KL UNIVERISTY
FIRST SEMESTER 2010-11
Course Handout
Academic Division

Dated: 07-07-2010

Course No. : CE C203
Course Title : Concrete Technology
Course Structure : 3-0-2
Course coordinator : K. Shyam chamberlin
Instructors : Dr. Acharya

1. Course Description:
Concrete technology is a fundamental subject for a civil engineer, which gives basics of the concrete ingredients and its raw products and its manufacturing, composition for preparation of concrete, tests to be conducted and its applications.

This subject will gives the designing of different grades of concrete based up on the requirement of the strength.

AIMS:

1) To know about different types of cement, their properties, functioning and uses. Different tests conducted on cement.
2) To classify the aggregates based on various aspects, the various types of test conducted on aggregates.
3) To know about the requirement of water for the purpose of construction.
4) To classify the types of mortars, its properties and uses various tests conducted on mortars.
5) To know the properties of concrete and its proportioning, water to cement ratio for making concrete.
6) To know about the different types of admixtures, their properties and functioning.
7) To know the workability of concrete and test used for the measurement of workability.
8) To know the manufacture procedure of concrete, transportation, placing compaction, curing and finishing of concrete.
9) To know about the various test that are conducted on hardened concrete.
10) To know about special concretes and different concreting methods adopted in construction.
11) To know about the different methods of mix designs.

2. Scope and Objective of the Course:
The main objective of this course is to given an overall idea about the different materials used in the construction, the different test to be conducted on the materials to know its suitability for construction purpose, the different methods of construction adopted in the field.

3. Books:

(i) Textbook:

a. "CONCRETE TECHNOLOGY" by A.M. Neville, *PEARSON EDITION*.. ..

(ii) **Reference Book:**

1 CONCRETE TECHNOLOGY by M.E. Grambhir, Tata Mc Graw- Hill Publishing Company Ltd.

2.Concrete technology by M.S Shetty, S. Chand & Company (Pvt) Ltd., New Delhi.

4. Syllabus

UNIT-1

1. CEMENT:

General; Cement and lime; Chemical composition of ordinary Portland cement; Functions of cement ingredients; Hydration of cement; Structure of Hydrated cement; Water requirements for hydration; Types of cement and its properties; Field tests for cement; Chemical composition test; Laboratory tests for cement; Grades of cement as per IS specifications.

2. AGGREGATES:

Classification; Source; Grading of Aggregates; IS: 383 requirements for aggregates; Tests on aggregates; Alkali - Aggregate reaction.

UNIT - 2

3. WATER:

General; Quality of water; Use of sea water; IS: 456 requirements.

4. MORTAR:

Functions of sand in mortar; Classification of mortars; Properties of good mortar mix and mortar; Preparation of mortar; Uses of mortar; Precautions in using mortar; Selection of mortar; Tests for mortars.

5. CEMENT CONCRETE:

Definition ; Properties of cement concrete; Proportioning of concrete; Water/cement ratio.

6. ADMIXTURES IN CONCRETE:

General; Air-entraining agents; Plasticizers; Pozzolanic admixtures; Accelerators; Retardars; Miscellaneous admixtures such as damp proofers and Surface hardeners.

7. FRESH CONCRETE:

Workability of concrete; Measurement of workability; Segregation; Bleeding; Yield of Concrete.

UNIT -3

8. MANUFACTURE OF CONCRETE:

Batching of concrete; Mixing; Transporting Concrete; Placing concrete; Compaction of concrete; Curing of concrete; Finishing.

9. TESTS ON HARDENED CONCRETE:

Compression test; Moulds and compacting; Curing; Failure of compression specimen; Effect of height / diameter ratio on strength; Flexural strength of concrete; Tensile strength of concrete; Non - destructive testing methods; Tests on composition of hardened concrete; Elastic properties of concrete; Relation between modulus of Elasticity and strength; Factors affecting modulus of elasticity; Creep; Factors affecting creep; Shrinkage; Plastic shrinkage; Mechanism of shrinkage; Factors affecting shrinkage.

UNIT - 4

10. DURABILITY OF CONCRETE:

Permeability of concrete ; Sulphate attack; Methods of controlling sulphate attack; Durability of concrete in sea water; Action of foreign matter on concrete.

