Pimpri Chinchwad Education Trust's

PIMPRI CHINCHWAD COLLEGE OFENGINEERING

SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044

(An Autonomous Institute Approved by AICTE and affiliated to SPPU, Pune)

DEPARTMENT OF CIVIL ENGINEERING

Curriculum Structure and Syllabus
of

M. Tech. Construction Management

(Regulation 2024)

Effective from Academic Year 2025-26

Institute Vision

To be one of the top 100 Engineering Institutes of India in coming five years by offering exemplarily Ethical, Sustainable and Value Added Quality Education through a matching ecosystem for building successful careers.

Institute Mission

1. Serving the needs of the society at large through establishment of a state-of-art Engineering institute
2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with an ability to think and act independently in demanding situations.

EOMS Policy

"We at PCCOE are committed to offer exemplarily Ethical, Sustainable and Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders.

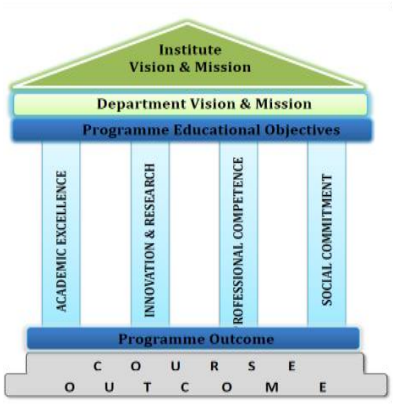
We shall strive for technical development of students by creating globally competent and sensible engineers, researchers and entrepreneurs through Quality Education.

We are committed for Institutes' social responsibilities and managing Intellectual property.

We shall achieve this by establishing and strengthening state-of-the-art Engineering Institute through continual improvement in effective implementation of Educational Organizations Management Systems (EOMS)."

Quality Objectives

- To Improve Academic Performance Index.
- To Improve Research and Innovation Index.
- To Improve Professional Competency of the Students and ensure social contribution.
- To enhance student's placements, training.



Pimpri Chinchwad Education Trust's
Pimpri Chinchwad College of Engineering
Department of Civil Engineering

Course Approval Summary M. Tech. Civil- Construction Management

A) Board of study- Department of Civil Engineering (PG)

Sr. No.	Course Name	Code	Page Number	Signature and stamp of BoS Chairman
1	Project Planning and Management in Construction (PPMC)	MCI21PC01	12	
2	Construction Technology (CT)	MCI21PC02	14	
3	Professional Core Lab-I	MCI21PC03	16	
4	**Professional Elective-I**			
	• Sustainable Construction Management	MCI21PE01A	17	
	• Disaster Management	MCI21PE01B	18	
	• Material Management	MCI21PE01C	19	
	• Safety Practices in Construction	MCI21PE01D	21	
5	**Professional Elective-II**			
	• Building Services and Maintenance	MCI21PE02A	22	
	• Value Engineering and Valuation	MCI21PE02B	24	
	• Human Resources and Management	MCI21PE02C	25	
	• Infrastructure Development	MCI21PE02D	26	

Chairman
BoS, Civil Engineering
PCET's, Pimpri Chinchwad College of Engineering
Sector No. 26, Pradhikaran, Nigdi, Pune-44

Chairman
BoS, Civil Engineering
PCET's, Pimpri Chinchwad College of Engineering
Sector No. 26, Pradhikaran, Nigdi, Pune-44

Chairman
BoS, Civil Engineering
PCET's, Pimpri Chinchwad College of Engineering
Sector No. 26, Pradhikaran, Nigdi, Pune-44

Sr. No.	Course Name	Code	Page Number	Signature and stamp of BoS Chairman
14	SDL(Oral & Written Communication)	MCI22VS02	52	
15	Integrated Mini-Project	MCI22EL02	54	
16	Seminar	MCI22EL03	55	
17	Dissertation Phase - I[Company/ In-house project]	MCI23EL04	57	
18	MOOCs	MCI23EL05	59	
19	Internship I [Company / Inhouse project]	MCI23EL06	59	
20	Research Review Paper Writing	MCI23EL07	60	
21	Dissertation Phase – II [Company/ In-house project]	MCI24EL08	62	
22	Internship II [Company / Inhouse project]	MCI24EL09	63	

Chairman
BoS, Civil Engineering
PCET's, Pimpri Chinchwad College of Engineering
Sector No. 26, Pradhikaran, Nigdi, Pune-44

Approved by Academic Council:

Chairman
Academic Council
PCET's, Pimpri Chinchwad College of Engineering
Sector No. 26, Pradhikaran, Nigdi, Pune-44

Chairman, Academic Council

Pimpri Chinchwad College of Engineering

Approved by Board of Governors:

Chairman, Board Governors

Pimpri Chinchwad College of Engineering

CONTENTS

LIST OF ABBREVIATIONS USED IN STRUCTURE

Abbreviations	Course Full Name
PCC	Professional Core Course
PEC	Professional Elective Course
VSEC	Vocational Skill Enhancement Course
ELC	Experiential Learning Course
H / Hrs	Hours

CURRICULUM STRUCTURE

STRUCTURE FOR 1ST YEAR M. TECH (CIVIL- CONSTRUCTION MANAGEMENT)

SEMESTER – I

M. Tech. Construction Management			Teaching Scheme				Examination Scheme					
Course Code	**Course Type**	**Course Name**	**L**	**P**	**H**	**CR**	**FA1**	**FA2**	**SA**	**TW**	**OR**	**Total**
MCI21PC01	PCC	Project Planning and Management in Construction (PPMC)	3	-	3	3	20	20	60	-	-	100
MCI21PC02	PCC	Construction Technology (CT)	3	-	3	3	20	20	60	-	-	100
MCI21PC03	PCC	Professional Core Lab-I	-	4	4	2	-	-	-	50	50	100
MCI21PE01X	PEC	Professional Elective-I	3	-	3	3	20	20	60	-	-	100
MCI21PE02X	PEC	Professional Elective-II	3	-	3	3	20	20	60	-	-	100
MCI21PE03	PEC	Professional Elective Lab-I	-	4	4	2	-	-	-	50	50	100
MCI21EL01	PCC	Research Methodology & IPR Lab	-	4	4	2	-	-	-	50	50	100
MCI21VS01	VSEC	Skill Development Lab – I (Software Skill)	-	4	4	2	-	-	-	50	50	100
		Total	**12**	**16**	**28**	**20**	**80**	**80**	**240**	**200**	**200**	**800**

SEMESTER – II

M. Tech. Construction Management			Teaching Scheme				Examination Scheme					
Course Code	**Course Type**	**Course Name**	**L**	**P**	**H**	**CR**	**FA1**	**FA2**	**SA**	**TW**	**OR**	**Total**
MCI22PC04	PCC	Construction Contracts Administration and Management (CCAM)	3	-	3	3	20	20	60	-	-	100
MCI22PC05	PCC	Project Economics and Financial Management (PEFM)	3	-	3	3	20	20	60	-	-	100
MCI22PC06	PCC	Professional Core Lab-II	-	4	4	2	-	-	-	50	50	100
MCI22PE04X	PEC	Professional Elective-III	3	-	3	3	20	20	60	-	-	100
MCI22PE05	PEC	Professional Elective-IV	2	-	2	2	10	10	30	-	-	50
MCI22VS02	VSEC	Skill Development Lab – II (Oral & Written Communication)	-	4	4	2	-	-	-	100	-	100
MCI22EL02	ELC	Integrated Mini-Project	-	6	6	3	-	-	-	50	50	100
MCI22EL03	ELC	Seminar	-	4	4	2	-	-	-	50	50	100
		Total	**9**	**18**	**29**	**20**	**70**	**70**	**210**	**250**	**150**	**750**

Abbr: Course Abbreviation; **L**- Lecture; **P**- Practical; **H**- Hours; **CR**- Credits; **FA1** – Formative Assessment-1; **FA2** – Formative Assessment -2; **SA** – Summative Asessment; **TW** – Term Work; **OR** – Oral Exam.

STRUCTURE FOR IIND YEAR M. TECH (CIVIL- CONSTRUCTION MANAGEMENT)

SEMESTER-III

M Tech. C.M.		Sem – III	TEACHING SCHEME					EXAMINATION SCHEME				
Course Code	**Course Type**	**Courses**	**L**	**P**	**H**	**CR**	**FA1**	**FA2**	**SA**	**TW**	**OR**	**Total**
MCI23EL04	ELC	Dissertation Phase –I [Company/ In- house project]	-	20	20	10	-	-	-	100	150	250
MCI23EL05	ELC	MOOCs	-	04	04	02	-	-	-	100	-	100
MCI23EL06	ELC	Internship I	-	12	12	06	-	-	-	50	50	100
MCI23EL07	ELC	Research / Review Paper Writing	-	04	04	02	-	-	-	50	-	50
		Total	**-**	**40**	**40**	**20**	**-**	**-**	**-**	**300**	**200**	**500**

*Internship I**: -It may be in summer/winter vacation or within semester at least for a span of three months (12 weeks),evaluation after end of semester.**

SEMESTER-IV

M. Tech. C.M.		Sem – IV	TEACHING SCHEME				EXAMINATION SCHEME					
Course Code	**Course Type**	**Courses**	**L**	**P**	**H**	**CR**	**FA1**	**FA2**	**SA**	**TW**	**OR**	**Total**
MCI24EL08	ELC	Dissertation Phase – II [Company/ In-house project]	-	28	28	14	-	-	-	250	150	400
MCI24EL09	ELC	Internship II	-	12	12	06	-	--	-	50	50	100
		Total	**-**	**40**	**40**	**20**	**-**	**--**	**-**	**300**	**200**	**500**

***Internship II**: -It should be in continuation with Internship I, for the same site at least for a span of three months (12 weeks),evaluation after end of semester.

Abbr: Course Abbreviation; **L**- Lecture; **P**- Practical; **H**- Hours; **CR**- Credits; **FA1** – Formative Assessment-1; **FA2** – Formative Assessment -2; **SA** – Summative Asessment; **TW** – Term Work; **OR** – Oral Exam.

PROFESSIONAL ELECTIVE COURSES

CourseCode	Elective-I	Course Code	Elective-II
MCI21PE01A	Sustainable Construction Materials	**MCI21PE02A**	Building Services and Maintenance
MCI21PE01B	Disaster Management	**MCI21PE02B**	Value Engineering and Valuation
MCI21PE01C	Material Management	**MCI21PE02C**	Human Resources and Management
MCI21PE01D	Safety Practices in Construction	**MCI21PE02D**	Infrastructure Development

CourseCode	Elective-III	CourseCode	Elective-IV
MCI22PE04A	Retro Fitting	**MCI22PE05A**	Advanced Geospatial Analytics for Construction Management
MCI22PE04B	Advanced Construction Technology	**MCI22PE05B**	Disaster Mitigation and Management
MCI22PE04C	Construction Equipment's and Management	**MCI22PE05C**	Construction Supply Chain Management
MCI22PE04D	International Contracting	**MCI22PE05D**	Organizational Behavior in Construction Industry

Course Syllabus

SYLLABUS CONTENT WITH TEACHING AND EVALUATION SCHEME

Course Syllabus
Semester-I

Program:	M. Tech. (Civil) Construction Management			Semester : I		
Course :	Project Planning and Management in Construction (PPMC)			Code :		MCI21PC01
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite: Project Management & Economics, Construction Management

Objectives:

1. To provide knowledge of basic management practices adopted in civil engineering by using various techniques and software's.
2. To provide knowledge of various aspects relayed to site mobilization & work-study.
3. To provide knowledge of site safety and administration.

Outcomes: After learning the course the students should be able to:

1. Apply knowledge of Construction Management on construction projects.
2. Analyze project scheduling using various techniques.
3. Apply knowledge of work-study on construction site to improve productivity.
4. Evaluate safety norms in construction site and decide incentive scheme.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Basics of Management:** Modern scientific management, Management Functions, Project Management: Basic forms of organization with emphasis on Project and matrix structures; project life cycle, planning for achieving time, cost, quality, Project feasibility reports based on socio-techno-economic-environmental impact analysis.	7
2.	**Procedures in management:** Project clearance procedures and necessary documentation forinfrastructure projects, Qualities, role and responsibilities of project Manager, Role of Project Management Consultants. **Project Scheduling:** Construction Scheduling, Work break down structure, activity cost and time estimation in CPM, PERT, LOB technique, Mass haul diagrams. Precedence Network Analysis.	8
3.	**Software's:** Introduction to Software in Construction scheduling (MSP, Primavera, Construction manager). **Site mobilization –** demobilization aspects, various Resources management based on fundsavailability. Co-coordinating, communicating & reporting techniques. Application of MIS to Construction.	7
4.	**Work study:-** Definition, Objectives, basic procedure, method study and work measurement, work study applications in Civil Engineering. Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams. Work measurement – Time and motion studies, Concept of standard time and various Allowances, time study, equipment performance rating.	8
5.	**Safety Engineering:** Causes of Accidents on various sites, safety measures and safety Policies to be adopted, determination of safety parameters, personal protective equipment's.Workmen Compensation Act.	7
6.	**Administration of Incentive Schemes:** Necessity, Merit rating, job evaluation, installation,modification and maintaining of incentive schemes based on implementation experience.	8
	Total	45

Text Books:

1. Construction Planning & Management By P.S. Gahlot & B M Dhir , New Age International Limited Publishers
2. Construction Project planning & Scheduling By Charles Patrick, Pearson, 2012
3. Construction Project Management Theory & practice --- Kumar Neeraj Jha,Pearson,2012
4. Construction management Fundamantals by Knutson, Schexnayder, Fiori, Mayo, Tata McGraw Hill, 2 nd Edition, 201Modern construction management--.Harris, Wiley India.
5. Construction Management and Planning by Sengupta and Guha-Tata McGraw Hill publication.

