

Course Code	Course Title	L	T	P	C
17CE013	ADVANCE CONCRETE TECHNOLOGY	3	0	0	3

**Course Objectives:**

1. To know the advancements in the field of concrete technology.
2. To understand the use of various chemical and mineral admixtures in concrete.
3. To understand the behavior of green materials for sustainable construction.
4. To be familiarize with the available Non-Destructive testing techniques for the testing of strength parameters of concrete.

**Course Outcomes:**

At the end of the course student will be able

1. To show understanding of concrete behavior, admixtures and polymers and their applications
2. To show appreciation of the factors affecting durability of concrete and know how durable concrete and special concretes are produced.
3. To be familiar with concepts of social, environmental and economic sustainability and engineering for sustainable development.

**Activities:**

1. Perform NDT on beams of Surveying lab to find strength.
2. Perform experimental investigation on strength of concrete in both fresh and hardened state when mineral admixtures are added to it.
3. Perform experimental investigation on strength of concrete in both fresh and hardened state when chemical admixtures are added to it
4. Analyze the behavior of concrete when green materials are used in concrete.

**Skills:**

1. Able to correlate the NDT test results to the strength of concrete.
2. Able to identify the effect of mineral and chemical admixtures on the strength of concrete.
3. Able to select the good material for the preparation of green concrete for the sustainable construction.

**UNIT-I: Introduction:**

Concrete - Understanding the quasi-brittle nature of concrete - Failure of concrete under low stress - Micro— cracking, crack propagation - stress concentration at openings –Destructive, semi-destructive & Non-destructive testing methodology - Rebound hammer test - Ultrasonic Pulse Velocity (UPV) Test - Penetration resistance test - Pull-out Test - Pull-off Method - Break-off test - Cover Measurement - Core Sampling and Testing - Half-cell electrical potential method - Resistivity Mapping Problems faced during Non-destructive evaluation - Microscopic Analysis – XRD, SEM, TEM Analysis.

**UNIT-II: Admixtures and Polymers:**

Chemical Admixtures- Mechanism of chemical admixture, Plasticizers and super Plasticizers and their effect on concrete property in fresh and hardened state, Marsh Cone test for optimum dosage of super plasticizer, retarder, accelerator, Air-entraining admixtures, and new generation super plasticiser.

Mineral Admixture-Fly ash, Silica fume, GGBS, and their effect on concrete property in fresh state and hardened state.

Polymers -Structural Plastics and Composites- Polymer Membranes Coatings.

### **UNIT-III: Durability Properties:**

Permeability – chemical attack – Sulphate attack – Carbonation - Quality of water – marine conditions – Thermal properties of concrete – fire resistance – methods of making durable concrete

### **UNIT-IV: Special Concrete:**

Light weight concrete, Fiber and Hybrid Fiber reinforced concrete, Polymer Concrete, Super plasticized concrete, Epoxy resins and screeds for rehabilitation Fly ash and High volume flyash concrete, -High performance concrete - Self compacting concrete - Self curing concrete – Recycled aggregate concrete - Bacterial concrete – Nanoconcrete

### **UNIT-V: Sustainability:**

Introduction - Need for sustainability - Concept of sustainability - social, environmental and economic sustainability concepts. Sustainable development - Engineering for sustainable development - Threats for sustainability - Low Impact development techniques-Green materials -Material selection for sustainable design.

### **TEXT BOOKS:**

1. Shetty M.S., “Concrete Technology”, S.Chand and Company Ltd. Delhi, 2013.
2. Gambhir.M.L., “Concrete Technology”, Tata McGraw Hill, Publishing Co. Ltd New Delhi, 2013.
3. Santhakumar .A.R.,” Concrete Technology”, Oxford University Press, NewDelhi 2006.

### **REFERENCE BOOKS:**

1. Neville, A.M., “Properties of Concrete”, Pitman Publishing Limited, London, 2012.
2. Mehta P.K. and Montreio P.J.M., "Concrete Structure Properties and Materials", 2nd edition, Prentice Hall, 1993.
3. A. M. Neville & J. J. Brooks, “Concrete Technology”, 4th Impression, Pearsons Education Ltd, 2009.