Course Type	Course Code	Name of the Course	L	T	P	Credit
DE	NCED523	Prestressed Concrete Structures	3	0	0	3

Course Objectives

This course deals with the contemporary professional aspects in the analysis, design, modeling and construction of Prestressed Concrete Structures along with the basic understanding of theories

Learning Outcomes

- Understand the basic concept and behaviour of Prestressed Concrete Structures.
- Develop knowledge of field-based contemporary design examples.
- Comprehend computer modeling and simulation of various practical examples

Unit No.	Topics to be Covered	Contact Hours	Learning outcomes
1.	Basic concepts of Prestressing, Early endeavor of Prestressing, Development of Building Materials, Applications, High Strength Concrete and High-Tensile Steel, Grout, Tensioning Devices, Pre-tensioning and Post-tensioning Systems, Tendon corrosion, Latest Indian, Eurocode, ACI and AASHTO Standard	7L	Acquire knowledge regarding the development of prestressed concrete, material properties, type of anchorages,
2.	Nature of Losses, Elastic Deformation, Friction, Anchorage Slip, Shrinkage and Creep of Concrete, Relaxation of Steel, Pressure Line, Kern Point, Load Balancing Concept, Flexural resistance of Rectangular and Flanged sections, Shear and Principal Stresses, Types of Shear Cracks, Ultimate Shear Resistance, Shear Reinforcements, Torsion.	9L	Familiarize with prestress losses, flexure, shear and torsional design
3.	Transmission Length, Bond Stresses, Transverse Tensile Stresses, End-Zone Reinforcements, Stress Distribution in End Block, Anchorage Zone Stresses, Design Philosophy, Types of Members, Camber, Short-Term Deflections of Uncracked Members, Long-Term Deflections, Crack Width in Prestressed members, Design of Sections for Flexure, Prestress-cast-in-situ composites, Indeterminate Structures, Secondary Moments, Concordant Tendon Profile, Prestressed Concrete One-way and Two-way Slabs	10L	Gain insight related to the transfer of prestress, anchorage zone stresses, estimation of deflections and design of prestressed concrete sections
4.	Prestressed Concrete Pole, Pre-tensioned Mast, Railway Sleepers, Prestressed Concrete Reactor and Containment Vessels, Circular Prestressing, Prestressed Concrete Pipes, Prestressed Concrete Tanks, Tank Floors, Circumferential Wire Winding Methods, Post-tensioning in Buildings: Floor Systems, Transfer Beams, Shear Wall and Service core, Design of Post-tensioned Slab Bridge Deck, Precast Technology, Shear friction, Behavior of Anchors, Strut-and-Tie Method	10L	Comprehend the behavior and design of real-life prestressed concrete structural components

5.	Structural Forms, Planning concepts with Practical Examples, Construction Techniques, Maintenance, Inspection and Rehabilitation, Computer Modelling and Analysis of Prestressed Concrete Structures	6L	Understand the planning and economical aspects of prestressed concrete, constructions, maintenance, rehabilitation and numerical modeling
Total Contact Hours		**42L**	

Recommended Textbooks:

1. N. Krishna Raju, Prestressed Concrete, McGraw Hill Education (India) Private Limited
2. T Y Lin and H Burns, Design of Prestressed Concrete, John Wiley and Sons

Recommended References:

1. Arthur H Nilson, Design of Prestressed Concrete, John Wiley and Sons
2. Edward G Nawy, Prestressed Concrete: A Fundamental Approach, Prentice Hall
3. Antoine E Naaman, Prestressed Concrete Analysis and Design: Fundamentals, Techno Press
4. P Dayaratnam and P Sarah, Prestressed Concrete Structures, MEDTECH A Division of Scientific International