Reference Books:

1. Project Management – K Nagrajan – New age International Ltd.
2.Work study – Currie.
3. Professional Construction Management Barrie-Paulson-McGraw Hill Institute Edition.
4. Project Management – Ahuja H.N. – John Wiely, New York.
5. Construction Project Management Planning, Scheduling and Controlling-Chitakara-Tata McGraw Hill, New Delhi
6. Construction Management – Roy, Pilcher
7. Construction Management – O'Brien.
8. Project Management-Planning and Control---Rory Burkey 4 th ed.—Wiley,India.

Program:	M. Tech. (Civil) Construction Management				Semester :	I
Course :	Construction Technology				Code : MCI21PC02	
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite: Building Materials, Building Construction, Concrete Technology, Geo-technical andfoundation Engineering, Tunnel Engineering.

Objectives:

1. To know the various methods and techniques involved in construction of deep foundations.
2. To get familiar with different construction processes with recommended specifications.
3. To provide a coherent development to the students in area of construction technology.

Outcomes: After learning the course the students should be able to:

1. Select the appropriate technique involved in construction of pile construction with process.
2. Decide the type of coffer dam /caisson and its techniques of construction
3. Recommend the construction techniques involve in tunnel construction and dewatering strategies.
4. Decide an action plan for prefab, formwork system and concrete plant considering challenges related to safety and management in high rise construction.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Pile construction techniques-**Introduction, uses, selection of piles, Classification of piles, pile driving techniques and equipment, grouping of piles, efficiency of group of piles, pile cap and pile shoe, loads on piles and pile testing, causes of failures of piles and precautionary measures, Use of NDT in pile construction.	7
2.	**Techniques for Coffer Dams and diaphragm wall construction:** types and selection of cofferdams, design features and construction of coffer dams, construction of single, double wall, Sheet pile cofferdams, concrete wall movable cofferdam, diaphragm wall construction , soldier construction method, Leakage Prevention and Economic Considerations	8
3.	**Techniques used in Caissons construction:** types and uses of caissons, , construction material, loads on caisson, Construction techniques for pneumatic, open and precast caissons. floating, sinking and tilting of caissons,caisson diseases.	7
4.	**Techniques in tunnel construction and under water excavation** –Tunnel alignment, size and shape of tunnel, tunneling in hard and soft strata, tunnel shaft-sinking and construction, techniques in tunnel lining, ventilation and lighting systems in tunnel, advance techniques for tunnel maintenance, Micro Tunneling. Underwater Excavation Challenges and Solutions	8
5.	**Grouting and dewatering techniques:** Problems Encountered in Excavation Underwater Drilling and Blasting, Grouting Methods: Jet Grouting and Chemical Grouting, Dewatering in Shallow and Deep Excavations, Vacuum Dewatering and Well Point System, Electro-Osmosis and Injection Techniques, Freezing Process and Vibro-Flotation technique for granular soils.	7
6.	**High rise construction techniques:** Prefabrication in High-Rise Construction, Shuttering/Formwork Systems for High-Rise Buildings, Scaffold Systems and Safety Measures, Formwork for Special Structures, Ready Mix Concrete Plant Erection and Concrete Pumping, Slip Forming and aluform Techniques, High-Rise Construction Maintenance Practices	8
	Total	45

Text Books:

1. S.P. Arora & S.P. Bindra, A Text Book of Building Construction, Dhanpat Rai &Sons, NewDelhi.
2. S.K. Sarkar and S. Saraswati, Construction Technology, Oxford University Press,New Delhi.
3. B.C. Punamia, Building Construction, Laxmi Publications, New Delhi
4. S.C. Rangwala, Building Construction, Charotar Publication Pvt Ltd. Anand
5. Construction Equipment Planning and Applications – Dr. Mahesh Varma

Reference Books:

1. Construction Planning, Equipment and methods – Peurifoy- Tata McGraw Hill Publication
2. Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.
3. Journals such as CE & CR. Construction world, International Construction.
4. Dr. Kumar Niraj Jha, — Formwork for Concrete Structures, Mc Graw Hill Publication

Program:	M. Tech. (Civil) Construction Management				Semester :	I
Course :	Professional Core Lab-I				Code :	MCI21PC03
Teaching Scheme			Evaluation Scheme			
Practical	Hours	Credit	TW	PR	OR	Total
4	4	2	50	--	50	100

Objectives:

Project Planning and Management in Construction (PPMC)

1. To provide knowledge of basic management practices adopted in civil engineering by using various techniques and software's.
2. To provide knowledge of various aspects relayed to site mobilization & work-study.
3. To provide knowledge of site safety and administration.

Construction Technology (CT)

1. To know the various methods and techniques involved in construction of deep foundations.
2. To get familiar with different construction processes with recommended specifications.
3. To provide a coherent development to the students in area of construction technology

Outcomes: After learning the course, the students should be able to:

Project Planning and Management in Construction (PPMC)

1. Apply knowledge of Construction Management on construction projects.
2. Analyze project scheduling using various techniques.
3. Apply knowledge of work-study on construction site to improve productivity.
4. Evaluate safety norms in construction site and decide incentive scheme.

Construction Technology (CT)

1. Select the process and technique involved in pile construction.
2. Decide the type of coffer dam /caisson and its techniques of construction
3. Explain the construction techniques involve in tunnel/underground construction.
4. Create an action plan for various activities and processes involved in high rise construction.

Detailed Syllabus:	Duration (H)
Project Planning and Management in Construction (PPMC)	
1. Assignment on Project clearance procedures and necessary documentation for any one project in detail.	**2**
2. Assignment on project life cycle	**2**
3. Assignment on developing a precedence network, calculation of floats and project crashing.	**2**
4. Assignment on safety measures and safety policies to be adopted on construction site.	**2**
Construction Technology (CT)	
1. Assignment on Pile construction.	**2**
2. Assignment on cofferdam and caisson	**2**
3. Assignment on high rise construction or under water structure	**2**
4. Student have to create action plan for any one construction technique from syllabus	**2**
5. Conduct site visit and prepare a detail site visit report on high rise/ pile/ caisson /cofferdam/ tunneling construction.	**2**

Program:	M. Tech. (Civil) Construction Management	Semester :	I
Course :	ELECTIVE I- SUSTAINABLE CONSTRUCTION MATERIALS	Code : M C I 2 1 P E 0 1 A	

Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite: Basic Civil Engineering, Concrete Technology

Objectives:

1. To examine the properties of common construction materials and their behaviors under different environmental conditions.
2. To explore various sustainable material available in market.
3. To understand material properties, mechanical tests and quality control tests for High performance concrete.
4. To understand concepts of sustainability in the context of building and conventional engineered buildingmaterials.

Outcomes: After learning the course, the Engineer should be able to:

1. To decide properties of construction materials to be tested before its procurement.
2. To suggest appropriate material satisfying need of the project.
3. To experiment and innovate for improving performance concrete.
4. To apply concept of sustainability, Green Performance rating for Building Certification.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	Conventional sustainable materials, Necessity and importance of sustainable construction materials. Material composition and properties, production, storage, distribution, testing, acceptance criteria, limitations use, economic consideration, recent development related to of the following materials to be studied.	7
2.	Various construction chemicals/admixtures, Fly ash and its use in concrete, Silica fumeconcrete, Self compacting concrete, Fiber Reinforced plastics and concrete, Light weight Concrete.	8
3.	Use of CD waste in concrete ,Crumb modified bitumen Rubber, Glenium Concrete, Materials used in nuclear-containment structures.	7
4.	High performance concrete, Nano technology in cement concrete, Ferro-cement Technology, Timber-Crete.	8
5.	Use of Building Integrated Photo Voltaic (BIPV) and other renewable energy in buildings, basic concepts of energy efficiency.	7
6.	Energy codes ECBC requirement, Concepts of OTTV etc, Green Performance rating, requirements of LEED, GRIHA etc.	8
	Total	45

Text Books:

1. Engineering Materials –Dr. S.V.Deodhar
2. Building Materials by M L Gambhir, Neha Jamwal, Tata McGraw Hill Publ.
3. Concrete Technology by M.S.Shetty, S.Chand Publ.
4. Concrete Technology by Neville

Reference Books:

1. Construction Materials, Methods & Techniques(3e) by William P Spence, Yesdee Publication 2012, Pvt.Ltd,, Chennai, India
2. Concrete Structure properties & Materials by Mehta P.K & Mantreio P.J.M, Prentice hall.
3. New Building Materials and Construction World magazine.
4. Ferro-cement Construction Mannual - Dr. D. B. Divekar-1030, Shivaji Nagar, Model Colony, Pune.
5. Civil Engineering and Construction Review magazine

Program:	M. Tech. (Civil) Construction Management	Semester :	I
Course :	ELECTIVE I- Disaster Management	Code :	M C I 2 1 P E 0 1 B

Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite: Construction Management

Objectives:

1. To make students aware about various types of natural and manmade disasters and their effects.
2. To make students self-efficient to solve the challenges with the aid of technological aids used in disaster management.
3. To make students aware about various IT aids and Public awareness & their Management.

Outcomes: After learning the course, the engineers should be able to:

1. To justify effect of various natural and manmade disasters.
2. To explain various aspects of disaster management.
3. To organize emergency management programme.
4. To organize various public awareness programme initiated by government.

Detailed Syllabus:

Unit	Description	Duration(H)
1.	**Disasters –** Natures and extent of disasters, natural calamities such as earthquake, floods, drought volcanoes, forest, coasts hazards, landslides etc. Manmade disasters such as chemical and industrial hazards, nuclear hazards, fire hazards etc.	7
2.	**Disaster Management –** Financing relief expenditure, legal aspects, rescue operations. Casual management, risk management.	8
3.	**Emergency Management program –** Administrative setup and organization. Hazard analysis, training of personnel, information management, emergency facilities and equipment necessary public awareness creation, preparation and execution of the emergency management program.	7
4.	**Organizations -**Various organizations registered with Government and NGO's working for disaster relief-Challenges faced by organizations.	8
5.	**Methods of assessment -** Methods of assessment of impact of disasters such as photogrammetric methods, media survey, ground data collection.	7
6.	**International adopted practices-**International adopted practices for disaster mitigation. Rules and regulations, Monitoring aspects of disaster mitigations programs.	8
	Total	45

Reference Books:

1. Construction Engineering and Management – Seetharaman
2. Project Management – K Nagarajan (New Age International Ltd.)
3. Different sites on internet on disaster management
4. NICMAR Publications
5. CECR"s Journals

Program: M. Tech. (Civil) Construction Management					Semester : I	
Course : ELECTIVE I- Material Management					Code :M C I 2 1 P E 0 1 C	
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite:

Building Materials, Building Construction, Project Management and Engg. Economics, Construction Management

Objectives:

1. To get familiar with the material management organization and procurement process.
2. To understand the inventory management and material storage systems
3. To know the concept of material quality control and wastage management of materials.

Outcomes: After learning the course the students should be able to:

1. Decide the plan for organizing material and store management.
2. Create purchase order for procuring material.
3. Apply inventory control techniques for material Management.
4. Suggest quality control techniques and remedial measures to control material wastage.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Materials Management importance:** Importance -its role in construction industry- scope, objectives and functions of material management, Integrated approach to materials management, Role of materials manager. Organizing for materials management – basis for forming organizations – conventional and modern approaches to organizing materials management. Materials identification – classification and codification of materials – standardization – simplification and variety reduction of materials	7
2.	**Material Procurement–** Material research, Identification of sources of procurement, Planning and creative Purchasing of Materials – Purchase under different situations - Bulk purchasing -budgeting- Norms of Vendor Rating – vendor analysis- Concept of (MRP)- Supply Management – Sources of Supply – Out Sourcing Material Management- Procurement Organization - Procurement Planning and Methods –Legal Aspects – Insurance of Materials, concept of international purchase	8
3.	**Inventory management:** Inventory Control techniques. Economical Order Quantity (EOQ), Advantages and limitation, ABC analysis-Procedure and its use, concept of (JIT)- Just in time management, Use of (MMS) – Materials Management Systems in materials planning, procurement, inventory, control, cost control etc. Introduction to application of software used for material management.	7
4.	**Stores Management:** Storing of Materials- Management of stores –Receipt and inspection- location -site layout and site organization– different types of stores – methods of storing –store accounts -stock verification- care, safety and security of materials - losses on storage- wastage, stores equipment – materials handling equipment – factors affecting materials handling	8
5.	**Quality Control:** Conventional methods of quality control of Construction materials. Statistical method of quality control, sampling techniques quality control in process. Quality management and its economics. OR techniques in material management	7
6.	**Waste management:** Obsolete, surplus and Scrap Materials Management – reasons for accumulation of surplus obsolete and scrap materials – methods of disposal – regulations and procedures	8
	Total	45

Text Books:

1. P. Gopalakrishnan and Sundaresan, Materials Management An Integrated Approach , Prentice Hall of India
2. Datta .A.K, “Materials Management: Procedures, Text and Cases”, PHI Learning
3. Ghose, Materials of Construction' by, Tata- McGraw Hill Publication.
4. *B.K. Roy Chowdhury , Management of Materials , S. Chand & Sons*

Reference Books:

1. Gopalkrishnan,Handbook of Materials management , Prentice Hall Publication.
2. Richard J. Tersine, “Modern Materials Management”, John Hardin Campbell – 2007
3. Arnold, “Introduction To Materials Management”, Pearson Education India,2009
4. Lee and Dobler, Purchasing and Material Management, McGraw Hill Publications
5. K.S. Menon Purchasing and Inventory Control, Wheeler Publishing
6. Magee and Boodman, Production, Planning & Inventory Control
7. Martin K. Starr and Miller, Inventory Management, Prentice Hall of India Pvt. Ltd.

