

**Master of Technology**  
**Structural Engineering**

**M. Tech. I Semester I**

**Subject Name:** Design of Precast Structural Components and Ferrocete Structure

**Subject Code:** MTST14106

**Type of course:** PE - II

**Prerequisite:** Basic Structural Analysis and Design Subjects

**Rationale:** Building with Precast concrete components has become now more popular with the development of heavy lifting equipments and with development of automatic manufacturing systems. Precast concrete construction helps in faster development of projects. This subject aims to provide the engineers with understanding & applications of Precast concrete construction.

**Teaching and Examination Scheme:**

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

**CA1:** Continuous Assessment (assignments/projects/open book tests/closed book tests) **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course.

**Content:**

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	<b>Introduction:</b> History and Development of Precast Concrete Construction, Advantages and Disadvantages of Precast Concrete Construction; Types of units involved in Building Construction - Residential & Factory, Principles of Design, Materials used - Concrete, Self Compacting Concrete, Grout, Reinforcement and Structural Welded Wire Cages. Influence of Manufacturing, Transport and Erection Technologies on Design Solution (Modular and Tilt-Up); Joints - Expansion and Contraction.	05	10%
2	<b>Precast Components and its Behavior:</b> Design of Precast Concrete Components and Behavior of Structural Components, Construction of Slab Panels, Wall panels, Beams, Columns, Shear walls. Design for Flexure - Strength Design, Service Load design, Design for Shear	10	20%
3	<b>Joints and Connections:</b> Joints and Connections in Precast Construction, Design of Concrete Bracket and Corbels; Cantilever Beam-Design method, Strut-and-Tie Method, Introduction to Hanger Connections, Design of Bearing Pads, Column Bases and Moment Resisting Connections.	05	10%
4	<b>Design of Ferrocete Structures:</b> Analysis & Design, Typical features of ferrocete affecting design, Design criteria, Rational method of design ferrocete structure. Strength through shape, Shape and form of a structure.	05	10%

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**Suggested Specification table with Marks (Theory/Practical):**

% Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	25	25	10	10	10

**Legends:** R: Remembrance, U: Understanding; A: Application, N: Analyze, E: Evaluate C: Create and above Levels (**Revised Bloom's Taxonomy**)

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Reference Text Books:**

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of Publication	Publication Edition
01	Journal of Ferrocement	---	International Ferracement Information Center in Collaboration with the New Zealand Ferrocement Association	1979	--
02	Precast Concrete Structures	Kim S. Elliott	CRC Press 9780367028039	June 12, 2019	2 <sup>nd</sup> Edition
03	Precast Concrete Structures	Hubert Bachmann	Wiley VCH978-3433029602	June 29, 2011	--
04	Precast Concrete Handbook	--	National Precast Concrete Association Australia	October 1, 2009	--
05	Planning and design handbook on precast building structures	--	978-2-88394-114-4	September 2014	
06	PCI Design Handbook	--	0- 937040-71-1	--	6th Edition

**Course Outcome:**

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % Weightage
CO-1	Understand the difference between Cast in Situ and Precast Concrete Design and Construction as well as Design Principles ( <i>R, U – Cognitive Level</i> )	15%
CO-2	Describe the Precast Components and its behaviors ( <i>U, A, N – Cognitive Level</i> )	15%
CO-3	Analyze and Design the Precast Structural elements ( <i>U, A, N, E, C – Cognitive Level</i> )	30%
CO-4	Able to Design Joints and Connections ( <i>U, A, N, E, C – Cognitive Level</i> )	20%
CO-5	Design Ferrocement Structures ( <i>U, A, N, E, C – Cognitive Level</i> )	20%

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**FOR TUTORIAL SESSIONS:**

**List of Tasks:**

- Group of Students have to prepare presentation based on topics of subject as well as individually students have to write / solve assignments.

**List of Open Source/learning website:**

- <https://www.youtube.com/watch?v=QhEGUHQUybo>
  - Webinar on Cost Effective and Time Saving in Precast Construction
- <https://www.youtube.com/watch?v=uiQzx1YFOBs>
  - Structural Joints in Precast Concrete
- <https://www.youtube.com/watch?v=IfgnHt6gpLQ>
  - Precast Vs Cast in Situ Concrete