

# M-TECH (CPM)

**DEPARTMENT OF CIVIL ENGINEERING  
INDUS INSTITUTE OF TECHNOLOGY AND ENGINEERING  
INDUS UNIVERSITY**

**M-TECH (CPM), SEMESTER –I TEACHING & EXAMINATION SCHEME  
WITH EFFECT FROM JULY 2017**

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					TOTAL	
			L	T	P			THEORY		PRACT		TOTAL		
								CIE		ESE	CIE			ESE
								MID	IE					
1	CP0101	Construction Project Management , Tools and Techniques	3	2	0	4	5	30	10	60	-	-	100	
2	CP0102	Legal Framework of Construction Projects	3	2	0	4	5	30	10	60	-	-	100	
3	CP0103	Construction Materials and Equipment Management	3	2	0	4	5	30	10	60	-	-	100	
4	CP0104	Construction Finance Management	3	2	0	4	5	30	10	60	-	-	100	
5	CP0105	Construction Software Applications (AutoCAD-BIM)	0	0	6	3	6	-	-	-	40	60	100	
6	CP0106	Construction Management Software-I (Microsoft Project)	0	0	6	3	6	-	-	-	40	60	100	
7	Ref Annex - I	Elective I	3	0	0	3	3	30	10	60	-	-	100	
<b>TOTAL</b>			<b>15</b>	<b>08</b>	<b>12</b>	<b>25</b>	<b>35</b>	<b>150</b>	<b>50</b>	<b>300</b>	<b>80</b>	<b>120</b>	<b>700</b>	

**ANNEX – I (ELECTIVE – I)**

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					TOTAL	
			L	T	P			THEORY		PRACT		TOTAL		
								CIE		ESE	CIE			ESE
								MID	IE					
1	CP0107	Management Information System	3	0	0	3	3	30	10	60	-	-	100	
2	CP0108	Infrastructure Development	3	0	0	3	3	30	10	60	-	-	100	

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3	CP0109	Lean Construction	3	0	0	3	3	30	10	60	-	-	100
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**INDUS UNIVERSITY**

**M-TECH (CPM), SEMESTER –II TEACHING & EXAMINATION SCHEME**  
**WITH EFFECT FROM JULY 2017**

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					TOTAL	
			L	T	P			THEORY		PRACT		TOTAL		
								CIE		ESE	CIE			ESE
								MID	IE					
1	CP0201	Advance Construction Project Management	3	2	0	4	5	30	10	60	-	-	100	
2	CP0202	Construction Quality Management	3	2	0	4	5	30	10	60	-	-	100	
3	CP0203	Advance Quantity Surveying	2	4	0	4	6	30	10	60	-	-	100	
4	CP0204	Value Engineering	2	2	0	3	4	30	10	60	-	-	100	
5	CP0205	Construction Safety Management	3	0	0	3	3	30	10	60	-	-	100	
6	CP0206	Construction Management Software-II (Primavera)	0	0	4	2	4	-	-	-	40	60	100	
7	CP0207	Seminar	0	0	4	2	4	-	-	-	40	60	100	
8	Ref Annex - II	Elective-II	3	0	0	3	3	30	10	60	-	-	100	
<b>TOTAL</b>			<b>16</b>	<b>10</b>	<b>08</b>	<b>25</b>	<b>34</b>	<b>180</b>	<b>60</b>	<b>360</b>	<b>80</b>	<b>120</b>	<b>800</b>	

**ANNEX – II (ELECTIVE – II)**

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					TOTAL	
			L	T	P			THEORY		PRACT		TOTAL		
								CIE		ESE	CIE			ESE
								MID	IE					

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									MID	IE			
1	CP0208	Green Building	3	0	0	3	3	30	10	60	-	-	100
2	CP0209	Energy Conservation System in Building Construction.	3	0	0	3	3	30	10	60	-	-	100
3	CP0210	Building Maintenance Management	3	0	0	3	3	30	10	60	-	-	100

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<b>M-TECH (CPM), SEMESTER –III TEACHING &amp; EXAMINATION SCHEME WITH EFFECT FROM JULY 2017</b>													
SR NO	CODE	SUBJECTS	TOTAL CREDITS	TEACHING SCHEME (HOURS)			EXAMINATION SCHEME						TOTAL
							INTERNAL			EXTERNAL			
				REPORT	VIVA-VOCE	PRESENTATION	REPORT	VIVA-VOCE	PRESENTATION				
L	T	P											
1	CP0301	Dissertation Phase –I	20	-	-	40	50	50	50	50	50	50	300
<b>TOTAL</b>			<b>20</b>	<b>-</b>	<b>-</b>	<b>40</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>300</b>

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M-TECH (CPM), SEMESTER –IV TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017													
SR N O	CODE	SUBJECTS	TOTAL CREDITS	TEACHING SCHEME (HOURS)			EXAMINATION SCHEME						TOTAL
				L	T	P	INTERNAL			EXTERNAL			
							REPORT	VIVA_VOCE	PRESENTATION	REPORT	VIAV_VOCE	PRESENTATION	
1	CP0401	Dissertation Phase – II	20	-	-	40	50	50	50	50	50	50	300
<b>TOTAL</b>			<b>20</b>	<b>-</b>	<b>-</b>	<b>40</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>300</b>

Department of Civil Engineering, IITE,  
Indus University

# 1<sup>st</sup> Semester

M-TECH (CPM), SEMESTER –I TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
			L	T	P			THEORY			PRACT		TOTAL
								CIE		ESE	CIE	ESE	
			MID	IE									
1	CP0101	Construction Project Management , Tools and Techniques	3	2	0	4	5	30	10	60	-	-	
2	CP0102	Legal Framework of Construction Projects	3	2	0	4	5	30	10	60	-	-	100
3	CP0103	Construction Materials and Equipment Management	3	2	0	4	5	30	10	60	-	-	100
4	CP0104	Construction Finance Management	3	2	0	4	5	30	10	60	-	-	100
5	CP0105	Construction Software Applications (AutoCAD-BIM)	0	0	6	3	6	-	-	-	40	60	100
6	CP0106	Construction Management Software-I (Microsoft Project)	0	0	6	3	6	-	-	-	40	60	100
7	Ref Annex - I	Elective I	3	0	0	3	3	30	10	60	-	-	100

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<b>TOTAL</b>	<b>15</b>	<b>08</b>	<b>12</b>	<b>25</b>	<b>35</b>	<b>150</b>	<b>50</b>	<b>300</b>	<b>80</b>	<b>120</b>	<b>700</b>
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**ANNEX – I (ELECTIVE – I)**

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
			L	T	P			THEORY			PRACT		TOTAL
								CIE		ESE	CIE	ESE	
								MID	IE				
1	CP0107	Management Information System	3	0	0	3	3	30	10	60	-	-	100
2	CP0108	Infrastructure Development	3	0	0	3	3	30	10	60	-	-	100
3	CP0109	Lean Construction	3	0	0	3	3	30	10	60	-	-	100

<b>Subject: Construction Project Management, Tools and Techniques</b>								
<b>Program: M. Tech. In Civil Engg. (Construction Project Management)</b>				<b>Subject Code: CP0101</b>			<b>Semester: I</b>	
<b>Teaching Scheme</b>				<b>Examination Evaluation Scheme</b>				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	2	-	4	30/60	-	20/40	-	50/100

**Course Objectives:**

- Provide basics knowledge of Construction Project Management.
- Impart knowledge on concepts and structure of construction project and its life cycle.

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- To provide information regarding project management functions and its role.
- Provide knowledge on construction management tools and techniques.

**Course Outcomes:**

- Clear differentiate between construction management and project management and its application.
- Apply fundamental principles of construction project management for real project management in construction sectors.
- Know basics of project management functions and its roles
- Capable in application of project management tools and techniques in planning and scheduling of construction projects.

**COURSE CONTENTS:**

**UNIT-I**

**[15]**

**Introduction to Construction Project Management:** Construction as industry and its challenges; Roles and Objectives of Construction Management; Definition & Scope of Project; Definition, Concept & Scope of Project Management; Project Purpose and Types; Project Maturity Level; Role, Responsibilities and Competencies of a Project Manager; Enhancing the Probability of Success of a Project; Project Planning and Implementation Cycle; Main Causes of Project Failure.

**Construction Project Concept Analysis & Feasibility Study:** Project Need Analysis; Project Feasibility Study; Project investment Analysis and Appraisal; Project Implementation strategy; Feasibility Study: Concept, Purpose, Analyzing Factors affecting Project Feasibility – Market Analysis, Technical Analysis and Financial Analysis; Feasibility Report

**UNIT-II**

**[12]**

**Management Functions:** Management Functions - Planning, Scheduling, Organizing, Staffing, Directing, Controlling & Co-ordination; Construction Project Stakeholders.

**Project Life Cycle:** Project Life Cycle – Phases & Processes – Initiation, Planning, Execution, Control & Closing; Fast-track Project Approach

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**Project Scheduling & Planning:** Scheduling Principles, Bar Charts (Gantt charts); Merits and Limitations of Bar Charts; Milestone charts; Line of balance chart, S-curve; Schedule Classification

**UNIT-III** [12]

**Project Networking Techniques - I** – Critical Path Method (CPM); PERT (Program Evaluation & Review Technique); Arrow Diagram; Network Logic Diagram; Activity on Arrow Network (AOA) – Concept, Rules of Network, Calculative Examples; Difference between CPM and PERT Techniques.

**UNIT-IV** [15]

**Project Networking Techniques – II** - Activity on Node (AON) /Precedence Diagram Method (PDM) Network – Concept, Type of Dependencies in a network and Calculative Examples; Time Estimates – One Time, Three Time Estimate (Optimistic, Most Likely & Pessimistic); Slack; Total, Free & Independent Floats; Merits and Limitations of Network Analysis Techniques

**Practical Approach:** Project Planning & Scheduling Procedures & Processes adopted in the Construction Industry – Flowchart.

**Text Books:**

1. Chitkara K K, (2011), “Construction Project Management- Planning, Scheduling and Controlling”– Tata McGraw Hill Education Private Limited.
2. Punmia B C, Khandewal, (2012), “Project Planning and Control with PERT and CPM” – Laxmi Publications Private Limited.
3. Rangwala S C, (2012), “Construction of structures and management of works” –Charotar Publishing House Private Limited.

