



GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering
Subject Code: 3174026
ADAVANCED CONSTRUCTION METHODS AND EQUIPMENT
B.E. 7th SEMESTER

Type of Course: **Elective**

Prerequisite: **NIL**

Rationale:

1. To provide an understanding on engineering fundamentals and operational details of important equipment(s) employed in different sectors of construction.
2. To provide an understanding on major methods of heavy construction related to substructure and superstructure construction work.

Teaching and Examination Scheme

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	PA(M)	Viva	PA (I)		
3	0	0	3	70	30	00	00	100

Course Contents

Sr.No.	Topics	Hrs.
1	Procurement and Planning of Construction Equipment(s): Owning and operating cost, Depreciation, Useful life of equipment, Replacement analysis, Equipment financing methods, Rental and lease contract considerations, Equipment selection criteria, Equipment maintenance and management systems and procedures	8
2	Excavation and Earthmoving Equipment(s): Engineering fundamentals of earthmoving equipment, Operational features and productivity analysis of earth moving equipment, Equipment requirement and planning for earth work projects, Equipment for dredging, trenching, and tunneling, Equipment for drilling and blasting.	11
3	Asphalt and Concrete Plants: Aggregate crushers, feeders and screens, Aggregate handling equipment, Concrete batching, mixing and pumping equipment, Transit Mixers, Asphalt plant, Asphalt pavers, Asphalt compacting equipment.	6
4	Material Handling Equipment: Operation, working and system design of Conveyor belts, Mobile cranes, Tower cranes, Scheduling lifting equipment for vertical construction, Construction pumps.	6
5	Substructure Construction Methods: Vacuum dewatering and well point system for excavation, Box jacking, Pipe jacking, Piling techniques and load testing, Well foundations, Pneumatic caissons, Cofferdams, Diaphragm walls: types, design considerations, construction sequence, , Sheet piles: laying operations for built up offshore system, Slope stabilization: Cable anchoring and grouting, ,	11



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	Superstructure Construction Methods: Concrete Formworks, Slip formwork, Erection techniques of tall structures, Launching techniques for heavy decks, In-situ pre-stressing in high rise structures, Post tensioning techniques, Handling and erecting lightweight components on tall structures.	
	Total	42

Reference Book(s)

- Gransberg, D. G., C. M. Popescu and R. C. Ryan, Construction Equipment Management for Engineers, Estimators, and Owners, Taylor & Francis, New York, 2006.
- Peurifoy R. L., C. J. Schexnayder, A. Shapira and R. Schmitt, Construction planning, equipment, and methods, 8th ed., McGraw Hill, New York, 2010.
- Jerry Irvine, Advanced Construction Techniques, CA Rocketr, 1984
- D. A. Day and N. B. H. Benjamin, Construction equipment guide, 2nd ed., Wiley, New Jersey, 1991.
- Bryan, Construction Technology: Analysis and Choice, 2ed., Wiley India
- Mahesh Varma, Construction Equipment Planning and Applications –
- Roy Chudley and Roger Greeno, Construction Technology, Prentice Hall, 2005.
- Patrick Powers. J., Construction Dewatering: New Methods and applications, John Wiley & Sons, 1992.
- Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications, 1995.
- Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi,

Course Outcome

Students will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Selection, Planning and Utilization of Construction Equipment	65
CO-2	Selection and Planning of Material Handling Equipment	15
CO-3	Understand different construction methods	20

know how engineering fundamentals are applied in the selection, planning and utilization of equipment (s) and methods for various construction activities.



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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	35	30	20	00	00

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

List of Assignments

1. Owning and operating costs of equipment
2. Productivity Analysis of Earthmoving equipment
3. Equipment requirement and planning for earthwork projects