SRI VIDYA COLLEGE OF ENGINEERING & TECHNOLOGY

COURSE PLAN (THEORY)

ACADEMIC YEAR: 2018-2019 ODD

Subject Code	CE6505	**L**	**P**	**T**	**C**
Subject Title	Design of reinforced concrete elements	3	0	0	3
Year / Dept / Sem	III / CIVIL / V	Regulation Year	2013		
Faculty Name / Desg / Dept	Mr.S.Keerthi Priyan / Assistant Professor / CIVIL				
Course Prerequisite	1. The students must have more knowledge about basic fundamentals of mathematics. 2. The students must have more knowledge about shear force and bending moment. 3. The students must have more knowledge about building components.				

Syllabus

CE6505 DESIGN OF REINFORCED CONCRETE ELEMENTS L T P C
3 0 0 3

OBJECTIVES:

- To introduce the different types of philosophies related to design of basic structural elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice.

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES 9

Concept of Elastic method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification – Limit State philosophy as detailed in IS code – Design of beams and slabs by working stress method.

UNIT II LIMIT STATE DESIGN FOR FLEXURE 9

Analysis and design of singly and doubly reinforced rectangular and flanged beams - Analysis and design of one way, two way and continuous slabs subjected to uniformly distributed load for various boundary conditions.

UNIT III LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR & TORSION 9

Behaviour of RC members in bond and Anchorage - Design requirements as per current code - Behaviour of RC beams in shear and torsion - Design of RC members for combined bending shear and torsion.

UNIT IV LIMIT STATE DESIGN OF COLUMNS 9

Types of columns – Braced and unbraced columns – Design of short Rectangular and circular columns for axial, uniaxial and biaxial bending.

UNIT V LIMIT STATE DESIGN OF FOOTING 9

Design of wall footing – Design of axially and eccentrically loaded rectangular pad and sloped footings – Design of combined rectangular footing for two columns only.

TOTAL: 45 PERIODS

OUTCOMES:

- The student shall be in a position to design the basic elements of reinforced concrete structures.

TEXTBOOKS:

1. Varghese, P.C., “Limit State Design of Reinforced Concrete”, Prentice Hall of India, Pvt. Ltd., New Delhi, 2002.
2. Gambhir.M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2006.
3. Subramanian,N.,”Design of Reinforced Concrete Structures”,Oxford University Press, New Delhi, 2013.

REFERENCES:

1. Jain, A.K., “Limit State Design of RC Structures”, Nemchand Publications, Roorkee, 1998
2. Sinha, S.N., “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002
3. Unnikrishna Pillai, S., Devdas Menon, “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., 2009

4. Punmia.B.C., Ashok Kumar Jain, Arun Kumar Jain, "Limit State Design of Reinforced Concrete",Laxmi Publication Pvt. Ltd., New Delhi, 2007.
5. Bandyopadhyay. J.N., "Design of Concrete Structures"., Prentice Hall of India Pvt. Ltd., New Delhi, 2008.
6. IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2000
7. SP16, IS456:1978 "Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 1999
8. Shah V L Karve S R., "Limit State Theory and Design of Reinforced Concrete", Structures Publilcations, Pune, 2013
9. N.Aravind., "Design of RC Elements"A.R.S. Publications, Chennai.

Course Objectives (CO)	CO1: To introduce the different types of philosophies related to design of slab which form part of any structural system with reference to Indian standard code of practice. CO2: To introduce the different types of philosophies related to design of beam which form part of any structural system with reference to Indian standard code of practice. CO3: To introduce the different types of philosophies related to design of column which form part of any structural system with reference to Indian standard code of practice. CO4: To introduce the different types of philosophies related to design of footing which form part of any structural system with reference to Indian standard code of practice.
Expected Course Outcomes (ECO)	At the end of the course, the students should be able to: ECO1: The student shall be in a position to design the basic elements of reinforced concrete structures. ECO2: The student will able to understand the fundamental of design and analysis of reinforced concrete member. ECO3: The student will able to understand the behavior of beams, slabs & columns. ECO4: The student will able to design the beam slab under flexures. ECO5: The student will able to design the beam, slab under shear. ECO6: The student will able to design the column under axial, uniaxial & biaxial loads.

Mapping of CO & PO(Specify the PO's) - ***(Fill the col.s with the legend given below)***

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	-	-	-	-	-	-	-	1	2
CO2	3	1	-	-	-	-	-	-	-	-	1	-
CO3	2	2	2	1	-	-	-	-	1	-	-	-
CO4	2	2	2	1	-	-	-	-	1	-	-	-
CO5	2	2	2	1	-	-	-	-	1	-	-	-
CO6	2	2	2	1	-	-	-	-	1	-	-	-

Bridging the Curriculum Gap (Additional Topics beyond syllabus/Seminars/Assignments)	BCG1: Design of arches. BCG2: Design of domes BCG3: Design of walls
Related Website URLs	W1: nptel.ac.in/courses/105105104/pdf/m3l6.pdf W2:www.sut.ac.th/engineering/Civil/CourseOnline/430431/RC04_Bending2.pdf W3: www.uwplatt.edu/~robermat/CEE3150/example/full.pdf
Related Video Course Materials (min. 3 no.s)	V1: https://www.youtube.com/watch?v=0fTvE8aSsiE V2: https://www.youtube.com/watch?v=FPeV2MDXvfY V3: https://www.youtube.com/watch?v=pIdaC_I6H_M