**Reference Books:**

1. Kotadia A S, (2012), “Construction Management and Equipments” – Mahajan Publishing House.

2. PMBOK Guide – 5<sup>th</sup> Edition
3. Nicholas, John M. “Managing Business & Engineering Projects”
4. Joy, P.K. “Handbook of Construction Management” Macmillan, Delhi, 1990
5. Iyer, P. Parameshwar “Engineering Project Management with Case Studies” Wheeler Publishing (A division of A.H. Wheeler & Co. Ltd., New Delhi, Allahabad)
6. Gopalakrishnan P, (2011), “Handbook of Materials Management” - PHI Learning Private Limited.
7. Harris, F. & McCaffer, R. “Modern Construction Management” BSP Professional Books, Oxford London Edinburgh.

#### **Web Resources:**

1. Beginner’s guide for construction project management -  
<https://www.smartsheet.com/construction-project-management-101>

#### **MOOCs:**

1. Construction Management - <https://www.mooc-list.com/tags/construction-management>
2. Project Management - <https://www.mooc-list.com/tags/project-management>
3. Introduction to Construction project management- <https://www.mooc-list.com/course/construction-project-management-coursera>
4. Project Management Techniques for Development Professionals (<https://www.mooc-list.com/course/construction-project-management-coursera>)
5. Initiating and Planning Projects (<https://www.mooc-list.com/course/construction-project-management-coursera>)
6. Project Management: The Basics for Success (<https://www.mooc-list.com/course/construction-project-management-coursera>)
7. Principles of Project Management (<https://www.mooc-list.com/tags/project-management>)
8. Best Practices for Project Management Success (<https://www.mooc-list.com/tags/project-management>)
9. Fundamentals of Project Planning and Management (<https://www.mooc-list.com/course/construction-project-management-coursera>)

10. Managing Project Risks and Changes (<https://www.mooc-list.com/course/construction-project-management-coursera>)

Subject: <b>Legal Framework of Construction Projects</b>								
Program: <b>M. Tech. In Civil Engg.</b> <b>(Construction Project Management)</b>				Subject Code: <b>CP0102</b>			Semester: <b>I</b>	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation	Continuous Internal Evaluation	Total

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						<b>(CIE)- Theory</b>	<b>(CIE)- Practical</b>	
3	2	-	4	30/60	-	20/40	-	50/100

**Course Objectives:**

- To focus on Contract Management Process.
- To explore various Contracts prevailing in Construction Industry.
- To implement Specifications effectively.
- To emphasize Tendering Process.

**Course Outcomes:**

- Understanding Contract Management Process.
- Gaining knowledge about various Contracts prevailing in Construction Industry.
- Implementation of Specifications effectively.
- Getting idea about whole Tendering Process.

**COURSE CONTENTS:**

**UNIT-I**

**[14]**

**Fundamentals of Contract Management:** Importance of Contract Management; History of Contract in India; Contract –Definition, Basic Terminologies of Contract & General Principles; Interpretation Clause of “The Indian Contract Act – 1872”; Essentials of Government Contract; Departmental execution and Contract System; Earnest Money Deposit; Security Deposit

**Classification & Types of Contracts:** Understanding Cost Analysis of Project, Classification of Contracts: Based on Purpose (Full, Labour, Turnkey, Procurement, Transport, Erection & Consultancy) & Economic Classification (Fixed Price, Fixed Price with Escalation, Cost Plus Type Contracts, Build Own Operate & Transfer (BOOT)); Standard Form Contracts – Lump Sum, Item Rate & Percentage Rate.

**Parties to the Contract:** Roles & Responsibilities of Parties to the Contract – Owner, Designer, Consultants, Contractor, Supplier, Employees and Other Parties; Relationship among the Parties – Traditional Arrangement, Management Arrangement and Package Arrangement.

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## UNIT-II

[13]

**Parts of Contract:** Major Parts of Contract- Agreement, Conditions, Specifications, BOQ & Drawings; Bonus Clause in Contract Document – Introduction, Advantages, Disadvantages and Discussion.

**Tendering Process:** Notice Inviting Tender – Concept & Case Studies; E-Tendering; Pre-Qualification Criteria and Comparison – Case Study; Types of Tenders – Open, Limited & Single/Negotiated Tenders; Bidding System – One, Two & Three Envelope System; Pre-Bid Meeting; Tender Submission; Tender or Bid Opening –Government Department & Private Sector; Tender Offers; Acceptance of Tender Offer; Negotiation; Award of Contract; Bidding Process.

## UNIT-III

[14]

**Specifications of Contract:** Principles of Good Specification Writing; Types of Specifications – Brief Specifications & Detailed Specifications; Sources of Specifications; Particular Specifications – Open, Restricted, Closed, Prescription, Performance and Proprietary; Language of Specifications.

**Dispute Resolution:** Dispute – Concept, Nature of Disputes – Technical, Managerial & Financial; Areas of Disputes, Consequences, Reasons for Disputes; Dispute Resolution – Means & Methods – Litigation & Judicial Intervention; Amicable Settlement; Alternative Dispute Resolution – Negotiation, Conciliation, Mediation, Arbitration; Arbitration Tribunal, Arbitration Proceedings, Arbitration Settlement, Principles of Arbitration & Documentation; Contract Correspondence and its significance in Dispute Minimization and Resolution.

## UNIT-IV

[13]

**Fair and Equitable Contract & FIDIC Conditions of Contract:** Fair & Equitable Contract: Concept, Importance & Necessity – Contractor’s view, Client’s view, Indirect Participant and their influences FIDIC Conditions of Contract: Concept; Overview; Clauses of FIDIC Conditions of Contract; Clauses of Military Engineering Services Conditions of Contract; Comparison of FIDIC & MES.

**Administration, Management and Performance of Contract in Construction Projects :**  
Concept; Major Conditions of Contract; Engineer's Duty & Authority, Obligations of Contractor & Employer, Extras & Variations, Termination of Contract – Project Based Case Studies  
**An overview of “The Indian Contract Act, 1872”**

**Text Books:**

1. Handbook of Contracts: Hudson
2. Civil Engineering Contracts and Estimates by Dr. B. S. Patil

**Reference Books:**

1. Indian Contract Act (1872)
2. Explanation of Indian Contract Act: Mulla and Sanjeeva Rao, B.D. Virmani, B. T. Gajaria
3. Turner, J.R. (2003). Contracting for Project Management. Surrey, UK: Gower Publishing Ltd.
4. Construction Contract Management , Prakash V.A., NICMAR, BOMBAY
5. Construction Contracting, Clough Rich arch, John Wiley & Sons, New York, 1986.
6. Harris, F., and McCaffer, R., 2005, Modern Construction Management, 5<sup>th</sup> Edition, Blackwell Publishing.

**Web Resources:**

1. [www.fidic.org](http://www.fidic.org)
2. <https://indiankanoon.org/doc/171398/>
3. [www.cpwd.gov.in](http://www.cpwd.gov.in)
4. [https://en.wikipedia.org/wiki/Contract\\_management](https://en.wikipedia.org/wiki/Contract_management)
5. <https://theconstructor.org>
6. [www.civiltutorial.org](http://www.civiltutorial.org)
7. <http://civilblog.org>

**MOOCs:**

1. Contract Law: From Trust to Promise to Contract ([https://www.mooc-](https://www.mooc-approved.com) Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

list.com/tags/contracts)

2. Contract Management: Building Relationships in Business (<https://www.mooc-list.com/tags/contract-management>)

<b>Subject: Construction Materials and Equipment Management</b>		
<b>Program: M. Tech. In Civil Engg. (Construction Project Management)</b>	<b>Subject Code: CP0103</b>	<b>Semester: I</b>

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Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	2	-	4	30/60	-	20/40	-	50/100

### Course Objectives:

- To impart the importance of material management in construction sector.
- To explore the functions and process of material management.
- To study the various material management techniques.
- Learn how to apply engineering fundamentals and analyses to planning, selection and utilization of construction equipments

### Course Outcomes:

- Students will clearly understand the importance of subjects in today fast growing construction industry.
- Will be clear about process and types of material management and functions.
- Will in capable to choice the right types of equipment for particular type of the jobs and will be get knowledge the other technical accepts and limitations of various equipments at the end of this subject.

### COURSE CONTENTS:

#### UNIT-I

[15]

**Introduction to Material Management:** Definitions, functions, objectives- primary and secondary, departments or parts of material managements, advantages.

**Material Planning:** Importance's, definitions, flowchart, techniques and examples of material planning.

**Purchase:** Importance's, definitions, objectives, principles, purchase cycle, types of purchase, vendor evaluation types and vendor rating and examples of vendor evolution and vendor rating.

**Store, Store Keeping:** Definition's and its importance, functions, store location and layout, store systems and procedures, and store accounting & verifications.

## **UNIT-II** **[15]**

**Classification and Codification:** Need, classification of material, nature of codification, process of codification, merits and demerits of codification, codification system.

**Inventory Control:** Introduction, definition's, importance and scope, inventory models, models on economic order quantity without and with shortages and examples on inventory control.

**Selective inventory model and tools:** ABC Analysis; Just in time; Value engineering; HML, VED FSN, WIP.

## **UNIT-III** **[12]**

**Selection of Construction Equipment:** Introduction; Classification of equipment's; Standard types of equipments; Special equipment; Financial aspects of equipment; Owning and operating costs; Depreciation costs; Economic life of construction equipment.

**Equipment management and engineering fundamental:** General information; Soil fundamental; Rolling resistance; Effect of grade on required tractive effort; Coefficient of traction; Drawbar pull; Rim pull; Effect of altitude; Temperature and pressure on the performance of IC engines

## **UNIT-IV** **[12]**

**Operation, maintenance and management of construction equipment:** Compacting and stabilizing equipments; Dozer; Scarper; Track and Hauling Equipment; Belt Conveyor system; Cranes, Excavators; Dragline and Clamshell; Trenching machines; Earth and Rock drilling machines; Concrete and concreting equipment's.

**Planning for building construction:** Introduction, site layout, lifting and support equipment's, delivery of structural components, steel erection, tilt-up construction and control of construction nuisances.

