

Course Code	Course Title	L	T	P	C
20SE009	ADVANCE CONCRETE TECHNOLOGY	3	0	0	3

**PRE-REQUISITE COURSES: CONCRETE TECHNOLOGY**

**COURSE OBJECTIVES:**

To study the properties of concrete making materials, To understand the use of various Chemical, Mineral Admixtures & Polymers in concrete, By the end of course, student should able to do mix design, To be familiarize with the methods of concrete, To study the advance tests on concrete.

**COURSE OUTCOMES:**

At the end of the course student will be able to

CO's	Course Outcomes	PO's
1	To be familiar with the properties of concrete making materials.	1
2	Identify the influence and compatibility of Chemical, Mineral Admixtures in concrete.	2
3	Update the knowledge on recent advances in special concretes.	5
4	To know about various methods of concrete.	1
5	Analyse the Performance of concrete structure through Microstructure Analysis.	4

**SKILLS**

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

#### **UNIT-I:**

**INTRODUCTION:** Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified grading, Testing of aggregates. Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, special cements.

#### **UNIT-II:**

**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:**

**MIX DESIGN & SPECIAL CONCRETE:** Principles of concrete mix design, Methods of concrete mix design, IS Method, ACI Method.

**SPECIAL CONCRETE:** Light weight concrete, Fly ash concrete, Fiber reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self- Compacting-Concrete, Geo Polymer Concrete, Waste material based concrete – Ready mixed concrete, Bacterial concrete – Nanoconcrete.

#### **UNIT-IV:**

**CONCRETING METHODS:** Process of manufacturing of concrete, methods of transportation, placing and curing. Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete.

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

**TESTS ON CONCRETE:** 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.

#### **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.

#### **REFERENCE BOOKS:**

1. Rajagopalan, N. “Prestressed concrete”, Narosa Publishing House.2nd edition, 2005.
2. Nilson, A. “Design of Prestressed Concrete”, John Willey & Sons.2nd edition, 1987.
3. Arthur H. Nilson, “Design of Prestressed Concrete”, John Wiley and Sons Inc, New York, 2004.
4. Lin. T. Y and Burns. H “Design of Prestressed Concrete Structures”, John Wiley and Sons Inc, New York, 2009.
5. Sinha. N. C. and Roy. S. K, “Fundamentals of Prestressed Concrete”, S. Chand and Co., 1998.
6. Santhakumar, A.R.”Concrete Technology” Oxford University Press, 2006.