M.Tech : Civil Engineering</b> <b>Regulation:2018</b>	<b>LP: CE 18502</b>
<b>PG Specialisation : NA</b>	<b>Rev. No: 01</b>
<b>Sub. Code / Sub. Name : CE 18502/ Design of Reinforced Concrete Elements</b>	<b>Date:</b>
<b>Unit : I</b>	<b>27.07.2022</b>

**Unit Syllabus: DESIGN CONCEPTS AND DESIGN OF BEAMS FOR FLEXURE 12**

Design concepts - Concept of elastic method, ultimate load method and limit state method-  
Advantages of Limit State method over other methods -Design of rectangular beam section by  
working stress method - Limit state method of design of singly reinforced, doubly reinforced and  
flanged beams - use of design aids for flexure

**Objective:** Differentiate the various design methodologies for the design of RC elements and design  
beam by Working stress method and limit state method.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Objective of structural design, Steps in RCC Structural Design Process	R1,Ch-1, 4-24	PPT
2	Type of Loads on Structures and Load combinations, Code of practices and Specifications	R1, Ch-2, 29-37	PPT
3	Concept of Working Stress Method, Ultimate Load Design and Limit State Design Methods for RCC, Properties of Concrete and Reinforcing Steel	R1, Ch-3, 44-49,	PPT
4	Analysis of Singly reinforced Rectangular beams by working stress method	R1,Ch-3, 49-55	PPT
5	Tutorial		
6	Design of Singly reinforced Rectangular beams by working stress method	R1,Ch-3,66-70	PPT
7	Problem - Design of Singly reinforced Rectangular beams by working stress method	R1,Ch-3,74-83	PPT
8	Analysis of singly reinforced rectangular beams by Limit State Method	R1,Ch-17,191-200	PPT
9	Tutorial		
10	Design of singly reinforced rectangular beams by Limit State Method	R1,Ch-17,205-214	PPT
11	Analysis and design of doubly reinforced rectangular beams by Limit State Method	R1,Ch-17,218-220	PPT
12	Tutorial		
<b>Content beyond syllabus covered (if any):</b>			



Sub. Code / Sub. Name: **CE 18502/ Design of Reinforced Concrete Elements**  
Unit : II

**Unit Syllabus: LIMIT STATE DESIGN OF BEAMS FOR SHEAR, TORSION AND SERVICEABILITY** 12

Limit state design of RC beams for shear and torsion - Design of RC beams for combined bending, shear and torsion – Use of design aids - Design requirement for bond and anchorage as per IS code – Detailing of reinforcement – Concept of Serviceability - Serviceability requirements for deflection.

**Objective:** Analyze and design of beams for shear, bond and torsion.

Session No *	Topics to be covered	Ref	Teaching Aids
13	Behaviour of RC members in Shear, Bond and Anchorage	R3,Ch.-7, 154-158	PPT
14	Design requirements as per current code	R3,Ch.-7, 158-172	PPT
15	Problem - Behaviour of RC members in Shear, Bond and Anchorage	R3,Ch.-8, 180-181	PPT
16	Tutorial		
17	Behaviour of rectangular RC beams in torsion	R3,Ch.-8, 184-185	PPT
18	Problem - Behaviour of rectangular RC beams in shear and torsion	R3,Ch.-8, 180-192	PPT
19	Tutorial		
20	Design of RC members for combined Bending	R3,Ch.-9, 146-158	PPT
21	Tutorial		
22	Design requirement for bond and anchorage as per IS cod	R3,Ch.-9,155-159	PPT
23	Concept of Serviceability	R3,Ch.-9, 160-162	PPT
24	Serviceability requirements for deflection.	R3,Ch.-9,162-167	PPT

**Content beyond syllabus covered (if any):**

\* Session duration: 50 mins



Sub. Code / Sub. Name: CE 18502/ Design of Reinforced Concrete Elements  
Unit : III

**Unit Syllabus: LIMIT STATE DESIGN OF SLABS**

12

Behavior of one-way and two-way slabs - Design of one-way simply supported, cantilever, and Continuous slabs - Design of two-way slabs for various edge conditions - Torsion reinforcement at corners.

