

**TWO YEAR MTECH PROGRAMME COURSE STRUCTURE**  
(Effective from Academic Session 2018-19)

<b>CONSTRUCTION MANAGEMENT</b>			
<b>SEMESTER I</b>			
<b>Subject Code</b>	<b>Subject Title</b>	<b>Total Credits</b>	<b>Contact Hours</b>
10M11CE111	Construction Techniques	3	3
10M11CE112	Estimating & Costing	3	3
10M11CE113	Construction Planning and Control	3	3
	Elective I	3	3
10M11CE115	Mechanical and Electrical Systems in Building	3	3
10M19CE191	Construction Capstone Project	2	4
	<b>Total</b>	<b>17</b>	<b>19</b>
<b>SEMESTER II</b>			
10M11CE211	Construction Contracts and Laws	3	3
	Elective II	3	3
10M11CE213	Construction Cost Analysis	3	3
10M11CE214	Construction Financial Management	3	3
10M11CE215	Sustainable Design and Construction	3	3
10M19CE291	Construction Capstone Project	2	4
	<b>Total</b>	<b>17</b>	<b>19</b>
<b>SEMESTER III</b>			
12M19CE391	Seminar	02	-
12M19CE392	Project Part-I	18	36
	<b>Total</b>	<b>20</b>	<b>36</b>
<b>SEMESTER IV</b>			
12M19CE492	Project Part II	22	44
	<b>Total</b>	<b>22</b>	<b>44</b>
<b>LIST OF ELECTIVES</b>			
	<b>Course Code</b>	<b>Course Name</b>	
<b>Elective I</b>	10M11CE114	Construction Safety and Health	
	12M1WCE332	Repair and Retrofitting of Structures	
	11M1WCE332	Advances in Construction Materials	
<b>Elective II</b>	10M11CE212	Heavy/Civil Construction Equipment, Methods, and Management	
	10M13CE334	Principles of Affordable Housing	
	10M13CE432	Construction Methods Improvement	

## **Syllabus for MTech in Construction Management**

**Construction Techniques:** Construction techniques associated with steel and reinforced concrete framing; floor systems; roof systems; masonry construction; curtain walls; building insulation; and interior and exterior finishes. Concrete formwork design, construction techniques for high rise buildings, fire resistant construction techniques, Cost Effective Construction Technique (CECT), repair techniques, innovative construction techniques, prefabrication and pre-casting, modular construction, in-situ pre-fabrication, lift slab and tilt up construction

**Estimation & Costing:** Different types of estimates and their uses; quantity take-offs - providing lists of quantities of all the items of materials and equipment necessary to complete a project - based on the drawings and specifications; estimate the probable cost of construction projects including direct and indirect costs; use of computer to assist in the preparation of the estimate; Parametric Cost Estimating techniques; and labour and equipment costs considering productivity factors

**Construction Planning & Control** Conversion of a Scope of Work into scheduling activities; developing a building plan including preconstruction, construction, and procurement activities; preparing, analysing, and updating Bar Charts and Critical Path Method Networks; prepare and presenting schedule information; assigning and analysing resource requirements of a project; performing time/cost trade-off analyses; justifying claims for additional time; processing schedule information in a computerized scheduling package; controlling cost by applying the Earned Value Analysis and other progress metrics

**Construction Safety and Health:** Concept of safety, factors affecting safety: psychological and technological, planning for safety provisions, techniques for construction safety management, safety considerations during construction, demolition and use of equipment; management of accidents/injuries, site management with regard to safety recommendations, training for safety awareness, implementation of health & safety plans, construction hazards & solutions, formulation of safety manuals, safety legislation, standards/codes with regard to construction safety, case studies, construction safety management – fundamentals, measuring performance & recording information, health hazard in construction, personal protective and lifesaving equipment, the safety policy; assessing the risks, control strategies for construction work; fire safety, the health and safety plan, training; meetings, understanding people, access to information, environment, health and safety issues - construction and the environment, construction health and safety law

**Mechanical & Electrical Systems in Buildings-** Site utilities (water, sewer, gas, and storm); residential and commercial plumbing systems; and specialty topics of fire protection, storm water, and natural gas; HVAC fundamentals, pumps, ventilation & cooling, air conditioners, and heating systems; introduction to electricity, power systems and equipment's, general requirements & planning of electrical and communication installations, inspection and testing of installations, lightning protection of buildings, boxes and conduit, service and distribution, transformers, grounding, branch circuits and feeders, motors and motor controls, lighting, fire alarm system, and low voltage systems

**Construction Capstone Project:** Student will be required to design a construction project, such as, commercial, educational, high rise residential, highway, bridges or industrial nature based on the undergraduate knowledge. They will develop a conceptual design and complete

cost estimate and construction schedule. There will be one mid term evaluation, a presentation at the end followed by a viva-voce examination

