SARVAJANIK UNIVERSITY
SarvajanikCollege of Engineering and Technology
Master of Technology
Structural Engineering

M. Tech. I Semester I

Subject Name: Advanced Concrete Technology **Subject Code**: MTST14102

Type of course: Program Elective-I

Prerequisite: Material Science, Concrete Technology

Rationale: Concrete is one of the most important construction materials and it is in demand when the properties like good compressive strength , impermeability, durability, resistance to fire are in need.. This course focuses on various aspects of special concreting techniques as well as properties and application of special types of concretes with properties differing from conventional or regular 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	**Concrete Ingredients**: 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	4	9
2	**Tests on Concrete:** Properties of fresh concrete, methods for determination of workability, Mechanical properties of Hardened concrete–compressive strength, elasticity, shrinkage, creep, Non Destructive tests on hardened concrete.	4	9
3	**Special Concreting Techniques:** Shotcreting and guniting, pumped concrete, Tremie concrete, underwater concrete, Pre placed concrete, vacuum dewatered concrete,Rollar compacted concrete, Ready mixed concrete, Concreting under extreme environmental conditions	8	18

4	**Concrete with Special properties and applications:** Ferro cement, Fiber reinforced concrete, Polymers in concrete, Shrinkage compensating concrete, High strength concrete, High performance concrete, Self compacting concrete, Green Concrete, Perforated concrete, Manufacturing process, Mechanical properties and field applications of special concretes	**12**	**27**
5	**Durability of Concrete**: Deterioration of concrete and its prevention, Transport mechanism of fluids in concrete, acid attack, Sulphate attack and sea water attack , carbonation and its effects ,efflorescence.	**7**	**16**
6	**Repair techniques for concrete structure**: Introduction, Symptoms and diagnosis of distress, Evaluation of cracks, Selection of repair procedure, Common types of repairs,Leak sealing,Underwater repair,Distress in fire damaged structures,Strengthening with composite laminates,Strengthening of deficient structures,Crack repairs by Epoxy/Resin, Repairs of Hair Cracks by Grouting, Epoxy Concrete ,Repairs of Floors , Columns , R.C.C. Slabs.	**10**	**22**

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
35	**35**	**20**	**5**	**5**	**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 andteachers. 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 ISBN-10 8131791076 ISBN-13 978-8131791073	2012	5th Edition
2	Concrete Technology, Theory and Practice	Gambhir.M.L	Tata McGraw-Hill Publishing Company ISBN-10 0070151369 ISBN-13 978-0070151369	2009	5th edition
3	Concrete	M S Shetty	S.Chand and Company	2005	17th

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	Technology, Theory and Practice		Ltd. Delhi ISBN:81-219-0003-4		
4	Concrete Technology	Santhakumar.A.R	Oxford University Press, ISBN-13: 978-0-19-945852-3 ISBN-10: 0-19-945852-9	2007 2018	1st edition 2nd edition
5	Concrete Technology	Gupta.B.L., Amit Gupta	Jain Book Agency ISBN: 9788180141706	2010	4th edition

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Know the main materials of concrete and process of making concrete and various tests on fresh as well as hardened concrete	18%
CO-2	Understand various special concreting techniques and the place of their application	18%
CO-3	Have complete understanding on special types of concretes, their properties and areas of application	27%
CO-4	Access the factors affecting the durability of concrete	16%
CO-5	Know various repair techniques for concrete structures	22%

LIST OF PRACTICALS:

1. Study the changes in the mechanical properties of Fiber reinforced concrete by varying % fiber content
2. Study the changes in the mechanical properties of Fiber reinforced concrete by varying geometry of fibers, Aspect ratio.
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 nondestructive testing on concrete

Major Equipments:

1. Universal Testing Machine
2. Concrete mixer

List of Open Source/learning website:

- https://nptel.ac.in/courses/105/106/105106176/
  - Concrete Ingredients:
  - Durability of concrete
- https://nptel.ac.in/courses/105/104/105104206/
  - Special Concreting Techniques
  - Concrete with Special properties and applications

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