**Text Books:**

1. Chitale A K, Gupta R C, (2013), "Material Management Text and Cases" – PHI Learning Private Limited
2. Chitkara K K, (2011), "Construction Project Management- Planning, Scheduling and Controlling"— Tata McGraw Hill Education Private Limited.
3. Peurifoy R L, Schexnayder C J, Shapira A, (2012), "Construction Planning, Equipments, and Methods"- Tata McGraw Hill Education Private Limited.
4. Kotadia A S, (2012), "Construction Management and Equipments" – Mahajan Publishing House.

**Reference Books:**

1. Gopalakrishnan P, (2011), "Handbook of Materials Management" - PHI Learning Private Limited.
2. Rangwala S C, (2012), "Construction of structures and management of works" –Charotar Publishing House Private Limited.
3. Nicholas J M, Steyn H, (2012), "Project management for engineering, business and technology" – by Routledge Publication.

**Web Resources:**

1. Material Management: <http://www.materialsmanagement.info/>
2. Material Management: [www.pitt.edu/~super7/30011-31001/30961.pp](http://www.pitt.edu/~super7/30011-31001/30961.pp)
3. Purchase Management: <http://www.materialsmanagement.info/purchase/index.htm>

**MOOCs:**

1. Construction Cost Estimating and Cost Control: <https://www.mooc-list.com/course/construction-cost-estimating-and-cost-control-coursera>

2. Supply Chain Management: <https://www.mooc-list.com/tags/supply-chain-management>
3. Negotiation : <https://www.mooc-list.com/tags/negotiation>

Subject: <b>Construction Finance Management</b>								
Program: <b>M. Tech. In Civil Engg.</b> <b>(Construction Project Management)</b>				Subject Code: <b>CP0104</b>			Semester: <b>I</b>	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	2	-	4	30/60	-	20/40	-	50/100

**Course Objectives:**

- Students will learn importance of Economic and finance in infrastructure
- This course is designed to introduce the role of infrastructure in economic and financial growth.
- The broad view of physical as well as social infrastructure will be dealt in depth which will be helpful for the students

**Course Outcomes:**

- Students will understand the challenges faced by India in the areas of social and economic infrastructure
- They will be Learning mode of development of projects.
- Students will learn the sources of finance
- Students will identify different issues related to economics and financial management.

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## **COURSE CONTENTS:**

### **UNIT-I**

**[10]**

**Principles of Economics:** Introduction, Importance of Economic background to measurement, Economic Decision making, Time value of money, Cash flow diagrams, objectives of business firm, factors bearing on size of firm, motives to growth, economic importance of infrastructures.

### **UNIT-II**

**[18]**

**Economic impact of public infrastructures:** Demand and supply effect, Comparison of alternatives: Present, future and annual worth method of comparing alternatives, Rate of return, Incremental rate of return, Break-even comparisons, Capitalized cost analysis, Benefit-cost analysis.

**Depreciation, Inflation and Taxes:** Depreciation, Inflation, Taxes. Equipment economics: Equipment costs, Ownership and operating costs, Buy/Rent/Lease options, Replacement analysis.

### **UNIT-III**

**[16]**

**Introduction:** Project finance, Nature and scope of project finance, Goals of financial management, Sources of financing infrastructure, Preparation and interpretation of cash flow statement

**Sources of Finance:** Long term finance, Ordinary shares, Equity shares, Preference shares, Debentures, Term loans, Asset based financing, Securities

**Working Capital Management:** Policy for working capital, Estimating working capital needs, Sources, procedures and practices in infrastructure construction industry Capital Investment Decisions: Techniques of capital budgeting, Types of budgets, Procedure for master budget, Cash flow forecast, Preparing a project financing plan

### **UNIT-IV**

**[10]**

**Case Studies in Project Finance:** Case studies of Power sector, Highway sector, Mass Rapid Transit Systems, Water supply projects, Airport Projects, Railway Projects, Waterway Projects

**Text Books:**

1. M Y Khan & P K Jain (2008) Financial Management, Tata McGraw Hill New Delhi.
2. Degarmo E Paul (1997) Engineering Economy, Prentice Hall Inc New Jersey

**Reference Books:**

1. Chawla Kishan (1987) Social Cost Benefit Analysis: An Introduction to Financial and Economic Appraisal of Projects, Mittal Publishers Jaipur
2. Prasana Chandra (2008) Financial Management: Theory & Practice, Tata McGraw Hill New Delhi
3. JC Van Horne (1997) Fundamentals of Financial Management, Prentice Hall, New Delhi

**Web Resources:**

1. [https://onlinecourses.nptel.ac.in/noc15\\_mg06](https://onlinecourses.nptel.ac.in/noc15_mg06)
2. [nptel.ac.in/courses/105103023/39](https://nptel.ac.in/courses/105103023/39)

**MOOCs:**

1. [scitechconnect.elsevier.com/mooc-financing-investing-infrastructure-stefano-gatti/](https://scitechconnect.elsevier.com/mooc-financing-investing-infrastructure-stefano-gatti/)

Subject: <b>Construction Software Applications (AutoCAD-BIM)</b>								
Program: <b>M. Tech. In Civil Engg.</b> <b>(Construction Project Management)</b>				Subject Code: <b>CP0105</b>			Semester: <b>I</b>	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
-	-	6	3	-	30/60	-	20/40	50/100

**Course Objectives:**

- To identify various software applications in construction industry and concept of BIM (Building Information Modelling).
- To learn basics of Auto-CAD (2D) and Revit Architecture to develop models for any engineering projects.

**Course Outcomes:**

- Theory and practical knowledge of this two software taught, along with practice will be helpful in following course outcomes.
  - Apply basics and advanced commands of Auto-CAD to develop 2D detail engineering and construction drawings for projects.
  - Apply basics and advanced commands of Revit architecture to develop 3D models along with drawing sheets of detail engineering and construction drawings for projects.

### **COURSE CONTENTS:**

#### **List of Modules:**

##### **A. Auto CAD – (2D/Advanced 2D)**

1. Starting a New Drawing/Opening an existing drawing
2. Drawing Commands
3. View Commands:
4. Modify Commands
5. Dimension Command
6. Drawing Settings and Aids
7. Saving and Plotting

##### **B. BIM (Building Information Modelling): Revit Architecture (Basics)**

1. Introduction to Building Information Modelling
2. Starting a Design
3. The Basics of the Building Model
4. Loading Additional Building Components
5. Viewing the Building Model
6. Using Dimensions and Constraints
7. Developing the Building Model
8. Detailing and Drafting
9. Construction Documentation



10. Presenting the Building Model

11. Rendering

**Text Book:**

1. AutoCAD 2017 Instructor, James A. Leach, SDC publications- Autodesk authorized publishers.
2. Autodesk Revit 2017 for Architecture, by Eric wing, SYBEX - Autodesk authorized publishers.

**Reference Books:**

1. Revit Architecture 2016 Basics- From the ground up by Elis Moss, SDC publications - Autodesk authorized publishers.

**Web Resources:**

1. <https://knowledge.autodesk.com/support/autocad/learn-explore?sort=score>
2. <https://www.youtube.com/watch?v=It2jXzsXrVw&list=PL74673F4429123413>
3. <https://www.youtube.com/watch?v=eKsagUwJHPo&list=PL-MShqIfN38V7mIdU-1vHVBo-PetvJuOS>

**MOOCs:**

1. <https://www.autodesk.com/education/home>

**Subject: Construction Management Software-I (Microsoft Project)**

Program: **M. Tech (CPM)**

Subject Code: **CP0106**

Semester: **I**

<b>Teaching Scheme</b>				<b>Examination Evaluation Scheme</b>				
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credits</b>	<b>University Theory Examination</b>	<b>University Practical Examination</b>	<b>Continuous Internal Evaluation (CIE)- Theory</b>	<b>Continuous Internal Evaluation (CIE)- Practical</b>	<b>Total</b>
0	0	6	3	-	30/60	-	20/40	50/100

**Course Objectives:**

To learn MS-Project and its importance in construction project management.

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**Course Outcomes:**

Understanding of MS-Project.

**COURSE CONTENTS:****List of Modules:**

1. An Introduction to Project Management Software
2. Getting Started
3. Creating a New Project
4. Building Project Details
5. Setting up Resources
6. Assigning Resources to Tasks
7. Customizing & Formatting Plans
8. Tracking Progress

9. Advanced Scheduling
10. Reports
11. Sharing Information with other Programs
12. Consolidating Projects and Resource
13. Live Case Study

**Text Books:**

1. Carl Chatfield C., and Johnson T. (2013) “*Step by Step Microsoft Project 2013*”, PHI Learning Press, Eastern Economy Edition

**Reference Books:**

1. Howard B., (2013)“*Microsoft Project 2013 Plain & Simple (English) (Paperback)*”, PHI Learning Press

**Web resources:**

1. [https://www.tutorialspoint.com/ms\\_project/ms\\_project\\_introduction.html](https://www.tutorialspoint.com/ms_project/ms_project_introduction.html)
2. <https://www.projectsmart.co.uk/introduction-to-microsoft-project.php>
3. [https://www.youtube.com/watch?v=3\\_ZzJJrNCHU](https://www.youtube.com/watch?v=3_ZzJJrNCHU)
4. [https://en.wikipedia.org/wiki/Microsoft\\_Project](https://en.wikipedia.org/wiki/Microsoft_Project)

**MOOCs:**

1. Managing Projects with Microsoft Project (<https://www.mooc-list.com/tags/microsoft-project>)

Subject: <b>Elective-I (Management Information System)</b>								
Program: <b>M. Tech. In Civil Engg. (Construction Project Management)</b>				Subject Code: <b>CP0107</b>			Semester: <b>I</b>	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	0	0	3	30/60	-	20/40	-	50/100

#### **Course Objectives:**

- To understand the key concepts of Management Information System.
- To gain the skills and knowledge needed to succeed in a MIS-dominated corporate world.
- To cover supporting tech infrastructures like E-Commerce, Telecom, Cloud computing.

#### **Course Outcomes:**

- Understand Management Information Systems (MIS) and their role in today's organizations.
- Become familiar with the major trends in MIS infrastructures like E-Commerce, Telecom, Cloud computing.

