

Branch Name:	Civil Engineering
Program Code:	ET106
Course Name:	Advanced Design of Structures
Course Code:	2ET1060801T
Pre-requisite Course:	Design of Reinforced Concrete Design, Design of Steel Structures, Structural Analysis-I & II.

Course Objective:

- To understand advanced concepts in structural design and behavior of complex structures.
- To develop skills in analysis and design of multi-story and industrial structures.
- To learn design principles of water-retaining and special reinforced concrete structures.
- To understand design concepts of prestressed concrete structures.
- To apply modern structural design approaches for safe and economical structures.

TEACHING SCHEME

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

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Unit 1: Advanced Design Philosophy and Structural Systems Limit State Design concepts for advanced structures Structural systems for high-rise buildings Load paths and structural stability Design loads and combinations as per IS codes	6	10
2	Unit 2: Design of Multi-Storey Buildings Structural planning of multi-storey buildings Analysis of building frames Design considerations for columns, beams and slabs Serviceability requirements	10	25
3	Unit 3: Design of Water Retaining Structures Design principles of liquid retaining structures Circular and rectangular tanks Underground water tanks Crack control and durability requirements	10	25
4	Unit 4: Prestressed Concrete Structures Principles of prestressing Losses in prestress Analysis and design of PSC beams Serviceability and strength requirements	8	20
5	Unit 5: Industrial Structures Functional requirements of industrial buildings Design of gantry girders Design concepts of industrial roofs and sheds Crane loads and supporting systems	8	20

Course Learning Outcome:

- CO1: Understand advanced structural systems and design philosophies.
CO2: Analyze and design multi-storey building structures.
CO3: Design water-retaining structures using relevant codes.
CO4: Analyze and design prestressed concrete structural elements.
CO5: Design Industrial Structures using relevant codes.

Reference Books:

1. N. Subramanian – Design of Reinforced Concrete Structures
2. P. C. Varghese – Advanced Reinforced Concrete Design
3. Duggal, S. K. – Limit State Design of Steel Structures
4. Bansal, R. K. – Design of Steel Structures
5. Ramchandra – Design of Steel Structures
6. IS 456:2000 – Plain and Reinforced Concrete – Code of Practice
7. IS 800:2007 – General Construction in Steel Code
8. IS 3370 (Part 1 to 4) – Concrete Structures for Storage of Liquids

List of Open-Source Software/learning website:

- NPTEL Civil Engineering Courses
- SWAYAM Learning Platform
- Bureau of Indian Standards (BIS)
- IIT Lectures and NPTEL Videos
- Structural Guide

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand advanced structural systems and design philosophies.	L-2
CLO2	Analyze and design multi-storey building structures.	L-4
CLO3	Design water-retaining structures using relevant codes.	L-3
CLO4	Analyze and design prestressed concrete structural elements.	L-4
CLO5	Design Industrial Structures using relevant codes.	L-3

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

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	M	M	M	M	-								M	-	-
CLO2	M	M	M	M	M								M	M	-
CLO3	M	M	M	L	M								M	M	-
CLO4	M	M	M	M	M								M	M	M
CLO5	M	M	M	M	M								M	M	M

H: High, M: Medium, L: Low