



# GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering

Subject Code: 3721417

Advanced Concrete Technology

2<sup>nd</sup> SEMESTER

Type of Course: Elective

Prerequisite: NIL

## Rationale:

This course explores the materials science of concrete, and attempts to bring about the understanding of concrete behavior from a fundamental perspective. The course discusses the structure and properties of concrete making materials, mixture proportioning of high performance concrete, self-compacting concrete etc.

## Teaching and Examination Scheme

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	PA(M)	Viva	PA (I)	
3	0	2	4	70	30	30	20	150

## Course Contents

Sr.No.	Topics	Hrs.
1	<b>Introduction:</b> Sustainable Development concept, Introduction of Recent advances in Concrete Technology, Sustainable Construction Practices: world scenario	03
2	<b>Supplementing Cement Materials (SCMs):</b> Review of types covering pulverized fuel ash, ground granulated blast furnaces slag and silica fume, Rice husk Ash, manufacture, physical characteristics, effects on properties of concretes. Admixtures: Plasticizers, Super plasticizers, retarder, accelerators, Curing compounds and their effects on properties of concrete. Epoxy resins and screeds for rehabilitation – Properties and Applications	08
3	<b>Concrete Mix Design</b> Review of methods and philosophies, mix design for special purposes <b>Ready Mixed Concrete</b> Types of plant, truck mixer efficiency, effects of prolonged agitation, quality control: acceptance and compliance	08
4	<b>Special Concretes:</b> High performance concrete, High Strength concrete, fiber reinforced concrete, Light weight concrete, High density and radiation shielding concrete, High volume fly ash concrete and self-compacting concrete, Ferro-cement concrete, Pumped Concrete, Roller Compacted Concrete, polymer concrete	06
5	<b>Sustainable Construction Concrete:</b> Green Concrete, Geo Polymer Concrete, Reactor Powder Concrete, Recycled concrete, Slag Cement and health assessment of concrete	06



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6	<b>Durability of Concrete</b> Durability concept, pore structure and transport processes, corrosion resistance, fire resistance, frost damage, sulfate attack, alkali silica reaction, short term tests to assess long term behaviour.	08
	<b>Total</b>	<b>39</b>

## Reference Book(s)

- Properties of Concrete by Neville A. M.
- Concrete Technology by Shetty M. S.
- Concrete Technology by Gambhir M. L.
- Concrete Technology by A.R. Santhakumar, IIT Madras
- Concrete Microstructure, Properties and material by P. Kumar Mehta & Paulo J M Monteiro
- Design of Concrete Mixes by Krishna Raju
- Progress in cement and concrete in series by S N Ghosh

## Course Outcome

Sr. No.	CO statement	Marks % weightage
CO-1	Understanding of supplementing cement materials	20%
CO-2	Concrete mix design for specific purposes	25%
CO-3	Understanding of special & sustainable concrete	30%
CO-4	Durability of concrete	20%

## **Suggested Specification table with Marks (Theory):**

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	25	20	20	15	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above

List of Open Source Software/learning website: [www.nptel.ac.in/courses/](http://www.nptel.ac.in/courses/)