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M.Tech. Construction Technology and Management
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COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTCE 5201	DCC	Quality and Safety in Construction	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
On completion of this course the students will be able to know the modern trends in project management viz. design, construction, resource unitlisation and cost estimation

Course Outcomes (COs):
1. To introduce the students about quality and safety related challenges in Construction industry.
2. To make students aware about the globally recognized guidelines/theories for quality and safety in construction.
3. To make students self-efficient to audit quality and safety related challenges in construction.
4. To summarize about various safety policies, safety representatives and international agreements.

Syllabus

UNIT I **08 Hrs.**
Construction Quality Management- need and importance, Quality control and methods, Quality Assurance, Quality assurance plan, Inspection and Testing- Process, Inspection test report, concepts of quality policy, Quality standards, Quality manual

UNIT II **09 Hrs.**
Quality Certification for companies and laboratories (ISO Certification, NABL certification). Total Quality Management, Features and Elements of TQM, Critical factors of TQM, TQM in construction Projects. Benchmarking, Types of Benchmarking and process, Third Party Certification- Process involved.

UNIT III **08 Hrs.**
Construction Safety-meaning and scope, Safety in construction Technological aspects, organizational aspects and behavioral aspects, Safety in Project management, Education and training. Safety legislation and Standards, Contract conditions on safety in Civil Engineering projects.

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MTCE 5201	DCC	Quality and Safety in Construction	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT IV **08 Hrs.**

Safety in Construction: Causes, classification, cost and measurement of an accident, accident report. Safety information systems, safety programme for construction, Safety budgeting, Factors affecting safety, Strategic Planning for safety provisions, SOPs, PPE, Inspections.

UNIT V **09 Hrs.**

Personal & Structural safety and Safety measure: For storage and handling of building materials, Construction of elements of a building, During use of equipment, In demolition of buildings- Safety lacuna in Indian scenario Site safety programmes - JSA, JHA, Safety audit, safety policy, manuals, training & orientation.

Text Books:

1. Managing Quality, Dale B. G, Fourth Edition, Blackwell Publishing, Oxford, 2003.
2. Reese. C.D and Eidson J.V, Handbook of OSHA Construction Safety and Health, Second Edition, CRC Press, Boca Raton, 2006
3. Principles of Construction Safety, Holt S. J, Blackwell Publishing, Oxford, 2008.

References:

1. Modern Construction Management, Harris .F, McCaffer .R and Edum-Fotwe .F, Sixth Edition, Blackwell Publishing, Oxford, 2006.
2. Construction Safety, Jimmie W. Hinze, Prentice Hall of India,

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MTCE 5202	DCC	Contract Management and Arbitration	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):
The objective of this course is

1. To develop concepts related with Construction contracts & Tendering which involves Planning, management, and Execution of the project with economic development & prosperity.
2. To learn basic principles of Construction contracts, Tendering & Arbitration in the context of various construction aspects.

Course Outcomes (COs):
At the end of the course,

1. Adopting the ethical knowledge for making construction contracts & Tenders.
2. The students will get the experience to make Estimation, Bill of Quantity for construction work.
3. The student will get in depth knowledge of special aspect of tender & contract management.
4. To learn various aspects of Arbitration to resolution of disputes in construction projects.

Syllabus

UNIT I **08 Hrs.**
Introduction: To law, Indian legal system, Laws governing structure & Working of Construction Organization Firms, Laws of Tort
Construction Contract Documents: Evaluation of contract documents, need for documents, present stage of national and international

UNIT II **09 Hrs.**
Stages in Contracting: Preparation of tender documents estimating, pre-qualification, bid evaluation, award of contract, project financing and contract payments, contracts close out and completion.

