

**NIRMA UNIVERSITY**  
**Institute of Technology**  
**School of Engineering**  
**Master of Technology - Civil Engineering**  
**(Computer Aided Structural Analysis and Design)**  
**Semester- I**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
3	0	2	4

<b>Course Code</b>	6CL105
<b>Course Name</b>	Advanced Concrete Technology

**Course Outcomes:**

At the end of the course, students will be able to -

1. propose usage of appropriate Supplementary Cementitious Materials
2. recommend applications of repair materials and chemical admixtures in field
3. demonstrate different types and techniques of concrete in practice.

**Syllabus:**

**Teaching Hours: 45**

**Unit-1: Supplementary Cementitious Materials**

**Hours: 12**

Introduction to naturally & artificially produced pozzolans like fly ash, ground granulated blast furnace slag, silica fume, metakaolin, rice husk ash, Physical, chemical and mineralogical properties, Hydration reaction and pozzolanic activity, Proportioning of concrete, Effect on properties of fresh and hardened concrete and on durability of concrete, Study of IS, ASTM and other codal provisions.

**Unit-2: Repair Materials**

**Hours: 05**

Characteristics and use in enhancing various structural properties, Applications of fiber reinforced polymer composites- carbon, glass, aramid / Kevlar, Micro concrete, Polymers, Epoxies, Adhesives, Cementitious grouts, Protective coatings, Waterproofing materials, Case studies.

**Unit-3: Chemical Admixtures**

**Hours: 08**

Overview of chemicals admixtures, Rheology of fresh concrete, Effect of incorporation of admixtures in concrete, Recent advances in field of admixtures.

**Unit-4: Special Concretes**

**Hours: 15**

Light weight concrete, High density concrete, High strength concrete, High performance concrete, Self-compacting concrete, Fiber reinforced concrete, Recycled concrete, Ferro cement concrete, Engineered cementitious composite, Polymer modified concrete, Pervious concrete, Geopolymer concrete, Other advances.

**Unit-5: Modern Trends in Concrete Techniques**

**Hours: 05**

Cold and hot weather concreting, Mass concrete, Roller compacted concrete, Ready mixed concrete, Underwater concreting, Pumped concreting, Other advancement.

### **Self-Study:**

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

### **Laboratory Work:**

Laboratory work based on above syllabus with minimum 05 experiments related to properties and usage of supplementary materials, dosage of repair materials and innovative concrete to be incorporated.

### **Suggested Readings:**

1. Malhotra, V.M.&Ramezaniapour, A. A.*Fly Ash in Concrete*, CANMET.
2. Mehta, P. K.*Concrete: Microstructure, Properties and Materials*, McGraw Hill.
3. Neville, A. M.*Properties of Concrete*, Pearson Education.
4. *Manual of Concrete Practice Vol. I to V*, American Concrete Institute.
5. Codes: IS:10262, IS:456.

L= Lecture, T= Tutorial, P= Practical, C= Credit

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w.e.f. academic year 2019-20 and onwards