

Branch Name:	Civil Engineering (Computer Aided Structural Analysis & Design)
Semester/Year:	Semester I/ First Year
Subject Title:	Advanced Design of Concrete Structures
Subject Code:	2ET2060103T
Pre-requisite:	Elementary design of concrete structures and Concrete Technology

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
4	3	1	0	4	24	60	16	40	00	00	00	00	100

Course Objective:

1. Reinforced cement concrete is one of widely used construction material.
2. With rapid development of infrastructure facilities, large number of special structures like bunker and silos, flat slabs, grid floors, folded plates, water retaining structures etc. are being designed and constructed across the globe.
3. The course on Advanced Design of Concrete Structures acquaints the structural engineering students to analyze and design such special structures as per Indian Standard code of practice

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	Serviceability criteria: Deflection and crack width	03	10
2	Proportioning, analysis and design of flat slab by direct design method and detailing.	04	10
3	Analysis and design of Grid floors by Rankine Grashoff Method, classical equivalent plate theory and IS:456 method	05	10
4	Design of rafts, Strip footing and pile cap.	07	15
5	Design of domes with openings	03	10
6	Design of Intze type shaft supported water tank	10	15
7	Analysis and design of Folded plate roofs.	06	15
8	Design of Bunker and Silos.	04	15

List of Tutorials:

At least two designs suitably selected from topics of the course. The report shall consist of full analytical treatment, design procedure, references and all necessary drawings in the form of neat dimensioned sketches.

Course Outcome:

At the end of this course, the student would be able

1. Carry out load calculation, analysis, design and detailing of Slender Column, Corbel, Deep beams, flat slabs, water tanks, bunker and silos, Shear Walls as per relevant IS code of practice.
2. Analysis and design of raft foundation, strip footing and pile caps,
3. Ensure serviceability criteria for reinforced concrete structural elements.

Open Ended Problems:

After learning the course, the students should be able to:

1. Carry out load calculation, analysis, design and detailing of flat slabs, grid floor, water tanks, bunker and silos,
2. Folded plate and domes as per relevant IS code of practice.,
3. Analysis and design of raft foundation, strip footing and pile caps,
4. Ensure serviceability criteria for reinforced concrete structural elements.



Sankalchand Patel University
Faculty of Engineering and Technology
First Year Master of Technology in Civil Engineering
(Computer Aided Structural Analysis and Design)
In Effect from Academic Year 2023-24

Open Ended Problems:

Apart from above tutorials/experiments a group of students has to undertake one open ended problem/design problem. Few examples of the same are given below:

1. Development of spread sheets for design of various structural elements like beam, column, slab, foundation etc.
2. Design of RCC High-rise building with shear walls and cross checking with any open-source / professional software and/or self-developed spread sheet/programs.

List of Reference Books

1. Design of Multi-Storied Building (G+3) - Shah and Karve, Structure Pub., Pune.
2. Advanced Design of Concrete Structures – Krishana Raju N., Tata Mc-Graw Hill, Delhi.
3. Reinforced Concrete Design – Sinha S. N., Tata Mc-Graw Hill, Delhi.
4. Limit State Design of Reinforced Concrete – Jain A. K., Nemchand & Bros., Roorkee.
5. Advanced Reinforced Concrete, Varghese A. V., Prentice Hall of India.
6. Reinforced concrete, Vol - I and II – Shah H. J., Charotar Pub., Anand.
7. IS Codes : IS:456, IS:875, IS:1893, IS:4326, IS:13920, IS: 3370, IS: 4995 (I & II), SP:16, SP:34.

List of Open Source Software/learning website:

<http://nptel.ac.in/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Carry out load calculation, analysis, design and detailing of Slender Column, Corbel, Deep beams, flat slabs, water tanks, bunker and silos, Shear Walls as per relevant IS code of practice.	L-1 and L-2
CLO2	Analysis and design of raft foundation, strip footing and pile caps,	L-3 L-4 and L-5
CLO3	Ensure serviceability criteria for reinforced concrete structural elements.	L-5

L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CLO1	M	M		M	H	M		H	M			H	M		
CLO2	M	M	M	M		M		H	M			M	M	H	M
CLO3	M	M	M	M	H	M		H	M			M	M		M

H: High, M: Medium, L: Low