NIRMA UNIVERSITY

Institute:	**School of Engineering, Institute of Technology**
Name of Programme:	**M. Tech. in Civil Engineering (Construction Technology and Management)**
Course Code:	6CL202
Course Title:	Advanced Construction Technology
Course Type:	(☑ Core/ ☐ Value Added Course/ ☐ Departmental Elective/ ☐ Institute Elective/ ☐ University Elective/(☐ Open Elective ☐ Any other)
Year of Introduction:	**2022-23**

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Course Learning Outcomes (CLOs):

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

1. apply advanced construction techniques for high rise building (BL3)
2. select most appropriate techniques for underground construction (BL5)
3. choose the appropriate techniques for bridge, road and offshore construction (BL3)
4. adapt the pre-cast & prefabricated technology (BL6)
5. examine techniques for ground improvement and demolition of structures. (BL4)

Syllabus: **Teaching hours: 45**

Unit	**Syllabus**	**Teaching hours**
Unit-I	**Construction of High-rise Building** Establishing site, excavation, earth support system, formwork, building frame, steel structure, floor, cladding, handling concrete, vacuum dewatering of concrete flooring, concrete paving technology, Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections, Erection techniques of tall structures, large span structures, launching techniques for heavy decks, in-situ pre-stressing in high rise structures, Post tensioning of slab, aerial transporting, Handling, and erecting lightweight components on tall structures, 3 D Printing in Construction**,** automation in construction.	10
Unit-II	**Underground Construction** Need of deep foundation, pile foundation, well foundation, caissons, cofferdam, box pushing techniques, diaphragm wall construction, dewatering for underground open excavation. Tunnel and underground Construction: site investigation, drilling & blasting, methods of construction, advantages & disadvantages, safety & hazard during construction, trenchless technique.	10

Unit-III	**Bridge and Road Construction** Bridge Construction - components, fixing bridge alignment, different methods of staging and shuttering, launching methods. Road construction- construction of subgrade, subbase, base course and surface course, material and equipment, maintenance repairs.	06
Unit-IV	**Pre-cast & Prefabrication Technology** concept, need, advantages, and disadvantages of prefabricated building, components, suitable material for pre-fabrication, components, construction methodology; erection technology, safety in construction, manufacturing process of pre-fabrication components, design consideration, joints in pre-fabrication construction, modular coordination	06
Unit-V	**Marine Construction** Off shore construction: sea floor and marine soil, material and erection in marine structures, off shore construction equipment, underwater construction, stages of off shore structure construction.	05
Unit-VI	**Ground Improvement Techniques** Need, remedies for soft soil, soil compaction, soil stabilization, soil densification, pre-consolidation, Injection and grouting, soil reinforcement	04
Unit-VII	**Demolition of Structures** Need, Demolition by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, Safety precaution in Demolition and Dismantling.	04

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

Suggested Readings/ References:

- Irvine, J., *Advanced Construction Techniques*, California Rocketry Publisher.
- Patrick Powers. J., *Construction Dewatering: New Methods and Applications*, John Wiley & Sons.
- Levitt, M., *Precast concrete - Materials, manufacture properties and usage*, Applied Science Publications
- Jha, K.N. *Formwork for concrete structures*, McGraw Hill Education
- Gerwick, B., *Construction of marine and offshore structures*. CRC Press
- Chew Yit Lin, Michael, *Construction Technology for Tall Buildings*, Singapore University Press
- Chudley, R., Greeno, R., Advanced construction techniques, Pearson
- Beer, G., Technology innovation in underground construction. CRC Press
- Cooke, B.. Construction Practices, Wiley Blackwell

- Singh, J., Heavy Construction: Planning, equipment and Methods, Taylor & Francis
- Rakshit, K.S. *Construction Maintenance Restoration and Rehabilitation of Highway Bridges*, New Central Book Agency
- NCCER, Heavy/Highway Construction Trainee Guide, Pearson

Suggested List of Experiments: -

Suggested Case List: -