Program:	M. Tech. (Civil) Construction Management	Semester :	I
Course :	Elective I- SAFETY PRACTICES IN CONSTRUCTION	Code : M C I 2 1 P E 0 1 D	

Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite: Construction Management

Objectives:

1. To Understand Safety risk and safety practices followed on basic level on job site
2. To get knowledge of effective implementation safety program in a construction company.
3. To be acquainted with knowledge of Laws related to construction Safety.

Outcomes: After learning the course, the students should be able to:

1. Identify safety risks on job sites.
2. Create and manage an effective safety program in a construction company.
3. Explain various laws related to construction safety and Compensation act.
4. Understand safety risk and code of practice on construction site.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	Introduction to Health, Safety and Environment, Introduction to Construction Safety And Safety Technology, historical background and current perspective; Government's policy in industrial safety; safety & health legislation in India, Construction Sites (Safety) Regulations	7
2.	Codes of practice; Potential hazards/risks associated with construction sites and high risk activities such as underground construction, use of hoist, Working at height and working in confined space. Safety in typical civil structures –Dams-bridges-water Tanks-Retaining walls-Critical factors for failure-Regular Inspection and monitoring. Safety in Erection and closing operation	8
3.	Construction materials –Specifications – suitability – Limitations – Merits and demerits – Steel structures –Concrete structure. Workplace ergonomics including display screen equipment and manual Material Storage handling of hazardous materials.	7
4.	Construction Safety Management and Accident Prevention. Accident Prevention: Principles of accident prevention; job safety analysis; fault tree analysis; accident management , Accident count, Hazards of Construction and their Prevention,fire safety, electrical hazards.	8
5.	Safety and Health in Construction: Theories of accident causation, health and illness related with construction works, cost of construction injuries, safety risk analysis and control, legal implications, Management Systems for Safe Construction & Safety Costs, Personal Protective Equipment (PPE) and Safety Training, OSHA Management System	7
6.	Enforcement of Health and Safety Laws, Safety Reliability and Safety Information, Safety training; safety policy; safety committees; safety inspection; safety audit; reporting accidents and dangerous occurrences	8
	Total	45

Text Books:

1. John V. Grimaldi. (1996). "Safety Management." AITBS Publishers & Distributors, New Delhi, India.

Reference Books:

1. Accident Prevention Manual for Industrial Operations, NSC, Chicago, 1982.
2. Fulman, J.B., Construction Safety, Security, and Loss Prevention, John Wiley and Sons,1979.
3. D. Reese and J. V. Eidson, Handbook of OSHA construction safety and health, 2 n d ed., CRC Press, Bocaaton, 2006.
4. S. J. Holt, Principles of construction safety, Blackwell Publishing, Oxford, 2008.

Program:	M. Tech. (Civil) Construction Management			Semester :	I	
Course :	ELECTIVE II: Building Services and Maintenance			Code :	M C I 2 1 P E 0 2 A	
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
03	03	03	20	20	60	100

Pre-requisite:
Building Construction, Architectural Planning

Objectives: After Completing this course, student will have adequate background to understand and solve the problem involving :

1. To develop concepts of management of building services provisions
2. To learn the synchronization of construction activities with installation of building services
3. To study the suitable electrical and mechanical services, fire protection, acoustic and sound Insulations

Outcomes: After learning the course, the students should be able to:

1. Apply the knowledge for planning building services provisions
2. Execute the construction activities with installation of building services.
3. Distinguish the suitable electrical as well mechanical services for particular requirements of buildings.
4. Design the Fire Protection, Acoustic and Sound Insulations.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Introduction to Building Services:** Definitions, Objective and uses of services, Applications of services for different types building considering, Classification of building services, Types of services and selection of services, Natural and artificial lighting principlesand factors, Arrangement of luminaries, Distribution of illumination, Utilization factors, Necessity of Ventilation Types – Natural and Mechanical Factors to be considered in the design of Ventilation.	7
2.	**Plumbing, Water supply and Sanitation** Water quality, Purification and treatment- water supply systems-distribution systems in small towns -types of pipes used- laying jointing ,testing-testing for water tightness plumbing system for building-internal supply in buildings- municipal bye laws and regulations – Rain Water Harvesting - Sanitation in buildings-arrangement of sewerage systems in housing -pipe systems- storm water drainage from buildings -septic and sewage treatment plant – collection, conveyance and disposal of town refuse systems.	8
3.	**Electrical Services &:: E**lectrical services in the building Technical terms and symbols for electrical installations and Accessories of wiring, Systems of wiring like wooden casing, cleat wiring, CTS wiring conduit wiring, Types of insulation, electrical layout for residence, small work shop, show room, school building, etc. **Air Conditioning-**Definition, Purpose, Principles, Temperature Control, Air Velocity Control, Humidity Control, Air Distribution system, Cleaners, Filters, Spray washers, Electric preceptors, Types of Air Conditioners, (Central type, Window Type, Split Unit).	7
4.	**Mechanical Services in Buildings** Introduction of mechanical services, Lift-Definition, Types of Lifts, Design Considerations, Location, Sizes, Component parts- Lift Well Escalators- Different types of elevators and Escalators, Freight elevators, Passenger elevators, Hospital elevators, Uses of different types of elevators Escalators. Conveyors-Different types of Conveyors, Uses of different types of Conveyors.	8
5.	**Fire Protection, Acoustic and Sound Insulations** **:** Introduction, Causes of fire and Effects of fire, General Requirements of Fire Resisting building as per IS and NBC 2016, Fire load calculation, Characteristics of Fire resisting materials, Maximum Travel Distance, Fire Fighting Installations for Horizontal Exit, Roof Exit / Fire Lifts, External Stairs,**Acoustics:** Requirement of good Acoustic, Various sound absorbent, Factors to be followed for noise control in residential commercial buildings .	7
6.	**Building Maintenance** Role of maintenance in durability and serviceability of buildings: – Necessity of maintenance – Economic aspects of maintenance. Different types of maintenance – Preventive maintenance – Remedial maintenance – Routine maintenance – Pre-monsoon maintenance -	8

	Special maintenance – Planning aspects of maintenance Cracks in buildings – Defects in foundation, masonry, plastering, Painting, flooring, doors and windows, concrete (RCC and PCC) and wooden roof - Corrosion of reinforcement and steel structures – structural damage due to fire - Causes – Preventive and remedial measures	
	Total	**45**

Text Books:

1. A text book on Building Services R. Udaykumar Eswar Press, Chennai
2. Building Services S. M. Patil Seema Publication, Mumbai Revised edition
3. National Building Code of India - 2005 Bureau of Indian Standards BIS, New Delhi

Reference Books:

1. Building Construction Dr. B. C. Punmia Laxmi Publications (P) Ltd., New Delhi
2. Building Construction P. C. Varghese PHI Learning (P) Ltd., New Delhi
3. Building repair and Maintenance Management P. S. Gahlot CBS Publishers & Distribution(P) Ltd

List of Software/Learning Websites

1. www.academia.edu
2. www.nptel.iitm.ac.in
3. "http://en.wikipedia.org/w/index.php?title=Dumbwaiter_(elevator)&oldid=621761813" Categories: www.bis.org.in/sf/nbc.htm
4. cpwd.gov.in/Units/handbook.pdf
5. http://www.civilengineeringnews.tk/2014/07/methods-of-demolition-of-building.html thecontractor.org

Program:	M. Tech. (Civil) Construction Management				Semester :	I
Course :	ELECTIVE II: Value Engineering and Valuation				Code : M C I 2 1 P E 0 2 B	
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite:
Project Management & Economics, Construction Management

Objectives:

1. To produce civil engineers with knowledge of value Engineering and analysis used in construction industry.
2. To produce civil engineer with knowledge of analysis carried out for life cycle costing and applications of value engineering.
3. To produce civil engineer with detailed knowledge of valuation for various types of assests.

Outcomes: After learning the course, the students should be able to:

1. Analyze product using value engineering.
2. Create various steps for the product development.
3. Prepare report using value Engineering applicable to construction project.
4. Prepare valuation report of product by applying Value Engineering..

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Value Engineering:** Definition, Importance to Contractors, Potential. VE Applications Value : basic and secondary functions, factor contributing to value such as aesthetic, ergonomic, technical, economic : identifying reasons or unnecessary costs.	7
2.	**Value Analysis:** 10 Commandments of value analysis; value analysis team; principles of value analysis, elements of a job plan viz. orientation, Information, presentation. Implementation, follow, up action, benefits of value analysis, various applications; assessing effectiveness of value analysis.	8
3.	**Value Engineering Methodology** - Orientation phase, Information phase, Function Analysis phase, Creative Phase, Evaluation Phase, Development Phase, Presentation Phase, implementation Phase.	7
4.	**Life cycle costing –** Forecasting of Capital as well as operating & maintenance costs, time value, present worth analysis, DCF methods, ROR analysis, sensitivity analysis.	8
5.	**Application of Value Engineering to a Construction Project:-** VE during the Planning Phase of a Construction Project , VE during the Design Phase of a Construction Project, VE during the Construction Phase of a Construction Project	7
6.	**Valuation Report:-**Valuation Report, contents, standard formats, Case study of any one Report.	8
	Total	45

Text Books:

1. Value Engineering: Analysis And Methodology By Del Younke
2. Industrial Organization & Engg. Economics, T.R.Banga, S.C.Sharma, Khanna Publ.
3. Estimating and Costing in Civil Engineering: Theory and Practice B.N Dutta Published S. Dutta & Company, Lucknow.

Reference Books:

1. Industrial Engg. & Mgt., O.P.Khanna, Dhanpat Rai Publ.
2. Estimating and Costing By: G.S.Birdie
3. Estimating and Costing By: Rangwala Published By: Charotar Publishing House,
4. Practical Information for Quantity Surveyors, Property valuers, Architects Engineers and Builders,
5. P.T.Joglekar, Pune Vidyarthi Griha Prakashan, 2008 reprint.

Program:	M. Tech. (Civil) Construction Management	Semester :	I
Course :	ELECTIVE II: Human Resources and Management	Code : M C I 2 1 P E 0 2 C	

Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite: Construction Management

Objectives:

1. To make aware of various key aspects of Human Resource Development.
2. To make aware of skills & recruitment procedures adopted in Human Resource management in the industry.
3. To make aware of details like training, various types of projects and Career Plan.

Outcomes: After learning the course, the engineers should be able to:

1. To analyze evolutions of HRM and different management theories.
2. Evaluate the skills of recruiter required for construction project.
3. Understand the importance of recruitment process and training programme for recruitment.
4. Develop carrier plan.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Introduction:** Evolution of theories of Human resource management, construction industry, industrial revolution and construction, modern management philosophy: classical approach, human behavioral, contempory management theory, contingency theory, Need of Human Resource:aim and objective of HRM Organization Policies various HRD parameters viz. Elements of the ICDP i.e. integrated construction development paradigm,	7
2.	**Need for Development of Human Resource-** flow diagram of human resource development and human resource management. Strategic HRM, Models of SHRM, developing SHRM plan, Flexible firm.	8
3.	**HRD Construction Projects -** Selection of contractors region wise & retaining, Upgrading Human Resource Development for construction MNC/Multi portfolio project handling organization. Formation of joint ventures, privatization and BOT type of systems.	7
4.	**Recruitment process:-**Recruitment policies, Pre requisites skills- Soft and technical skills. Employee testing & selection Personal Management – Concept of Personal Management, Responsibilities & authority and Role Function of Personal Manager, Necessity of Personal Management	8
5.	**Training: –**Training of multi-skilled workforce, quality, productivity and employee relations in construction, contractors & sub-contractors – selection, training & development, performance appraisal, potential appraisal, training rewards and recognition etc.	7
6.	**Career Plan & development** Career development cycle, , teams synergy, Participative management. leadership, communication and team behaviors adapted and applied to construction management; case studies.	8
	Total	45

Text Books:

1. Human Resource Management by Biswajeet Pattanayak
2. Human Resource Management by Gary Dessler & Biju Varkkey, Pearson publication
3. Managing Human Resources by Bohlander & Snell.

Reference Books:

1. Personnel Management‘ by Monappa A. Tata McGraw Hill,new delhi.1997
2. Harvard Business Review, Appraising Perfoprmance Appraisal, Tata McGraw Hill.
3. Nair,MRR, Excellence through Human Resource D evelopment, Tata McGraw Hill.
4. Rao T, HRD in the New Economic Environment, Tata McGraw Hill.
5. Pareck,HRD in the New Millenium, Tata McGraw Hill.
6. Singh, Selected Reading in HRD Tata McGraw Hill.

Program:	M. Tech. (Civil) Construction Management			Semester : I		
Course :	Elective II – Infrastructure Development (ID)			Code : M C I 2 1 P E 0 2 D		
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite:

Objectives:

1. To know role of Infrastructure in Nations Economy.
2. Co-relating Budget provisions and construction sector for infrastructure development
3. Role of Public Private Partnership in Economic Development

Outcomes: After learning the course, the engineers should be able to:

1. Justify role of Infrastructure in National Economy.
2. Co-relate Indian budget and its relation w,r,to any of the Construction sector.
3. Explain role of Public Private Partnership in Construction project.
4. Identify and apply various provisions made for Infrastructure Development.