UNIT III **08 Hrs.**
Contract Conditions: Interpretation by parties to contract, obligations and responsibilities of the parties, protection and indemnification, bonds and insurance, laws and liens, subsurface conditions, inspection of work, change of work, rejected work and deficiencies

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MTCE 5202	DCC	Contract Management and Arbitration	60	20	20	0	0	3	0	0	3

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UNIT IV **08 Hrs.**

Office Engineering: Proper record keeping in contract administering, establishment of standard procedures, coordination between various agencies involved, providing data for interpretation of contract clauses Special aspects of contract management

UNIT V **09 Hrs.**

Arbitration Comparison of Actions and Laws - Agreements, subject matter-Violations-Appointment of Arbitrators-Conditions of Arbitrations-Powers and duties of Comparison of Actions and Laws, Agreements, subject matter Violations-Appointment of Arbitrators-Conditions of Arbitrations, Powers and duties of Arbitrator-Rules of Evidence Enforcement of Award-costs. Causes and resolution of disputes, settlement of claims and extra items, arbitration Indian Contract Act, Arbitration Act

Text Books:

1. Contracts Management A Life Cycle, Rashid Hussain, 3C Corporate Consulting Contracting, 2020, First Edition.
2. Content of Construction Contracts, Arvind Gavade, Sunit Dhere, 2018, First Edition.
3. Contracts and Their Management, B.S. Ramaswamy, Lexis Nexis, 2016, First Edition

References:

1. Introduction to Construction Contract Management, Brian Greenhalgh, Routledge, 2016.
2. Construction Contracts Preparation and Management: From concept to completion, Geoff Powell, Palgrave Macmillan, 2016, First Edition

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTCE 5203	DCC	Construction Equipment and Methods	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The objective of this course is to study and understand the various types of equipments used for earthwork, tunneling, drilling, blasting, dewatering, material handling conveyors and its applications in construction projects.

Course Outcomes (COs):
At the end of the course,

1. To decide which types and capacity of construction equipment can be used for excavating, compacting
2. To prepare mass diagram for excavation particularly useful for road project.
3. To describe various pile driving equipments and its types.
4. To prepare cost analysis for Excavating and concreting equipment.

Syllabus

UNIT I **08 Hrs.**

Construction Equipments and Management: Identification, planning of equipment, selection of equipment - equipment management in projects - maintenance management, equipment cost, operating cost, cost control of equipment - depreciation analysis, replacement of equipment-replacement analysis - safety management.

UNIT II **09 Hrs.**

Excavating Equipments: Different types of Excavator such as Front shovel, hoes. Their selection, calculation of shovel production, height & cut of shovel, angle of swing effect on shovel production., calculation of hoe production, Type of loaders their bucket attachments, loader production rates, calculation of wheel loader production

UNIT III **08 Hrs.**

Compacting and Stabilization Equipment: Compaction of soil and rock, types of compacting equipment, roller production estimating, Planning for Earthwork Construction: Graphical presentation of earth work, earthwork quantities, Mass Diagram, Estimation of Cost production. Study of equipments with reference to available types and their types and their capacities, factors affecting their performance

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MTCE 5203	DCC	Construction Equipment and Methods	60	20	20	0	0	3	0	0	3

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UNIT IV **08 Hrs.**

Earthmoving Equipment: Tractors and attachments, dozers and rippers, scrapers, shovels, draw lines, trenching machines, clamshell, hoes, trucks and wagons, dumpers, rollers, and compactors.
Pile Driving Equipments: Types, pile driving hammers, single acting and double acting, differential acing hammers, hydraulic and diesel hammers, vibratory drivers

UNIT V **09 Hrs.**

Pumping Equipments: Reciprocating, diaphragm & centrifugal pumps, well point system. Concrete manufacture, transport, placing and compacting equipment, mixers, central batching and mixing plants, pavers, transit mixers, concrete pumps shotcrete Air Compressor Equipments for moving materials, builder's hoists, forklifts, cranes, belt conveyors, cableways, ropeways.

Text Books:

1. Construction Equipment and Management, S.C. Verma, Khanna Publishing New Delhi, India, 2019.
2. Construction planning, Equipments and Methods. R. L. Peurify, TMH, 2010

References:

1. Construction Machinery and Equipment in India, (A compilation of articles Published in Civil Engineering and Construction Review), Publish by Civil Engineering and Construction Review NewDelhi,1991.

