

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	BTech Civil Engineering
Course Code:	2CL102CC23
Course Title:	Construction Materials
Course Type:	Core
Year of Introduction:	2023-2024

L	T	Practical Component				C
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Course Learning Outcomes (CLO):

At the end of the course, the student will be able to –

1. appraise regarding the properties and applications of construction materials (BL5)
2. infer the behaviour of fresh and hardened concrete in field applications (BL4)
3. select modern construction materials for diversified applications (BL3)
4. evaluate the quality of construction materials in laboratory. (BL5)

Unit	Contents	Teaching hours (Total 30)
Unit-I	Construction Materials Cement: manufacturing process, hydration of cement, types, tests; aggregates: criteria, classification, properties, tests; mortar and plaster: types, properties; bricks and blocks: classification, manufacturing, types, applications, tests; clay and ceramic products: manufacturing, classification, properties and tests; plastics: classification, properties and applications; wood: classification, applications; steel: classification, types, applications and other metals; stones: classification, applications; paints and varnishes: classification, types, applications.	15
Unit-II	Concrete Concrete technology: introduction, classification, properties, grades, quality control of concrete, mineral and chemical admixtures; fresh concrete: workability, factors, segregation, bleeding, manufacturing process of concrete, tests; concrete mix design: factors and mix design using Indian standard code; hardened concrete: parameters affecting strengths, destructive test, shrinkage, creep, permeability and other properties.	10
Unit-III	Advanced Sustainable Materials Glass, bamboo, thermal insulating materials, sound insulating materials, composite material, fibre reinforced polymers, nano materials, smart materials.	05

Self Study: The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings/
References: Subramanian & Narayan, *Building Materials, Testing and Sustainability*, Oxford University Press.
Shetty, M.S., *Concrete Technology*, Theory & Practice, S. Chand and Co.
Gambhir, M.L. & Jamwal, N. *Building and Construction Materials: Testing and Quality Control*, Tata McGraw Hill.
Varghese, P.C., *Building Materials*, Prentice-Hall of India.
Duggal, S.K., *Building Materials*, New Age International.
Neville, A.M., *Properties of Concrete*, Longman Publishers.
Mehta, P. K. & Montiero, P. M. J., *Concrete: Microstructure, Properties and Materials*, McGraw-Hill.

Laboratory Work: Laboratory work will be based on above syllabus with minimum 10 experiments/exercises to be incorporated.

Suggested List of Experiments:

Sr. No.	Name of Experiments/Exercises	Hours
1	Testing of cement	06
2	Testing of aggregates	06
3	Testing of bricks & blocks	02
4	Test on bamboo	02
5	Test on tiles	02
6	Test on chemical admixtures	02
7	Test on mineral admixtures	02
8	Concrete mixture design	04
9	Fresh and Hardened Concrete Properties	02
10	Testing on FRP	02