GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (STRUCTURAL ENGINEERING) (20)

PRESTRESSED CONCRETE

SUBJECT CODE: 2722011

SEMESTER: II

Type of course: Elective

Prerequisite: Mechanics of Solids and Design of Reinforced Concrete Structures and Concrete Technology

Rationale: Prestressed concrete is one of the most reliable, durable and widely used construction materials in building and bridge projects around the world. It has made significant contributions to the construction industry, the precast manufacturing industry and the cement industry as a whole. It has led to an enormous array of structural applications, including buildings, bridges, foundations, parking garages, water towers, nuclear reactors, TV towers and offshore drilling platforms due to its distinct advantages.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks		Practical Marks				
				ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
L	T	P	C							
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction: Principles of prestressing - types and systems of prestressing, need for High Strength materials, Loading stages, Determination of losses, deflection (short-long term), camber, cable layouts.	05	10
2	Behavior under flexure - IS codal provisions, ultimate strength, Design of flexural members including large span slabs and beams.	05	15
3	Design for Shear, bond and torsion. Design of End blocks	06	15
4	Design of tension members - application in the design of prestressed pipes and prestressed concrete cylindrical water tanks.	05	15
5	Design of compression members with and without flexure - its application in the design piles, flag masts and similar structures.	04	10
6	Composite beams - analysis and design, ultimate strength - their applications. Partial prestressing - its advantages and applications.	05	15
7	Application of prestressing in continuous beams, concept of linear transformation, Concordant cable profile and cap cables.	06	10

8	Introduction to the special prestressed structures like prestressed folded plates, Prestressed cylindrical shells, prestressed concrete poles.	06	10

Reference Books:

1. Prestressed concrete - Krishna Raju
2. Design of Prestressed Concrete Structures - T.Y.Lin
3. Fundamentals of Prestressed Concrete - N.C.Sinha & S.K.Roy S.Chand & Co.,
4. Prestressed Concrete- Design and Construction – Leonhardt F., Wilhelm Ernst and Shon, Berlin
5. Prestressed Concrete - Freyssinet
6. Prestressed Concrete, - Evans, R.H. and Bennett, E.W., Chapman and Hall
7. Prestressed concrete - Rajgopalan
8. IS:1343-Code for Practice for Prestressed Concrete.
9. IS:3370-3 (1967): Code of Practice Concrete structures for the storage of liquids, Part 3: Prestressed concrete structures

Course Outcome:

After learning the course the students should be able to:

(a) analyse and design for flexure shear, bond and torsion
(b) Design of tension members
(c) Design of compression members with and without flexure
(d) Analysis and design of composite beams
(e) Understand design principles of the special prestressed structures like prestressed folded plates, prestressed cylindrical shells, prestressed concrete poles.

List of Experiments/Tutorials:

At least 15 problems based on above mentioned.

Open Ended Problems:

Apart from above tutorials/experiments a group of students has to undertake one open ended problem/design problem. Few examples of the same are given below:

1. Analysis and design of Prestressed structure like building, bridges etc. using pen-source / professional software or other suitable means.
2. Analysis and design of pipes and prestressed concrete cylindrical water tanks using pen-source / professional softwtare or other suitable means.
3. Analysis and design of piles, flag masts and similar structures using pen-source / professional software or other suitable means.

Major Equipments: --

List of Open Source Software/learning website:

http://nptel.ac.in/

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website