



Concrete Engineering and Technology

SWAYAM Prabha Course Code - C17

PROFESSOR'S NAME	Dr. Sudhir Misra
DEPARTMENT	Civil Department
INSTITUTE	Indian Institute of Technology, Kanpur
Course Outline	<p>The course deals with different aspects of modern concrete technology that has evolved as a result of rapid developments in mechanized construction, use of mineral and chemical admixtures in concrete.</p> <p>Use of concrete in more challenging environments, better understanding of the material properties of concrete, emphasis on durability, etc.</p> <p>Examples of special concretes and construction methods are used to illustrate the scientific principles involved therein and their engineering treatment.</p> <p>To a limited extent, provisions in codes and their limitations are also discussed.</p> <p>A brief discussion on maintenance of concrete structures, including nondestructive testing, evaluation criteria, repair and rehabilitation will also be included for completeness.</p> <p>The course is designed as a elective course for final year level degree and post-graduate students of civil engineering, who have a basic background of concrete constituents and properties, and design of concrete structures.</p> <p>It is hoped that the material will also be useful to teachers and practitioners.</p> <p>Contents:</p> <p>Fundamental of concrete - constituents, proportioning, mixing, transportation, placing and curing; Properties of fresh and hardened concrete.</p> <p>Quality control in concrete construction; Durability of concrete; Special</p>

	concretes, construction methods and reinforcing materials. Introduction to evaluation of existing structures and repair methods.
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COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1	L1	Introduction and course overview
2	L2	Constituents of concrete (Part 1 of 2)
3	L3	Constituents of concrete (Part 2 of 2)
4	L4	Admixtures in concrete - mineral and chemical
5	L5	Hydration of cement
6	L6	Basic properties of concrete
7	L7	Proportioning of concrete mixes (Part 1 of 3)
8	L8	Proportioning of concrete mixes (Part 2 of 3)
9	L9	Proportioning of concrete mixes (Part 3 of 3)
10	L10	Pores and porosity in concrete
11	L11	Porosimetry - measuring pores in concrete
12	L12	Principles of quality control in concrete construction
13	L13	Quality control and acceptance criteria for concrete based on compressive strength
14	L14	Fibre reinforced concrete
15	L15	High strength concrete
16	L16	Mass concrete (Part 1 of 2)
17	L17	Mass concrete (Part 2 of 2)
18	L18	Concreting in cold weather

19	L19	Concreting in hot weather
20	L20	Roller compacted concrete
21	L21	Self-compacting concrete
22	L22	Testing self-compacting concrete
23	L23	Shotcrete and underwater concrete
24	L24	Alkali- aggregate reaction (Part 1 of 2)
25	L25	Alkali - aggregate reaction (Part 2 of 2)
26	L26	Reinforcement corrosion in concrete
27	L27	Chloride penetration in concrete
28	L28	Using epoxy-coated bars in concrete structures
29	L29	Using FRP as reinforcement in concrete structures (Part 1 of 2)
30	L30	Using FRP as reinforcement in concrete structures (Part 2 of 2)
31	L31	Grouting and importance of formwork in concrete construction
32	L32	Carbonation and freezing & thawing in concrete structures
33	L33	Using recycled aggregates in concrete construction
34	L34	Basic non-destructive testing for concrete structures
35	L35	Measuring permeability in concrete
36	L36	Some additional topics
37	L37	Considerations in repair of concrete structures (Part 1 of 2)
38	L38	Considerations in repair of concrete structures (Part 2 of 2)
39		Laboratory demonstration
40		Review of the course

References if Any:

1. P.K. Mehta and Paulo J.M. Monteiro, "Concrete: microstructure, properties and materials", The McGraw- Hill Companies [L] [SEP]
2. AM Neville, Properties of concrete, Pearson [L] [SEP]
3. M L Gambhir, Concrete Technology, Tata McGraw Hill [L] [SEP]
Companies
4. A R Santakumar, Concrete Technology, Oxford University Press