B. Tech. Civil Engineering				
Course code: Course Title	**Course Structure.**			**Pre-Requisite**
CE406: Pre-stressed Concrete Structures	**L**	**T**	**P**	CE203: Design of Structures-I
	3	1	0	

Course Objective: To equip students for analysing, designing prestressed concrete structures**.**

S. No	Course Outcomes (CO)
CO1	Understand the principles and necessity of prestressing in concrete structures. Analyse different prestressing systems and materials.
CO2	Learn the design methodologies for prestressed concrete beams, slabs, and other structural elements.
CO3	Study losses in prestress and deflection considerations.
CO4	Examine the behaviour of prestressed structures under various loading conditions.
CO5	Gain exposure to real-world applications in bridges, buildings, and special structures.

S. No	Contents	Contact hours
UNIT 1	**Introduction:** Design of simply-supported beams, slabs, and bridges, Concept of prestressing: Need and advantages, Comparison between Reinforced Concrete (RC) and Prestressed Concrete (PC), Historical background and development, Applications of prestressed concrete in infrastructure.	6
UNIT 2	**Materials & Prestressing Systems:** High-strength concrete and high-tensile steel, Pre-tensioning vs. post-tensioning, requirement of minimum grade of concrete. Prestressing systems, Anchorage devices, jacking equipment, and prestressing cables.	6
UNIT 3	**Analysis of Prestressed Concrete Members:** Stress calculations at transfer and service loads, Load balancing method, stress concept method, and strength concept method. Pressure line and thrust line concepts.	8
UNIT 4	**Losses of Prestress:** Types of losses: Elastic shortening, creep, shrinkage, friction, relaxation of steel, anchorage slip, Calculation of short-term and long-term losses, Methods to minimize prestress losses	6
UNIT 5	**Design of Prestressed Concrete Sections:** Flexural design of beams, Limit state design: Serviceability and ultimate strength, IS Code provisions (IS:1343), Shear and torsion in prestressed concrete. Design of simply supported beams, slabs, and bridges. **Deflections and Cracking:** Short-term and long-term deflections, Factors affecting deflections, Control of cracking in prestressed	10

	concrete, Design considerations for deflection control.	
UNIT 6	**Special Topics and Applications:** Prestressed concrete in bridge structures, Prestressed concrete in tall buildings, Segmental construction and precast prestressed elements, Prestressed concrete tanks and pavements, Case studies of failure and durability concerns.	6
	TOTAL	**42**

REFERENCES		
S. No.	**Name of Books/Authors/Publishers**	**Year of Publication / Reprint**
1	Prestressed concrete. Krishna Raju N., Tata McGraw-Hill Company, New Delhi.	2007
2	Prestressed concrete, Mallik S.K. and Gupta A.P., Oxford and IBH.	1987
3	Design of Prestressed Concrete Structures, Lin T .Y and Burns N.H, John Wiley and Sons.	1982
4	Fundamentals of Prestressed Concrete, Sinha N.C and Roy S.K., S. Chand and Co., New Delhi.	1985
5	Prestressed Concrete. R. Rajagopalan	2010
6	IS: 1343 Code of Practice Prestressed Concrete.	2012