NIRMA UNIVERSITY

Institute:	**Institute of Technology, School of Engineering**
Name of Programme:	**B. Tech. in Civil Engineering**
Course Code:	2CL102
Course Title:	**Construction Materials**
Course Type:	(☑Core/□Value Added Course/□Departmental Elective/ □Institute Elective/□University Elective/(□Open Elective Any other)
Year of Introduction:	2023-24

L	**T**	**Practical Component**				**C**
		LPW	**PW**	**W**	**S**	
2	**-**	**2**	**-**	**-**	**-**	**3**

Course Learning Outcomes (CLO):

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

1. explain the properties and applications of construction materials (BL2)
2. apply the properties of fresh and hardened concrete (BL3)
3. select modern construction materials for intended applications (BL3)
4. examine the quality of construction materials in the laboratory. (BL4)

Syllabus: **Teaching Hours: 30**

Unit	**Syllabus**	**Teaching hours**
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, manufacture 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	**Modern Sustainable Materials** Glass, bamboo, thermal insulating materials, sound insulating materials, composite material and 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 Material*, 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 Material, Microstructure and Properties*, McGraw-Hill.
Suggested List of Experiments:	Laboratory work will be based on above syllabus with minimum 09 experiments/exercises to be incorporated.

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