**17CE41E1 - PRESTRESSED CONCRETE STRUCTURES**

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| **Course Category**  | Core Elective | **Credits**  | 3 |
| **Course Type**  | Theory | **Lecture - Tutorial - Practical**  | 3 - 0 - 0 |
| **Prerequisite**  | RCC Structural Design-I | **Sessional Evaluation**  | 40 |
| **Semester End Exam Evaluation**  | 60 |
| **Total Marks**  | 100 |

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| **Course Objectives** | 1. To understand the basic concepts and analysis of prestressed concrete structures.
2. To perform the design of prestressed concrete structures.
3. To understand the design of pre-tensioned members.
4. To understand the concept and analyse post-tensioned members.
5. To understand and analyse the composite prestressed concrete members.
6. To understand the concept of design of pre stressed concrete slabs.
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| **Course Outcomes** | CO1 | Calculate the resultant stresses in rectangular prestressed concrete. |
| CO2 | Analyse the losses and design the prestressed concrete sections. |
| CO3 | Design Pre-tensioned members. |
| CO4 | Analyse and design partially post-tensioned members.  |
| CO5 | Analyse and design composite prestressed concrete members. |
| CO6 | Design prestressed concrete slabs. |
| **Course Content** | **UNIT – I****INTRODUCTION:** Basic concepts of prestressing –Historical development –Advantages of prestressed concrete –High strength concrete –High tensile steel.**PRESTRESSING SYSTEM:** Introduction –Tensioning devices –Pretensioning and post tensioning systems –Thermo-electric and chemical prestressing. **ANALYSIS OF PRESTRESSED CONCRETE SECTIONS:** Basic assumptions – analysis of prestress –Resultant stress at a section –Pressure line –Concept of load balancing –Stress in tendons and cracking moment.**UNIT – II****LOSSES OF PRESTRESS**: Nature of losses of prestress – Loss due to elastic deformation of concrete – Shrinkage of concrete – Creep of concrete – Relaxation of stress in steel – Friction and anchorage slip – Total losses allowed for design.**DESIGN OF PRESTRESSED CONCRETE SECTIONS:** Design of sections for Flexure – Axial tension – Compression bending and for shear – Design of members for bond and the sections for bearing.**UNIT – III****DESIGN OF PRE- TENSIONED MEMBERS:** Dimensioning of flexural members – Estimation of self-weight of beams –Ultimate flexure strength –Ultimate shear strength –Limit state of design.**UNIT – IV****DESIGN POST-TENSIONED MEMBERS:** Ultimate moment and shear –Cross sectional dimensions –Moment and shear forces – Minimum section modules – permissible tendon zone – Deflection and serviceability – Design of partially prestressed members.**UNIT – V****COMPOSITE CONSTRUCTION OF PRESTRESSED AND IN SITU CONCRETE:** Composite structural members –Types of composite construction –Analysis of stress – differential shrinkage –Deflection of composite members –Flexural strength of composite sections and design of composite sections.**UNIT – VI****PRESTRESSED CONCRETE SLABS**: Types of prestressed concrete floor slabs –Design of prestressed concrete one way slabs –Two way slabs & simple flat slabs. |
| **Textbooks****& References** | **TEXTBOOKS:**1. Prestressed concrete by N.Krishna Raju.2. Prestressed concrete structures by P. Dayaratham.3. Prestressed concrete by S. Ramamrutham.**REFERENCE BOOKS:**1. Fundamentals of Prestressed Concrete by N.C.Sinha and S.K.Roy.2. Modern Prestressed Concrete by James R.Libby.3. Design of Prestressed Concrete Structures by T.Y. Lin & N.H. Burns. |