#### **COURSE CONTENTS:**

##### **UNIT-I**

[12]

**Introduction:** MIS Concept, Conceptual framework of MIS, Components of MIS, Types of MIS, Characteristics of good MIS, Benefits of MIS.

**Information Systems:** Definition, Importance of Information Systems, Use of Information Systems, Structure of Information Systems, Data and Information, Information Processing, Dashboard.

**Project Management Information System:** Definition, Key features, Need for PMIS, Benefits of PMIS, Application in Construction Industry.

## **UNIT-II**

**[14]**

**Database Management System:** Hierarchy of data, Traditional Approach vs Database Approach, Database structures, Database Development.

**Supply Chain Management:** Key supply chain management processes, SCM Applications, SCM and Internet, Global Supply Chain Issues, Push and Pull based Model, SCM Challenges and Benefits, Supply Chain Risk Management.

**Customer Relationship Management:** Introduction to CRM, Customer data origination, Types of CRM, Evaluation Metrics for CRM, Benefits and Challenges of CRM.

## **UNIT-III**

**[14]**

**E-Commerce:** Introduction to E-Commerce, Multi-stage model of E-Commerce, Features, Key Concepts and Challenges of E-Commerce, E-Commerce Applications, Threats to E-Commerce, Strategies for successful E-Commerce, M-Commerce.

**Network:** Network Topologies, Network switching devices, Network basics, Communication Software.

**Telecom:** An Overview of Communications Systems, Elements of Telecommunication Systems, Telecommunication Applications.

**Internet:** How internet works, Use and Functioning of the Internet, Access to Internet, Internet Issues.

## **UNIT-IV**

**[14]**

**Process Mapping:** Definition, Attributes of Process Map, Types of Process Map, Value Add and Non value Add, Current State and Future State Maps.

**Cloud Computing:** Introduction to Cloud computing, Cloud Model, Aim of cloud computing, Risks and Challenges involved in Cloud Computing, Advantages of Cloud Computing.

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## **Live Case Study Projects**

### **Text Books:**

1. O'Brien J A, (2008), "Management Information Systems" – Tata McGraw Hill Publishing Company Limited

### **Reference Books:**

1. Robert G M, (2010), "Information Systems for Modern Management"
2. Chatterjee I, (2010), "Management Information Systems"
3. PMBOK Guide – 5th Edition.

### **Web resources:**

1. [https://www.tutorialspoint.com/management\\_information\\_system/management\\_information\\_system.htm](https://www.tutorialspoint.com/management_information_system/management_information_system.htm)
2. <http://www.webopedia.com/TERM/M/MIS.html>
3. <https://www.slideshare.net/sikandersaini77/management-information-system-15207283>
4. <https://www.inc.com/encyclopedia/management-information-systems-mis.html>

### **MOOCs:**

1. Introduction to Management Information Systems (MIS): A Survival Guide (<https://www.mooc-list.com/tags/mis>)
2. Cloud Computing Concepts, Part 1 & Part 2 (<https://www.mooc-list.com/course/introduction-management-information-systems-mis-survival-guide-edx>)
3. Cloud Computing Applications, Part 1 & Part 2 (<https://www.mooc-list.com/course/introduction-management-information-systems-mis-survival-guide-edx>)
4. Cloud Networking (<https://www.mooc-list.com/course/introduction-management-information-systems-mis-survival-guide-edx>)  
Customer Relationship Management (<https://www.mooc-list.com/tags/crm>)

Subject: <b>Elective-I (Infrastructure Development)</b>								
Program: <b>M. Tech (CPM)</b>				Subject Code: <b>CP0108</b>			Semester: <b>I</b>	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	-	-	3	30/60	-	20/40	-	50/100

**Course Objectives:**

- Strategizing the policy process for infrastructure development
- Understanding the best tools for effective project evaluation, management and control
- Identifying Risks involved in infrastructure development and how to overcome it.

**Course Outcomes:**

- Learning lessons of experience from best practices in international/national project management
- Learning mode of development of projects.
- Need for infrastructure planning and engineering
- Students will identify different issues related to development

**COURSE CONTENTS:**

**UNIT-I**

**[10]**



**Introduction:** Concept of infrastructure; Need for infrastructure planning and engineering; Infrastructure development scenario in India; Scope for infrastructure management.

**Construction Industry:** Nature, Characteristics, Size and structure, Role of infrastructure in employment, various agencies and sectors associated with infrastructure development in India

## **UNIT-II** **[17]**

**Overview of Indian Infrastructure Assets:** Urban infrastructure, Water, Dams, Bridges, Canals, Housing, Roads, Railways, Ports, Airports, Energy, Power

**Status of Infrastructure in India:** Assessment of infrastructure development related to civil engineering, Roads and buildings, Health and education, water, Comparison of Indian infrastructure with world Energy Infrastructure, Transport Infrastructure, Urban Infrastructure, Rural Infrastructure.

## **UNIT-III** **[12]**

**Trends in Infrastructure development:** Infrastructure development through Public Private Partnership (PPP), PPP-models for infrastructure projects, Ownership structures like BOT, BOT, BOOT, BOLT, DBFO etc.,

**Indian government policies and Initiatives:** Government's role in successful PPP, Policies related to various infrastructures.

## **UNIT-IV** **[15]**

**Issues related to Infrastructure Development:** Legal and Regulatory Issues, Issues related to funding and managing, Issues Moving Towards Low Carbon Economy: The Need for Renewable Energy Solutions role, responsibility of project management consultants, ISSUES IN PPP

**Business Models of the Future-** Case studies will be discussed (Commercial and urban infrastructure, transport, metro rail, social infrastructure)

**Text Books:**

1. Raghuram G (2001) Infrastructure Development and Financing: Towards a Public Private Partnership, Macmillan Publishers, New Delhi.

**Reference Books:**

1. Joshi P (2001) Law Relating to Infrastructure Projects, Taxman Publishers New Delhi.  
Alagiri D (2007) Infrastructure Development, ICFAI University Press Hyderabad
2. India Infrastructure Reports, Infrastructure Development Finance Company
3. Infrastructure Today Magazine.

**Web resources:**

1. <https://www.nrcan.gc.ca/earth-sciences/.../resource-development-infrastructure>
2. [moud.gov.in/cms/urban-infrastructure.php](http://moud.gov.in/cms/urban-infrastructure.php)
3. <https://www.idfc.com/pdf/report>
4. [www.indiainfrastructure.com](http://www.indiainfrastructure.com)

**MOOCs:**

1. <https://www.edx.org/course/next-generation-infrastructure-delftx-ngix-0>
2. <https://online-learning.tudelft.nl/courses/the-next-generation-of-infrastructure/>

Subject: Elective-I (Lean Construction)								
Program: M. Tech (CPM)				Subject Code: CP0109			Semester: I	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	-	-	3	30/60	-	20/40	-	50/100

**Course Objectives:**

- To learn the concept and its application in construction project management.
- To give knowledge regarding the unnecessary cost associated with project and its reduction by lean construction.

**Course Outcomes:**

- Student will learn the importance of lean construction by identify the value added activities and will in position to bring down the cost of project of lean concepts application.

## **COURSE CONTENTS:**

### **UNIT-I** **[13]**

Lean Introduction – Principles  
Lean Thinking  
Integrated Project Delivery (Activity and Workshop)  
Last Planner System (Class Activity and Workshop)

### **UNIT-II** **[15]**

Identification of Construction Waste (Field Activity and Workshop)  
Collaboration (Class Activity and Workshop)  
Lean Tools (Class Activity and Workshop)  
5 S  
5 Why  
A3 Strategy  
Go to Gemba (Field Activity)  
Kaizen & P-D-C-A (Class & Field Activity)  
Fishbone

### **UNIT-III** **[14]**

Preventives  
Job Instructions  
Lean Terminologies  
Value Stream Mapping (Class and Field Activities)  
Creating Value by Eliminating Waste – Customer Driven Approach

### **UNIT-IV** **[12]**

Lean Supply Chain  
Lean Site Management  
Applying Lean Thinking to Construction  
Barriers to implement Lean construction

**Text Books:**

1. Ade, “ Lean Construction, key to improvements in time, cost and quality”, volume 1, 2008

**References Books:**

1. PMBOK Guide – 5<sup>th</sup> Edition
2. Jeffrey Liker ,“The Toyota Way”, 2004

**Web Resources:**

1. Lean Construction: <https://www.leanconstruction.org/>
2. Introduction to Lean Construction: <https://www.buildingsguide.com/blog/introduction-lean-construction>
3. Benefits of Lean: <http://www.turnerconstruction.com/experience/lean/lean-read-more>
4. Breaking Down the Principles of Lean Construction:  
<http://www.constructconnect.com/blog/operating-insights/breaking-principles-lean-construction/>
5. Lean Construction: [constructingexcellence.org.uk/wp-content/uploads/2015/03/lean.pdf](http://constructingexcellence.org.uk/wp-content/uploads/2015/03/lean.pdf)

**MOOCs:**

1. Lean Management: <https://www.mooc-list.com/tags/lean-management>
2. Lean Six Sigma: <https://www.mooc-list.com/tags/lean-six-sigma>
3. Lean: <https://www.mooc-list.com/tags/lean>

Department of Civil Engineering, IITE,  
Indus University

## 2<sup>nd</sup> Semester

<b>M-TECH (CPM), SEMESTER –II TEACHING &amp; EXAMINATION SCHEME WITH EFFECT FROM JULY 2017</b>													
<b>SR NO</b>	<b>CODE</b>	<b>SUBJECTS</b>	<b>TEACHING SCHEME</b>			<b>CREDITS</b>	<b>HOURS</b>	<b>EXAMINATION SCHEME</b>					
			<b>L</b>	<b>T</b>	<b>P</b>			<b>THEORY</b>			<b>PRACT</b>		<b>TOTAL</b>
								<b>CIE</b>		<b>ESE</b>	<b>CIE</b>	<b>ESE</b>	
								<b>MID</b>	<b>IE</b>				
1	CP0201	Advance Construction Project Management	3	2	0	4	5	30	10	60	-	-	100
2	CP0202	Construction Quality Management	3	2	0	4	5	30	10	60	-	-	100
3	CP0203	Advance Quantity Surveying	2	4	0	4	6	30	10	60	-	-	100
4	CP0204	Value Engineering	2	2	0	3	4	30	10	60	-	-	100
5	CP0205	Construction Safety Management	3	0	0	3	3	30	10	60	-	-	100
6	CP0206	Construction Management Software-II (Primavera)	0	0	4	2	4	-	-	-	40	60	100
7	CP0207	Seminar	0	0	4	2	4	-	-	-	40	60	100
8	Ref Annex - II	Elective-II	3	0	0	3	3	30	10	60	-	-	100