Detailed Syllabus:

Unit	Description	Duration(H)
1	**Construction Industry:** Nature, characteristics, size and structure. Role of infrastructure development in employment generation and improving of the National economy. Various Agencies associated with infrastructure development in India as regards various sectors.	**7**
2	**Status of Infrastructure in India:** Road sector Port, Railway, communication, water supply and drainage, Power sector, oil and industry, Health and educational services. Infrastructure Development, Indian budget and its relation with Infrastructure development projects in India. Various programs related with Infrastructure development in rural and urban sector.	**8**
3	Public Private Partnership (PPP) in Infrastructure: Concept, definition, benefits; Processes, Modules of PPP, Draft Concession Agreement for PPP projects, Escrow Agreement.	**7**
4	Issues related to infrastructure development – pre – requisites necessary to ensure success for switching over from public sector management to private sector management, issues in developing, funding and managing infrastructure projects, role, and responsibility of project management consultants. FDI in Infrastructure development, Problem areas and Solutions.	**8**
5	Study of provisions made for Infrastructure Development in the (12^{th} and 13^{th}) **five year plans of the planning commission Government of India**. Formation of the Indian Infrastructure Development Corporation. SPV's for Infra projects. Detailed study of 20 years plan by Govt. and provisions made for the development of Infrastructure.	**7**
6	JNNURM - Jawaharlal Nehru National Urban Renewal Mission, PMGSY – Pradhan Mantri Gram Sadak Yojana, RGGVY - Rajiv Gandhi Grameen Vidyutikaran Yojana, Ports Connectivity Projects, Indira Gandhi International Air Port project, Indo – US Nuclear Deal, Nuclear Power Projects in India	**8**
	Total	**45**

Text Books:

1. Construction Engineering & management of Projects(For Infrastructure & Civil Works) by S. C. Sharma, Khanna Publishers, 2 Edition, 2011
2. India Infrastructure Report – Rakesh Mohan.
3. Infrastructure Development in India by Rajarshi Majumder Rawat Publications – 2010

Reference Books:

1. Document of five year plans, published by Govt. of India.
2. Public Private Partnership in Infrastructure by R. N. Joshi Vision Publications – 2010.6.
3. Journal of the Indian Roads' Congress.
4. Infrastructure Today – Magazine.
5. Indian Highways – Journals.

Program:	M. Tech. (Civil) Construction Management	Semester : I
Course :	**Professional Elective Lab-I** **Elective-I-** Sustainable Construction Materials, DisasterManagement, Material Management, Safety Practices in Construction **Elective-II-** Building Services and Maintenance, ValueEngineering and Valuation, Human Resources and Management, Infrastructure Development	**Code : MCI21PE03**

Teaching Scheme			Evaluation Scheme			
Practical	**Hours**	**Credit**	**TW**	**PR**	**OR**	**Total**
4	4	2	50	--	50	100

Pre-requisite

Sustainable Construction Materials

1. Basic Civil Engineering 2. Concrete Technology

Disaster Management

1. Construction Management

Material Management,

1. Building Materials, 2. Building Construction, 3. Project Management and Engineering, 4. Economics, Construction Management

Building Services and Maintenance,

1. Building Construction, 2. Architectural Planning

Value Engineering and Valuation,

1. Project Management & Economics, 2. Construction Management

Human Resources and Management

1. Construction Management

Objectives: Elective I

Sustainable Construction Materials

1. To examine the properties of common construction materials and their behaviors under different environmental conditions.
2. To explore various sustainable material available in market.
3. To understand material properties, mechanical tests and quality control tests for Highperformance concrete.
4. To understand concepts of sustainability in the context of building and conventional engineeredbuilding materials.

Disaster Management:

1. To make students aware about various types of natural and manmade disasters and their effects.
2. To make students self-efficient to solve the challenges with the aid of technological aids used in disaster management.
3. To make students aware about various IT aids and Public awareness & their Management.

Material Management:

1. Explain concept of material management, standardization and codification of materials.
2. Explain the material procurement process.
3. Understand inventory management and store management techniques.
4. Suggest the quality control techniques and remedial measures to control material wastage

SAFETY PRACTICES IN CONSTRUCTION

1. To Understand Safety risk and safety practices followed on basic level on job site
2. To get knowledge of effective implementation safety program in a construction company.
3. To be acquainted with knowledge of Laws related to construction Safety.

Elective II

Building Services and Maintenance:

1. To develop concepts of management of building services provisions
2. To learn the synchronization of construction activities with installation of building services
3. To study the suitable electrical and mechanical services, fire protection, acoustic and sound Insulations

Value Engineering and Valuation:

1. To produce civil engineers with knowledge of value Engineering and analysis used in construction industry.
2. To produce civil engineer with knowledge of analysis carried out for life cycle costing and applications of value engineering.
3. To produce civil engineer with detailed knowledge of valuation for various types of assets.

Human Resources and Management:

1. To make aware of various key aspects of Human Resource Development.
2. To make aware of skills & recruitment procedures adopted in Human Resource management in the industry.
3. To make aware of details like training, various types of projects and Career Plan.

Infrastructure Development

1. To know role of Infrastructure in Nations Economy.
2. Co-relating Budget provisions and construction sector for infrastructure development
3. Role of Public Private Partnership in Economic Development

Outcomes: Elective I

Sustainable Construction Materials: After learning the course, the Engineer should be able to:

1. To decide properties of construction materials to be tested before its procurement.
2. To suggest appropriate material satisfying need of the project.
3. To experiment and innovate for improving performance concrete.
4. To apply concept of sustainability, Green Performance rating for Building Certification.

Disaster Management: After learning the course, the students should be able to:

1. To Justify effect of various natural and manmade disasters.
2. To explain various aspects of disaster management.
3. To organize emergency management programme.
4. To organize various public awareness programme initiated by government.

Material Management: After learning the course the students should be able to:

1. Decide the plan for organizing material and store management.
2. Create purchase order for procuring material.
3. Apply inventory control techniques for material Management.
4. Suggest quality control techniques and remedial measures to control material wastage.

SAFETY PRACTICES IN CONSTRUCTION

1. Identify safety risks on job sites.
2. Create and manage an effective safety program in a construction company.
3. Explain various laws related to construction safety and Compensation act.
4. Understand safety risk and code of practice on construction site.

Elective II

Building Services and Maintenance: After learning the course, the students should be able to:

1.Apply building services provisions
2. Execute the construction activities with installation of building services.
3. Distinguish the suitable electrical as well mechanical services for particular requirements of buildings.
4. Design the Fire Protection, Acoustic and Sound Insulations.

Value Engineering and Valuation: After learning the course, the students should be able to:

1. Analyze product using value engineering.
2. Create various steps for the product development.
3. Prepare report using value Engineering applicable to construction project.
4. Prepare valuation report of product by applying Value Engineering.

Human Resources and Management: After learning the course, the students should be able to:

1. Describe skills required for development Human Resource.
2. Evaluate the skills of recruiter required for construction project.
3. Decide a training programme for recruitment.
4. Develop carrier plan.

Infrastructure Development

1. Justify role of Infrastructure in National Economy.
2. Co-relate Indian budget and its relation w,r,to any of the Construction sector.
3. Explain role of Public Private Partnership in Construction project.
4. Identify and apply various provisions made for Infrastructure Development.

Guidelines :

1. Any one subject from Part A and Part B as per students elective choices
2. Total assignment to be conducted are Three from Part A and Three from Part B

Total 6 Assignment- 12 hours.

Detailed Syllabus:		
Part A: Elective 1- Sustainable Construction Materials (ANY Three)		
Assignment	**Description**	**Duration (H)**
1	Importance of Sustainable Construction Materials.	**2**
2	Reuse and Recycling of waste construction Materials	**2**
3	High performance concrete, Nano technology in cement concrete, Ferro-cement Technology, Timbercrete.	**2**
4	Green Performance rating for Building Certification.	**2**
	Total	**6**
Part A: Elective 1- Disaster Management, (ANY Three)		
Assignment	**Description**	**Duration (H)**
1	Assignment-1	**2**
2	Assignment-2	**2**
3	Assignment-3	**2**
4	Assignment-4	**2**
	Total	**6**
Part A: Elective 1- Material Management, (ANY Three)		
1	Assignment on Inventory management	**2**
2	Assignment on use of any material management software	**2**
3	Assignment on store management and wastage reduction	**2**
4	Case study Presentation by individual on any topic from above syllabus.	**2**
	Total	**6**
Part A: Elective 1- SAFETY PRACTICES IN CONSTRUCTION (any 3)		
1	Report on Safety Codes available.	**2**
2	Accident Prevention measures.	**2**
3	Laws related to construction safety and Compensation act.	**2**
4	Report on Safety Audits.	**2**
	Total	**6**

Part B: Elective II- Building Services and Maintenance, (ANY Three)		
Assignment	**Description**	**Duration (H)**
1	Assignment based on Types of services and selection of services.	**2**
2	Assignment based on Electrical services in the building.	**2**
3	Assignment based on Lift/ Elevators and component parts.	**2**
4	Assignment based on Air Conditioning, types, description.	**2**
	Assignment based on Fire Protection, Acoustic and Sound Insulations.	**2**
	Total	**6**
Part B: Elective II- Value Engineering and Valuation, (ANY Three)		
Assignment	**Description**	**Duration (H)**
1	Write report on guest lecture conducted related to value Engineering.	**2**
2	One site visit related to any topic from above syllabus.	**2**
3	Assignment on case study of value engineering.	**2**
4	Assignment on application of value Engineering in Construction Industry.	**2**
	Total	**6**
Part B: Elective II- Human Resources and Management (ANY Three)		
1	Assignment on need of HRD in Construction Industry	**2**
2	Assignment on recruitment process adopted in Construction industry in detail.	**2**
3	Assignment on various types of training program organized by HR department for staff.	**2**
4	Prepare career Plan using guidelines studied in the course.	**2**
	Total	**6**
Part B: Elective II Infrastructure Development (Any three)		
1	Presentation on Any one on: JNNURM, PMGSY, RGGVY and its New forms.	**2**
2	Case study of any Public Private Partnership scheme. .	**2**
3	Presentation on Infrastructural activities and its effect on GDP in India.	**2**
4	Detailed study of (last) FIVE year plan and its provisions for development ofInfrastructure.	**2**
	Total	**6**

Program: M. Tech. (Civil) Construction Management					Semester: I	
Course: Research Methodology and IPR Lab					Code: M C I 2 1 E L 0 1	
Teaching Scheme/ Week			Evaluation Scheme			
Lecture	Pr	Hours	Credit	TW	OR	Total
--	4	4	2	50	50	100

Pre-requisite: Seminar and project in undergraduate

Objectives:

1. To equip students with essential research skills and methodologies for identifying, formulating, and solving research problems.
2. To provide students with a comprehensive understating of Intellectual property rights and copyrights.
3. To enhance students' abilities in research report writing and communication.
4. To facilitate students' professional development by providing opportunities for practical experience.

Outcomes: After learning the course, the students will be able to:

1. To define appropriate research problem and parameters with appropriate research methodology.
2. To understand subject matters of copyright laws and designs, the fundamentals of patent laws, and drafting procedure.
3. To demonstrate proficiency in writing research papers & reports and present them effectively.
4. To demonstrate the ability to critically evaluate and synthesize key insights and findings from their experiential learning.

Detailed Syllabus:

Sr. No.	Description	Duration (H)
A	Following assignments are **Research Methodology [12 practicals]** 1. Research problem formulation and solution [2] 2. Literature review, critical analysis and technologies for compressive literature survey [2] 3. Hypothesis formulation and testing – applying statistical methods in research [2] 4. Survey design and questionnaire development – principles and practices [2] 5. Sampling techniques and sample size determination [1] 6. Experimental design and data collection techniques [1] 7. Quantitative data analysis techniques [1] 8. Sustainability assessment methods in construction and management research [1]	**24**
B	**Patents and IPR [6 practicals]** 1. Patent drafting and filling – practical aspects of patent application preparation 2] 2. Copyright and trademark research – identifying and protecting intellectual property assets [2 3. Technology transfer and commercialization – from research to market [2]	**12**
C	**Research report writing and publication (Any two) [6 practicals]** 1. Research dissemination strategies – writing a research paper, report, and publication process. [3] 2. Research proposal development for funding [3] 3. Organizing a baby conference. [3]	**12**
D	**Visit (Anyone) [3 practicals]** 1. Visit to any research center and write a visit report. [3] 2. Attending any conference and writing a conference report. [3] 3. Attend any research exhibition and write an exhibition report. [3]	**12**
	Total	**60**
	Textbooks: 1. C. R. Kothari, Research Methodology: Methods and Techniques, New Age International, 2nd Edition, 1985 2. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, 2nd Edition.,2010. 3. Ramakrishna B and Anil Kumar H S., Fundamentals of IPR, Notion Press, 2016 **4.** Virendra Kumar Ahuja, IPR in India, LexisNexis Butterworths Wadhwa Nagpur, 2017	

	Reference Books: 1. Stuart Melville and Wayne Goddard, Research methodology: An Introduction for Science &Engineering students 2. S.D. Sharma, Operational Research, Kadar Nath Ram Nath & Co. 3. Wayne Goddard and Stuart Melville, Research Methodology: An Introduction, Juta and CompanyLtd, 2004	

Program: M. Tech. (Civil) Construction Management					Semester : I	
Course : Skill Development Lab - I (Software Skills)					Code: MCI21VS01	
Teaching Scheme			Evaluation Scheme			
Practical	**Hours**	**Credit**	**TW**	**PR**	**OR**	**Total**
4	4	2	50	--	50	100

Pre-requisite: -

Objectives:

1. To acquire basic software skills competency skill
2. To learn planning ,scheduling using software

Outcomes: After learning the course the students should be able to:

1. learn planning, scheduling, and controlling of small scale projects using software
2. Analyze cost and risk minimization
3. Prepare various reports using software

Guidelines :

1. **S**oftware Application Use of construction management software's (**PRIMAVERA or MS-PROJECTS, ERP in Construction Management, Building Information Modeling-BIM or any other etc.)**
2. **Expected hours minimum 24 hrs + 24 Hrs Hands on practice**

Detailed Syllabus:

Skill Development Lab (ANY Six)

Expt.	Description	Duration (H)
1.	Describing Enterprise and Project-Specific data/ Introduction to different construction software's	**2**
2.	Create a project & navigating in the Projects Window	**2**
3.	Defining & creating the WBS Hierarchy	**2 + 2**
4.	Adding Activities and Creating relationships	**2**
5.	Application of software for project planning, scheduling & control.	**2 + 2**
6.	Define & assign roles and resources	**2 +2**
7.	Optimize the project plan/schedule	**2 +2**
8.	Report Creation	**2**
	Total	**24**

