

NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALLI

Department of Civil Engineering

Course Plan

Course Title: CONCRETE TECHNOLOGY

Course Code: CEPC 15

No. of Credits: 3

Department: Civil Engineering

Programme: B.Tech. 3rd Semester, Civil Engineering (Section – B)

Pre-requisites: Nil

Co-requisites: Nil

Course Co-ordinator: Dr. K.Baskar (2nd year B.Tech. class committee chairperson)

Course Teacher: Dr. J.Karthikeyan

Learning Hours: Lecture – 3 hours per week. (Tuesday-7th hour, Thursday & Friday -5th hour)

Course Type: PC

Student Quota: A maximum of 50 per section

Session in Academic year: July 2016

Course Description:

Concrete Technology is one the important fundamental course for the undergraduate curriculum. This course deals with a detailed understanding of concrete making materials including admixtures, material Property studies (Laboratory test procedures) and to design the concrete mix under different environmental conditions as per the Indian standards. Further, by going through the course one would develop adequate understanding on the sequence in concrete production, what sort of machineries/equipment used and how to maintain quality of concrete by understanding its behavior under fresh and hardened state. This course enables the students to have an in-depth knowledge on not only on the mechanical properties but also in durability and NDT techniques too. The final chapter of the course describes in detail about the significance and need for special concrete like HPC, SCC, LWC etc. to be used for certain specialized construction purpose.

Course Objective:

This course provides a comprehensive treatment of the materials and civil engineering principles which results in production and construction of good quality concrete for buildings and infrastructure. The following are the course objectives, from which the students must

- understand the properties of ingredients of concrete.
- study about the concrete design mix.
- study the behaviour of concrete at its fresh and hardened state.
- know about the procedures in concreting.
- understand special concrete and their use.

Course Content:

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

Contents	Lecture Hours
Introduction - Concrete materials - Cement: Physical tests on cement - Tests on aggregates - Quality of Water for mixing and curing - use of sea water for mixing concrete - Mineral and chemical Admixtures	11 to 12
Mix Design - factors influencing mix proportion - Mix design by ACI method and I.S. code method	5 to 6
Batching - Mixing -Transportation - Placing of concrete - curing of Concrete. Fresh and hardened properties of Concrete - Quality control - Sampling and testing-Acceptance criteria.	6 to 7
Creep, Shrinkage and temperature effects of concrete - durability of concrete - permeability of concrete - Corrosion - Causes and effects - remedial measures-Fire resistance of concrete – Rebound hammer and Ultra-sonic pulse velocity testing methods	6 to 7
Special Concrete – Lightweight concrete - Fibre reinforced concrete - Polymer concrete - Ferro cement -Ready mix concrete- High Performance Concrete - Self compacting concrete – Sustainability of concrete	7 to 8
Total	35 to 40

Text Books:

1. Shetty, M.S., Concrete Technology (Theory & Practice), S.Chand and Co, Revised edition, 2013.
2. Gambhir, M.L., Concrete Technology, Tata McGraw Hill, fifth edition, 2013.
3. A.M.Neville, Properties of Concrete, Pearson India, fifth edition, 2011
4. A.M.Nevillie and J.J. Brooks, Concrete Technology, Pearson Education India Ltd. 2015.
5. P.C.Aitcin, High Performance Concrete, E & FN Spon, UK, 1998.
6. Geert Geert De Schutter, Peter J. M. Bartos, Peter Domone and John Gibbs, Self-Compacting Concrete, Whittles Publishing, UK, 2008

Course Learning Outcomes (CLOs):

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

- CO1 - test all the concrete materials as per IS code
- CO2 - design the concrete mix using ACI and IS code methods
- CO3 - determine the properties of fresh and hardened of concrete
- CO4 - ensure quality control while testing/ sampling and acceptance criteria
- CO5 - design special concretes and their specific applications

Programme Learning Outcomes (PLOs):

Graduates of the Civil Engineering programme will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and Civil Engineering principles to the solution of complex problems in Civil Engineering.
2. Identify, formulate, research literature, and analyse complex Civil Engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.
3. Design solutions for complex Civil Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions related to Civil Engineering problems.
5. Create, select, and apply appropriate techniques, resources, and modern engineering tools such as CAD, FEM and GIS including prediction and modelling to complex Civil Engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional Civil Engineering practice.
7. Understand the impact of the professional Civil Engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the Civil Engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communicate effectively on complex Civil Engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage Civil Engineering projects and in multidisciplinary environments.
12. Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping of Programme Outcomes with Course Outcomes

PLO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO												
CO1	√	√	√	√		√	√	√		√	√	
CO2	√	√	√	√		√		√		√		
CO3	√	√	√	√	√		√	√		√		
CO4	√	√	√	√	√	√		√	√	√	√	
CO5	√	√	√	√	√	√	√	√	√	√	√	√

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. Students will have to generate/condense the class notes from the lecture or study material provided to them (say 4 or 5 students in a group) which will be treated as home assignment (5 marks). The generated class notes will be corrected by teacher and will be circulated to the students. Students will be taken for two field visits related to this course work during their leisure hours (start and end of the semester). One will be a cement factory and the other will be a ready mix concrete plant. As mix design is the heart of this course. Students will be given a special hands on training in the laboratory on this topic when they study 2nd and 3rd unit of this course, apart from their regular laboratory schedule which will be treated as their laboratory assignment (5 marks). Also, NDT equipment demonstration will be shown to the students while handling unit -4.

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 CECP15-Concrete Technology are as follows,

S.No.	Assessment	Max.Marks
1.	Cycle test -1 (last week of August or first week of September 2016)	20
2.	Cycle test – 2 (October 2016)	20
3.	Re-test (only for genuine reasons)	20
4.	Home assignment	5
5.	Laboratory assignment	5
6.	End Semester Examination	50
	Total	100

The students must take the above mentioned tests/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 will be given 'Z' grade even if he leaves in genuine reason. For such students, they can write supplementary exam during the month of December-2016, May 2017 and so on for 100 marks and mark range/grading system assigned for his batch will be followed.

Guidelines on grading

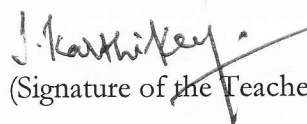
Any one of the logical methods will be followed to decide the grades as per the NITT regulations. (i.e. either Normalized curve method or z-score method)

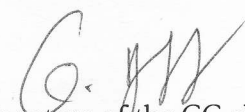
Attendance:

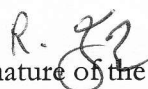
Students who enrolls/register to this course CEPC15 - Concrete Technology must have a minimum of 75% attendance inclusive of medical leave, on other duty related to academic, co-curricular activities and others etc. thereafter, no OD or any other leave shall be considered for attendance relaxation. But, 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.

Means/Process for student feedback on course:

The same student's feedback mechanism will be followed at the end of this course as how it was done previously.


(Signature of the Teacher)


(Signature of the CC chairperson)


(Signature of the HoD)