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<b>TOTAL</b>	<b>16</b>	<b>10</b>	<b>08</b>	<b>25</b>	<b>34</b>	<b>180</b>	<b>60</b>	<b>360</b>	<b>80</b>	<b>120</b>	<b>800</b>
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**ANNEX – II (ELECTIVE – II)**

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME					
			L	T	P			THEORY		PRACT		TOTAL	
								CIE		ESE	CIE		ESE
								MID	IE				
1	CP0208	Green Building	3	0	0	3	3	30	10	60	-	-	100
2	CP0209	Energy Conservation System in Building Construction.	3	0	0	3	3	30	10	60	-	-	100
3	CP0210	Building Maintenance Management	3	0	0	3	3	30	10	60	-	-	100

<b>Subject: Advance Construction Project Management</b>								
<b>Program: M. Tech. In Civil Engg. (Construction Project Management)</b>				<b>Subject Code: CP0201</b>			<b>Semester: II</b>	
<b>Teaching Scheme</b>				<b>Examination Evaluation Scheme</b>				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	2	-	4	30/60	-	20/40	-	50/100

**Course Objectives:**

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- To learn the organizational structures of project, Work break down structures and its importance.
- To study the resource allocation and leveling and updating of network.
- To learn optimization in cost and time parameters of the project by various techniques.
- To understand concept of Risk Management, its types and its impacts of projects. To resolve risk in construction management.
- To impart knowledge of Project Management Information System.

**Course Outcomes:**

- Student will be in position to identify the structural organization and management of any type's construction firm. They will be proficient in cost optimization and risk management in construction project. Will also gain the knowledge regarding other construction management concepts for its real life application in construction industry.

**COURSE CONTENTS:**

**UNIT-I**

**[14]**

**Project Organization:** Organizational influences on project management – cultures and styles, communications, structures, process assets, enterprise environmental factors; influence of organizational structures on projects, types of organizational structures – functional, matrix and projectized, criteria to help determine a suitable organizational form in a given project environment.

**Work Breakdown Structure:** Definition, concept; role of project manager in developing WBS; work breakdown levels, typical hierarchy in the WBS of a project, desirable characteristics of work packages; product oriented WBS; functionally oriented WBS; benefits of WBS

**UNIT-II**

**[14]**

**Network Scheduling with Limited Resources:** Resource allocation; resource levelling; case studies & calculative examples; updating the network

**Project Control :** Concept; control cycle; basic controlling parameters; line of balance technique; role of project management on control cycle; basic planning and developing a classification system for controlling; time control : measures to be taken by project manager for time control; cost control: strategic planning and cost programming; potential for cost reduction during different phases of project; cost planning; project time cost trade off planning for minimum costs; cost optimization by network crashing; numerical examples.

**UNIT-III** **[14]**

**Project Monitoring:** Concept; general steps for monitoring; objectives of monitoring; reporting system; levels of management in reporting system; project monitoring system; major functions of monitoring system; corrective measures for unfavorable variations; influence of decision making authority in project monitoring

**Earned Value Analysis:** Earned value reporting; earned value analysis; earned value example; practice examples

**Project Risk Management:** Introduction; objectives; risk identification – sources of risk; risk factors; methods of risk identification; risk mitigation planning & strategy; role of project manager in managing risks; benefits

**UNIT-IV** **[12]**

**Miscellaneous Topics:**

- a) Sizing project work packages - Importance of work packages, factors affecting, re-sizing work packages
- b) Project duration assessment – using Monte Carlo simulation technique
- c) Time value of money - Time-money link, future value of a single amount, future value of an annuity of equal amount, the present value of a future amount, present value of an annuity of equal amount, present value of cash inflow of unequal amount and discount;
- d) Break even analysis – Introduction, break-even analysis methodology, assumptions and limitations, uses of break-even analysis
- e) Capital budgeting process - Importance, estimating the cash flow, establishing the cost of capital, applying the investment appraisal criterion

- f) Privatized infrastructure projects management – Introduction; scope; stakeholders, role of government in designing and implementing the concessions, concessionaire project management process, key factors, conclusion

**Project Management Information System (PMIS):** Introduction; scope; PMIS control information pyramid; PMIS structure; project management software tools; functions of project monitor

**Text Books:**

1. Chitkara K K, (2011), “Construction Project Management- Planning, Scheduling and Controlling”-- Tata McGraw Hill Education Private Limited.
2. Punmia B C, Khandewal, (2012), “Project Planning and Control with PERT and CPM” – Laxmi Publications Private Limited.
3. Rangwala S C, (2012), “Construction of structures and management of works” –Charotar Publishing House Private Limited.

**Reference Books:**

1. Kotadia A S, (2012), “Construction Management and Equipments” – Mahajan Publishing House.
2. PMBOK Guide – 5<sup>th</sup> Edition
3. Nicholas, John M. “Managing Business & Engineering Projects”
4. Joy, P.K. “Handbook of Construction Management” Macmillan, Delhi, 1990
5. Iyer, P. Parameshwar “Engineering Project Management with Case Studies” Wheeler Publishing (A division of A.H. Wheeler & Co. Ltd., New Delhi, Allahabad)
6. Gopalakrishnan P, (2011), “Handbook of Materials Management” - PHI Learning Private Limited.
7. Harris, F. & McCaffer, R. “Modern Construction Management” BSP Professional Books, Oxford London Edinburgh.

**Web Resources:**

1. Beginner’s guide for construction project management -

<https://www.smartsheet.com/construction-project-management-101>

**MOOCs:**

1. Construction Management - <https://www.mooc-list.com/tags/construction-management>
2. Project Management - <https://www.mooc-list.com/tags/project-management>
3. Introduction to Construction project management- <https://www.mooc-list.com/course/construction-project-management-coursera>
4. Project Management Techniques for Development Professionals (<https://www.mooc-list.com/course/construction-project-management-coursera>)
5. Initiating and Planning Projects (<https://www.mooc-list.com/course/construction-project-management-coursera>)
6. Project Management: The Basics for Success (<https://www.mooc-list.com/course/construction-project-management-coursera>)
7. Principles of Project Management (<https://www.mooc-list.com/tags/project-management>)
8. Best Practices for Project Management Success (<https://www.mooc-list.com/tags/project-management>)
9. Fundamentals of Project Planning and Management (<https://www.mooc-list.com/course/construction-project-management-coursera>)
10. Managing Project Risks and Changes (<https://www.mooc-list.com/course/construction-project-management-coursera>)

Subject: <b>Construction Quality Management</b>								
Program: <b>M. Tech. In Civil Engg. (Construction Project Management)</b>				Subject Code: <b>CP0202</b>			Semester: <b>II</b>	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory	University Practical	Continuous Internal	Continuous Internal	Total

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				<b>Examination</b>	<b>Examination</b>	<b>Evaluation (CIE)- Theory</b>	<b>Evaluation (CIE)- Practical</b>	
3	2	-	4	30/60	-	20/40	-	50/100

**Course Objectives:**

- To learn Quality management concept and its philosophies.
- To study quality management tools: Six Sigma and TQM.
- To understand the Quality Management System and its implementation in Construction industry.

**Course Outcomes:**

- Will be aware of quality management importance in construction. Also be in form to apply various quality management tools and process in construction project to improve the quality of structure.
- Get idea of various standards at national and international level in construction industry.

**UNIT-I**

[13]

**Quality Management:** Concept; Importance; Quality; Quality History; Quality Inspection; Quality Engineering; Quality Management; Quality Assurance; Quality Control; Quality Control Tools

**Quality Management Philosophies:** Quality Management Gurus & their Philosophies: Philip B. Crosby; W. Edward Deming – PDCA Cycle, Statistical Process Control, 14 Principles of Transformation, The Seven Point Action Plan; Kaoru Ishikawa; Joseph M. Juran

**UNIT-II**

[14]

**Total Quality Management (TQM):** Definition & Concept; changing views of Quality; Principles of TQM – Basic Components, Phases, Elements, Application in Construction Projects

**Six Sigma** :Introduction; Six Sigma Methodology; Six Sigma Roadmap; Leadership Principles; Six Sigma Team; Analytic Tool Sets – FORD Global 8D Tool; DMAIC Process; DMADV Process; DMAIC Process; DMADDD Process; Application in Construction Projects

### **UNIT-III**

[14]

**Quality Management System (QMS)**:Introduction; Quality Standards; Standards Organizations; International Organization for Standardization (ISO); ISO 9000 Quality Management System; ISO9000 Quality System Requirements – Quality System Elements & Functions Requirement; ISO 9000 Quality System Documentation; ISO 14000 Environment Management System & Benefits; OHSAS 18000 & Benefits of OHSAS Management System;

**QMS Certification & Quality Cost**: QMS Certification: ISO Certification - Process Methodology & Schedule; Integrated Quality Management System – Methodology; Quality Cost: Introduction; Categories of Costs; Reasons for Poor Quality; Quality Cost in Construction; Quality Performance Management System

### **UNIT-IV**

[13]

**A Practical Approach: Quality Assurance Processes/Techniques for Construction Projects**: Quality Management Plan; QA/QC Observation & Surveillance; Issuance of Non- Conformance reports; Corrective & Preventive actions; Quality Reports; QA/QC Audit & Reporting; Management Review Committee Meeting; 5S for Construction Projects – Case Studies.

