NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALLI

Department of Civil Engineering

Course Plan

Course Title: PRESTRESSED CONCRETE STRUCTURES

Course Code: CE 654

No. of Credits: 3

Department: Civil Engineering

Programme: M.Tech. 2nd Semester, Structural Engineering

Pre-requisites: Nil

Co-requisites: Nil

Class Committee Chairperson: Dr. R. Manjula

Course Teacher: Dr. J.Karthikeyan

Learning Hours: Lecture – 3 hours per week. (Monday-1st hour, Tuesday-4th hour, ~~Friday~~ Wednesday -2nd hour)

Course Type: Core

Student Quota: 30 nos.

Session in Academic year: January 2017

Course Description:

Prestressed Concrete Structures is one of the most important design course for the postgraduate students of structural engineering. This course emphasizes the fundamental concepts of analysis and design of prestressed concrete structures and provides students a sufficiently strong basis for handling everyday design problems, and the tackling of the more complex problems with confidence. Further, by going through the course one would develop adequate understanding of the philosophy of prestressing design. This course enables the students to have an in-depth knowledge on not only systems for prestressing but also in the design of PSC bridges and strut and tie model which will be dealt in the 4th and 5th chapter of the syllabus.

Course Objective:

This course provides a comprehensive treatment of the prestressing materials, systems, and design philosophy involved in the prestressed concrete design. The following are the course objectives, from which the students must

- understand the philosophy of prestressing design.
- study the design of indeterminate prestressed concrete structures.
- understand the connections for prestressed concrete elements.
- design prestressed concrete bridges.
- study the seismic design of prestressed concrete structures.

Course Contents:

The contents of the course and approximate lecture hours required for completion is shown below,

Contents	Lecture Hours
Introduction – Important Concepts of Prestressing – Systems of Prestressing – the philosophy of design – Time dependent deformation of concrete and losses of prestress.	10 to 12
Flexural design of Prestressed concrete elements – Shear, torsion and bond – Indeterminate prestressed concrete structures – Camber, deflection and crack control.	8 to 10
Prestressed concrete compression and tension members – Two way Prestressed Concrete floor systems – Connections for prestressed concrete elements.	6 to 8
Design of prestressed concrete bridges incorporating with long-term effects like creep, shrinkage, relaxation and temperature effects.	4 to 5
Strut and tie model – Seismic design of Prestressed concrete structures	6 to 8
Total	34 to 43 hrs

Text Books:

1. Antonnie.E.Naaman, Prestressed Concrete Analysis and Design, Technopress, 3rd edition, 2012.
2. Edward.G.Nawy, Prestressed Concrete, Prentice Hall, 5th edition, 2010.
3. Arthur.H.Nilson, Design of Prestressed Concrete, John Wiley & Sons, 2nd edition, 1987.
4. Rajagopalan.N, Prestressed Concrete, Alpha Science International, 2nd edition, 2005.
5. Krishna Raju. N, Prestressed Concrete, Tata McGraw Hill education Pvt Ltd., 5th edition, 2012.
6. IS 1342:2012, Indian Standard Prestressed Concrete – Code of Practice, (2nd Revision), BIS, 2012.

Course Learning Outcomes (CLOs):

On completion of the course, the students will be able to:

- CO1 – ensure the design philosophy of prestressing
- CO2 - design the flexural members due to shear, torsion, bond by incorporating the prestress losses.
- CO3 – design the connections for compression and tension prestressing elements and floor systems.
- CO4 – design the prestressed concrete girder bridges by incorporating the long-term effects
- CO5 - design the prestressed concrete structures to take care against the seismic effects

Course Teaching and Learning activities:

Power point presentation/ chalk and talk mode of lecture will be followed throughout the course work for all the five units.

Course Assessment Methods:

Assessment is an on-going evaluation process aimed at understanding and improving student learning by measuring the learning outcomes the students may have achieved.

The assessment methods for the course CE 654- Prestressed Concrete Structures are as follows,

S.No.	Assessment	Max.Marks
1.	Assessment - 1 (before mid of February 2017)	20
2.	Assessment – 2 (last week of March 2017)	20
3.	Re-Assessment (only for genuine reasons)	20
4.	Seminar/Design Projects/Assignments	10
5.	End Semester Examination	50
	Total	100

The students must take the above mentioned assessments/assignments/exam seriously and score well. Students have to take these cycle tests and end semester examination mandatorily as per the scheduled date and time mentioned by the teacher. If a student is unable to take any one of the cycle test due to some genuine reasons. He/She should inform the teacher well in advance and one re-test will be given to them (i.e. before the end semester exam). Only for genuine cases, retest will be given and it is upto the teacher who handles the course. If a student is absent for the end semester examination, he/she will be given 'V' grade even if he leaves in genuine reason. For such students, they can write exam

the month of May 2017 and so on for 100 marks and mark range/ grading system assigned for his batch will be followed.

Guidelines on grading

The pass mark for this course is 40 out of 100. Students securing below 40% will be treated as fail. The following grading pattern is followed;

Grade	Marks Range
S	91 to 100
A	81 to 90
B	71 to 80
C	61 to 70
D	51 to 60
E	40 to 50
F	≤39
V	-1 (Absent)
Student cannot withdraw the course after registration, as this subject is one of the core course.	

Attendance:

Students who enrolls/register to this course CE654 – Prestressed Concrete Structures must have a minimum of 75% attendance inclusive of medical leave, on other duty related to academic, co-curricular activities and others etc. thereafter, no OD or any other leave shall be considered for attendance relaxation. But, Allowance in the attendance requirement may be considered only for genuine reasons like suffering from long-term ill-health, surgery, sudden mishap etc. which can be claimed by producing a valid medical certificate. One or two day's sick leave shall not be considered as a Medical leave and no medical certificate will be considered for this. Students who secures less than 75% of attendance in this course will not be allowed to write the end semester examination and 'V' grade shall be awarded. He/she must register for the next summer-term course to clear the course work.

(Signature of the Teacher) (Signature of the CC chairperson) (Signature of the HoD)