Course Syllabus

Semester-II

Program:	M. Tech. (Civil) Construction Management	Semester :	II
Course :	CONSTRUCTION CONTRACTS ADMINISTRATION AND MANAGEMENT	Code : MCI22PC04	

Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite:
Quantity Surveying & Contract Tenders, Construction Management

Objectives:

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

Outcomes: After learning the course, the students should be able to:

1. Adopting the ethical knowledge for preparing construction contracts clauses.
2. Create contractual Tender documents satisfying need of project.
3. Exhibit role and responsibilities of Arbitrator for resolution of disputes in construction projects.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Construction Contracts :** Indian Contract Act (1872) :Definition of the contract as per the ACT. Valid, Voidable,Void contracts, Objectives of the act.(from model 5) Clauses 1 to 75- Contract formation, contract performance, valid excuses for non-performance, Breach of contract, effects of breach-understanding the clauses and applying them to situations/scenarios on construction projects. Importance of the Workmen‘s Compensation Act on construction projects. Salient features of workmen compensation act.	7
2.	**Contract Formation (Procurement):** Methods of inviting tenders, pre-bid meetings, pre-qualification system, scrutiny of tenders and comparative statement. Contract formation, conditions of contracts, contracts with various stakeholders on a major construction projects, contract pricing by the client, project management consultants and the contractor, contract performance, contract correspondence and contract closure. Contract Strategies (Traditional approach, design & amp; build, BOT, management, partnering, joint ventures).	8
3.	**Project Administration:** Pre-construction Operations – Constructability Analysis, Issuance of Bidding Documents, Pre-qualification of Bidders, Bonds, Opening Acceptance and Documentation of Bids. Construction Administration, Organizational Structure, Lines of Authority on Construction Projects, Responsibility, Staffing Responsibilities, Design Build Contracts, Responsibility for Coordination of the trades.	7
4.	**Documentation and Risk Identification:** Familiarization with construction documents, Certainty, Risk and Uncertainty, Risk Management, Identification and Nature of Construction Risks, Contractual allocations of Risk, Types of Risks, Minimizing risks and mitigating losses, use of expected values, utility in investment decisions, decision trees, sensitivity analysis. Control of Quality in Construction.	8
5.	**Dispute Resolution & Arbitration:** Disputes – Settlement through arbitration – Indian Arbitration Act 1940 – Clauses and advantages of arbitration. Alternate Dispute Resolution methods- mediation, conciliation, arbitration and Dispute Resolution Boards..	7
6.	**Construction Claims:** Construction Claims: Extra items and causes of claims. Types of construction claims, documentation. Settlement of claims Dispute Resolution: Causes of disputes and importance of role of various stakeholders in prevention of disputes.	8
	Total	45

Text Books:

1. Civil Engineering Contracts and Estimates - B.S.Patil – Universities Press- 2006 Edition,reprinted in 2009.
2. The Indian Contract Act (9 of 1872), 1872- Bare Act- 2006 edition, Professional Book Publishers.
3. The Arbitration and Conciliation Act,(1996), 1996 (26 of 1996)- 2006 Edition, Professional Book Publisher.

Reference Books:

1. Law of contract Part I and Part II, Dr. R.K. Bangia- 2005 Edition, Allahabad Law Agency.
2. Arbitration, Conciliation and Alternative Dispute Resolution Systems- Dr. S.R. Myneni- 2004 Edition, reprinted in 2005- Asia Law House Publishers.
3. The Workmen's Compensation Act, 1923 (8 of 1923) Bare Act- 2005- Professional Book Publishers.
4. Standard General Conditions for Domestic Contracts- 2001 Ministry Of Statistics and Program Implementation, Government of India.
5. FIDIC Document (1999).
6. Dispute Resolution Board foundation manual -www.drbf.org. 30 Edition

Program:	M. Tech. (Civil) Construction Management		Semester :	II		
Course :	Project Economics and Financial Management (PEFM)		Code : MCI22PC05			
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite: Basics of Finance, Project management

Objectives: After Completing this course, student will have adequate background to:-

1. Analyze of economics to facilitate the process of economic decision making.
2. attain awareness on basic financial management aspects.
3. Develop the skills to analyze financial statements.

Outcomes: After learning the course, the students should be able to:

1. Apply knowledge of project economics, risk management and PPP in projects.
2. Apply appraisal techniques for financial feasibility studies, risk estimation techniques and financing methodsof projects.
3. Apply knowledge of finance and accounting in management of projects
4. Possesses knowledge of PPP in infrastructure projects

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Economics of Engineering Projects -** Nominal and effective rate of interest, Discrete and continuous compounding, Inflation and real rate of interest, Capitalized cost. Economic factors, Equivalence and use of multiple factors.	7
2.	**Financial Appraisal Criteria** - Discounting and non- discounting criteria (Payback period, NPV, AW, ROR, IRR, Benefit- cost ration, Break even analysis). MARR & it"s estimation	8
3.	**Risks in Construction Projects -** Types of risk, Measures of project risk, Risk estimation, Risk analysis and Risk management. Sensitivity analysis, Simulation, Decision tree analysis, Selection of projects, Fuzzy Systems applications.	7
4.	**Financing Projects -** Sources of finance, equity, debit, securities, borrowings, debentures, Working capital requirement, Financial institutes, Direct and indirect financial assistance.	8
5.	**Accounting -** Site Accounts - preparation, reporting, Accounting records, Depreciations, Classification of construction costs, Standard budgeting and control.	7
6.	**Public Private Participation in Projects-** PPP Models, BOOT, BOT, Joint Ventures, Annuity, DBFO, External Commercial Borrowings, International Finance.	8
	Total	45

Text Books:

1. Engineering Economy By E. Paul Degarmo, William G. Sullivan
2. Project preparation Appraisal Implementation by Prasanna Chandra.
3. Principles of Construction Management by Roy Pilcher.

Reference Books:

1. Engineering Economy, Leland T. Blank. Anthony Tarquin. McGraw Hill, 2008.
2. Engineering Economics, David Bedworth, Sabah Randhawa. McGraw Hill, 1996.
3. Real Estate, Finance and investment, Bruggeman. Fishr, McGraw Hill, 2010.
4. Foundations of Financial Management', Block Hirt. McGraw Hill, 2009.
05. Case studies in finance, Burner, McGraw Hill, 2009.
06. Cases in Finance , DeMello McGraw, 2003.
07. The cost management toolbox ; A Managers guide to controlling costs and boosting profits. Oliver, Lianabel. Tata McGraw Hill, 1999.
08. ―Financial Management¦ – Indian Institute of Banking and Finance – Macmillan Publications.
09. Projects planning, Analysis Selection, Implementation and Review, Prasanna Chandra Tata McGraw Hill, New Delhi, 2005
10. Fundamentals of Engineering Economics—Pravin Kumar, Wiley, India.

Program:	M. Tech. (Civil) Construction Management				Semester : II	
Course :	Professional Core Lab-II				Code : MCI22PC06	
Teaching Scheme			Evaluation Scheme			
Practical	Hours	Credit	TW	PR	OR	Total
4	4	2	50	--	50	100

Objectives:

CONSTRUCTION CONTRACTS ADMINISTRATION AND MANAGEMENT

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.
3. To learn various aspects of Arbitration to resolution of disputes in construction projects.

Project Economics and Financial Management

1. Understanding of economics to facilitate the process of economic decision making.
2. attain awareness on basic financial management aspects.
3. Develop the skills to analyze financial statements.

Outcomes: After learning the course, the students should be able to:

CONSTRUCTION CONTRACTS ADMINISTRATION AND MANAGEMENT

1. Adopting the ethical knowledge for preparing construction contracts clauses.
2. Create contractual Tender documents satisfying need of project.
3. Exhibit role and responsibilities of Arbitrator for resolution of disputes in construction projects.

Project Economics and Financial Management

1. Evaluate the economic theories, cost concepts and pricing policies.
2. monitor accounting systems and analyze financial statements using ratio analysis.
3. Apply the concepts of financial management for project appraisal.

Detailed Syllabus:

Unit	Description	Duration
	CONSTRUCTION CONTRACTS ADMINISTRATION AND MANAGEMENT **1.** Definition of the contract as per the ACT. Valid, Voidable, Void contracts, Objectives of the ICA (1872) **2.** Preparation of conditions of Contract related to time of completion, delay, Defects in construction work. **3.** Tender form submission and necessary Tender Documents. **4.** Procedure of Bid Opening **PROJECT ECONOMICS AND FINANCIAL MANAGEMENT** 1. Assignment on objectives of business firm / working capital/ cash management. 2. Assignments on cash planning / Depreciation /Various Appraisal Criteria Methods/ Break-even analysis / Cash flow analysis / Risk Analysis. 3. Assignment on Stock, Borrowings/Debentures/ Loan Capital/ Public Deposit/ Dividend Policies/ Budgetary control system. 4. Assignment on World financial market/ Role of financing institutes in Construction sector/ SEBI regulation /GST, CGST,SGST /Direct Tax Court System. 5. Preparation of profit and loss account and balance sheet as per the companies Act2013/ Ratio Analysis.	

Program:	M. Tech. (Civil) Construction Management			Semester : II		
Course :	Elective III- Retro Fitting (PE III)			Code : MCI22PE04A		
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite:
Building Construction, Concrete Technology, Advanced concrete Technology

Objectives:
1. To impart knowledge about maintenance and Retrofitting of Structures
2. To acquire knowledge about repairs, rehabilitation and damage assessment
3. To enable the students to understand the repair materials and techniques

Outcomes: After learning the course the students should be able to:
1. Evaluate the cause of deterioration of concrete structures.
2. Assess the damage and design the plan to repair
3. Decide the various techniques of retrofitting of structures
4. Recognize good materials for repair and retrofitting technique

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Introduction to retrofitting:** Definition for Repair, Retrofitting, Strengthening and rehabilitation. Importance of retrofitting, Physical and Chemical Causes of deterioration of concrete structures. Rehabilitation studies of buildings, underground construction, bridges, highways, sewage treatment plants – masonry work, R.C.C works, steel structures.	7
2.	**Damage Assessment:** Purpose of assessment, Rapid assessment, Investigation of damage, Evaluation of surface and structural cracks, Damage assessment procedure, destructive, non-destructive and semi destructive testing systems	8
3.	**Influence on Serviceability and Durability:** Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, and catholic protection.	7
4.	**Maintenance and Retrofitting Techniques:** Definitions: Facts of Maintenance and importance of Maintenance, Need for retrofitting, retrofitting of various RC structural members, Study of different retrofitting techniques like Externally bonding technique (ERB), near surface mounted (NSM) technique, External post- tensioning, Section enlargement and guidelines for seismic rehabilitation of existing building, Rust eliminators and polymers coating for rebar during repair foamed concrete, mortar and dry pack.	8
5.	**Materials for Repair and Retrofitting:** Types of FRP like CFRP, GFRP, AFRP, BFRP, and use of natural fiber like Sisal and Jute. Adhesive like, Epoxy Resin, Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain, Gunite and Shot Crete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Construction chemicals based on nano- technology.	7
6.	**Repair of Earthquake damages buildings and maintenance:** methods of seismic retrofitting, restoration of buildings, effects of earthquakes, response of buildings to earthquake motion, factors related to building damages due to earthquake, Maintenance of rehabilitated structures, Evaluation of structural damages to the concrete structural elements.	8
	Total	45

Text Books:
1. Sidney, M. Johnson, "Deterioration, Maintenance and Repair of Structures"
2. Denison Campbell, Allen & Harold Roper, "Concrete Structures – Materials, Maintenance and Repair"- Longman Scientific and Technical.
3. Technology of Building Repairs, Raikar R N

4. Maintenance & Repairs of Buildings, P. K. Guha *5. Construction, Maintenance & Restoration and Rehabilitation of Highway Bridges, K. S. Rakshit*
Reference Books: 1.R.T.Allen and S.C. Edwards, "Repair of Concrete Structures"-Blakie and Sons 2. Raiker R.N., "Learning for failure from Deficiencies in Design, Construction and Service"- R&D Center (SDCPL). 3. Concrete Structures Protection Repair and Rehabilitation, R. Dodge Woodson, Elsevier Publication 4. Retrofitting of Concrete Structures by Externally Bonded FRP's – CEB – FIP, Technical report. 5. Handbook on repair and rehabilitation of RC structure by -CPWD

Program:	M. Tech. (Civil) Construction Management				Semester : II	
Course :	Elective III- Advanced Construction Technology (PE-III)				Code : MCI22PE04B	
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite: Construction Technology

Objectives:

1. To acquire knowledge of implementation of advanced construction techniques with recommended specifications.
2. To provide knowledge about equipment, systems required to facilitate the advanced construction techniques.
3. To provide a coherent development to the students in area of advanced construction technology

Outcomes: After learning the course the students should be able to:

1. Select construction equipment and processes involved in bridges and metro, construction.
2. Recommend the method of construction used for port and high rise construction
3. Justify advanced techniques used in special structures and marine construction.
4. Suggest outline for construction of high rise construction.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Construction of Bridges:** Types, Construction methods for sub-structure and super-structure, various launching methods, Steel Bridges, Arch Bridges, Cantilever Bridges Segmental construction & Box Girders. Construction of special type of bridges such as cable stayed bridge, suspension and Pre-stressed bridge.	7
2.	**Construction of Metro and Monorail -** Underground and over ground structures, different methods and techniques of construction. Problems and solutions – during maintenance and up-keep of structures. Fire, Ventilation , De watering and power supply, Subsidence, Vibration etc.	8
3.	**Construction of Ports:** Construction of docks & Jetties, Fender Systems, Container terminals & oil terminals, under water construction, Dredging System, Mechanism, Advantages & Disadvantages of Various Dredging System	7
4.	**Construction of high rise structures:** Steel and concrete composites construction methods, techniques, automation used for construction, Fabrication and erection of heavy structures including prefab construction, Erection of different cranes like mobile, lifting, tower, roof truss. Innovative methods of construction – Jump form, Aluform & Tunnel Form Technology, Dry wall technology.	8
5.	**Construction of Special structures:** Features and functions of the special types of civil engineering structures: Silos, Elevated service reservoir, domes and arches, Construction of power generating structures – Atomic Power stations, Thermal power stations. Co generation power plant , Windmills, Transmission towers, Chimneys	7
6.	**Marine and offshore structures** such as- Beacons, Oil drilling Platforms, light houses. Barges- types, Function, utilization & economics of barges.	8
	Total	45

Text Books:

1. S.P. Arora & S.P. Bindra, A Text Book of Building Construction, Dhanpat Rai &Sons, New Delhi.
2. S.K. Sarkar and S. Saraswati, Construction Technology, Oxford University Press,New Delhi.
3. B.C. Punamia, Building Construction, Laxmi Publications, New Delhi
4. S.C. Rangwala, Building Construction, Charotar Publication Pvt Ltd. Anand
5. *Construction Equipment Planning and Applications – Dr. Mahesh Varma*

Reference Books:

1. Construction Planning, Equipment and methods – Peurifoy- Tata McGraw Hill Publication
2. Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.
3. Journals such as CE & CR. Construction world, International Construction.
4. Dr. Kumar Niraj Jha, — Formwork for Concrete Structures, Mc Graw Hill Publication
5. Manuals, brochures, publications from construction companies, firms etc.