**An Overview and Guidelines for Quality Control Plan in Construction Projects**

**A Practical Approach: Quality Management Checklist & Documentation.**

#### **Text Books:**

1. Rumane, Abdul R. “*Quality Management in Construction Projects*”, CRC Press
2. Juran, J.M., and Godfrey, A.B. (1999). *Juran’s Quality Handbook*, Fifth edition, New York: McGraw-Hill.
3. PMBOK Guidelines

## References Books:

1. Thorpe, B., Sumner, P., and Duncan, J. (1996). Quality Assurance in Construction. Surrey, U.K.: Gower Publishing Ltd.
2. Narayan B. ISO 9000 & Quality Movements. A.P.H. Publishing Corporation, New Delhi 110 002
3. Total Quality Management & ISO 9000 Certification in Construction. NICMAR, First Edition, July 1994.
4. Dewar, J.D. & Anderson, R. Manual of Ready Mixed Concrete Blackie & Son Ltd., 1988 Glasgow & London.

## Web Resources:

1. Construction Quality Management: (<https://www.irmi.com/articles/expert-commentary/construction-quality-management>)
2. Process Quality Improvement: (<http://nptel.ac.in/courses/110101010/6>)
3. Six Sigma: ([nptel.ac.in/courses/110105039](http://nptel.ac.in/courses/110105039))
4. Total Quality Management: ([https://onlinecourses.nptel.ac.in/noc17\\_mg18/preview](https://onlinecourses.nptel.ac.in/noc17_mg18/preview))
5. Project Management Information System: (<http://lmit.edu.au/blog/project-management-information-system-pmis/>)

## MOOCs:

1. Quality Management: (<https://www.mooc-list.com/tags/quality-management>)
2. Quality Management: (<https://www.mooc-list.com/tags/quality-management>)
3. Six Sigma Certification: (<https://www.mooc-list.com/tags/six-sigma-certification>)
4. Total Quality Management: (<https://www.mooc-list.com/tags/tqm>)

Subject: Advance Quantity Surveying								
Program: <b>M.Tech. In Civil Engg.</b> <b>(Construction Project Management)</b>				Subject Code: <b>CP0203</b>			Semester: <b>II</b>	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
2	4	-	4	30/60	-	20/40	-	50/100

### Course Objectives:

- To learn role and duties of professional quantity surveyor in construction industry.
- To study the various types and process of estimate involve and role of QS during various stages of construction project.
- To get knowledge related to the building estimates.

### Course Outcomes:

- Clear understand the job of QS in construction. Also over again the knowledge of application of various estimates in projects. Will be position to read, calculate and estimate cost of various parameters (material, labor, equipments etc) construction projects. Will also have good hand on estimating software's.

### COURSE CONTENTS:

#### UNIT-I

[09]

**The Construction Industry and the Quantity Surveyor:** Construction industry, client's team, legislation and control of the building process, funding and market drives, economic and construction cycles, development of the quantity surveyor, construction innovation and the quantity surveyor

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**Introduction to Estimate:** Estimate and its role in construction industry, conceptual estimates, preliminary estimates and cost planning, preparing construction estimates, project delivering system and estimating, estimates for different types of contracts, estimating and construction safety.

## **UNIT-II**

**[09]**

**Estimating Process and Preliminary Procedures:** Bid estimating process, Open Bidding, The Decision to Bid, Scheduling the Estimating process, Bid Record and Bid Documents, Obtaining Bid Documents, Review Bid Documents.

**Working with Main Contractors:** Contracting organizations, management system, marketing for contracts, estimating and the contractor's quantity surveyor.

## **UNIT-III**

**[09]**

**Building Estimate:** General thumb rules of estimate, types of building estimates- centre line and long wall and short wall, deduction for the openings in the structures, bar bending schedules, examples of building estimates of residential building, R.C.C beam and column, footing and retaining wall, highway estimate & estimates from the cad drawing.

## **UNIT-IV**

**[09]**

**Rate analysis:** Prerequisites, factor affecting rate analysis, overhead expenses, procedure for the rate analysis. Examples on requirement of labour and material for the different types of work and its rate analysis

**Estimating Software:** Over view of quantity estimating software

### **Text Books:**

1. Donald Towey, (2012), "Construction Quantity Surveying, A Practical Guide for the Contractor's QS" by Welley Publication.
2. David Pratt, (2011), "Fundamentals of Construction Estimating" by Cengage Learning

### **Reference Books:**

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1. Rethaliya R. P, (2013), “Professional Practice and Valuation” by Atul Prakashan.
2. Dutta B. N, (2012), “Estimating and Costing”

**Web Resources:**

1. Role of Quantity Surveyor: (<http://www.nziqs.co.nz/What-is-a-QS>)
2. Construction Economics and Finance: (<http://nptel.ac.in/courses/105103023/36#>)
3. Types of Estimation in Building Construction: (<http://www.acivilengineer.com/2013/03/types-of-estimates-in-building.html>)
4. Types of Construction Cost Estimate: (<https://theconstructor.org/construction/types-of-construction-cost-estimates/841/>)

**MOOCs:**

1. Construction Cost Estimating and Cost Control (Coursera): (<https://www.mooc-list.com/course/construction-cost-estimating-and-cost-control-coursera?page=3>)
2. Estimation: (<https://www.mooc-list.com/tags/estimation>)
3. Project Estimation: (<https://www.mooc-list.com/tags/project-estimation>)
4. Cost Estimation: (<https://www.mooc-list.com/tags/cost-estimating>)

Subject: Value Engineering								
Program: M. Tech. In Civil Engg. (Construction Project Management)				Subject Code: CP0204			Semester: II	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
2	2	-	3	30/60	-	20/40	-	50/100

**Course Objectives:**

- To learn the concept of value engineering.
- To study importance of VE application construction industry.
- To analysis the benefits of implementation of VE in Construction project.

**Course Outcomes:**

- Will get clear idea about Value Engineering and its importance in construction industry.
- Will study the real life application of VE in construction project.
- Will analysis the benefits of VE and cost study on construction project after its application.

**COURSE CONTENTS:**

**UNIT-I**

**[09]**

**Introduction of value engineering:** Definition and Objectives of VE; Reasons for the unnecessary costs; Application of VE; VE methodology and techniques

**Project scope and budget:** Elements of project budget; Budgeting techniques; Cost control; Defining project scope; parameters and parameter cost.

## **UNIT-II** **[09]**

**Preparation of cost models:** Making models; Construction cost models; other resources; types of models.

**Planning for VE services:** VE Objectives; Level of effort; VE and total project management; Team selection; VE job plan

**Function analysis:** Classifying function; Defining functions; Project level function analysis system techniques (FAST) diagram.

## **UNIT-III** **[09]**

**Creativity and interpersonal skills:** Creativity and fixation; Interpersonal skills; Human factors; creativity throughout the job plan; generation of ideas; Delphi technique; Value engineering.

**Life cycle costing:** Decision makers' impact on LCC; LCC and total building costs; LCC terminology and examples; LCC methodology; Application of LCC to buildings

## **UNIT-IV** **[09]**

**Integrating VE into the construction industry:** Planning and design; Construction; Maintenance and Operations (M&O)

**VE Applications to Risk Assessment and Analysis:** Risk Assessment; Risk Analysis

**Case Studies:** Application of VE on different types of projects.

**Text Books:**

1. Dell'isola, J. Alphonse, "Value Engineering in the Construction Industry, by Smith, Hinchman & Grylls Washington, D.C. 20036 Third Edition.
2. L.W. Zimmerman, "Value Engineering- A practical approach for Owner, Designers and Contractors", by CBS Publishers & Distributors Pvt Ltd, First Edition 1998.

**Reference Books:**

1. James J O'Brien, "Value Analysis in Design and Construction", by McGraw Hill Book Company.
2. L.D. Miles, "Techniques of Value Analysis and Engineering", by McGraw Hill Book Company.
3. George, A. Taylor, "Managerial and Engineering Economy", by Van Nostrand Reinhold Company; Affiliated East-West Press (Pvt.) Ltd., East-West student edition 1969.
4. Lomash, S. (1997), "Value Management text book", by Sterling Publishers (Pvt.) Ltd., New Delhi 110 016.

**Web Resources:**

1. Value Engineering: (<https://www.gsa.gov/portal/category/21589>)
2. Value Engineering:  
([http://www.omnex.com/members/standards/valueengineering/value\\_engineering.aspx](http://www.omnex.com/members/standards/valueengineering/value_engineering.aspx))
3. Implementing Value Engineering: (<https://www.gsa.gov/portal/content/101697>)
4. Value Engineering Consultation: (<https://www.gsa.gov/portal/content/101698>)
5. Value Analysis (VA) and Value Engineering (VE) : Definition and Benefits:  
(<http://www.advice-manufacturing.com/Value-Analysis.html>)

**MOOCs:**

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1. Value Engineering: (<http://nptel.ac.in/courses/112107217/6>)

Subject: <b>Construction Safety Management</b>								
Program: <b>M. Tech. In Civil Engg. (Construction Project Management)</b>				Subject Code: <b>CP0205</b>			Semester: <b>II</b>	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	0	0	3	30/60	-	20/40	-	50/100

**Course Objectives:**

- To enhance / develop the skills of professionals working in construction.
- This course examines occupational safety and health practices needed to address occupational safety and health issues in the workplace
- Students will utilize regulatory standards as a guide to apply policies, procedures, standards and occupational safety and health principles.
- Students will learn different methods to prevent incidents using the hierarchy of controls, effective safety and health management systems and task oriented training.

**Course Outcome:**

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- Students will be able to recognize and evaluate occupational safety and health hazards in the workplace.
- Students will determine appropriate hazard controls following the hierarchy of controls.
- Students will furthermore be able to analyze the effects of workplace exposures, injuries and illnesses, fatalities
- Evaluate workplace to determine the existence of occupational safety and health hazards

## **COURSE CONTENTS:**

### **UNIT-I [12]**

**Introduction to Safety in Construction:** Introduction to Indian Construction Industry, and Importance & requirement of Construction Safety Management in Indian construction industry. Management of Occupational Safety and Health (OSH), HIRARC. Fundamental of Accident Prevention, Job Safety Analysis, Laws and Regulation, Duties of responsible person.

### **UNIT-II [15]**

**Preparing for the work:** Pre-inception, work program, material/machinery safety, safe working method. Organizing the work: Notify the authority and Authority concerned

#### **Setting up the site:**

*Site requirement:* site access, site boundary, site security, work's safe passage.

