

**B. Tech. III Semester V**

**Subject Name :** Modern Concrete Technology

**Subject Code:** BTCL14501

**Type of course :** PEC-I

**Prerequisite :** Material Science

**Rationale :** Concrete is manmade stone as important construction materials and it is in demand when the properties like good compressive strength, impermeability, durability, resistance to fire are in need. It is generally a material which prepared at site where it is difficult to have check over the quality control. The performance of hardened concrete depends on how the concrete mix is made ie, mix proportion, process of mixing, water cement ratio, curing etc. This course focuses on all of these aspects as well as properties of special types of concretes with different properties than the conventional concrete.

**Teaching and Examination Scheme:**

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

**CA1:** Continuous Assessment (assignments/projects/open book tests/closed book tests) **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

**Content:**

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	<b>Ingredients of Concrete:</b> Cement- Classification, Grade of cement, Chemical Compositions, hydration of cement, special cements. Aggregates-Classification, IS specifications, Grading, methods of combining aggregates, testing of aggregates, Admixtures-purpose, types of admixtures, special admixtures.	5	11%
2.	<b>Tests of Concrete:</b> Properties of fresh concrete, methods for determination of workability, Mechanical properties of Hardened concrete—compressive strength, elasticity, shrinkage, creep, Destructive and Non Destructive tests on hardened concrete.	4	09%
3.	<b>Mix design:</b> Design of high strength concrete mixes, design of light weight aggregate concrete mixes, design of fly-ash cement concrete mixes, and design of high density concrete mixes.	9	20%

4.	<b>Special Concrete:</b> Light weight concrete, ultra-light weight concrete, vacuum concrete, mass concrete, waste material-based concrete, shotcreting, guniting, sulphur concrete and sulphur infiltrated concrete, jet cement concrete (ultra-rapid hardening), gap graded concrete, no fines concrete, high strength concrete, high performance concrete	9	20%
5.	<b>Concrete with Special properties and applications:</b> Ferro cement, Fiber reinforced concrete, Polymers in concrete, Shrinkage compensating concrete, Light emitting concrete, Green Concrete, Perforated concrete, Manufacturing process, Mechanical properties and field applications of special concretes	9	20%
6.	<b>Durability of Concrete:</b> Causes of inadequate durability, Transport mechanism of fluids in concrete, acid attack, Sulphate attack and sea water attack , carbonation and its effects ,efflorescence	9	20%

**Suggested Specification table with Marks (Theory/Practical):**

% Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	30	30	10	10	0

**Legends: R:** Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels (**Revised Bloom's Taxonomy**)

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Reference Text Books:**

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Properties of Concrete	A M Neville	Pearson Education India	2012	5 <sup>th</sup>
2	Concrete Technology, Theory and Practice	Gambhir.M.L	Tata McGraw-Hill Publishing Company	2009	5 <sup>th</sup>
3	Concrete Technology, Theory and Practice	M S Shetty	S.Chand and Company Ltd. Delhi	2005	17 <sup>th</sup>
4	Concrete Technology	Santhakumar.A.R	Oxford University Press,	2018	12 <sup>th</sup>
5	Concrete Technology	Gupta.B.L., Amit Gupta	Jain Book Agency	2010	4 <sup>th</sup>

**Course Outcome:**

**PEC-I: Professional Elective Course-I**

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Discover the main materials of concrete and process of making concrete, mix design ( <i>Cognitive Level U</i> )	19
CO-2	Visualize various tests on fresh as well as hardened concrete ( <i>Cognitive Level U,E</i> )	19
CO-3	Design the mix of concrete by various methods ( <i>Cognitive Level U,A,N</i> )	19
CO-4	Recognize special types of concretes, their properties and areas of application ( <i>Cognitive Level U,A</i> )	28
CO-5	Justify the factors affecting the durability of concrete ( <i>Cognitive Level U,A</i> )	15

**Mapping with POs:**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	2	2	1	3	2	3	1	3	3	3	3	2	1	2
CO-2	2	3	2	3	3	2	1	2	2	2	2	1	1	3	3
CO-3	2	3	2	3	2	2	2	1	2	2	2	2	3	1	2
CO-4	1	2	2	3	2	3	1	3	1	3	2	2	3	2	2
CO-5	1	1	1	2	1	3	1	3	1	3	2	2	3	2	1
<b>Rationale*</b>	09	11	09	12	11	12	08	10	09	13	11	10	12	09	10

**Rationale\*:** The study of fundamental aspects of concrete, its tests, mix design of concrete, special concrete and its special properties, durability of concrete will help to know the various use of modern concrete and justify the well-defined POs and PSOs.

**List of Practical:**

1. Study the Compressive strength of concrete at 7 and 28 days. Flexural strength and Split tensile strength of concrete.
2. Study the Flexural and Split tensile strength of concrete.
3. Study tensile properties of Normal and Fiber reinforced concrete
4. Study the effect on Pull-Off strength of concrete on addition of fibers
5. Demonstration of non-destructive testing on concrete

**Major Equipment:**

1. Universal testing Machine (UTM)/
2. Compression Testing Machine (CTM)
3. Rebound Hammer
4. Ultrasonic Pulse Velocity

**List of Open Source/learning website:**

- <https://nptel.ac.in/courses/105/106/105106176/>
  - Concrete making Ingredients
  - Concrete with Special properties and applications-Fiber reinforced concrete
  - Durability of Concrete