11. SPECIAL CONCRETE & CONCRETING METHODS:

Special concretes such as light weight concrete and no fines concrete; High density concrete; Polymer concrete and Fibre reinforced concrete; Special concreting methods Cold weather concreting, Hot weather concreting; Gunite or shortcrete; Ferro cement.

UNIT - 5

12. CONCRETE MIX DESIGN:

Concept of mix design; Variables in proportioning; Nominal mix and design mix; Indian standard method of mix design; ACI Method

5.Course Plan:

Lecture No	Learning objectives	Topic to be Covered	Chapter in the text book
1	To have an idea about Concrete cement and lime, OPC	Significance of cement and lime in construction work composition of ordinary Portland cement	pg .no 1 T1 pg .no14 of T1
2.	To have an idea about cement and lime, cement ingredients	Functions of cement ingredients;	pg .no14 of T1
3.	To know about hydration	Hydration of cement; Structure of Hydrated cement, Water requirements for hydration;	pg .no 17,18,22,25 of T1
4.	To have knowledge about site for cement factory	Site for cement factory; Manufacture of ordinary Portland cement	pg .no5-9 of T1
5	To have an idea about storage of cement	Storage of cement; Uses of cement	IS CODE 22509
6.	To have an idea about the types and properties of cement	Types of cement and its properties,	pg .no28 of T1
7.	To have a knowledge about field tests for cement	Field tests for cement; Chemical composition test;	pg .no47,56 of T1

8.	To have a knowledge about laboratory tests for cement	Laboratory tests for cement	pg .no48-56 of T1
9.	To have an idea about aggregates	Aggregates used in mortar and concrete. Classification and Source of aggregates	pg .no66-68 of T1
10.	To know about IS: 383 requirements for aggregates	Grading of Aggregates; IS: 383 requirements for aggregates	pg .no91-94 of T1
11.	To have a knowledge about Tests on aggregates	Tests on aggregates; Alkali - Aggregate reaction.	pg .no107-115 of T1
12.	To know the idea about water used in cement works	Water used in mortars and concrete Quality of water; Use of sea water	Pg .no 119-122 of T1
13.	To know the idea about mortar	Mortar, Functions of sand in mortar; Classification of mortars.	14.19 of T1
14.	To know the properties and preparation of mortar	Properties of good mortar mix and mortar; Preparation of mortar	IS CODE 2150
15.	To know the uses of mortar ,tests on mortar	Uses of mortar; Precautions in using mortar Selection of mortar; Tests for mortars.	IS CODE 2150
16.	To have knowledge about cement concrete	Cement concrete. Definition; Properties of cement concrete	Pg .no 219 of T1
17.	To have an idea about water cement ratio	Proportioning of concrete; Water/ cement ratio.	Pg .no 220 of T1
18.	To have an idea about the admixtures of concrete	Admixtures in concrete, Air-entraining agents;	Pg .no 125,159-173. Of T1
19.	To have an idea about the admixtures of concrete	Plasticizers; Pozzolanic admixtures Accelerators; Retardars;	Pg .no 174-180. Of T1 Pg .no 148-158. Of T1
20.	To have an idea about the admixtures of concrete	Miscellaneous admixtures such as damp proofers and Surface hardeners.	Pg .no 198 of T1
21.	To learn about Workability of concrete	Fresh concrete, Workability of concrete; Measurement of workability Segregation; Bleeding; Yield of Concrete.	Pg .no 219-229. Of T1 Pg .no 223-236. Of T1