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MTCE 5204	DCC	Construction Techniques	60	20	20	30	20	2	0	2	3

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The objective of this course is to study and understand the various types of construction techniques used for prefabricated, modular construction practice, formwork and its applications in construction projects.

Course Outcomes (COs):
At the end of the course,

1. Identify various construction techniques and their limitations
2. Analyze productivity and economics in construction techniques.
3. Comprehend modular construction practices.
4. Implement advanced construction techniques for Civil Engineering projects.

Syllabus

UNIT I **08 Hrs.**

Prefabricated Structures: Introduction to Prefabricated structures, Planning for pre-casting, Selection of equipment for fabrication, Transport and erection of prefabricated components, Quality measures, Design considerations of precast elements, Safety measure during erection

UNIT II **09 Hrs.**

Modular Construction Practices: Introduction to Modular Construction, Modular coordination, Modular Standardization, Modular System Building, Limitation and Advantages of Modular Construction

UNIT III **08 Hrs.**

Formwork: Requirements of Formwork, Loads carried by Formwork, Types of Formworks: Timber, Steel, Modular shuttering, Slip forms, Scaffolding, Deep Excavation Methods.

UNIT IV **08 Hrs.**

High Rise Buildings: New Design Trends in Geometrical Forms, Construction Techniques of High Rise Buildings, High Rise Construction Techniques, Brick work, Selected High-Tech High-Rise Buildings.

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MTCE 5204	DCC	Construction Techniques	60	20	20	30	20	2	0	2	3

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UNIT V **09 Hrs.**

Bridge construction Techniques: Introduction, Embankments and Foundations, Conventional Bridge Construction Techniques, Accelerated Bridge Construction, Prefabricated Bridge Construction.

Text Books:

1. Prefabricated Structures, Dr. R. Ganesan and Mrs. A. Latha, Sree Kamalamani Publications, 2014.
2. Modern Practices in Formwork for Civil Engineering Construction Works, Janardan Jha, S.K. Sinha, Laxmi Publications, 2012

References:

1. Construction Materials and Techniques, D. S. Vijayan, S. Arvindan and A. Paulmakesh, Notion Press, 2021, First Edition.
2. Principles and Practices of Commercial Construction, Cameron Andres, Ronald Smith and W. Woods, Pearson, 2018, Tenth Edition.
3. Advanced Construction Technology, Mr Roy Chudley, Roger Greeno, Prentice Hall; 4th edition, 2006.

List of Experiments:

1. Preparation of cost estimates for a small project.
2. Material statement and material analysis.
3. Inspection of a concrete construction site and preparation of report showing correct and incorrect practices.

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MTCE 5206	SEC	Building Information Modelling Laboratory	0	0	0	0	50	0	0	2	1

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The objective of this course is to study and understand the various fundamentals and process involve in building information modelling.

Course Outcomes (COs):
At the end of the course,

1. Apply the fundamental concepts of Building Information Modeling (BIM)
2. Integrate construction processes through Building Information Modelling (BIM)
3. Analyze project delivery methods using BIM and related digital technologies.
4. Model a structure with building information modeling (BIM) software.

Syllabus

1. Level of Detail (LOD) BIM Concepts
2. Detailed Architectural BIM Modeling
3. Basic Introduction to Structural / MEP BIM Concepts
4. 3D Spatial Interference Analysis
5. Generating Good for Construction (GFC) Documentation
6. Material Take-Off (MTO)
7. Bill of Quantity (BOQ) Generation
8. Project Scheduling with BIM

Text Books:

1. BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors, Chuck Eastman, Paul Teicholz, Rafael Sacks and Kathleen Liston, John Wiley & Sons, 2008.
2. BIM and Construction Management: Proven Tools, Methods, and Workflows, Brad Hardin, Sybex, 2009.

References:

1. Building Information Modeling (Pocket Architecture), Karen M. Kensek, Routledge, 2014 First Edition.
2. Building Information Modeling: BIM in Current and Future Practice, Karen Kensek and Douglas Noble, Wiley, 2014, First Edition.

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