*Site facilities:* welfare facilities, waste area, storage, hazardous material's storage and Illumination. Safety plan: emergency procedures, planning for the emergency, fire safety, first aid, on-site regulation.

### **UNIT-III [13]**

#### **Construction-phase health and safety Part-1:**

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## **Site Management and Supervision.**

**Infra-structure work:** survey, site clearance, logistics, earthwork, service relocation work, confined space work and demolition.

**Substructure work:** Foundation work safety (excavation and concreting), welding and cutting work safety.

## **UNIT-IV**

**[14]**

### **Construction-phase health and safety Part-2**

**Superstructure work:** scaffolds, temporary structures (chutes and catch platform), ladder safety and lift operation (passengers' hoist and lifting crane).

**Finishing work:** roofing work, insulation and cladding work, electrical safety, testing and commissioning.

**General requirement:** hand power tool safety, road traffic management, working over water, permit to work.

### **Text Books:**

1. Construction Site Safety Handbook, Published by The Real Estate Developers Association of Hong Kong and The Hong Kong Construction Association

### **References Books:**

1. Introduction to Health and Safety at work by Phil Hughes, Ed Ferrett Third Edition, Published by Elsevier Limited.
2. Construction Safety Management by Raymond E. Levitt, Nancy M. Samelsove, 2<sup>nd</sup> Edition, Published by Wiley Publication Ltd.
3. Handbook of Health and Safety in Construction, 3<sup>rd</sup> Edition, published in 2006 by HSG150
4. SP70 Handbook on construction safety practices published Bureau of Indian Standards.

### **Web Resources:**

1. Construction Safety: (<https://www.osha.gov/doc>)
2. Construction – Health and Safety for the construction industry – HSE :

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**MOOCs:**

1. Safety Function Action For Disaster Responders (Canvas net)  
(<https://www.mooc-list.com/.../safety-function-action-strategies-disaster-responders-canvasnet>)
2. [http://www.alabamasafestate.ua.edu/educationtraining/health\\_safety\\_management\\_certificate.php](http://www.alabamasafestate.ua.edu/educationtraining/health_safety_management_certificate.php)
3. <https://alison.com/course/SMP20>

Subject: <b>Construction Management Software-II (Primavera)</b>								
Program: <b>M. Tech. In Civil Engg. (Construction Project Management)</b>				Subject Code: <b>CP0206</b>			Semester: <b>II</b>	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
0	0	4	2	-	30/60	-	20/40	50/100

**Course Objectives:**

- To learn Primavera software thoroughly.

**Course Outcomes:**

- Developing hands on Primavera.

## **COURSE CONTENTS:**

### **List of Modules:**

1. Overview and Configuration
2. Getting Started
3. Adding a New Project
4. Building Project Details
5. Creating Calendars
6. Defining Resources
7. Work Breakdown Structures
8. Establishing Budgets
9. Implementing Schedules
10. Advanced Scheduling
11. Customizing Projects
12. Importing and Exporting data
13. Comparing MSP with Primavera
14. Live Case Study

### **Text Books:**

1. Harris P E, “Project Planning and Control Using Oracle Primavera P6: P8.1 & 8.2& 8.3 Professional Client & Optional Client (English) (Paperback)” BPB Publications

### **Reference Books:**

1. “Oracle Primavera P6 Project Management - Reference Manual”

### **Web resources:**

1. <https://www.slideshare.net/KetutSwandana/pdf-primavera-tutorial>
2. [media.techtarget.com/constructionsoftwarereview/.../primavera\\_p6\\_book\\_excerpt.pdf](http://media.techtarget.com/constructionsoftwarereview/.../primavera_p6_book_excerpt.pdf)

**Subject: Seminar**

**Program: M. Tech. In Civil Engg.  
(Construction Project Management)**

**Subject Code: CP0207**

**Semester: II**

<b>Teaching Scheme</b>				<b>Examination Evaluation Scheme</b>				
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credits</b>	<b>University Theory Examination</b>	<b>University Practical Examination</b>	<b>Continuous Internal Evaluation (CIE)- Theory</b>	<b>Continuous Internal Evaluation (CIE)- Practical</b>	<b>Total</b>
0	0	4	2	-	30/60	-	20/40	50/100

**Course Objective:**

- To allow student to prepare a seminar report of these choose to improve the knowledge regarding the topic and also increase their presentation and soft skill.

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**Course Outcomes:**

- In this course, the construction engineering and management, concepts on specific contemporary topic will be studied and tools for preparing reports will be used by students to prepare report.
- Reporting, writing and presentation skill development in engineering and technology is the main objective.

**COURSE CONTENT:**

**ANY CONTEMPORARY TOPIC OTHER THAN DISSERTATION TOPIC**

Subject: <b>Elective-II (Green Building)</b>								
Program: <b>M. Tech (CPM)</b>				Subject Code: <b>CP0208</b>			Semester: <b>II</b>	
<b>Teaching Scheme</b>				<b>Examination Evaluation Scheme</b>				
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credits</b>	<b>University Theory Examination</b>	<b>University Practical Examination</b>	<b>Continuous Internal Evaluation (CIE)- Theory</b>	<b>Continuous Internal Evaluation (CIE)- Practical</b>	<b>Total</b>
3	-	-	3	30/60	-	20/40	-	100

**Course Objectives:**

- To learn basics of green design and sustainable development concept.

- To identify various area of implementing strategies for green design in projects to enhance built environment.
- To learn institutional guidelines for development and certification of green designs.

**Course Outcomes:**

- Student after studying theory of green design and sustainable development concept will be able to adopt various design aspects and use of sustainable materials to enhance built environment in and out for building which can enhance conventional construction practice to green design level. Also they will have an exposure to certification process and criteria required to comply for guidelines for such certification.

**COURSE CONTENTS:**

**UNIT-I** **[15]**

**Green Building Concept:** Overview of green building movement; Concept of Green building and sustainable development; Issues and strategies of Green building and sustainable development; Objectives Principles and Benefits of Green building design; Introduction to High performance building; integrated design process of high performance building; Green project requirements and strategies; Overview of various green rating systems worldwide.

**UNIT-II** **[15]**

**Green Building Materials and Indoor environment Quality:** Introduction; Low emitting materials; Building and material reuse; Construction waste management; Regional materials; Life cycle cost assessment of building materials and products; Factors affecting indoor environment quality; Ventilation and filtration; Building materials and finishes- Emittance level; Indoor Environment quality best practice.

**UNIT-III** **[12]**

**Water and Energy efficiency designs:** Introduction; Waste water strategy and water reuse/recycling; Water fixtures and water use reduction strategies; Impact of energy and

atmosphere – introduction; A building envelop; Intelligent energy management system; Mechanical system: Air conditioning, Heating and ventilation; Electric power and lighting system; Solar energy system

#### **UNIT-IV**

**[12]**

**IGBC Guidelines:** Introduction ; IGBC green new building Rating system – Overview and process – project checklist; Sustainable architecture and design; Site selection and planning; Water conservation & energy efficiency; Building materials and resources; Indoor Environment quality; Innovation and development

#### **Text Book:**

1. Hand book of Green building Design and construction, Sam Kubba by Elsevier Architecture press.

#### **Reference Books:**

1. Green building: principals and practice in residential construction by Abe Kruger and Carl Seville, Cengage Learning.
2. IGBC Green New building rating system (Version 3.0), March 2015.
3. GRIHA Manual Volume-1: Introduction to National Rating System by Ministry of New and Renewable Energy, Government of India and the energy and resource institute, New Delhi.

#### **Web Resources:**

1. Green Building : (<https://igbc.in>)
2. Green Building Rating System in India: GRIHA : ([grihaindia.org](http://grihaindia.org))
3. Green Building Materials: (<https://greenbuildingsolutions.org/green-building-materials/>)
4. Green Building Tools and Resources: (<http://www.energyandfacilities.harvard.edu/green-building-resource/green-building-tools-resources>)
5. Case study on Green Building: (<https://www.slideshare.net/vinaymandaloju/green-building-case-study-on-teribangalore>)

6. Case study on Green Building: (<http://www.energyandfacilities.harvard.edu/green-building-resource/leed-case-studies>)

**MOOCs:**

1. Modern Building Design: (<https://www.mooc-list.com/tags/modern-building-design>)
2. Sustainable Building Design: (<https://www.mooc-list.com/tags/sustainable-building-design>)
3. Building Information Modeling: (<https://www.mooc-list.com/tags/building-information-modeling>)

<b>Subject: Elective-II (Energy Conservation System in Building Construction)</b>								
<b>Program: M. Tech. In Civil Engg. (Construction Project Management)</b>				<b>Subject Code: CP0209</b>			<b>Semester: II</b>	
<b>Teaching Scheme</b>				<b>Examination Evaluation Scheme</b>				
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credits</b>	<b>University Theory</b>	<b>University Practical</b>	<b>Continuous Internal</b>	<b>Continuous Internal</b>	<b>Total</b>

				<b>Examination</b>	<b>Examination</b>	<b>Evaluation (CIE)- Theory</b>	<b>Evaluation (CIE)- Practical</b>	
3	0	0	3	30/60	-	20/40	-	50/100

### **Course Objectives:**

- Students will learn importance of Energy Conservation techniques used in construction.
- This *course* is designed to introduce the resource conservation of advanced building technologies.
- To understand the environmentally friendly buildings.
- Students will learn the various services provided for building design as energy efficient buildings.

### **Course Outcomes:**

- Students will understand the energy management for environmental sustainable building.
- They will understand the energy audit and its type.
- Students will learn the environmental impact on green buildings design.

### **COURSE CONTENTS:**

#### **UNIT-I** **[13]**

**Introduction:** Fundamentals of energy- Energy Production Systems-Heating, Ventilating and Air-conditioning. Solar Energy and Conservation - Energy Economic Analysis Energy conservation and audits. Domestic energy consumption - savings -challenges -primary energy use in buildings. Residential -Commercial -Institutional and public buildings -Legal requirements for conservation of fuel and power in buildings.

#### **UNIT-II** **[12]**

**Environmental:** Energy and resource conservation - Design of green buildings - Evaluation tools for building energy - Embodied and operating energy - Peak demand - Comfort and Indoor



Air quality - Visual and acoustical quality - Land, water and materials - Airborne emissions and waste management.

