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SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology
Civil Engineering

B. Tech. IV Semester VII

Subject Name : Advanced Concrete Design **Subject Code:** BTCL14701
Type of course: PEC-IV
Prerequisite : Engineering Mechanics(BTCL12113), Theory of Structures (BTCL13305), Structural Analysis (BTCL13404), Concrete & Construction Technology (BTCL 13302), Basic Concrete Design (BTCL13502)
Rationale : This course contains the advanced topics of design of various RCC structures where the students will get complete fundamental knowledge of structural design and detailing of reinforcements using IS codes. After learning the course, the students will have ability to understand the behavior of RCC structures and its detailing.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	100
3	0	0	3	60	25	15	--	--	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Design of G+3 storey RCC Building:** Loads, Combination of Loads, distribution & flow of loads, lateral load due to wind as per latest IS Codes, Structural layout of buildings and guidelines for its preparation, Analysis, design & detailing of G + 3 RCC framed residential building, ductile detailing.	14	30%
2.	**Design of Retaining wall:** Types, behavior and application of retaining wall, stability criteria, design & detailing of cantilever & counter-fort type retaining wall for various ground conditions.	08	15%
3.	**Introduction to Design of Liquid Retaining Structures:** Classification of water tank and method of analysis, permissible stresses, codal provisions, Design of circular and rectangular under-ground water tanks using IS code method, Design of elevated water tank with frame type of staging and foundation considering effect of earthquake and wind forces.	07	15%

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4.	**Introduction to Design of Flat Slab:** Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat slabs-Check for one way and two way shears, Limitations of Direct design method, Introduction to Equivalent frame method.	06	15%
5.	**Earthquake Resistant Design of Building:** Earthquake resistant design philosophy, capacity design concept, four virtues of Earthquake Resistant design: strength, stiffness, ductility and configuration, Irregularities in structures, Lateral load distribution – Torsionally coupled & uncoupled system, Seismic coefficient Method, Ductile detailing as per IS:13920.	10	25%

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
05	15	20	30	25	5

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Reinforced concrete Vol-I;	Dr. H.J. Shah;	Charotar Pub. Anand ISBN: 9789385039188	2016	11th
2.	Reinforced Concrete Vol 2 (Advanced Reinforced Concrete)	Dr. H.J. Shah;	Charotar Pub. Anand ISBN-10 : 8192869229 ISBN-13 : 978-8192869223	2014	7th
3.	Advanced R C C Design (R C C Vol. 2)	S.S. Bhavikatti	New Age International Private Limited ISBN-10 : 8122440525 ISBN-13 : 978-8122440522	2016	1st
4.	Reinforced Concrete (Limit State Design)	A.K.Jain	Nem Chand & Brothers ISBN-10 : 9788185240664 ISBN-13 : 978-8185240664	2012	7th

5.	Limit State Theory & Design of Reinforced Concrete (I.S. 456 - 2000)	Vl Shah Sr Karve	Structures Publication, Pune ASIN : B0095GYDE4 ISBN-10 : 8190371711 ISBN-13 : 978-8190371711	-	8th
6.	Limit State Design of reinforced concrete	P. C. Vargheese	Prentice Hall India Learning Private Limited ISBN-10 : 8120320395 ISBN-13 : 978-8120320390	2008	2nd
7.	Advanced Reinforced Concrete Design	P. C. Vargheese	Prentice Hall India Learning Private Limited ISBN-10 : 812032787X ISBN-13 : 978-8120327870	2005	2nd
8.	Handbook of Reinforced Concrete Design	Dr. V.l. Shah and Dr. S.r. Karve	Structures Publications ISBN-10 : 8190371703 ISBN-13 : 978-8190371704	2010	5th
9.	RCC Design	B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain	Laxmi Publications ISBN-10 : 8131809420 ISBN-13 : 978-8131809426	2015	10th
10.	Limit State Design of Reinforced Concrete	B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain	Laxmi Publications ASIN : 8131802418 ISBN-10 : 9788131802410 ISBN-13 : 978-8131802410	2016	Revised Edition
11.	Reinforced Concrete Design	Devdas Menon, S. Pillai	McGraw Hill Education ISBN-10 : 007014110X ISBN-13 : 978-0070141100	2017	3rd
12.	Design of Reinforced Concrete Structures	N. Subramanian	Oxford ISBN-10 : 0198086946 ISBN-13 : 978-0198086949	2013	Illustrated Edition
13.	Structural Design & Drawing	N. Krishna Raju	Universities Press ASIN : 8173716706 ISBN-10 : 9788173716706 ISBN-13 : 978-8173716706	2009	3rd
14.	Advanced Reinforced Concrete Design	N. Krishna Raju	CBS ASIN : 8123929609 ISBN-10 : 9788123929606 ISBN-13 : 978-	2016	3rd

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			8123929606		
15.	Design Of Reinforced Concrete Structures	Ramamrutham S	Dhanpatrai Publishing company (P) Ltd-New Delhi ISBN-10 : 9352161327 ISBN-13 : 978-9352161324	2016	1st

IS: 456 – 2000 Code of practice for plain and reinforced concrete
IS: 875 (Part I to V) - Code of practice for structural safety of Buildings Loading standards
IS: 13920 -Code of Practice for ductile detailing of RC structure
IS: 1893 - Criteria for earthquake resistant design of structures
SP: 16 Design Aid for Reinforced Concrete, SP-34
IS: 3370 (P-1 to 4)

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Prepare structural layout, calculate the loads and its combinations as per IS codes, analyze the multistoried buildings for wind load. *(R, U, A, N, E ....cognitive level)*	15
CO-2	Analyze, design and detailing various structural elements for RCC G+3 storey framed buildings using latest IS codes. *(R, U, A, N, E ....cognitive level)*	25
CO-3	Describe the behavior of retaining walls subjected to earth pressure and Analyze, design and detailing retaining walls using latest IS codes. *(R, U, A, N, E ,C ....cognitive level)*	15
CO-4	Explain the behavior of water tanks subjected to water and soil pressure and Analyze, design and detailing water tanks using latest IS codes. *(R, U, A, N, E, C ....cognitive level)*	15
CO-5	Describe the behavior of flat slab subjected gravity loads and Analyze, design and detailing flat slabs using latest IS codes. *(R, U, A, N, E, C ....cognitive level)*	15
CO-6	Apply earthquake resistant design philosophy and its concept to Analyze, design and detailing the building subjected to earthquake forces using latest IS codes. *(R, U, A, N, E ....cognitive level)*	15

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	3	-	1	-	3	-	2	2	3	1	3	-	1	3
CO-2	3	3	3	1	-	3	-	2	2	3	1	3	-	1	3
CO-3	3	3	3	1	-	3	-	2	2	3	1	3	-	1	3
CO-4	3	3	3	1	-	3	-	2	2	3	2	3	-	1	3
CO-5	3	3	3	1	-	3	-	2	2	3	2	3	-	1	3
CO-6	3	3	3	1	-	3	-	2	2	3	2	3	-	1	3
Rationale*	18	18	15	6	-	18	-	12	12	18	9	18	-	6	18

Rationale*: The knowledge of designing and detailing of various RCC structures satisfying majority of programme outcomes and at the end of programme, the specific objectives are also satisfy.

List of Open Source/learning website:

- https://nptel.ac.in/courses/105/105/105105039/
  - Design of Retaining walls