



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Construction Engineering and Management

Subject Code: ME02014111

Subject Name: Construction Methods and Equipment

| | |
|-------------------------|------------------------------|
| w.e.f. Academic Year: | 2024-25 |
| Semester: | 2 |
| Category of the Course: | Professional Elective Course |

| | |
|----------------------|--|
| Prerequisite: | NIL |
| Rationale: | In this subject, students will be introduced to the construction means, methods, and equipment used to transform a design concept into a completed usable structure or facility. Students will study the selection and optimization of individual items of equipment needed to produce completed work, eventually applying these principles in a construction project. |

Course Outcome:

After Completion of the Course, Student will able to:

| No. | Course Outcomes |
|-----|---|
| 01 | Select construction equipment appropriate to tasks |
| 02 | Evaluate equipment ownership and operating costs. |
| 03 | Estimate and schedule activities using equipment productivity and cost data. |
| 04 | Apply contemporary techniques pertaining to construction methods, equipment usage and management. |
| 05 | Know advanced and modern construction methods |

Teaching and Examination Scheme:

| Teaching Scheme(in Hours) | | | Total Credits L+T+(PR/2) | Assessment Pattern and Marks | | | | Total Marks |
|---------------------------|---|----|-----------------------------|------------------------------|------------|----------|--------------------|-------------|
| L | T | PR | | C | Theory | | Tutorial/Practical | |
| | | | ESE (E) | | PA/ CA (M) | PA/CA(I) | ESE (V) | |
| 3 | 0 | 2 | 4 | 70 | 30 | 20 | 30 | 150 |



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Course Content:

| Unit No. | Content | No. of Hours | % of Weightage |
|----------|---|--------------|----------------|
| 1 | Equipment Economics: Equipment records, Cost of Capital, Elements of ownership Cost, Operating Cost, Replacement Decisions, Rent and Lease Considerations, Numericals | 10 | 22 |
| 2 | Planning for Earthwork Construction: Planning, Graphical Presentation of Earthwork, Earthwork Quantities, Mass Diagram, Pricing Earthwork Operations. Compaction and Stabilization Equipment: Compaction of Soil, Types of Compacting Equipment, Dynamic Compaction, Stabilizing soils with Lime, Cement Soil Stabilization. | 10 | 22 |
| 3 | Mobile Equipment Power Requirements: Required Power, Available power, Usable power, Performance Charts. | 05 | 18 |
| 4 | Dozers, Scrapers, Excavators: Introduction, Performance Characteristics of Dozers, Pushing Material, Land Clearing, Scraper types, operation, Performance Charts, Production cycle, Hydraulic Excavators, Shovels, Hoes. Trucks and Hauling Equipment, Finishing Equipment: Trucks, productivity, Performance Calculations, Graders, Trimmers. | 10 | 16 |
| 5 | Introduction to Modern Construction Methods in Construction Projects: Choice of choosing MCM, Segmental, In-situ construction of Bridges, Elaborate (Case studies) (Mechanical Fabrication, Typical Method statements), and Introduction to IT tools in construction. Stochastic Methods for Estimating Productivity | 10 | 22 |
| | Total | 45 | 100 |

Suggested Specification Table with Marks (Theory):

| Distribution of Theory Marks | | | | | |
|------------------------------|---------|---------|---------|---------|---------|
| R Level | U Level | A Level | N Level | E Level | C Level |
| 20 | 30 | 30 | 10 | 10 | 0 |

Where R:Remember; U:Understanding; A:Application, N:Analyze and E:Evaluate C:Create(as per Revised Bloom's Taxonomy)



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References/Suggested Learning Resources:

1. Construction equipment management for engineers, estimators, and owners, Gransberg, D. D., & Rueda- Benavides, J. A., CRC Press, 2020, 2nd Edition.
2. Construction planning, equipment, and methods, Peurifoy, R. L., Schexnayder, C. J., Schmitt, R. L., McGraw-Hill Education, 2018, 9th Edition.
3. Construction Equipment and Management, Sharma S.C. Khanna Publishers New Delhi, 2019, 1st Edition.
4. Construction equipment management, Schaufelberger, J.E. and Migliaccio, Routledge, 2019, 1st Edition.

Laboratory work / Tutorial work may include following :

1. Numericals on Equipment Economics : Equipment owning and operating costs, Depreciation, Rate of Return, Economic Life and Life cycle cost
2. Earthwork Quantities Calculation, Equipment Productivity, Pricing
3. Required and Available Power Calculations
4. Typical Method statements for construction methods for Bridge, Fabrication of steel structure,
5. Study of working of Construction Equipments on site, Production cycle,
6. Case studies