22.	To have an idea about manufacturing of concrete	Manufacturing of concrete, Batching of concrete; Mixing; Transporting Concrete Placing concrete;	Pg .no 238-247. Of T1 Pg .no 247-265. Of T1
23.	To have an idea about manufacturing of concrete	Compaction of concrete; Curing of concrete; Finishing.	Pg .no 265-295. Of T1
24.	To have an idea about hardened concrete	Hardened concrete. Water - cement ratio; Gel / space ratio; Gain of strength with age	Is 456
25.	To know Maturity concept of concrete	Maturity concept of concrete; Effect of maximum size of aggregate on strength.	IS CODE 10262
26.	To have an idea about tests on concrete	Tests on hardened concrete Compression test; Moulds and compacting; Curing;	Pg .no 421-425 of T1
27.	To know the Effect of height / diameter ratio on strength.	Failure of compression specimen; Effect of height / diameter ratio on strength.	Pg .no 425-427 of T1
28.	To learn how to test the Flexural strength of concrete	Flexural strength of concrete Tensile strength of concrete	Pg .no 429-430 of T1
29.	To learn how to test the composition of hardend concrete	Non destructive testing methods; Tests on composition of hardened concrete	Pg .no 439-446 of T1
30.	To know about Elastic properties of concrete	Elastic properties of concrete; Relation between modulus of Elasticity and strength;	Pg .no 325-328 of T1
31.	To know about Elastic properties of concrete	Factors affecting modulus of elasticity; Creep; Factors affecting creep; Shrinkage; Plastic shrinkage	Pg .no 329,33-339 of T1 Pg .no 339-344 of T1
32.	To have an idea about shrinkage of concrete	Mechanism of shrinkage; Factors affecting shrinkage	Pg .no 344of T1
33.	To know about Durability and Permeability of concrete	Durability of concrete, Permeability of concrete	Pg .no 349-356 in T1
34.	To learn sulphate attacks the concrete	Sulphate attack; Methods of controlling sulphate attack	Pg .no 389-390 of T1
35.	To have an idea about Durability of concrete in sea water	Durability of concrete in sea water Action of foreign matter on concrete.	Pg .no 396 of T1 Pg .no 400-408 of T1
36.	To have an idea about Special concretes	Special concretes ,light weight concrete and no fines concrete.	Pg .no 506-509,517-520 of T1

37	To have an idea about Special	High density concrete, Polymer concrete	Pg .no 520-522 of T1
38.	To have an idea about Special concretes	Fibre reinforced concrete	Pg .no 526-530 of T1
39.	To have an idea about Special concreting methods	Special concreting methods - Cold weather concreting	Pg .no 542-544 of T1
40.	To have an idea about Special concreting methods	Hot weather concreting Guniting or shortcrating ferrow cement concrete	Pg .no 552-556 of T1
41.	To have an idea about mix design	Concept of mix design	Pg .no 562-566 of T1 Pg .no 459 of T1
42.	To have an idea about ACI method mix design	Concept of ACI method mix design	Pg .no 466-479 of T1 Pg .no 473 of T1
43.	To have an idea about proportions of mix design	Variables in proportioning, Nominal mix and design mix	Pg .no 459 of T1 Pg .no 458 of T1
44.	To learn Indian standard method of mix design	Indian standard method of mix design	Pg .no 489-499 of T1
45.	To learn IS method of mix design	IS Method of mix design, Road Note 4 method of designs	Pg .no 489-499 of T1

6.Self learning material:

Lecture No	Learning objectives	Topics to be covered	Chapter in the text book
1	To have knowledge about site for cement factory & Manufacture of cement	Site for cement factory; Manufacture of ordinary Portland cement	pg .no5-9 of T1
2	To have an idea about Durability of concrete in sea water	Durability of concrete in sea water Action of foreign matter on concrete.	Pg .no 396 of T1 Pg .no 400-408 of T1

7.Evaluation Scheme:

Component	Duration (minutes)	% Weightage	Marks	Date & Time	Venue/ Room No's
Test-1	50 Min	7.5	10	10-08-2010 9.30 to 10.20 A.M	CSE002, 103, 104, 502
Test-2	50 Min	7.5	10	14-09-2010 9.30 to 10.20 A.M	CSE002, 103, 104, 502
Assignement submission		3.75	5	Continous	
Assignment Test	50 Min	3.75	5	26-10-2010 9.00 to 10.20 A.M	CSE002, 103, 104, 502
Quiz	30 Min	3.75	5	26-10-2010 9.00 to 10.20 A.M	
Regular Lab Evaluation	Continuous	12.5	50		
Comprehensive Lab Exam	3 Hrs	10	40		
Comprehensive Exam	3 Hrs	45	60		
Attendance for Theory & Tutorial		3.75	5	Continuous	
Attendance for Lab		2.5	10	Continuous	

8. Chamber consultation hour: Informed in the class in first week.

9. Notices: All notices regarding the course will be put in E-learning website.

10.Tutorial: Tutorial will be conducted by the respective in charge faculty. The tutorials are planned to supplement the material taught in the lectures and clear doubts. Student must attend registered section for tutorial in the respective classroom. Class assignment, class tests and other evaluation components will also be conducted during tutorials. Students must actively participate in the tutorial and come prepared for it.

Course Coordinator