

GUJARAT TECHNOLOGICAL UNIVERSITY

BE (CIVIL & INFRASTRUCTURE ENGINEERING) ADVANCED CONSTRUCTION METHODS & EQUIPMENT

SUBJECT CODE:2164006

6th Semester

Type of course: Department Elective Subject in BE (Civil and Infrastructure Engineering)

Prerequisite: NIL

Rationale:

Advanced Construction Methods & Equipment is providing conceptual understanding and applications of construction technologies & equipment for infrastructure sector. With the help of this knowledge students may be able:

1. To apply engineering fundamentals and economic aspects on planning, selection and operation of construction equipment(s)
2. To demonstrate and understand operations and productivity analysis of major excavating and material handling equipment(s) for construction planning operations
3. To familiar with the operations, systems and techniques used in concrete and other heavy constructions
4. To equip with knowledge of basic features, uses and limitations of different types of formworks, scaffolds and other temporary structures

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE	PA(M)		ESE (V)		PA (I)		
PA	ALA	ESE		OEP						
3	2	0	5	70	20	10	30	0	20	150

Contents:

Sr. No	Topics	Hrs.	% Weightage
1	Engineering Fundamentals of Construction Materials & Equipments: Weight-Volume Relations of Materials, Shrinkage and swell factors, Pay load, Machine power: Rim pull, Available pull, Resistance and Coefficient of traction, Drawbar pull.	6	12
2	Procurement & Planning of Construction Equipments: Procurement criteria & cost, Replacement analysis, Production/Output analysis and Suitability of Power Shovel, Dragline, Backhoe, Scraper, Clamshells, Ripper, Bulldozer, Concrete pumps, Cranes, Conveyor belts etc.	6	12

3	Concreting Process: Equipment for concrete Productions, Concrete transportation systems, Concrete placing and compaction methods, Production planning of concrete operations, Hot weather concreting, Underwater concreting, Shotcreting	10	22
4	Heavy Constructions Methods: Soil stabilization/ Compaction - Compressed Air, Blasting & Dewatering Systems etc, Box jacking, Pipe jacking, Under water construction of diaphragm walls and basement, Trenchless technology, Tunneling techniques, Cofferdams, Well foundations, Pneumatic Caissons, Erecting tall buildings, Prefabricated construction, Pre-stressed construction	13	27
5	Formwork, Scaffolding & Shoring: Materials & arrangement System for Formwork, Scaffolding & Shoring elements, Formwork for foundations, columns, beams & walls, Slip formwork, Types of Scaffolding and its suitability, Types of Shoring and its suitability	13	27

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	20	25	20	15	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above

Reference Books:

1. Peurifoy, L., Schexnayder, C.J. and Shapira, A., Construction Planning, Equipment and Methods, McGraw Hill, New Delhi, 8th Edition, 2010.
2. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers Delhi, 2008.
3. Roy Chudley, Roger Geeno, "Advanced Construction Technology" Latest Edition
4. D. A. Day and N. B. H. Benjamin, Construction equipment guide, 2nd ed., Wiley, New Jersey, 1991.
5. Bryan, Construction Technology: Analysis and Choice, 2ed., Wiley India
6. Roy Chudley and Roger Greeno, Construction Technology, Prentice Hall, 2005.
7. Patrick Powers. J., Construction Dewatering: New Methods and applications, John Wiley & Sons, 1992.
8. Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications, 1995.
9. Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi,
10. Sharma, S.C., Construction Equipment & Management, Khanna Publications,
11. New Delhi, 1988.
12. Mahesh Varma, "Construction Equipment and its planning and application", Metropolitan Book Company, New Delhi, 2003.
13. M. J. Tomlinson, Foundation Design and Construction (7 Edition), Prentice Hall Publishing
14. Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.

15. Robert L. Peurifoy and Garold D. Oberlender, Formwork For Concrete Structures, McGraw - Hill , 1997.

Course Learning Outcomes:

1. Ability to plan and select suitable construction equipments for different construction activities
2. Ability to do planning for construction operations based on equipment productivity
3. Able to understanding on various systems and techniques used in concreting and other heavy construction operations
4. Will be familiar with materials and systems used in the temporary supporting structures/systems used at construction sites.

List of Open Source Software/learning website:

www.nptel.iitm.ac.in/courses/

Active learning Assignments (AL) : Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The Power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.