S.No	Topic Name	Book – P. No	Teaching Aids	No of hrs	Cumulative hrs
UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES					
1.	Concept of Elastic method, ultimate load method and limit state method	T1 1-5	Class room teaching	2	2
2.	Advantages of Limit State Method over other methods	R9 1.5	Class room teaching	1	3
3.	Design codes and specification	R9 1.7	Class room teaching	1	4
4.	Limit State philosophy as detailed in IS code	R9 2.2	Class room teaching	1	5
5.	Design of beams by working stress method	R9 1.8	Class room teaching	1	6
6.	Design of singly reinforced beams by working stress method	R9 1.21	Class room teaching	2	8
7.	Design of doubly reinforced beams by working stress method	R9 1.43	Class room teaching	2	10
8.	Design of slabs by working stress method	R9 1.20	Class room teaching	1	11
9.	Design of one way slabs by working stress method	R9 1.79	Class room teaching	2	13
10.	Design of cantilever slabs by working stress method	R9 1.81	Class room teaching	2	15
UNIT II LIMIT STATE DESIGN FOR FLEXURE					
1.	Analysis and design of singly reinforced rectangular beams	T1 48-69	Class room teaching	1	16
2.	Analysis and design of doubly reinforced rectangular beams	T1 70-88	Class room teaching	2	18
3.	Analysis and design of singly reinforced flanged beams	T1 119-145	Class room teaching	2	20
4.	Analysis and design of doubly reinforced flanged beams	T1 119-145	Class room teaching	2	22
5.	Analysis and design of one way subjected to uniformly distributed load.	T1 189-213	Class room teaching	2	24
6.	Analysis and design of two way subjected to uniformly distributed load for various boundary conditions.	T1 241-265	Class room teaching	2	26

7.	Analysis and design of one way continuous slabs, two way continuous slabs subjected to uniformly distributed load for various boundary conditions.	T1 189-265	Class room teaching	2	28
UNIT III	**LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR & TORSION**				
1.	Behaviour of RC members in bond	T1 170-188	Class room teaching	1	29
2.	Behaviour of RC members in Anchorage	T1 170-188	Class room teaching	1	30
3.	Design requirements as per current code	R 6 1-90	Class room teaching	1	31
4.	Behaviour of RC beams in shear	T1 89-118	Class room teaching	1	32
5.	Behaviour of RC beams in torsion	T1 388-420	Class room teaching	1	33
6.	Design of RC members for combined bending shear.	T1 89-118	Class room teaching	2	35
7.	Design of RC members for torsion.	T1 388-420	Class room teaching	2	37
8.	Design of RC members for combined bending shear problems	T1 89-118	Class room teaching	2	39
9.	Design of RC members for torsion probelems	T1 388-420	Class room teaching	2	41
UNIT IV	**LIMIT STATE DESIGN OF COLUMNS**				
1.	Types of columns	T1 266	Class room teaching	1	42
2.	Braced and unbraced columns	T1 267	Class room teaching	1	43
3.	Design of short Rectangular for axial, bending.	T1 268-280	Class room teaching	2	45
4.	Design of short Rectangular for uniaxial bending.	T1 268-280	Class room teaching	2	47
5.	Design of short Rectangular for biaxial bending.	T1 268-280	Class room teaching	2	49
6.	Design of short circular columns for axial, bending.	T1 268-280	Class room teaching	2	51
7.	Design of short circular columns for uniaxial bending.	T1 268-280	Class room teaching	1	52
8.	Design of short circular columns for biaxial bending.	T1 268-280	Class room teaching	1	53
UNIT V	**LIMIT STATE DESIGN OF FOOTING**				
1.	Introduction	T1 466	Class room teaching	1	54
2.	Design of wall footing	T1 466- 480	Class room teaching	1	55
3.	Design of axially loaded rectangular pad footings	T1 466- 480	Class room teaching	2	57
4.	Design of eccentrically loaded rectangular pad footings	T1 466- 480	Class room teaching	2	59
5.	Design of axially loaded sloped footings	T1 466- 480	Class room teaching	2	61

6.	Design of eccentrically loaded sloped footings	T1 466- 480	Class room teaching	2	63
7.	Design of combined rectangular footing for two columns only.	T1 466- 480	Class room teaching	2	65

	Prepared by	***Approved by***
Signature		
Name	Mr.S.Keerthi Priyan	Mr.P.SureshKumar
Designation	Assistant Professor / CIVIL	HOD/CIVIL
Signed date		

LEGEND:

METHODOLOGY TO MAP OBJECTIVE WITH OUTCOME

Course outcomes are achieved through

- **a.** Suitable Analogies.
- **b.** Class room teaching.
- **c.** Assignments.
- **d.** Tutorials
- **e.** Weekly, monthly and model exams.
- **f.** Brain storming.
- **g.** Group discussion and role play.
- **h.** Seminars