Program:	M. Tech. (CM)			Semester :	II	
Course :	Elective III - Construction Equipment's and Management (CEM)			Code : MCI22PE04C		
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Pre-requisite: Construction management, Basic Mathematics.

Objectives:

1. Importance of Construction Equipment and their maintenance.
2. Application of different equipment in construction industry.
3. Carry effective management of equipment.

Outcomes: After learning the course, the students should be able to:

1. Experience through stud, various applications of equipment and its management.
2. Analyze the operational role of different equipment's in construction industry.
3. Evaluate equipment maintenance and operative cost analysis.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Construction Equipment-I** Construction Equipment's – Understanding basics, Capacity, Function & Efficiency of All Machinery, involving all machinery data, power use, fuel consumption and labour utilization.	7
2.	Equipment for **Earthmoving Machinery**, Concreting Equipment, Material Handling Equipment such as cranes, boom, lift and maintenance transportation Equipment's. Bitumen Equipment's, Compacting Equipment's, rollers etc.	8
3.	**Construction Equipment's – II** a) Pile driving equipment's. b) Explosives & blasting equipment's. c) Crushers. d) Concreting equipment's including plant.	7
4.	**Work cycle** time of any machine with corrective factors, depreciation of equipment, operative cost, inventory cost control, higher/rental- a) Average Investment value, b) Annual Ownership Cost.	8
5.	**Equipment Management**: Equipment Management, Costing, Optimum utilization and Equipment selection, depreciation, interest on capital, Manpower, Spare parts etc, Documentation, Log-Books, History Books, Periodical MIS Report	7
6.	**Equipment maintenance** - Planned, unplanned, preventive, breakdown maintenance, merits and demerits of maintenance	8
	Total	45

Text Books:

1. Construction Planning, Equipment and methods – Peurifoy-Tata McGraw Hill Publication
2. Construction Technology: Analysis, and Choice, Bryan, Wiley India
3. Construction Planning, Equipment and methods – Peurifoy-Tata McGraw Hill Publication
4. Construction Equipment Planning and Applications – Dr. Mahesh Varma

Reference Books:

1. Journals such as CE & CR. Construction world, International Construction.
2. Document Reports of actual major works executed.
3. Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.
4. Dr. Kumar Niraj Jha, ― Formwork for Concrete Structures¦, Mc Graw Hill Publication

Program:	M. Tech. (Civil) Construction Management	Semester :	II
Course :	Elective III- International Contracting	Code : MCI22PE04D	

Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
3	3	3	20	20	60	100

Objectives:

1. Able to know role of International Contracting
2. Able to understand rules and regulations for international contracting
3. Able to know the roles disputes arising in international contracting and their resolution

Outcomes:

After learning the course, the students should be able to:

1. Explain the impact of international contracting in construction
2. Develop international contract documents
3. Apply disputes resolutions for international contracting

Detailed Syllabus:

Unit	Description	Duration (H)
1	International contracting – meaning, scope, nature, present status of the International construction market, role of Asia- Pacific region countries in the present construction development. Impact of WTO/GATS on the Indian Construction Sector as regards domestic market and export sector. Selection of personnel to suit socio-economic-environmental culture in other countries, suitable organizational structure.	**10**
2	Study and application of various conditions of contract under the FIDIC document. Development of regulatory framework. Project exports from India. International financing : Various institution such as WB, IMF, ADB. African bank etc. and their role, rules – regulations in funding various projects, forming alliance, bilateral and multilateral funding, trade practices etc.	**12**
3	International Projects – Types of BOT systems such as BOT, BOOT, BOO, DBO, BOR, BLT, BRT, BTO & DBFOT, MOOT, ROO, ROT, BOLT – Contractual procedures, special features, methods of handling.	**12**
4	Disputes Resolving – International Courts, formation of DRB's (Dispute resolving boards) functioning and experiences in India and abroad, Advantages of DRB's UNICTRAL Proceedings for International Arbitration. Institutionalized Arbitration, CIDC –SIAC Arbitration case studies of any 2 major project executed/functioning under International contracting.	**11**
	Total	**45**

Text Books:

Reference Books:

1. A Short Course in International Contracts: Drafting the International Sales by By Karla C. Shippe : world trade press
2. FIDIC documents
3. Construction Contracts & Claims – Simon M.S. McGraw Hill, New York
4. Unified Contract Documents by Ministry of Statistics and program implementation, Government of India.
5. Dispute Review Board Manual by Robert Matyas and Mathews.
6. International Construction Contracting – K.N.Vaidya -NICMAR Publication

Program:	M. Tech. (Civil) Construction Management			Semester:	II	
Course:	Advanced Geospatial Analytics for Construction Management (AGACM) (Elective-IV)			Code: MCI22PE05A		
Teaching Scheme			Evaluation Scheme			
Lecture	Hours	Credit	FA1	FA2	SA	Total
2	2	2	10	10	30	50

Pre-requisite: Surveying, Environmental and Infrastructure Planning, Fundamentals of Computer Applications in Civil Engineering

Objectives: After Completing this course, student will have adequate background to:-

1. Understand the principles of remote sensing, GIS, and their applications in construction management.
2. Develop skills in spatial data acquisition, processing, and geospatial analysis for infrastructure planning.
3. Utilize remote sensing techniques for project monitoring, site selection, and resource management.

Outcomes: After learning the course, the students should be able to:

1. Demonstrate proficiency in remote sensing and GIS techniques for construction planning and monitoring.
2. Apply satellite image processing and classification methods for infrastructure development.
3. Use geospatial tools for land suitability analysis, site selection, and construction project management.
4. Integrate UAV-based remote sensing and GIS for smart and real-time infrastructure monitoring.

Detailed Syllabus:

Unit	Description	Duration (H)
1.	**Fundamentals of Remote Sensing for Construction Management** • Basics of Remote Sensing: *Electromagnetic Radiation (EMR), Energy Interactions, Spectral Signatures* • Satellite and Drone-Based Remote Sensing: *Optical, Microwave, and LiDAR Sensors* • Resolutions in Remote Sensing: *Spatial, Spectral, Temporal, and Radiometric* • Applications in Construction: *Land Use Analysis, Material Inventory, Structural Health Monitoring*	**8**
2.	**Satellite Image Processing & Analysis** • Types of Remote Sensing Data: Multispectral, Hyperspectral, Thermal, and Microwave • Preprocessing Techniques: Radiometric and Geometric Corrections, Atmospheric Correction • Image Enhancement and Filtering: Contrast Stretching, Histogram Equalization, Noise Reduction • Image Transformation and Classification: Principal Component Analysis (PCA), NDVI, Supervised & Unsupervised Classification • Google Earth Engine & Cloud GIS: Big Data Analysis for Infrastructure Planning	**7**
3.	**Geographic Information Systems (GIS) for Construction** • Introduction to GIS: Components, Spatial & Non-Spatial Data, Data Models • GIS Software and Tools: ArcGIS, QGIS, Python for GIS, Web GIS Platforms • GIS in Construction Project Management: Site Analysis, Environmental Impact Assessment, Spatial Planning • 3D GIS and BIM Integration: Digital Twin Technology, Smart Construction Models • Digital Twin & BIM for Smart Infrastructure	**8**
4.	**UAV and Remote Sensing in Construction Monitoring** • Digital Elevation Models (DEM) and Terrain Mapping: Applications in Construction Site Planning • Remote Sensing for Structural Health Monitoring: Deformation Mapping, Crack Detection using Satellite Imagery • Real-Time GIS and Web-Based Mapping: GIS Dashboards for Project Management • Case Studies: GIS-Based Infrastructure Planning, Remote Sensing in Road and Bridge Construction	**7**
	Total	**30**

Text Books:		
1.	Bhatta, B. – Remote Sensing and GIS (Oxford University Press)	
2.	Lillesand, T., Kiefer, R., & Chipman, J. – Remote Sensing and Image Interpretation (Wiley)	
3.	Remote Sensing & Geographical Information System, M. Anji Reddy, BS Publications, Hyderabad, 4th Edition, 2022	
Reference Books:		
1.	Textbook on Remote Sensing, C. S. Agarwal and P. K. Garg, Wheeler Publishing House, 2000.	
2.	Campbell, J. B., & Wynne, R. H. – Introduction to Remote Sensing (Guilford Press, 5th Ed., 2011)	
3.	Chang, K. – Introduction to Geographic Information Systems (McGraw Hill, 9th Ed., 2019)	
4.	ESRI, Google Earth Engine & Open GIS Tutorials	
5.	Online Learning Portals (NPTEL, Coursera, MIT OCW)	

Program:	FY M. Tech. (Construction Management)			Semester:	II		
Course:	Disaster Mitigation and Management (Elective-IV)			Code:	MCI22PE05B		
Teaching Scheme				Evaluation Scheme			
Lecture	Tutorial	Hours	Credit	FA1	FA2	SA	Total
2	-	2	2	10	10	30	50

ior Knowledge:

1.

Course Objectives:

1. Understanding of the roles of the various phases of disaster management and issues concerning planning and policies in those phases.
2. Understanding of the role of federal, state, and local governments in disaster planning and policies.
3. Understanding of comprehensive emergency management from a planning and policy perspective, mitigation planning, factors affecting short and long-term recovery and rebuilding and the role of planners and policy-makers
4. Understanding of the factors that give rise to disaster vulnerabilities (e.g. natural, physical, social, economic, policies, and governance).
5. Knowledge and capabilities to assess and manage these vulnerabilities levels of community resilience

Course Outcomes:

After learning the course, the students should be able to:

1. Understand the necessity of disaster management measures and tools.
2. Get a sound knowledge on the technology involved in disaster management planning and mapping
3. Acquire knowledge on the various mitigation measures.
4. Understand the effect role of communication and its effectiveness in the disaster preparedness and mitigation activity

Detailed Syllabus

Unit	Description	Duration(H)
1	Introduction to– Disaster, Hazards, Exposure, Vulnerability, Risk – Types of disasters – Natural and Man-made - Earth quake, Liquefaction, Landslide, Flood, Dam break, Cyclone and Tsunami, Drought and Forest fire, Chemical, industrial and accidents. Institutional framework - Disaster Management Act, 2005, Disaster Management Cycle - Hazard identification - vulnerability and risk assessment - Mitigation strategies or measures - risk reduction	8
2	National Disaster Management Authority (NDMA), SDMA, DDMA National Executive Committee (NEC) - National Institute of Disaster Management (NIDM), National Disaster Response Force (NDRF) - Financial Arrangements, Financing the Relief Expenditure - National Disaster Response Fund (NDRF) - Monitoring of Expenditure from Relief Funds - Disaster Response Reserve - Plan and non-plan Schemes - International co-operation on DMM and Infrastructure - Vulnerabilities caused by development - Soft computing tools in assessment of vulnerability and risk. Pre and Post disaster activities - Search and rescue (SAR) – Evacuation - Logistics and supply	8
3	Communication and information management - Emergency operations management - Survivor response and coping, Security - Livelihood Restoration - Response and Recovery - Post-disaster assessment - Relief and Rehabilitation - Reconstruction - Resilience - Disaster Recovery and Rebuilding - Mitigation strategies - Prevention and Mitigation - Measuring and Mapping Vulnerability and risk - Risk reduction strategies - Structural and Non-Structural measures -	7
4	Preparedness and Planning - Mitigation Planning and Policy Strategies: Local, State, and Federal Level Capacity building - Climate Change Adaptation. Emergency Management Planning - Tools for risk reduction measures - early warning - Emergency exercises/training - Emergency communications systems - The Emergency Operation Plan (EOP) - Evacuations plans and training - Emergency personnel/contact lists - Role of Information, Communication and Geo-informatics Technologies in Disasters	7
	Total	**30**

Text Books:

1. Etkin, D. Disaster Theory: An Interdisciplinary Approach to Concepts and Causes, Elsevier Science & Technology, 2015
2. Hans Jochen Scholl, (Eds.) Disaster Management and Information Technology, Professional Response and Recovery Management in the Age of Disasters, 2023, doi.org/10.1007/978-3-031-20939-0.

3. Hans Jochen Scholl, (Eds.) Disaster Management and Information Technology, Professional Response and Recovery Management in the Age of Disasters, 2023, doi.org/10.1007/978-3-031-20939-0.
Reference Books: 1. 1. Sahni, P.and Malagola M. (Eds.). Disaster Risk Reduction in South Asia, Prentice-Hall of India, New Delhi. 2003. 2. Ramkumar, Mu, (Eds.). Geological Hazards: Causes, Consequences and Methods of Containment, New India Publishing Agency, New Delhi, 2006..
E-Resources:

Program:	FY M. Tech. (Construction Management)			Semester:		II	
Course:	Construction Supply Chain Management (Elective-IV)			Code:		MCI22PE05C	
Teaching Scheme				Evaluation Scheme			
Lecture	Tutorial	Hours	Credit	FA1	FA2	SA	Total
2	-	2	2	10	10	30	50

Prior Knowledge:

2. Nil

Course Objectives:

1. To understand the fundamentals of supply chain management in the construction industry and analyze the flow of materials, information, and finances across construction supply chains.
2. To explore the techniques for effective planning, coordination and understand the digitalization, sustainability, and risk management in construction logistics and procurement.

Course Outcomes:

After learning the course, the students should be able to:

1. Explain the concept and components of supply chain management (SCM) specific to the construction industry.
2. Analyze various supply chain structures, procurement strategies, and logistics systems in construction projects.
3. Apply optimization and digital tools to manage inventory, procurement, and logistics in construction supply chains.
4. Evaluate risks, sustainability practices, and performance metrics for improving construction supply chain operations.

Detailed Syllabus

Unit	Description	Duration (H)
1	Unit 1: Introduction to Construction Supply Chain Definition, nature, and scope of Supply Chain Management (SCM) in construction, Components: material, information, and financial flow, Characteristics of construction supply chains Vs manufacturing supply chains, Key stakeholders: owner, contractor, suppliers, consultants, Construction project life cycle and SCM linkages, Role of SCM in project performance (time, cost, quality)	7
2	Unit 2: Procurement & Logistics in Construction Procurement methods: traditional, EPC, PPP, turnkey, e-procurement, Vendor selection and prequalification processes, Logistics management: transportation, material handling, site delivery planning, Just-in-Time (JIT) delivery in construction, Material tracking and inventory control systems, Case studies on local/regional supply chain, practices in Maharashtra	8
3	Unit 3: Supply Chain Tools and Technologies Basics of lean construction and how it improves supply chain, Simple methods for improving supply chain flow (pull system, reducing waste), Introduction to software tools used in construction supply chain (e.g. MS Project, Primavera), Use of BIM (Building Information Modeling) to track materials and plan better, New technologies: barcodes, QR codes, and RFID for material tracking, Overview of smart systems like AI and blockchain (basic understanding)	7
4	Unit 4: Risk, Sustainability, and Performance in Construction SCM Risk factors in construction supply chains: political, environmental, economic, Strategies for risk mitigation, Sustainable SCM: green procurement, life cycle thinking, circular economy, Key performance Indicators for SCM in construction, Supply chain resilience and agility,National and international standards related to SCM	8
	Total	30

Text Books:

1. Sharma, J.S. & Banga, T.R. – *Construction Management and Machinery*, Khanna Publishers, 2019 (1st Edition)
2. William J. O'Brien, Carlos T. Formoso, Kerry London, and Will Hughes- Construction Supply Chain Management Handbook, CRC Press, 2010

Reference Books:

1. Ahuja, H.N., Dozzi, S.P., & Abourizk, S.M. – Project Management for Construction, Wiley,1994
2. Langford, D., & Male, S. – Strategic Management in Construction, Wiley-Blackwell, 2001 (2nd Edition)
3. Designing and Managing the Supply Chain: Concepts, Strategies and Case studies (4th Edition) by David Simchi Levi, Edith Simchi Levi, Ravi Shankar, Philip Kaminsky. McGraw Hill Education. 2022 •
4. MacCarthy, Bart L., and Dmitry Ivanov, eds. The digital supply chain. Elsevier, 2022.

Program:	M. Tech. (Civil Engineering)			Semester :		II	
Course:	Organizational Behavior in Construction Industry (Elective-IV)			Code:		MCI22PE05D	
	Teaching Scheme (Hrs/Week)			Evaluation Scheme and Marks			
Credits	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	2	--	2	10	10	30	50

Prior Knowledge:

1. Project Management,

Course Objectives: This course aims at enabling students,

1. To introduce the fundamentals of Organizational Behavior and examine how individual traits, perception, and motivation influence employee performance in construction.
2. To explore group dynamics, leadership, and the effects of organizational structure and culture on team effectiveness in construction firms.
3. To develop an understanding of leadership, decision-making, organizational change, and strategies to foster innovation and employee engagement.

Course Outcomes: After learning the course, the students should be able to:

1. Students will be able to describe OB principles and analyze how personality, perception, and motivation impact individual behavior on construction projects.
2. Students will be able to evaluate group behavior, leadership styles, and organizational frameworks that shape collaboration in construction environments.
3. Students will be able to apply leadership and change management concepts to improve innovation, adaptability, and engagement in construction organizations.

Detailed Syllabus

Unit	Description	Duration (H)
1	**Unit 1: Foundations of Organizational Behavior in Construction** 1. Definition and scope of Organizational Behavior (OB) 2. Importance of OB in the construction industry 3. Historical development and key theories of OB 4. Unique characteristics of construction organizations.	7
2	**Unit 2: Individual Behavior and Motivation in Construction Settings** 1. Personality traits and their impact on work behavior 2. Perception and attribution in organizational contexts 3. Motivation theories: Maslow, Herzberg, McClelland 4. Application of motivation theories in construction projects	8
3	**Unit 3: Group Dynamics and Team Management in Construction Projects** 1. Formation and development of teams 2. Communication processes within teams 3. Leadership styles and their effectiveness 4. Conflict resolution and negotiation strategies.	7
4	**Unit 4: Leadership and Decision-Making in Construction Management** 1. Leadership theories and their application in construction 2. Decision-making processes and problem-solving techniques 3. Ethical considerations in leadership 4. Case studies on leadership in construction projects	8
	Total	30

Reference Books:

1. Luthans, F. (2011). *Organizational Behavior: An Evidence-Based Approach*. McGraw-Hill Education.
2. Adair, J. (2006). *Effective Team Building*. Pan Macmillan.
3. Daft, R.L. (2015). *Organization Theory and Design*. Cengage Learning.
4. Northouse, P.G. (2018). *Leadership: Theory and Practice*. Sage Publications.
5. Hinze, J. (2011). *Construction Safety*. Prentice Hall.
6. Burke, W. W. (2017). *Organization Change: Theory and Practice*. Sage Publications.
7. Robbins, S.P., & Judge, T.A. (2019). *Organizational Behavior*. Pearson.
8. Armstrong, M. (2020). *Armstrong's Handbook of Human Resource Management Practice*. Kogan Page.

Program:	M. Tech. (Civil) Construction Management	Semester : II
Course :	Skill Development Lab - II (Soft Skills and English Aptitude)	Code: MCI22VS02

Teaching Scheme			Evaluation Scheme			
Practical	**Hours**	**Credit**	**TW**	**PR**	**OR**	**Total**
4	4	2	100	--	--	100

Pre-requisite: -

Objectives:

1. To facilitate holistic growth
2. To make the students aware about the significance of Soft Skills and English Aptitude
3. To develop the ability of effective communication through individual and group activities
4. To expose students to right attitude and behavioral aspects and build the same through various activities

Outcomes: After learning the course the students should be able to:

1. Express effectively through verbal/oral communication skills
2. Prepare for group discussions/meetings/interviews and presentations
3. Operate effectively in multi disciplinary and heterogeneous teams through the knowledge of team work,inter personal relationships, conflict management and leadership activities.

Guidelines :

1. Total experiments to be conducted are Six **out of eight**
2. **Total : 6 experiments in 12-15 hours**

Detailed Syllabus:

Skill Development Lab (ANY Six)

Expt.	Description	Duration (H)
1	**Group Discussion:** Make students aware of proper and globally accepted ethical way to handle work, colleagues and clients. Develop group communication skills. Learn to speak-up one's opinion in a forum. Cultivate the habit of presenting solution-driven analytical arguments making them contributors in any team.	2
2	**Public Speaking:** Any one of the following activities may be conducted : **1. Prepared speech** (Topics are given in advance, students get 10 minutes to prepare the speech and 5 minutes to deliver.) **2. Extempore speech** (Students deliver speeches spontaneously for 5 minutes each on a given topic)	2
3	**Writing An Article On Any Social Issue:** Build writing skills, improve languageand gain knowledge about how to write an article/ report	2
4	**Reading and Listening skills:** The batch can be divided into pairs. Each pair willbe given a article by the facilitator. Each pair would come on the stage and read aloud the article one by one. After reading by each pair, the other students would be asked questions and needful corrections in the article. The facilitator can evaluate the students for reading and listening skills.	2
5	**Debate On Current Affairs/ Social Relevance Topics:** Cultivate the habit to present forceful arguments while respecting the opponents perspective andenhance verbal skills.	2
6	**Telephonic etiquettes:** To teach students the skills to communicate effectively over the phone. Students will be divided into pairs. Each pair will be given different situations, such as phone call to enquire about job vacancy, scheduling a meeting with team members, phone call for requesting of urgent leave from higher authorities. Students will be given 10 min to prepare. Assessment will be done on the basis of performance during the telephone call.	2
7	**Email etiquettes:** To provide students with an in-depth understanding of writingformal emails.	2
8	**Mock interviews:** Guide students and conduct mock interviews	2
	Total	15

Text Books:

1. Barun Mitra, Personality Development and Soft Skills 2. Stephen Lucas, The Art of Public Speaking
Reference Books: 1. Marcia Weaver, Empowering Employees Through Basic Skills 2. Gerald Ratigan, Aced: Superior Interview Skills to Gain an Unfair Advantage to Land Your DREAM JOB!

Program: M. Tech. (Civil) Construction Management					Semester II:	
Course : Integrated Mini-Project					Code : MCI22EL02	
Teaching Scheme			Evaluation Scheme			
Practical	Hours	Credit	TW	PR	OR	Total
6	6	3	50	--	50	100

Pre-requisite: UG Seminar and UG Project

Objectives:

1. To plan for various activities of the project and channelize the work.
2. To build, design and implement real time application using available platforms

Outcomes: After learning the course the students should be able to:

1. Understand, plan and execute a Mini Project.
2. Design real time application
3. Prepare a technical report based on the Mini project.
4. Deliver technical seminar based on the Mini Project work carried out.
5. Understand publication and copyright process of research

Guidelines: Total: 24 H (minimum contact) + 48 H (non-contact/implementation)

1. Individual student needs to design and demonstrate Mini-project under the guidance of allocated guide.
2. Students can choose the project considering their future implementation in Major Project in second year.
3. The Site selections or lab selection for experimentation or data collections and analysis should be visited by the guide.
4. Mini-Project Report should be submitted as a compliance of term work along with a diary report signed by the Site Engineer / Contractor / owner associated with site.
5. Paper publication associated with mini-project as research outcome should be given more weightage in Term work marks.
6. Mini-project work preferably should be completed on site or lab under supervision of the allocated guide.

Detailed Syllabus:

Integrated Mini-Project

Sr. No.	Activity
1.	**Week 1 & 2** : Mini-project guide allotment, finalization of topic and platform, Planning of the work
2.	**Week 3 & 4**: Literature review and specification and Methodology Finalization, **Review 1** for finalization of topic and specification.
3.	**Week 5 & 6** : Simulation of Idea on appropriate testing/experimentation/data collection and Analysis and summarizing Observations and
4.	**Week 7 & 8** : understanding observations and trials for next level achievements or modifications if needed after **Review 2** to understand the progress of the project
5.	**Week 9 & 10**: Mini Project Report writing and publication or copyright planning and execution.
6.	**Week 11 & 12**: Demonstration of Project work and Final **Review 3** for submission and term work Compliances.

Program:	M. Tech (Civil) Construction Management				Semester: II	
Course:	Seminar				Code: MCI22EL03	
Teaching Scheme			Evaluation Scheme			
Practical	Hours	Credit	PR	TW	OR	Total
4	4	2	--	50	50	100

Objectives:

1. To work on a specific technical topic in Construction Management and technology, in order to acquire the skills for technical communication.
2. To acquire technical writing abilities for seminars and conferences.

Outcomes: After learning the course the students should be able to:

1. Identify and define a problem statement.
2. Evaluate literature in chosen area of research and define (establish) scope of work.
3. Develop research methodology for seminar work.
4. Prepare technical report.

Guidelines:

1. Individual student need to study recent topics in the field of Construction Management under the guidance of allocated guide.

2. Students can choose topic related to Construction Management, considering recent trends and its societal importance.

3. The extensive Literature Survey, Mathematical Modeling of particular method, experimentation and valuable conclusion is expected from seminar study.

4. Seminar Report should be submitted as a compliance of term work.

5. Technical paper publication is expected as outcome of seminar.

6. Total Duration: 24 Contact Hours and additional 24 Hours should be spend by students on completion of related activities and requirements.

Detailed Syllabus:

Seminar Activities

Sr. No.	Activity	Duration (H)
1.	**Week 1, 2 & 3**: Guide allotment, finalization of topic, Planning of the work. **Review-1** conduction	12
2.	**Week 4 & 5**: Literature review, Specification and Methodology Finalization, of detail topic.	8
3.	**Week 6, 7 & 8**: Detail Topic Mathematical model, Experimentation methodology and findings. **Review-2** conduction	12
4.	**Week 9 & 10**: Comparison of detail topic with other existing methods.	8
5.	**Week 11 & 12**: Seminar Report writing and publication or copyright planning **Final Review** conduction.	8
	Total	48

Course Syllabus

Semester-III

Program:	**M. Tech (Civil) Construction Management**				**Semester : III**	
Course :	Dissertation Phase – I [Company/ In-house project]				**Code :MCI23EL04**	
Teaching Scheme			**Evaluation Scheme**			
Practical	**Hours**	**Credit**	**FA**	**TW**	**OR**	**Total**
20	20	10	-	100	150	250

Essentials:

1. The knowledge acquired by the students through seminar and project at bachelor engineering program.
2. The knowledge acquired by the student from all theory courses and laboratory work done in Sem I and Sem II in first year M.Tech.

Objectives:

1. To develop innovative and research oriented applied work which contribute to the needs ofthe society.
2. To provide an opportunity of planning, designing and developing complete system or subsystem in the area of construction management and technology, where the students like to acquire specialized skills.
3. To inculcate research culture in students for their technical growth.

Outcomes: After learning the course the students should be able to:

1. Identify and define a problem statement.
2. Critically evaluate literature in chosen area of research and define (establish) scope of work.
3. Develop research methodology.
4. Carryout theoretical study and / or experimental work to demonstrate technical competency.
5. Prepare technical report for research article / copy right / IPR.
6. Develop solution for the benefit of society and environment.

Guidelines :

1. Individual student should carry out project work/ dissertation work under the supervision of allocated guide in the concerned Department.
2. Sponsored Project or Project Internship is acceptable considering postgraduate scope. A candidate may however, in certain cases, be permitted to work on the project in an Industrial/Research Organization, on the recommendation of Head of the Department, with the approval of the Head of the Institution. In such cases, the project work shall be jointly supervised by a supervisor of the Department and an Engineer / Scientist from the organization and the student shall be instructed to meet the supervisor periodically and to attend the review committee meetings for evaluating the progress.
3. Students have to select a topic for the dissertation, based on his/her interest and available facilities at the commencement of dissertation work.
4. Dissertation work may cover analytical formulation, experimentation or survey based project or combination of these and can also undertake an interdisciplinary type project.
5. Student should present the Synopsis Submission Presentation with literature survey report to justify the research gap, innovativeness, applicability, relevance and significance of the work.
6. Student should undertake project work after approval of synopsis.
7. Students are required to search, collect and review sufficient research articles published in chosen area of research from peer reviewed journals.
8. Students should complete the dissertation phase-I work that will consist of problem statement, literature review: project overview, scheme of implementation (Mathematical Model/block diagram/PERT chart, etc.) and layout & design of setup if any.
9. Student should submit a dissertation phase-I report on the research work carried out by him/her as a compliance of term work associated with course.

10. Dissertation phase-I presentation and oral will be based on preliminary results from his/herwork during the semester with report.

11. It is expected to submit the project and plagiarism report within 30 days from the last day ofend of semester in which dissertation work is done.

13. For non-satisfactory performance, student will be given grace period of 2 weeks. After 2weeks student will be again evaluated with grade penalty.

14. Minimum 02 presentations should be delivered by the student during semester.

15. Paper publication is expected as research outcome of dissertation phase-I (Conference or reputed journal) and 40% of planned project work should be completed for submission of Dissertation Phase-I.

16. Total 120 hours are expected to be spend by students to satisfy all project requirements and implementations.

Detailed Syllabus:

Dissertation Phase – I [Company/ In-house project]

Sr. No.	Activity
1.	**Week 1, 2 & 3**: Guide allotment, applying for sponsorship and project internship,finalization of topic, Planning of work and required tools. **Review 1** for Title finalization.
2.	**Week 4 & 5**: Literature collection, Specification and Methodology Finalization, **Review 2** for Literature Analysis and specification.
3.	**Week 6, 7 & 8**: Detail literature review, planning of the necessary tools/resources for implementation and/or related software,
4.	**Week 9 & 10**: Finalization of scheme of implementation (Mathematical Model/block diagram/chart, etc.) and layout & Design of experimental setup if any. Survey, data Collection planning. **Review 3** to understand the progress of the work.
5.	**Week 11 & 12**: Project Report writing / copyright.

Program:	M. Tech (Civil) Construction Management				Semester: III	
Course:	MOOCs				Code: MCI23EL05	
Teaching Scheme			Evaluation Scheme			
Practical	Hours	Credit	FA	TW	OR	Total
4	4	2	--	100	--	100

Guidelines :

1. Individual student need to register for MOOC course of their interest or entrepreneurship related trainings.
2. Weekly assignment needs to be regularly completed as per requirement of course, which will be considered for internal assessment of course.
3. The certification of course or training is mandatory.
4. Oral and presentation of course/ training will be taken at the end of semester by internal / external examiner.
5. Total Duration: 24 Contact Hours and additional 24 Hours should be spend by students on completion of related activities and requirements.

Program:	M. Tech (Civil) Construction Management				Semester: III	
Course:	Internship I [Company / In-house]				Code: MCI23EL06	
Teaching Scheme			Evaluation Scheme			
Practical	Hours	Credit	FA	TW	OR	Total
12	12	6	--	50	50	100

Guidelines:

1. Individual student should attempt for internship with help of PCCOE T&P cell / T&Pdepartmental coordinator in the **Construction Management domain** under the guidance ofinternship coordinator.
2. The presentation is expected from the students based on their internship work.
3. Internship report should be submitted as a compliance of term work associated with subject.
4. Total Duration: 24 Contact Hours and additional 24 Hours should be spend by students on completion of related activities and requirements.

Detailed Syllabus:

Internship/ In-house / Entrepreneurship activity

Sr. No.	Activity	Duration (H)
1.	**Week 1, 2 and 3**: Guide allotment, Application of internships, finalizationof topic, Planning of the work. **Review-1** conduction	6
2.	**Week 4 & 5**: Internship/ Mini-project/ Entrepreneurship activity implementation as per requirements	4
3.	**Week 6 to 8**: **Review-2** of Activities	6
4.	**Week 9 & 10**: Interaction of Guides with Industry, Presentation	4
5.	**Week 11 & 12**: Internship Report writing, **Final Review** conduction.	4
	Total	24

Program:	M. Tech (Civil) Construction Management				Semester: III	
Course:	Research / Review Paper Writing				Code: MCI23EL07	
Teaching Scheme			Evaluation Scheme			
Practical	Hours	Credit	FA	TW	SA	Total
4	4	2	--	50	--	50

Pre-requisite: Basics of Technical writing is essential

Course Objectives: This course will enable students

1. To provide an opportunity to the students to carry out research review of specific topic
2. To familiarize students with publication support tools

Course Outcomes: After learning the course, the students will be able to:

1. Develop an ability to learn the concept of Literature Review, Technical Reading, Critical Evaluation, Attributions and Citations.
2. Use publications tools such as writing tools, plagiarism tools and AI writing tools.
3. Understand Publication Ethics and their impact in research.
4. Prepare a technical review paper with appropriate statistics and conclusions.

Guidelines:

1. Individual student need to find the specific area of research under the guidance of allocated supervisor.
2. Student need to collect at least 25 papers in specified area.
3. They have to prepare Literature review on the basis of papers collected.
4. Student is supposed to appropriate writing tools such as Latex for preparation of material.
5. Student need to learn tools for good English writing such as Grammarly.
6. Students need to use plagiarism and AI writing checking tools for their document.
7. **Three reviews** will be scheduled to assess progress of the research work.
8. Student must publish the good review paper in conference/ journal.

One MOOCs course related to Research Review Writing is advisable.

Detailed Syllabus:

	Description	
1	Guide allotment and selection of research area	
2	Finalize research review topic and scope of research	
3	Conducting critical literature review: Selection of appropriate research papers, Critical reading and thinking, Comparative analysis of the papers, Finding a research Gap	
4	Review-1 (Will be conducted in Week 5-6): Expectation: Discussion on the Area of research selected for review	
5	Review-2 (Will be conducted in Week 11): Expectations: Discussion on paper downloaded, their findings , tools used till now	
6	Write a research review paper. Software for paper formatting like LaTeX/MS Office etc can be used Citing styles and tools such as Google scholar, Mendley etc Reference Management Software like Zotero/Mendeley etc. ***MOOC on Research Paper Writing and Certificate for same will be given more weightage***.	

Course Syllabus

Semester-IV

Program:	**M. Tech. (Civil) Construction Management**				**Semester : IV**	
Course:	Dissertation Phase – II [Company/ In-house project]				**Code : MCI24EL08**	
Teaching Scheme			**Evaluation Scheme**			
Practical	**Hours**	**Credit**	**TW**	**PR**	**OR**	**Total**
28	28	14	250	--	150	400

Essentials:

1. The knowledge acquired by the students through seminar and project at bachelor engineering program.
2. The knowledge acquired by the student from all theory courses and laboratory work done in Sem I and Sem II in first year M. Tech.

Objectives:

1. To develop innovative and research oriented applied work which contribute to the needs of the society.
2. To provide an opportunity of planning, designing and developing complete system or subsystem in the area of construction management and technology, where the students like to acquire specialized skills.
3. To inculcate research culture in students for their technical growth.

Outcomes: After learning the course the students should be able to:

1. Identify and define a problem statement.
2. Evaluate literature in chosen area of research and define (establish) scope of work.
3. Develop research methodology.
4. Carryout theoretical study and / or experimental work to demonstrate technical concepts.
5. Prepare technical report for copy right, IPR and research article.
6. Develop solution for the benefit of society and environment.

Guidelines :

1. The student should complete the remaining major part of the project in this semester IV, which will consist of the experimental set up and analysis required for the project or software based analysis, validation of results and conclusions.
2. The student should prepare the duly certified final report of the project work in standard format within 30 days after end of the last day of semester IV.
3. Final Project Report should be submitted as a compliance of term work associated with course.
4. For non-satisfactory performance, student will be given grace period of 4 weeks. After 4 weeks student will be again evaluated with grade penalty.
5. If a candidate fails to submit the dissertation on or before the specified deadline, he / she is deemed to have incomplete dissertation and should re-register for the same in subsequent semester.
6. Student should present / publish minimum 1 research paper in peer reviewed conference/research journals as research outcome of Dissertation Phase – II (Conference or reputed journal) and 100% of planned project work should be completed for submission of Dissertation Phase-II
7. Total Duration: 144 hours are contact hours with guides and for reviews , 144 hours are expected to be spend by students to satisfy all project requirements and implementations.

Detailed Syllabus:

Dissertation Phase – II

Sr. No.	**Activity**
1.	**Week 1 & 2**: Experimental set up required for the project, Experimental or software analysis etc. completed
2.	**Week 3 & 4**: 60 % Work should be completed. Progress **Review 1** conduction.
3.	**Week 5 & 6**: 80% work should be completed. Taking results, analysis and validation of results.
4.	**Week 7 & 8**: Compliance of 100 % work. Progress **Review -2** will be conducted to check the quality of project and requirements fulfillment to permit project submission.

5.	**Week 9 & 10**: Paper writing and report writing should be in process	
6.	**Week 11 & 12**: Project Report writing, patent and copyright planning and execution. Demonstration of Project work and **Final Research Review** Committee (RRC) reviews will be conducted for submission and term work compliances.	

Program:	**M. Tech (Civil) Construction Management**			**Semester: IV**		
Course:	Internship II [Company / In-house]			**Code: MCI24EL09**		
Teaching Scheme			**Evaluation Scheme**			
Practical	**Hours**	**Credit**	**FA**	**TW**	**OR**	**Total**
12	12	6	--	50	50	100

Guidelines:

1. This Internship should be in extension of Internship I, for the same site preferably with same Builder / Contractor.
2. The presentation is expected from the students based on their internship work.
3. Internship report should be submitted as a compliance of term work associated with subject.
4. Total Duration: 24 Contact Hours and additional 24 Hours should be spend by students on completion of related activities and requirements.

Detailed Syllabus:

Internship/ In-house / Entrepreneurship activity

Sr. No.	**Activity**	**Duration (H)**
1.	**Week 1, 2 and 3**: Guide allotment, Application of internships, finalization of topic, Planning of the work. **Review-1** conduction	**6**
2.	**Week 4 & 5**: Internship/ Mini-project/ Entrepreneurship activity implementation as per requirements	**6**
3.	**Week 6 to 8**: **Review-2** of Activities	**6**
4.	**Week 9 & 10**: Interaction of Guides with Industry, Presentation	**6**
5.	**Week 11 & 12**: Internship Report writing, **Final Review** conduction.	**6**
	Total	**30**

VISION AND MISSION and POs OF CIVIL ENGINEERING DEPARTMENT

Vision

To establish as a premier civil engineering department in Maharashtra in the coming five years by providing quality education, fostering innovation with ethical values to serve the society.

Mission

1. Fostering value-based education to achieve academic excellence with the right attitude and professional ethics.
2. Inculcating a culture of research and innovation, with an aim of serving society in a sustainable manner.
3. Developing skilled civil engineers with an ability to provide solutions to meet national and global challenges in accordance with the needs of the society.

Program Outcomes

PO1: Able to undertake research /investigation and development work independently for solving problems.

PO2: Capable to write and present ethically a meaningful technical report.

PO3: Able to demonstrate a degree of mastery over the construction management area. The mastery should be at a level higher than the requirements in the appropriate bachelor program**.**

PO4: Able to use modern-day engineering tools to evaluate social, economic, legal, health, and cultural issues that are pertinent to construction engineering practice.

PO5: Able to apply construction management principles independently or as a team, embracing lifelong learning in the ever changing technological advancements.

Higher Study Scope: PhD. Research Centre at PCCOE.

- Computer Engineering
- E&TC Engineering
- Mechanical Engineering
- Civil Engineering

Features of PhD Research Centers

- Experienced Research Guides
- Separate Research Laboratories, Library, licensed software, recent hardware and other Facilities
- Good support for Publications.
- Justified and clear evaluation systems
- Defined rules and regulations for evaluation and submission.
- Effective Course work conductions