**Construction Contracts and Laws:** Basics of the legal system including contracts, torts, land zoning and property ownership, bonds and insurance, bidding, subcontracting, contractor liability, mechanics liens, litigation and arbitration, Indian and international construction law, hazardous waste issues and labor laws, disputes and disputes resolutions, case studies, Indian contract act, elements, types, features-suitability-design of contract documents, international contract document, law of torts; tenders: prequalification-bidding-accepting-evaluation of tender, formation and interpretation, potential contractual problems, world bank procedures and guidelines; BOT projects, arbitration, comparison of actions and laws, agreements, conditions of arbitrations, powers and duties of arbitrator, rules of evidence, Dispute Redressal Boards(DRB), Laws: legal requirements, insurance and bonding, laws governing sale, purchase and use of urban and rural land, land revenue codes, tax laws, income tax, sales tax, excise and customs duties, legal requirements for planning, property law, agency law, local government laws for approval, statutory regulations

**Heavy/Civil Construction Equipment, Methods, and Management:** Planning and executing heavy/civil construction projects, earthwork quantities; fundamental concepts of equipment economics; earthmoving equipment, operations, productivity, and capabilities; compaction and stabilization equipment; rock blasting and drilling equipment; asphalt mix production and placement; hoisting equipment; piles and pile driving equipment; equipment safety; optimizing crew and equipment; heavy equipment costs

**Construction Cost Analysis:** Cost-Benefit analysis, economic performance analysis-incremental analysis, economic feasibility analysis; advanced conceptual estimating techniques, quick methods of determining approximate costs of a project, life cycle cost analysis- technique of economic evaluation that sums the costs of initial investments, replacements, operations, maintenance and repair investments, case studies

**Construction Financial Management:** Introduction, modern financing theory, real estate development & finance, construction accounting systems, analysis of financial statements, managing costs, determining labor burden, managing general overhead costs, setting profit margins for bidding, profit center analysis, cash flows for construction projects & construction companies, time value of money, risks & uncertainties and management decision in capital budgeting, taxation and inflation, financing a company's financial needs, tools for making financial decisions, interest factors, amortization schedule, computerized accounting systems, international financial management, practical problems & case studies

**Sustainable Design and Construction:** Sustainability, challenges in sustainable construction, design construction and equipment, materials and systems, maintenance and conservation, waste materials, site waste management, re-use and recycling of materials, Energy efficient buildings, concepts of green and sustainable buildings, natural lighting, rainwater harvesting, solar panels and solar HVAC systems, sustainable building design, rating system, delivery of green buildings

**Construction Capstone Project:** Student will be assigned a proposed construction project, such as, commercial, educational, high rise residential, highway, bridges or industrial nature. Student will be required to complete site, geological and economic feasibility studies including city building bye laws and rules. They will develop a conceptual design and

complete cost estimate and construction schedule. There will be one midterm evaluation, a presentation at the end followed by a viva-voce examination

### **SYLLABUS FOR ELECTIVE COURSES**

**Leadership and Human Resource Management:** Overview of project management, TEAM, essential concepts of leadership and management, building leadership skills, leadership characteristics, leadership theories, leaders & managers, winning strategies for the construction industry, constructive communication, human motivation, integrating motives and emotions into a holistic pattern of leadership, personal orientation motive in leadership, place orientation and leadership, time orientation and leadership, organization strategy, crisis management, case studies

**International Construction Business Management:** Introduction, preparation for entry into international construction, international trade and the nature of international construction, international construction finance; key factors in operating and sustaining a business, business development and project management in international markets, impact of social, cultural, legal and financial aspects of international contracting, logistics of labor, materials, and equipment in a foreign environment, models of human resource management applied to international construction, the global market and competitive advantage, case studies- international consultant & contract, special problems

**Value Engineering:** Introduction, concept of cost & value, objectives, fundamentals and principles, methodology, techniques and applications of value engineering, project scope and budget, cost control, cost models, function analysis, life cycle costing, integrating value engineering in planning, design and construction, case studies

**Construction Methods Improvement:** Methods analysis, work analysis, work methods improvement, productivity analysis, measuring productivity, time study, standard data systems, predetermined time systems, work sampling, physiological work measurement, labour reporting, improving productivity, introduction to ergonomics, incentives to increase productivity, alternative methods for increasing productivity, case studies

**Construction Information Systems:** Management information systems in construction industry, current integration of computer aided design (CAD), computerized project management systems, use of automated programs for planning, scheduling, estimating and controlling construction projects, data processing and applications in pricing, tendering, scheduling and cost control system, simulation of construction operations, internet technology, web applications in construction, use of project planner software

**Advances in Construction Materials:** Newer and improved materials of construction, steel having greater ductility, tensile strength and corrosion resistance, high performance concrete, self-compacting concrete, chemicals, epoxies, latexes and bonding agents for repairs, geotextiles and geomembranes

**Facilities Management :** Introduction and overview of facility management, long range and annual facility planning, financial forecasting budgeting and appropriations; real estate considerations, analysis and planning; interiors and space planning; construction and renovation; types of maintenance programs, maintenance technologies, commissioning existing buildings, metering for operations and maintenance, O&M for major equipment types, operational efficiency, computerized maintenance management system, administrative services and technology

**Principles of Affordable Housing:** Introduction and overview, current trends in affordable housing, project feasibility, affordable housing policy, practice and issues, affordable housing development process, financing affordable housing, site planning, architecture and cost of new and rehabilitated affordable housing, non-profit housing development, future of affordable housing production