### **UNIT-III**

**[15]**

**Design:** Natural building design consideration - Energy efficient design strategies - Contextual factors - Longevity and process Assessment - Renewable Energy Sources and design - Advanced building Technologies - Smart buildings - Economies and cost analysis.

**Services:** Energy in building design - Energy efficient and environment friendly building - Thermal phenomena - thermal comfort - Indoor Air quality - Climate, sun and Solar radiation, - Psychometrics - passive heating and cooling systems - Energy Analysis - Active HVAC systems - Preliminary Investigation - Goals and policies - Energy audit - Types of Energy audit - Analysis of results - Energy flow diagram - Energy consumption / Unit Production - Identification of wastage- Priority of conservative measures - Maintenance of energy management programme.

### **UNIT-IV**

**[14]**

**Energy management:** Energy management of electrical equipment - Improvement of power factor - Management of maximum demand - Energy savings in pumps - Fans -Compressed air systems - Energy savings in Lighting systems - Air conditioning systems - Applications - Facility operation and maintenance - Facility modifications - Energy recovery dehumidifier - Waste heat recovery - Steam plants and distribution systems - Improvement of boiler efficiency - Frequency of blow down - Steam leakage - steam Flash and condense return.

#### **Text Books:**

1. Moore F., Environmental Control system Tata McGraw - Hill, Inc. 1994.

#### **Reference Books:**

1. Brown, GZ, Sun, Wind and light: Architectural design strategies, John Wiley & Sons, 1985.
2. Cook, J, Award - Winning passive Solar Design, Tata McGraw - Hill, 1984.
3. J.R. Waters, Energy conservation in Buildings: A Guide to part L of the Building Regulations, Blackwell Publishing, 2003.

**Web Resources:**

1. <https://www.dmme.virginia.gov/DE/LinkDocuments/HandbookNewConstruction.pdf>

**MOOCs:**

1. Energy Efficiency: (<https://www.mooc-list.com/tags/energy-efficiency>)

<b>Subject: Elective-II (Building Maintenance Management)</b>		
<b>Program: M. Tech. In Civil Engg.</b>	<b>Subject Code: CP0210</b>	<b>Semester: II</b>

<b>(Construction Project Management)</b>								
<b>Teaching Scheme</b>				<b>Examination Evaluation Scheme</b>				
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credits</b>	<b>University Theory Examination</b>	<b>University Practical Examination</b>	<b>Continuous Internal Evaluation (CIE)- Theory</b>	<b>Continuous Internal Evaluation (CIE)- Practical</b>	<b>Total</b>
3	0	0	3	30/60	-	20/40	-	50/100

### **Course Objectives:**

- To understand the role of construction manager into building maintenance.
- To understand importance of building maintenance management.
- To study procedure of building maintenance management as a whole.

### **Course Outcomes:**

- Gaining knowledge about comprehensive Building Maintenance by studying its types, probable areas where maintenance could be an issue and its solution, role of individual involved, maintenance strategies and future plans related to it.

### **COURSE CONTENTS:**

#### **UNIT-I**

**[14]**

#### **Introduction, Scope and structure, Definitions**

**Guidance for building services designers:** Designers' responsibilities, Advising and guiding the client, Clients' requirements, Installation, Design parameters, First-year operation and maintenance requirements.

**Maintenance techniques and their applications:** Management of maintenance, Types of maintenance, establishing a maintenance policy, Choice of maintenance strategy, Main principles of a planned maintenance system, typical range of maintenance services.

**Understanding Building Maintenance & Management:** General, Timely maintenance, common building defects, their symptoms selecting the appropriate solutions for, (defects in building and building services), Areas for special attention, types of statutory orders, orders issued by the building department, investigation order, repair order, fire safety improvement directions.

**UNIT-II** [14]

**Need for Effective Maintenance and Management:** Principles of Long Term Maintenance, Principles of Inspection, Surveillance and Control, Forming Organizations, Taking out Appropriate Insurance Policies.

**Carrying out Repair and Maintenance Works:** Fundamentals, Project Planning and Financing, Insurance, Precautionary and Safety Measures, Appointment of Building Professionals, Appointment of Contractors, Tendering, Post Contract Management, Management Aspects during the Progress of Works, Site Safety Supervision Plans (SSSP)

**Long term maintenance plans:** Maintenance in General, Planned Maintenance, Survey of Existing Conditions, Maintenance Strategy and Standard, Maintenance Budget and Replacement Reserve, Maintenance Cycle.

**UNIT-III** [13]

**Miscellaneous Issues in Management:** Environmental Issues, Fire Evacuation Plan and Fire Drill, Security Measures and Appointment of Security Personnel, Owners' Corporation.

**Controls for building services:** Purpose of controls, Maintenance requirements, Routine maintenance checks, Building management systems, Upgrading control systems, Need for training.

**Commissioning and testing:** Commissioning management, Summary of commissioning requirements, Commissioning manager and commissioning specialist responsibilities, Documentation, Designer's checklist, repeat testing and commissioning, Controls and building management systems, Decommissioning and mothballing.

**UNIT-IV** [13]

**Handover procedures:** Preparation, Commissioning, Inspections, User training, Occupant training, Tools, spares and keys, Handover information, Equipment warranties,

**Operation and maintenance information:** The importance of O&M manuals, Health and safety, Computer-based information systems, Maintenance management systems, Updating.

**Risk assessment and management procedures:** introduction, types of risks associated with building maintenance, Dependency modelling.

**Owning and operating costs:** Cost data, Bench marking, cost data attributes, Levels of information, Utilization of labour, Backlog of maintenance, Simple accounting techniques, Life cycle costs.

**Maintenance audits:** Audit document, Audit details, scoring system, Recording comments, Audit procedure.

**Condition surveys:** Types and frequency, Thermal imaging, Consistency of information, Classifying priorities, Data collection, Updating information, Future developments.

#### **Text Books:**

1. Maintenance Engineering and Management, CIBSE Guide M.
2. Guide book: Building maintenance and management ([www.info.gov.hk/bd](http://www.info.gov.hk/bd)).

#### **Reference Books:**

1. Practical Handbook on building maintenance Civil works (Sixth edition), Er. M. K. Gupta, Nabhi Publications.
2. Building Maintenance management (Second edition), Barrie Chanter and Peter Shallow, Blackwell publishing.
3. A House Builder's Handbook Building Materials, Construction And Maintenance, Dr. Nainan P. Kurian.
4. Lee's Building maintenance management (4<sup>th</sup> edition), Paul Wordsworth.
5. Building Maintenance management (Second edition), Reiginald lee, Willy publishers.

#### **Web resources:**

1. [www.cpwd.gov.in](http://www.cpwd.gov.in)

2. [https://en.wikipedia.org/wiki/Building Maintenance](https://en.wikipedia.org/wiki/Building_Maintenance)
3. <https://www.getapp.com/s/open-source-building-maintenance-software>
4. <https://theconstructor.org>
5. [www.civiltutorial.org](http://www.civiltutorial.org)
6. <http://civilblog.org>

**MOOCs:**

1. <https://www.mooc-list.com/tags/construction>
2. <https://www.class-central.com/tag/building%20construction>

Department of Civil Engineering, IITE,  
Indus University

3<sup>rd</sup> Semester

**M-TECH (CPM), SEMESTER –III TEACHING & EXAMINATION SCHEME  
WITH EFFECT FROM JULY 2017**

SR NO	CODE	SUBJECTS	TOTAL CREDITS	TEACHING SCHEME (HOURS)			EXAMINATION SCHEME						TOTAL
							INTERNAL			EXTERNAL			
							REPORT	VIVA-VOCE	PRESENTATION	REPORT	VIVA-VOCE	PRESENTATION	
L	T	P											
1	CP0301	Dissertation Phase –I	20	-	-	40	50	50	50	50	50	50	300
<b>TOTAL</b>			<b>20</b>	<b>-</b>	<b>-</b>	<b>40</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>300</b>



**Subject: Dissertation Phase-I**

<b>Program: M. Tech. In Civil Engg. (Construction Project Management)</b>				<b>Subject Code: CP0301</b>			<b>Semester: III</b>	
<b>Teaching Scheme</b>				<b>Examination Evaluation Scheme</b>				
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credits</b>	<b>University Theory Examination</b>	<b>University Practical Examination</b>	<b>Continuous Internal Evaluation (CIE)- Theory</b>	<b>Continuous Internal Evaluation (CIE)- Practical</b>	<b>Total</b>
0	0	40	20	-	75/150	-	75/150	150/300

Department of Civil Engineering, IITE,  
Indus University

## 4<sup>th</sup> Semester

M-TECH (CPM), SEMESTER –IV TEACHING & EXAMINATION SCHEME WITH EFFECT FROM JULY 2017													
SR NO	CODE	SUBJECTS	TOTAL CREDITS	TEACHING SCHEME (HOURS)			EXAMINATION SCHEME						TOTAL
				L	T	P	INTERNAL			EXTERNAL			
							REPORT	VIVA-VOCE	PRESENTATION	REPORT	VIVA-VOCE	PRESENTATION	
1	CP0401	Dissertation Phase – II	20	-	-	40	50	50	50	50	50	50	300
<b>TOTAL</b>			<b>20</b>	<b>-</b>	<b>-</b>	<b>40</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>300</b>

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**Subject: Dissertation Phase-II**

<b>Subject: Dissertation Phase-II</b>								
<b>Program: M. Tech. In Civil Engg. (Construction Project Management)</b>				<b>Subject Code: CP0401</b>			<b>Semester: IV</b>	
<b>Teaching Scheme</b>				<b>Examination Evaluation Scheme</b>				
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credits</b>	<b>University Theory Examination</b>	<b>University Practical Examination</b>	<b>Continuous Internal Evaluation</b>	<b>Continuous Internal Evaluation</b>	<b>Total</b>

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17

						<b>(CIE)- Theory</b>	<b>(CIE)- Practical</b>	
0	0	40	20	-	75/150	-	75/150	150/300

Approved Vide Agenda Item No. 03 of Minutes of Meeting of Academic Council held on 11 July 17