**Objective:** Design the various types of slabs by the limit state method.

Session No *	Topics to be covered	Ref	Teaching Aids
25	Behavior of one way and two way slabs	R3, Ch-11, 189-191	
26	Design of one way slab cantilever slab	R3, Ch-11,250-254	PPT
27	Tutorial		
28	Design of one way simply supported slab	R3, Ch-11,250-254	PPT
29	problem- Design of one way simply supported slab	R3, Ch-11,250-254	PPT
30	Analysis and design of continuous slabs	R3, Ch-11, 262-267	PPT
31	Design of continuous slabs	R3, Ch-11,262-267	PPT
32	Tutorial		
33	Two way slab- Design of simply supported slab	R3, Ch-12,309-312	PPT
34	Problem - Design of two way simply supported slab	R3, Ch-12, 312-314	PPT
35	Two way slab- continuous slab, Torsional reinforcement at the corners	R3, Ch-12, 319-321	PPT
36	Tutorial		

**Content beyond syllabus:**

\* Session duration: 50 mins



Sub. Code / Sub. Name: CE 18502/ Design of Reinforced Concrete Elements  
Unit : IV

**Unit Syllabus: LIMIT STATE DESIGN OF COLUMNS**

12

Types of columns – Braced and unbraced columns - Design of short columns for axial load, combined axial load with uniaxial and biaxial bending - use of design aids.

**Objective:** Design columns for axial, uniaxial and biaxial eccentric loadings.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Introduction- Types of columns – Braced and unbraced columns	T2,Ch-13, 266-268	PPT
38	Design of braced column	T2,Ch-13, 269-272	PPT
39	Problem: Design of braced column	T2,Ch-13, 269-272	PPT
40	Design of Unbraced column	T2,Ch-13, 272-274	PPT
41	Tutorial		
42	Design of short columns for axial load	T2,Ch-13, 274-280	PPT
43	Tutorial		
44	Design of short columns for uniaxial bending	T2,Ch-14, 301-305	PPT
45	Problem : Design of short columns for uniaxial bending	T2,Ch-14, 301-305	PPT
46	Design of short columns for biaxial bending	T2,Ch-14,306-309	PPT
47	Problem : Design of short columns for biaxial bending	T2,Ch-14,309-314	PPT
48	Tutorial		
<b>Content beyond syllabus covered (if any):</b>			

\* Session duration: 50 mins



Sub. Code / Sub. Name: CE 18604/ Advanced structural analysis  
Unit : V

**Unit Syllabus: LIMIT STATE DESIGN OF FOOTINGS**

12

Concepts of Proportioning footings and foundations based on soil properties-Design of wall footing – Design of axially and eccentrically loaded Square, Rectangular pad footings – Design of sloped footings - Design of Combined Rectangular footing for two columns (principles only)

**Objective:** Design the footing by limit state method.

Session No *	Topics to be covered	Ref	Teaching Aids
49	Concepts of Proportioning footings	R4, Ch-22, 564-568	PPT
50	Foundations based on soil properties	R4, Ch-22, 569-571	PPT
51	Design of wall footing	R4, Ch-22, 572-573	PPT
52	Tutorial		
53	Design of axially loaded Square	T2,Ch-22, 475-478	PPT
54	Design of axially loaded Rectangular footings	T2,Ch-22, 480-481	PPT
55	Design of eccentrically loaded Square	R4, Ch-22, 597-599	PPT
56	Design of eccentrically Rectangular pad footings	R4, Ch-22, 600-606	PPT
57	Tutorial		
58	Design of sloped footings)	R4, Ch-22, 577-589	PPT
59	Design of Combined Rectangular footing for two columns	R4, Ch-22, 604-603	PPT
60	Tutorial		

**Content beyond syllabus covered (if any):** Design principles of circular footing

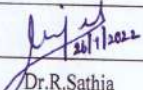
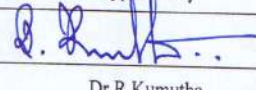
\* Session duration: 50 mins

**Textbooks:**

1. Gambhir M L, Fundamentals of Structural Steel Design, McGraw Hill Education India Pvt Limited, 2017.
2. Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., New Delhi, 2008 72

**References:**

1. Krishnaraju.N " Design of Reinforced Concrete Structures ", CBS Publishers & Distributors Pvt. Ltd., New Delhi, 2019
2. Unnikrishna Pillai and Devdas Menon, Reinforced Concrete Design (Third Edition), Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 3rd Edition, 2017.
3. Punmia. B.C., Ashok Kumar Jain, Arun Kumar Jain, "Limit State Design of Reinforced Concrete", Laxmi Publication Pvt. Ltd., New Delhi, 2018.
4. Subramanian, N., "Design of Reinforced Concrete Structures", Oxford University Press, New Delhi, 2014.

	Prepared by	Approved by
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Date	26/07/2022	26/07/2022
Remarks *:		
Remarks *:		

\* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD