COIMBATORE INSTITUTE OF TECHNOLOGY, COIMBATORE – 641 014
(An Autonomous Institution affiliated to ANNA UNIVERSITY, CHENNAI)
DEPARTMENT OF CIVIL ENGINEERING
REGULATIONS 2023 CHOICE BASED CREDIT SYSTEM

M. E. CONSTRUCTION MANAGEMENT

VISION

To provide quality education in Civil Engineering and to become a state-of-the-art source of world-class Civil Engineers and Researchers.

MISSION

- M1 - To impart quality education in diverse areas of civil engineering to achieve the industrial expectations.
- M2 - To offer state-of the art facilities towards academic and research excellence.
- M3 - To nurture intellectual knowledge in modern technologies of Civil Engineering for enhancing entrepreneurship qualities and employability skills.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

The educational objectives of the postgraduate programme of PG Construction Management are:

PEO 1: Excel in research or will succeed in Construction Engineering and Management profession in the government, public and private sector organizations.

PEO 2: Have a sound knowledge in statistics, project management and construction engineering fundamentals required for solving real time construction Engineering and Management Problems using modern equipment and software tools.

PEO 3: Become entrepreneurs and develop processes and construction technologies through innovation, by integrating their knowledge in multidisciplinary management to meet the needs of society and formulate solutions that are technically sound, economically feasible, and socially acceptable.

PEO 4: Have professional and ethical attitude, effective communication skills, teamwork skills, leadership quality, multidisciplinary approach and an ability to relate Construction Engineering and Management issues in broader social context.

PEO 5: Have competence of excellence, leadership, written ethical codes and guidelines, and the life-long learning needed for a successful professional career.

PROGRAM OUTCOMES (POs)

POs describe what students are expected to know or be able to do by the time of post-graduation from the program. The Program Outcomes of M.E Construction Management are as follows:

PO1 An ability to independently carry out research/investigation and development work to solve practical problems

PO2 An ability to write and present a substantial technical report/document

PO3 Able to demonstrate a degree of mastery over the area as per the specialization of the program at a level higher than the requirements in the appropriate bachelor program

PROGRAM SPECIFIC OUTCOMES (PSOs)

Graduates of the program M.E. Construction Management will be able to

PSO1: Knowledge of Construction Engineering and Management discipline
PSO2: Critical analysis of Construction management problems and innovation
PSO3: Conceptualization and evaluation of engineering solutions to Construction Issues.

MAPPING OF PROGRAMME EDUCATIONAL OUTCOMES WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC COUTCOMES

PEOs	PROGRAMME OUTCOMES			PSOs		
	PO1	PO2	PO3	PSO1	PSO2	PSO3
1	x	x	x	x	x	x
2	x	x	x		x	
3				x	x	x
4	x		x	x	x	x
5	x	x	x	x	x	x

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M. E. CONSTRUCTION MANAGEMENT

CURRICULA AND SYLLABI

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	23MCM111	Statistical Methods and Research methodology for construction management	FCC	3	1	0	4	4
2.	23MCM112	Construction Project Management	PCC	3	0	0	3	3
3.	23MCM113	Construction Project Formulation and Appraisal	PCC	3	0	0	3	3
4.	23MCM114	Construction Economics and Financial Management	PCC	3	0	0	3	3
5.		Program Elective – 1	PEC	3	0	0	3	3
6.		Value added course -1 Green Buildings	EEC	2	0	0	2	1
PRACTICALS								
7.	23MCM121	Data Analysis Laboratory for Construction Management	PCC	0	0	4	4	2
8.	23MCM122	Research proposal writing and IPR	EEC	0	0	4	4	2
			TOTAL	**17**	**1**	**8**	**26**	**21**

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	23MCM211	Construction Planning, Scheduling and Control	PCC	3	0	0	3	3
2.	23MCM212	Contract Management and Dispute Resolution	PCC	3	0	0	3	3
3.	23MCM213	Quantitative Techniques in Construction Management	PCC	3	0	0	3	3
4.		Program Elective – 2	PEC	3	0	0	3	3
5.		Program Elective – 3	PEC	3	0	0	3	3
6.		Value added Course – 2	EEC	2	0	0	2	1
PRACTICALS								
7.	23MCM221	Project Planning Laboratory for Construction Management	PCC	0	0	4	4	2
8.	23MCM222	Advanced Construction Engineering and Experimental Techniques Laboratory	PCC	0	0	4	4	2
			TOTAL	**17**	**0**	**8**	**25**	**20**

SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Program Elective – 4	PEC	3	0	0	3	3
2.		Program Elective – 5	PEC	3	0	0	3	3
3.		Open Elective / Program Elective - 6	PEC/OEC	3	0	0	3	3
PRACTICALS								
4.	23MCM331	Practical Training	EEC	0	0	0	0	2
5.	23MCM332	Project Work – Phase 1	EEC	0	0	6	6	3
			TOTAL	**9**	**0**	**6**	**15**	**14**

SEMESTER IV

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	23MCM441	Project Work – Phase 2	EEC	0	0	30	30	15
			TOTAL	**0**	**0**	**30**	**30**	**15**

LIST OF PROFESSIONAL ELECTIVE COURSES:

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CONTACT PERIODS	CREDITS
1.	23MCME01	Advanced Construction Materials and Equipment	PEC	3	0	0	3	3
2.	23MCME02	Quality Management for Construction Projects	PEC	3	0	0	3	3
3.	23MCME03	Management Information systems	PEC	3	0	0	3	3
4.	23MCME04	Advanced Construction Techniques	PEC	3	0	0	3	3
5.	23MCME05	Functional Planning, Building Services and Maintenance Management	PEC	3	0	0	3	3
6.	23MCME06	Construction Risk Management	PEC	3	0	0	3	3
7.	23MCME07	Shoring, Scaffolding and Formwork	PEC	3	0	0	3	3
8.	23MCME08	Advanced concrete technology	PEC	3	0	0	3	3
9.	23MCME09	Valuation of Real Properties	PEC	3	0	0	3	3
10.	23MCME10	Building Information Management	PEC	3	0	0	3	3
11.	23MCME11	Construction Safety and Health Management	PEC	3	0	0	3	3
12.	23MCME12	Lean Construction Concepts, Tools and Practices	PEC	3	0	0	3	3
13.	23MCME13	Construction Personal Management	PEC	3	0	0	3	3
14.	23MCME14	Design of Energy Efficient Buildings	PEC	3	0	0	3	3
15.	23MCME15	Maintenance, Repair and Rehabilitation of	PEC	3	0	0	3	3

		structures						
16.	23MCME16	Environmental Impact Assessment for Construction Engineers	PEC	3	0	0	3	3
17.	23MCME17	Supply chain management & logistics in construction	PEC	3	0	0	3	3
18.	23MCME18	Resource Management and control in construction	PEC	3	0	0	3	3
19.	23MCME19	GIS in Construction Management	PEC	3	0	0	3	3
20.	23MCME20	Digital Design and construction	PEC	3	0	0	3	3
21.	23MCME21	3D Printing and Design						

LIST OF OPEN ELECTIVE COURSES OFFERED FOR THE STUDENTS OF OTHER PG PROGRAMMES:

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CONTACT PERIODS	C	PG PROGRAMME
1.	23MSEOE01	Disaster Management	OEC	3	0	0	3	3	SE, CM & ES
2.	23MSEOE02	Energy Efficient buildings	OEC	3	0	0	3	3	SE, CM & ES
3.	23MCMOE01	Landscaping and architecture	OEC	3	0	0	3	3	SE, CM & ES
4.	23MENOE01	Climate change and Adaptation	OEC	3	0	0	3	3	SE, CM & ES

SUMMARY

Category; FC – Foundational course, PCC –Professional Core, PE- Professional Elective Course,
OE-Open Elective Course, EEC –Employability Enhancement Course

M.E. CONSTRUCTION MANAGEMENT						
Sl. No.	Subject Area	Credits per Semester				Total Credits
		I	II	III	IV	
1.	FC	4				**4**
2.	PCC	11	11			**22**
3.	PEC	3	6	6		**15**
4.	OEC			3		**3**
5.	EEC	3	3	5	15	**26**
					TOTAL CREDITS	**70**

SEMESTER I

23MCM111	STATISTICAL METHODS AND RESEARCH METHODOLOGY FOR CONSTRUCTION MANAGEMENT	L	T	P	C
		3	1	0	4

MODULE I ESTIMATION THEORY **12**

Estimators: Unbiasedness, Consistency, Efficiency and Sufficiency - Maximum Likelihood Estimation - Method of moments

MODULE II TWO – DIMENSIONAL RANDOM VARIABLES **12**

Joint distributions (Discrete & Continuous) – Marginal and conditional distributions – Covariance – Correlation and linear regression.

MODULE III CORRELATION AND REGRESSION **12**

Multiple and partial correlation – Method of least squares – Plane of regression – Properties of residuals – Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation with total and partial correlations.

MODULE IV TESTING OF HYPOTHESIS **12**

Sampling distributions - Small and large samples -Tests based on Normal, t, F distributions and Chi square test for testing of means, variance and proportions – Analysis of r x c tables – Goodness of fit – Independent of attributes.

MODULE V DESIGN OF EXPERIMENTS **12**

Analysis of variance - One-way and two-way classifications - Completely randomized design - Randomized block design - Latin square design.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Assimilate ideas of Consistency, efficiency and unbiasedness of estimators, method of maximum likelihood estimation.

CO2: Explain the concepts of two dimensional random variables with correlation and correlation coefficient and also regression.

CO3: Evaluate the multiple correlation and partial correlation.

CO4: Utilize the concepts of testing of hypothesis for small and large samples which plays an important role in real life problems.

CO5: Calculate the analysis of variance using the concepts of design of experiment.

TOTAL: 60 PERIODS

REFERENCES:

1. “Introduction to Probability and Statistics for Engineers and Scientists”, Sheldon M. Ross, 4th edition, Academic Foundation, 2011
2. “Probability and Statistics for Engineering and the Sciences”, Jay L. Devore, 9th edition, Cengage Learning, 2020.
3. “Higher Engineering Mathematics”, T. Veerarajan, 1st edition, Yes Dee Publishing Pvt, 2022.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	2	2	1	1
2	1	2	2	2	2	1
3	1	2	2	2	2	1
4	2	1	2	2	3	2
5	1	2	2	2	2	2
AVg.	**1.2**	**1.6**	**2**	**2**	**2**	**1.4**

1-low, 2-medium, 3-high

23MCM112	CONSTRUCTION PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I CONSTRUCTION PROJECT PERSPECTIVES 9

Construction Project Life Cycle - Types of Construction - Selection of Professional Services - Stake-holders in Construction Project - Structure of Project Organization - Perspectives of Owners & Builders -Role of Project Managers - Financing of Constructed Facilities -Design and Construction as an Integrated Process - Design Concepts.

MODULE II CONSTRUCTION PROJECT COST ESTIMATION & MANAGEMENT 9

Various Types of Project Cost -Method of Structuring Project Cost - Clients' Estimate and Contractors Estimation of Project Cost - Type of Construction Cost Estimates -Allocation of Joint Costs -Estimation of Operating Costs - Cost Indices and its Applications to Estimating - Cost Planning, Budgeting and Control - Cost Codes - Cost Statement - Value Engineering.

MODULE III RESOURCE PLANNING AND MANAGEMENT 9

Labour Productivity - Factors Affecting Job-Site Productivity -Labour Estimation, Allocation and Control - Materials Estimation - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management - Construction Equipment - Choice of Equipment and Standard Production Rates -Estimation of Equipment Requirement - Construction Processes Queues and Resource Bottlenecks.

MODULE IV CONSTRUCTION PLANNING, MONITORING AND CONTROL 9

Types of Project Plans - Work Breakdown Structure - Resource Levelling - Resource Allocation Interface Management aspects -Project Scheduling -Types of Project Scheduling - Project Progress Control - Measuring and Updating of Project Progress using Bar Chart, Progress Reports to aid Progress Review - Stage-wise Completion Cost - Earned Value Analysis.

MODULE V PROJECT CLOSURE 9

Project Closure - Construction Closure - Financial Closure - Contract Closure - Project Managers' Closure - Lessons Learnt from the Project - Profit/Loss at Completion - Disputes and Claims - Settlement of Disputes and Claims - Final Project Closure Reports.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Determine the project objectives and prepare a project schedule for time, cost and resources.

CO2: Prepare an estimate of the project Cost and plan the cost budget.

CO3: Plan for the various resources on real-time required for the construction activities.

CO4: Update Project Progress and prepare reports for review and to control the project.

CO5: Prepare a final project closure report.

TOTAL: 45 PERIODS

REFERENCES:

1. “Construction Project Management - Theory and Practice”, Kumar Neeraj Jha, Pearson Publications - Dorling Kindersley (India) Pvt. Ltd., 2012
2. “Construction Project Management: Planning, Scheduling and Control”, K.K. Chitkara, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
3. “Construction Project Management”, Frederick E. Gould and Vary E. Joyce, Wentworth Institute of Technology and Massachusetts Institute of Technology, 2000.
4. “Project Management”, S. Choudhury, Tata McGraw-Hill Publishing Company, New Delhi, 1988.
5. “Total Construction Project Management”, George J. Ritz, McGraw-Hill Inc, 1994

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	3	3	2	3
2	1	2	3	3	2	3
3	1	1	3	3	2	2
4	1	2	2	3	3	3
5	1	2	2	2	1	1
AVg.	**1**	**1.8**	**2.6**	**2.8**	**2**	**2.4**

1-low, 2-medium, 3-high

23MCM113	CONSTRUCTION PROJECT FORMULATION AND APPRAISAL	L	T	P	C
		3	0	0	3

MODULE I PROJECT FORMULATION **9**

Project - Phases of Project - Capital investments - Generation and Screening of Project Ideas - Project identification - Preliminary Analysis, Market, Technical, Financial, Economic and Ecological - Pre-Feasibility Report and its Clearance, Project Estimates and Techno-Economic Feasibility Report, Detailed Project Report - Different Project Clearances required.

MODULE II PROJECT COSTING **9**

Project Cash Flows - Basic principles of cash flow estimation - Time Value of Money - Time lines and notations - Future value of single amount - Present value of single amount-Future value of an annuity-Present value of an annuity- Concept of average Cost of capital - Cost of debt and preference - cost of equity and depreciation.

MODULE III PROJECT APPRAISAL **9**

NPV - BCR - IRR - ARR - Urgency - Pay Back Period - Assessment of Various Methods - Indian Practice of Investment Appraisal - International Practice of Appraisal - Analysis of Risk - Sensitivity analysis -Scenario analysis - Break even analysis - Hillier Model - Simulation analysis - Decision tree analysis - Project selection under risk.

MODULE IV PROJECT FINANCING **9**

Project financing - Public and Private sources of capital - Equity - Equity capital - Preference capital - Internal accruals - Debt - Term loans - Debentures - Working capital advances - Miscellaneous sources - Key financial indicators - ratios.

MODULE V PRIVATE SECTOR PARTICIPATION **9**

Private sector participation in Infrastructure Development Projects - Features of BOT model, BOL model and BOOT model - Key Project parties - Financing of Infrastructure projects with case studies - Technology transfer and foreign collaboration - Scope of technology transfer.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Design and implement an integrated project formulation & business planning framework, defining relevant processes, tools, information needs and reports.

CO2: Estimate time value of money, cash flows and project costing.

CO3: Apply the project appraisal techniques and analyze risks in construction projects.

CO4: Assess the various sources of finance, key financial indicators and its merits.

CO5: Recognize the implication of private sector participation and technology transfer in construction projects.

TOTAL: 45 PERIODS

REFERENCES:

1. "Handbook of Management Consulting Services", S.W. Barcus and J.W. Wilkinson, McGraw Hill, New York, 1986.
2. "Projects - Planning, Analysis, Selection, Implementation Review", Prasanna Chandra, Eighth edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2014.
3. "Total Project Management - The Indian Context", Joy P.K., Macmillan India Ltd., New Delhi, 2006.
4. "Manual for the Preparation of Industrial Feasibility Studies", United Nations Industrial Development Organisation (UNIDO), (IDBI Reproduction), Bombay, 1987.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	3	2	2	2
2	1	2	3	3	1	2
3	2	2	3	3	3	2
4	2	1	3	3	3	2
5	2	1	2	3	2	1
AVg.	**1.6**	**1.6**	**2.8**	**2.8**	**2.2**	**1.8**

1-low, 2-medium, 3-high

23MCM114	CONSTRUCTION ECONOMICS AND FINANCIAL MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I MANAGERIAL ECONOMICS **9**

Economics - Concepts and Importance's - Managerial Economics - Engineering Economics - Support Matters of Economy related to Engineering -Market demand and supply - Economic law of production - Choice of Technology - Role of Civil Engineering in Industrial Development.

MODULE II CONSTRUCTION ECONOMICS **9**

Construction development in Housing, transport, energy and other infrastructures - Economics of ecology, environment, energy resources - Local material selection - Form and functional designs - Construction workers - Construction economics with respect to Urban Problems, Poverty, Migration, Unemployment, Pollution.

MODULE III FINANCING **9**

The need for financial management - Types of financing - Source of Finance: Financing instruments- Short term borrowing - Long term borrowing - Leasing - Equity financing - Internal and External generation of funds - Assistance from government budgeting support and international finance corporations - Loans to Contractors - Security and risk aspects

MODULE IV ANALYSIS OF FINANCIAL STATEMENTS **9**

Balance Sheet - Profit and Loss account - Cash flow and Fund flow analysis - Ratio analysis - Investment and financing decision - Financial Control - Centralized management.

MODULE V ACCOUNTING METHOD **9**

Accounting - Cash basis of accounting - Accrual basis of accounting - Percentage completion method - Completed contract method - Accounting for tax reporting purposes and financial reporting purposes - Accounting Standards- Audit - Quality Control.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Explain the concepts of Managerial Economics.

CO2: Interpret the relationship between the Economic concepts with Construction Economics.

CO3: Govern the financial system of an organization.

CO4: Perform the Financial Statement for a firm.

CO5: Assess the accounting methods and auditing processes

TOTAL : 45 PERIODS

REFERENCES:

1. “Management Accounting - Principles and Practice”, Shashi K. Gupta and R.K. Sharma, Kalyani Publishers, 2016.
2. “Urban Economics”, Arthur O'Sullivan, McGraw Hill Publication, 2019..
3. “Financial Management”, C. Paramasivan and T. Subramanian, New Age International Publishers, 2018.
4. “Financial and Cost Concepts for Construction Management”, D.W. Halpin, John Wiley & Sons, New York, 1985.
5. “Project Selection, Planning, Analysis, Implementation and Review”, Prasanna Chandra, Eighth edition, Tata McGraw Hill Publishing Company, 2014.
6. “Fundamentals of Construction Management and Organisation”, Kwaku A. Tenah and Jose M. Guevara, Prentice-Hall of India, 1995.
7. “Introduction to Financial Accounting”, T. Horngren Charles, L. Sundern Gary, and A. Elliott John, Pearson Publications, 2017.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	2	2	1	1
2	2	2	3	3	2	2
3	1	1	2	2	1	1
4	1	2	2	2	1	1
5	2	2	2	3	2	1
AVg.	**1.4**	**1.8**	**2.2**	**2.4**	**1.4**	**1.2**

1-low, 2-medium, 3-high

23MCM121	DATA ANALYSIS LABORATORY FOR CONSTRUCTION MANAGEMENT	L	T	P	C
		0	0	4	2

LIST OF EXPERIMENTS:

1. Data analysis of technical and financial bid of construction projects
2. Ranking of attributes/criteria for selecting the best alternative using multi criteria decision making
3. Inventory analysis of construction projects
4. Data analysis of interest factors of capital investments
5. Simulation analysis of construction projects
6. Scenario analysis of construction projects
7. Design of a simple equipment information system for a construction project.
8. Earned value analysis of construction projects
9. Preparation of questionnaire data and computation of descriptive statistics
10. Inferential analysis of questionnaire data (t- test, one way anova, simple and multiple regression)
11. AHP to calculate the weights of criteria for decision making
12. TOPSIS methods to select and prioritize best project

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students will be able

CO1: Interpret the data using various statistical analysis methods with charts and graphs using spread sheets.

CO2: Formulate simulation and scenario models for project risk analysis.

CO3: Design simple information systems.

CO4: Demonstrate ability to identifying and defining the issues in decision making with multiple criteria and understanding its root causes to provide appropriate solution to the business firms.

CO5: Evaluate project performance using earned value analysis.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	2	2	2	2	1
2	1	2	2	3	3	2
3	1	1	2	2	1	1
4	2	2	3	2	3	2
5	1	2	2	3	2	2
AVg.	**1.4**	**1.8**	**2.2**	**2.4**	**2.2**	**1.6**

1-low, 2-medium, 3-high

23MCM122	RESEARCH PROPOSAL WRITING AND IPR	L	T	P	C
		0	0	4	2

LIST OF EXPERIMENTS:

1. Introduction to Research Proposal Writing

- Understanding the significance of research proposals
- Differentiating between reactive and proactive proposals
- Overview of the proposal development process
- Components of a Research Proposal

2. Problem Identification and Needs Assessment

- Techniques for conducting needs assessment (e.g., PRA, participatory tools)
- Rationale and Literature Review
- Incorporating previous research into project rationale
- Goals, Objectives, and Sustainability
- Formulating clear and SMART objectives
- Strategies for project sustainability beyond initial funding

3. Project Implementation and Management

- Developing project activities and using tools like log frames
- Creating project work plans and GANTT charts

4. Budgeting and Intellectual Property Rights

- Devising project budgets considering expenses and funding sources
- Introduction to Intellectual Property Rights (IPR) and its relevance in research

5. Monitoring, Evaluation, and Institutional Capability

- Designing effective monitoring and evaluation plans
- Addressing management and institutional capacity in proposals

6. Proposal Writing Practice and Review

- Hands-on proposal writing exercises
- Peer review and feedback sessions

7. IPR Considerations in Proposal Writing

- Explain copyright, patents, and other IPR concepts
- Incorporating IPR considerations in research proposals

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students will be able

CO1: Apply the Skill at generating well-suited proposals to meet distinct demands.

CO2: Apply the Skill in the creation of proactive proposals.

CO3: Illustrate the components of a proactive proposal and the process

CO4: Evaluate a financial plan for the project, taking into consideration all required costs and potential avenues for funding.

CO5: Evaluate a comprehensive monitoring and evaluation scheme to assess the project's progress and outcomes

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	3	3	2	2	2
2	1	3	2	2	2	1
3	1	2	2	2	1	1
4	2	2	2	3	2	2
5	1	2	2	3	2	2
AVg.	**1.2**	**2.4**	**2.2**	**2.4**	**1.8**	**1.6**

1-low, 2-medium, 3-high

SEMESTER II

23MCM211	CONSTRUCTION PLANNING, SCHEDULING AND CONTROL	L	T	P	C
		3	0	0	3

MODULE I CONSTRUCTION PLANNING **9**

Basic Concepts in the Development of Construction Plans - Choice of Technology and Construction Method - Defining Work Tasks - Defining Precedence Relationships among Activities - Estimating Activity Durations - Estimating Resource Requirements for Work Activities - Coding Systems.

MODULE II SCHEDULING PROCEDURES AND TECHNIQUES **9**

Construction Schedules - Critical Path Method - Scheduling Calculations - Float - Presenting Project Schedules - Scheduling for Activity-on-Node and with Leads, Lags, and Windows - Scheduling with Resource Constraints and Precedences - Use of Advanced Scheduling Techniques - Scheduling with Uncertain Durations - Calculations for Monte Carlo Schedule Simulation - Crashing and Time/Cost Tradeoffs - Improving the Scheduling Process.

MODULE III COST CONTROL, MONITORING AND ACCOUNTING **9**

The Cost Control Problem - The Project Budget - Forecasting for Activity Cost Control - Financial Accounting Systems and Cost Accounts - Control of Project Cash Flows - Schedule Control - Schedule and Budget Updates -S Curve - Earned value method -Relating Cost and Schedule Information.

MODULE IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION **9**

Quality and Safety Concerns in Construction - Organizing for Quality and Safety - Work and Material Specifications - Total Quality Control - Quality Control by Statistical Methods - Statistical Quality Control with Sampling by Attributes - Statistical Quality Control with Sampling by Variables - Safety.

MODULE V ORGANIZATION AND USE OF PROJECT INFORMATION **9**

Types of Project Information - Accuracy and Use of Information - Computerized Organization and Use of Information - Organizing Information in Databases - Relational Model of Databases - Other Conceptual Models of Databases - Centralized Database Management Systems - Databases and Applications Programs - Information Transfer and Flow.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Develop effective construction plans with right selection of technologies, estimation of duration and resources of construction projects.

CO2: Prepare work break down structure and schedule the activities of construction projects using network analysis.

CO3: Evaluate the project budget required for the particular construction project and monitor the projects through effective cost control techniques and procedures.

CO4: Apply the elements of quality control and safety of construction projects and recognize quality control tools in the construction industry.

CO5: Organize the project information in databases and use the right information at right time for projects.

TOTAL: 45 PERIODS

REFERENCES:

1. “Construction Project Management: Planning, Scheduling and Control”, K.K. Chitkara, Third edition, Tata McGraw-Hill Publishing Company, New Delhi, 2014.
2. “Construction Project Management - Theory and Practice”, Kumar Neeraj Jha, Pearson Education India, 2011.
3. “Project Planning, Scheduling and Control in Construction: An Encyclopedia of Terms and Applications”, Calin M. Popescu and Chotchai Charoenngam, Wiley, New York, 1995.
4. “Project Management for Construction - Fundamental Concepts for Owners, Engineers, Architects and Builders”, Chris Hendrickson and Tung Au, Prentice Hall, Pittsburgh, 2000.
5. “Statistical Quality Control: A Modern Introduction”, Douglas C. Montgomery, Sixth edition, Wiley student edition, 2010.
6. “Scheduling Construction Projects”, E. M. Willis, John Wiley & Sons, 1986.
7. “Financial and Cost Concepts for Construction Management”, D. W. Halpin, John Wiley & Sons, New York, 1985.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	3	3
2	1	1	3	3	3	3
3	2	2	3	3	3	3
4	1	1	3	3	2	3
5	1	2	2	3	2	2
AVg.	**1.2**	**1.4**	**2.8**	**3**	**2.6**	**2.8**

1-low, 2-medium, 3-high

23MCM212	CONTRACT MANAGEMENT AND DISPUTE RESOLUTION	L	T	P	C
		3	0	0	3

MODULE I CONSTRUCTION CONTRACTS 9

Elements of Contracts - Types of Contracts - Features - Suitability - Salient Features of Indian contract Act 1872 as Relevant to Construction Contracts - Design of Contract Documents - International Contract Document - Standard Contract Document - Contract for Engineering and Architectural Services- Contract between Owner and Contractor.

MODULE II TENDERS 9

Types of Tenders - Notice Inviting Tender - Prequalification - Preparation and Submission of Bid Documents & Tenders – Bidding - Acceptance/Rejection of Tenders - Evaluation of Tender from Technical, Contractual and Commercial Points of View -World Bank Procedures and Guidelines - Tamil Nadu Transparency in Tenders Act - Local and International Competitive Bidding - Global Tendering.

MODULE III CONTRACT ADMINISTRATION AND MANAGEMENT 9

Selection of Project Management Team - Possession of Construction Site - Duties of Employers - Duties of Contractors - Selection of Sub-contractors - Handling of Contract Matters - Settlement of Variations & Clarifications in Construction - Documentation and Maintenance of Construction Progress Records - Field Diary -Maintenance of Feed Back Reports and Documentation - Quality control Inspection Reports and Outcomes.

MODULE IV ALTERNATE DISPUTE RESOLUTION 9

Claims and Disputes in Construction contracts - Various Methods of Settlement of Disputes - Alternate Dispute Resolution - Negotiation, Mediation, Conciliation and Arbitration - Salient Features of The Arbitration and Conciliation Act 1996 - Formation of Arbitration Tribunal - Interim Award - Conduct of Arbitration Proceedings - Award Writing and Setting aside of Award.

MODULE V ADJUDICATION AND DISPUTE RESOLUTION BOARD 9

ADR Process - Tender and Contract Conditions for Dispute Resolution - Dispute Review Board - Member Selection - Duties and Functions of DRB - Reference of Disputes to DRB - Practice Guidelines - Termination or Resignation of DRB Members - Deliberations and Hearing of DRB - Report and Recommendations of DRB - International Perspective.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Explain and interpret the various elements of contract documents, and properly administer the contracts clauses.

CO2: Prepare and submit a tender for a construction project and to evaluate a tender document received for the award of a contract.

CO3: Plan and organize the contract administration process effectively.

CO4: Infer the intension of Alternate Dispute resolution and identify appropriate methods to resolve disputes.

CO5: Appreciate the role of an adjudicator and form a Dispute Resolution Board in the project for monitoring and settling the disputes as and when it arises

TOTAL: 45 PERIODS

REFERENCES:

1. “Laws Relating to Building and Engineering Contracts in India”, G.T. Gajaria, M.M.

Tripathi Private Ltd., Bombay, 1982.
2. “Construction Contracts”, Jimmie Hinze, McGraw Hill, 2001..
3. “Contracts and the Legal Environment for Engineers and Architects”, Joseph T. Bockrath, McGraw Hill, 2000.
4. “Fundamentals of Construction Management and Organisation”, Kwaku A. Tenah and Jose M. Guevara, Prentice Hall, 1985.
5. “Civil Engineering Contracts and Estimates”, B.S. Patil, Universities Press (India) Private Limited, 2006.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	3	3	2	2
2	1	1	3	3	3	3
3	1	1	3	3	2	3
4	2	1	2	3	2	1
5	2	1	2	3	1	1
AVg.	**1.4**	**1.2**	**2.6**	**3**	**2**	**2**

1-low, 2-medium, 3-high

23MCM213	QUANTITATIVE TECHNIQUES IN CONSTRUCTION MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I LINEAR PROGRAMMING 9

Formulation of problems - Graphical solutions - Analytical methods - Standard form - Canonical form - Basic feasible solution - Simplex Method - Two phase method - Penalty method - Primal and Dual algorithm.

MODULE II ALLOCATION MODELS IN CONSTRUCTION 9

Transportation Model - Assignment Models - Sequencing Problems.

MODULE III DYNAMIC PROGRAMMING 9

Bellman's principle of optimality - Multistage Decision problem -Decision Model and Analysis - Competitive Situation - Games and Gaming Models.

MODULE IV PRODUCTION MANAGEMENT AND MANAGERIAL ECONOMICS 9

Inventory Control - EOQ Model - Quantity Discounts - Safety Stock – Replacement Theory – PERT and CPM – Simulation Models –Cost Concepts – Break-even analysis – Pricing Techniques.

MODULE V SIMULATION OF CONSTRUCTION SYSTEMS 9

Simulation Approach and Models - Generation of Data - Monte-Carlo Simulation.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Apply the knowledge of science and engineering fundamentals in learning the concept of operations research and its practical applicability for solving challenges in construction.

CO2: Explain the elementary concepts and techniques of business research methods, and to appreciate how statistical and mathematical analysis can materially help in business decision-making.

CO3: Identify complex problems and arrive optimal solution through decision making.

CO4: Prepare the required man, material, equipment, cost and time as per needs by proper decision rules.

CO5: Apply the Simulation concepts for decision making in construction projects.

TOTAL : 45 PERIODS

REFERENCES:

1. “The Managerial Decision-Making Process”, Frank Harrison, E., Houghton Mifflin Co., Boston, 1999
2. “Operations Research: An Introduction”, Hamdy A. Taha, Prentice Hall, 2010.
3. Quantitative Approaches to Management”, Levin, R.I., Rubin, D.S., and Stinson, J., McGraw Hill College, 1993.
4. “Quantitative Technique for Decision Making in Construction”, Tang S.L., Irtishad U. Ahmad, Syed M. Ahmed, Ming Lu, Hongkong University Press, HKU, 2004.
5. “Quantitative Techniques in Management”, Nd. Vohra, Fifth Edition, Tata McGraw-Hill Company Ltd, 2017.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	3	3
2	1	2	2	2	2	1
3	2	1	3	3	3	3
4	1	1	3	3	3	3
5	1	1	3	3	3	3
AVg.	**1.2**	**1.2**	**2.8**	**2.8**	**2.8**	**2.6**

1-low, 2-medium, 3-high

23MCM221	PROJECT PLANNING LABORATORY FOR CONSTRUCTION MANAGEMENT	L	T	P	C
		0	0	4	2

LIST OF EXERCISES

TENDER, CONTRACTS & SPECIFICATION PREPARATION

Quantity takeoff, Preparation and delivery of the bid or proposal of an engineering construction project.

STRUCTURING PROJECTS

Optimize the project plan, understand data structures, Overview about EPS and OBS, Calendars, Creating a Project, Creating a work breakdown structure, Adding activities, creating relationships, scheduling, Adding constraints, Maintaining the project documents library, Formatting scheduled data.

RESOURCE MANAGEMENT

Codes for Activities and Resources, Roles, Resources, Assigning Resources and costs, Base lining the project plan.

PROJECT EXECUTION AND CONTROL

Update Progress date, Record the actual effort involved, Monitor the project, Reporting performance, user defined fields, project expenses, duration type, percent complete type, earned value analysis.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Prepare Bid for a construction projects using spread sheets programs.

CO2: Structure the project and schedule the project, allocate the resources and optimize the project plan.

CO3: Track, update and control a construction project and report its performance.

CO4: Evaluate the value of existing civil engineering structures and project planning tools.

CO5: Analyze schedule and cost variance of projects.

TOTAL: 30 PERIODS

REFERENCES:

1. “Estimating and Costing in Civil Engineering”, B.N. Dutta, UBS Publishers and Distributors (P) Ltd.,
2. “Elements of Estimating and Costing”, S.C. Rangwala, Charotar Publishing House, Anand-388001..
3. “Planning and Managing Projects with P6 Project Planner”, Dr. P. Vinayagam and Dr. A. Vimala, I.K. International Publishing House Pvt. Ltd., New Delhi, 2015.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	2	3	1	2
2	1	2	3	3	2	3
3	2	1	3	3	2	2
4	1	2	2	3	1	1
5	2	1	3	3	2	2
AVg.	**1.4**	**1.6**	**2.6**	**3**	**1.6**	**2**

1-low, 2-medium, 3-high

23MCM222	ADVANCED CONSTRUCTION ENGINEERING AND EXPERIMENTAL TECHNIQUES LABORATORY	L	T	P	C
		0	0	4	2

LIST OF EXPERIMENTS:

1. Mix design of concrete as per IS, ACI & BS methods for high performance concrete.
2. Flow Characteristics of Self Compacting concrete.
3. Effect of minerals and chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength and durability.
4. NDT on hardened concrete - UPV, Rebound hammer, Windsor probe test and core cutting test.
5. Permeability test on hardened concrete (RCPT) – Demonstration.
6. Principles of operations of Hydraulic loading systems and Calibration.
7. Principles of operations of Force measuring equipment's and Calibration.
8. Principles of operations of strain measuring equipment's and Calibration.
9. Study on equipment's for measuring deflection and vibration.
10. NDT – Ultrasonic flaw detector.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students will be able

CO1: Design high-performance concrete mixes by applying international standards (IS, ACI and BS).

CO2: Assess the flow characteristics of self-compacting concrete and interpreting test results.

CO3: Assess the impact of different admixtures on workability, strength, and durability of concrete.

CO4: Perform Non-Destructive Test tests to diagnose concrete conditions using UPV, Rebound hammer, Windsor probe and core cutting.

CO5: Operate and calibrate hydraulic loading systems, force and strain measuring equipment, deflection and vibration measurement tools for accurate data acquisition.

REFERENCES:

1. "Recommended Guidelines for Concrete Mix Design", IS 10262: 2020, Bureau of Indian Standards, New Delhi.
2. "Indian Standard Code of Practice for Plain and Reinforced Concrete", IS 456-2000, Bureau of Indian Standards, New Delhi.
3. "Standard Practice for Selecting Proportions for Normal, Heavy Weight and Mass Concrete", ACI: 211.1 - 2019, American Concrete Institute, Farmington Hills, MI.
4. "Guidebook on Non-Destructive Testing of Concrete Structures", International Atomic Energy Agency, Vienna, Austria, 2002.
5. "Concrete Technology", Santhakumar, A. R., Oxford Higher Education, New Delhi, 2011.
6. "Properties of Concrete", Neville, A. M., ELBS, London, 2011.
7. "Concrete Technology", Shetty, M. S., S. Chand and Company, New Delhi, 2010.
8. "Concrete Technology", Krishnasamy, K. T., Dhanpat Rai, New Delhi, 2012

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	1	3	3	2	3
2	1	2	2	3	1	2
3	1	2	2	3	1	2
4	2	1	2	3	2	1
5	1	1	2	2	1	1
AVg.	**1.4**	**1.4**	**2.2**	**2.8**	**1.4**	**1.8**

1-low, 2-medium, 3-high

23MCM331	PRACTICAL TRAINING	L	T	P	C
		0	0	4	2

SEMESTER III

The students individually undertake training in reputed engineering companies doing construction during the summer vacation for a specified duration of four weeks. At the end of the training, a detailed report on the work done should be submitted within ten days from the commencement of the semester. The students will be evaluated through a viva-voce examination by a team of internal staff.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Describe the Construction Industry.

CO2: Realize the various functions of construction activities.

CO3: Develop skills in facing and solving the problems experiencing in the Construction Management field.

CO4: Prepare technical reports.

CO5: The present the work carried out in practical training

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	2	3	1	2
2	1	2	3	3	2	3
3	2	1	3	3	2	2
4	1	2	2	3	1	1
5	2	1	3	3	2	2
AVg.	**1.4**	**1.6**	**2.6**	**3**	**1.6**	**2**

1-low, 2-medium, 3-high

23MCM332	PROJECT WORK – PHASE 1	L	T	P	C
		0	0	0	3

The student individually works on a specific topic approved by faculty member who is familiar in this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Apply the knowledge gained from theoretical and practical courses in solving problems.
CO2: Summarize the importance of literature review.
CO3: Identify the problem.
CO4: Solve the identified problem based on the formulated methodology.
CO5: Interpret and present the findings of the work conducted

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	1	3	3	2	3
2	1	2	2	3	1	2
3	1	2	2	3	1	2
4	2	1	2	3	2	1
5	1	1	2	2	1	1
AVg.	**1.4**	**1.4**	**2.2**	**2.8**	**1.4**	**1.8**

1-low, 2-medium, 3-high

23MCM441	PROJECT WORK – PHASE 2	L	T	P	C
		0	0	0	15

SEMESTER IV

The student should continue the phase I work on the selected topic as per the formulated methodology/ Undergo internship. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated based on the report and the viva-voce examination by a panel of examiners including one external examiner.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Discover the potential research areas.

CO2: Apply the knowledge gained from theoretical and practical courses to be creative, well planned, organized and coordinated.

CO3: Identify the problem.

CO4: Solve the identified problem based on the formulated methodology.

CO5: Interpret and present the findings of the work conducted.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	1	2	3	1	2
2	1	2	3	3	2	3
3	2	1	2	3	2	2
4	1	2	3	3	3	3
5	1	3	2	2	2	2
AVg.	**1.4**	**1.8**	**2.4**	**2.8**	**2**	**2.4**

1-low, 2-medium, 3-high

23MCME01	ADVANCED CONSTRUCTION MATERIALS AND EQUIPMENT	L	T	P	C
		3	0	0	3

ELECTIVE SYLLABUS

MODULE I SPECIAL CONCRETE 9

Behaviour of concrete- high strength and high performance concrete-SIMCON, SIFCON-lightweight concrete - Ferrocement - Self compacting concrete - Geo polymer concrete - Nano concrete - Self healing concrete - self-cleaning concrete -Bacterial concrete.

MODULE II METALS AND SMART MATERIALS 9

Types of steel and its properties -grades- New alloy steel and its application -Types of coating and coating to reinforcement- properties and advantages of aluminium- applications - Types of smart materials and its applications.

MODULE III COMPOSITES AND GREEN MATERIALS 9

Types of plastics - properties - Types of fibres - Fibre Reinforced Polymers (FRP) -Structural applications of FRP - Geo-textiles and applications- Green building concepts and materials - LEED.

MODULE IV EQUIPMENT FOR EARTHWORK AND MATERIALS HANDLING 9

Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end loaders, Earth Movers -Forklifts and related equipment - Portable Material Bins - Conveyors.

MODULE V PRODUCTION AND OTHER CONSTRUCTION EQUIPMENTS 9

Crushers - Feeders - Screening Equipment- Batching and Mixing Equipment - Hauling, Pouring and Pumping Equipment - Transporters - Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting - Equipment for Compaction - Erection Equipment -Pile Driving Equipment.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Apply new special concretes in the construction field.

CO2: Handle the smart materials and metals efficiently.

CO3: Gain information regarding green materials, structural applications of FRP and geotextiles.

CO4: Be familiar with the operation of various earthwork equipment's and materials handling equipment's.

CO5: Explore the working of production and construction equipment's.

TOTAL: 45 PERIODS

REFERENCES:

1. “Civil Engineering Materials”, Shan Somayaji, 2nd Edition, Prentice Hall Inc., 2001.
2. “Materials for Civil and Construction Engineers”, Mamlouk, M.S. and Zaniewski, J.P., Prentice Hall Inc., 2000.
3. “Construction Equipment and Management”, Sharma S.C., Khanna Publishers, New Delhi, 1988.
4. “Construction Equipment and Job Planning”, Deodhar, S.V., Khanna Publishers, New Delhi, 1988.
5. “Construction Equipment and its Planning and Application”, Dr. Mahesh Varma, Metropolitan Book Company, New Delhi, 1983.
6. “Building Materials - Products, Properties and Systems”, Gambhir, M. L. and Neha Jamwal, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.
7. “Special Concretes”, Siddique, R., Galgotia Publications, New Delhi, 1st Edition, 2000.
8. “Construction Planning, Equipment and Methods”, Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., McGraw Hill, Singapore, 2006

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	1	3	3	2	2
2	2	1	3	3	1	2
3	2	2	3	3	1	3
4	1	1	2	2	1	1
5	1	1	2	2	1	1
AVg.	**1.6**	**1.2**	**2.6**	**2.6**	**1.2**	**1.8**

1-low, 2-medium, 3-high

23MCME02	QUALITY MANAGEMENT FOR CONSTRUCTION PROJECTS	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION **9**

Quality: Necessity for improving Quality in the context of Global Challenges - Concept of Quality Control, Quality Assurance, Quality Management and Total Quality Management (TQM).

MODULE II QUALITY STANDARDS, METHODS & TECHNIQUES **9**

Study of various Quality Standards in Construction Related to building materials and other inputs for construction processes, methods and techniques for construction outputs, products and services.

MODULE III QUALITY MANAGEMENT **9**

Managing Quality in various projects stages from concept to completion by building quality into design of structures, Inspection of incoming material and machinery, in process quality inspections and tests.

MODULE IV QUALITY CONTROL & ASSURANCE **9**

Designing of quality manuals, checklists and inspection reports, installing the quality assurance System, monitoring and control - Quality Assurance Department and quality control responsibilities of the line organization. Quality in foundations and piling work, structural work, concreting, electrical system building facilities, waste recycling and maintenance.

MODULE V INTERNATIONAL STANDARDS **9**

Developing quality culture in the organization - Training of people, Bench - marking quality. Quality circles - Study of ISO 9000, ISO 14000 and QS 9000 standards and certification procedures - BIS, BS, Indian standards, British, American, German & Japanese standards.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Explain the concepts of Quality Control, Assurance, and Total Quality Management within global construction challenges

CO2: Apply diverse quality standards and methods, ensuring compliance with international and industry-specific criteria.

CO3: Manage quality across project stages, integrating it into design, inspections, and in-process tests.

CO4: Design and implement effective quality control systems, focusing on key construction activities.

CO5: Foster a quality culture through training, benchmarking, and adherence to international standards and certifications.

TOTAL: 45 PERIODS

REFERENCES:

1. “Quality Planning and Analysis”, J.M. Juran and Frank Gryna, 6th Edition, Tata McGraw Hill Book Co. Ltd., Delhi, 2014.
2. “Managerial Breakthrough”, J.M. Juran, 3rd Edition, Tata McGraw Hill Book Co. Ltd., Delhi, 1995.
3. “Total Quality Control”, A.V. Feigenbaum, 4th Edition, Tata McGraw Hill Book Co. Ltd., Delhi, 2004.
4. “The Six Sigma Way”, Peter Pande and others, Tata McGraw Hill Book Co. Ltd., Delhi, 2014.
5. “Quality is Free”, Phil Crosby, 4th Edition, Tata McGraw Hill Book Co. Ltd., Delhi, 2001

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	2	3	1	1
2	1	1	3	3	1	2
3	1	1	3	3	2	3
4	1	1	3	3	2	3
5	1	2	2	3	1	1
AVg.	**1**	**1.4**	**2.6**	**3**	**1.4**	**2**

1-low, 2-medium, 3-high

23MCME03	MANAGEMENT INFORMATION SYSTEMS	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION **9**

Information Systems - Establishing the Framework - Business Models - Information System Architecture - Evolution of Information Systems - Modern Information System - System Development Life Cycle - Structured Methodologies - Designing Computer Based Methods, Procedures, and Control - Designing Structured Programs.

MODULE II INFORMATION SYSTEMS **9**

Integrated Construction Management Information System - Project Management Information System - Functional Areas, Finance, Marketing, Production, Personnel - Levels, DSS, EIS, and ES - Comparison, Concepts and Knowledge Representation - Managing International Information System.

MODULE III IMPLEMENTATION AND CONTROL **9**

Control - Testing Security - Coding Techniques - Detection of Error - Validating - Cost Benefit Analysis - Assessing the value and risk of Information System.

MODULE IV SYSTEM AUDIT **9**

Software Engineering qualities - Design, Production, Service, Software specification, Software Metrics, Software quality assurance - Systems Methodology - Objectives - Time and Logic, Knowledge and Human Dimension - Software life cycle models - Verification and Validation.

MODULE V INTERFACE MANAGEMENT **9**

Definition - Background - Requirement - Process - Interface Management System - Interface Matrix Framework - Interface Management Tools - Barriers to Interface Management - Design Interface Management (DIMS) for Construction - Objectives - Terminologies - Methodology - Advantages.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Identify the role and significance of various management information systems, and design the structured programs by computer based methods.

CO2: Apply fundamental database concepts and apply these concepts to the design of management information system for the project.

CO3: Perform the validation of the computer model and assess the risk of information system and information security.

CO4: Perform software quality assurance, verification and validation.

CO5: Demonstrate knowledge on interface management systems with interface tools.

TOTAL: 45 PERIODS

REFERENCES:

1. “Management Information Systems: Organisation and Technology”, Kenneth C. Laudon and Jane Price Laudon, Prentice Hall, 1996.
2. “Management Information System: Conceptual Foundations, Structure and Development”, Gordon B. Davis, McGraw Hill, 1974.
3. “Case Series for Management Information Systems”, Joyce J. Elam, Simon and Schuster, Custom Publishing, 1996.
4. “Decision Support for Managers”, Ralph H. Sprague and Huge J. Watson, Prentice Hall, 1996.
5. “Software Quality Assurance and Management”, Michael W. Evans and John J. Marciniah, John Wiley and Sons, 1987.
6. “Measuring Software Design Quality”, Card and Glass, Prentice Hall, 1990.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	3	3	2	2
2	1	1	3	3	1	2
3	2	1	3	3	2	3
4	1	1	3	2	2	3
5	1	1	2	2	1	1
AVg.	**1.2**	**1.2**	**2.8**	**2.6**	**1.6**	**2.2**

1-low, 2-medium, 3-high

23MCME04	ADVANCED CONSTRUCTION TECHNIQUES	L	T	P	C
		3	0	0	3

MODULE I SUB STRUCTURE CONSTRUCTION 9

Box jacking - Pipe jacking - Under water construction of diaphragm walls and basement - Tunneling techniques - Piling techniques - Driving well and caisson - sinking cofferdam - cable anchoring and grouting - Driving diaphragm walls, Sheet piles - Laying operations for built up offshore system - Shoring for deep cutting - Large reservoir construction - well points - Dewatering for underground open excavation.

MODULE II SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS 9

Concrete paving technology - Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections - Erection techniques of tall structures, Large span structures - launching techniques for heavy decks - in- situ prestressing in high rise structures, Post tensioning of slab - Construction techniques of long span prestressed concrete bridges - aerial transporting - Handling and erecting lightweight components on tall structures.

MODULE III CONSTRUCTION OF SPECIAL STRUCTURES 9

Erection of lattice towers - Rigging of transmission line structures - Construction sequence in cooling towers, Silos, chimney, sky scrapers - Bow string bridges, Cable stayed bridges - Launching and pushing of box decks - Construction of jetties and break water structures - Construction sequence and methods in domes - Support structure for heavy equipment and machinery in heavy industries - Erection of articulated structures and space decks. Construction techniques of prefabricated tall structures.

MODULE IV REHABILITATION AND STRENGTHENING TECHNIQUES 9

Seismic retrofitting - Strengthening of beams - Strengthening of columns - Strengthening of slab - Strengthening of masonry wall, Protection methods of structures, Mud jacking and grouting for foundation - Micro piling and underpinning for strengthening floor and shallow profile - Sub grade water proofing, Soil Stabilization techniques.

MODULE V DEMOLITION 9

Planning, Building Appraisal and Demolition Plan, Utilities, Hazardous Material, precautionary measures, Demolition Techniques- Interior Demolition- Selective Demolition-Total Demolition, Mechanical Method by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, special structures - Prestressed Concrete Structures - Composite Structures and Steel Structures - Hanging Structures- Underground Structures- Structures Supporting Ground or Sitting on Slopes, site supervision and inspection, Safety precaution in Demolition and Dismantling.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Develop competence for selection of suitable construction technique/methods for substructure and superstructure.

CO2: Propose and evaluate alternative construction systems and methods in response to given building performance requirements

CO3: Appreciate and prepare for the management of innovative practice in the field of construction technology

CO4: Demonstrate a high level of technological understanding of the design of buildings and associated construction processes and solutions.

CO5: Critically analyse and resolve ad-hoc construction related problems.

TOTAL: 45 PERIODS

REFERENCES:

1. "Advanced Construction Techniques", Jerry Irvine, CA Rocketr, 1984.
2. "Construction Dewatering: New Methods and Applications", Patrick Powers J., John Wiley & Sons, 1992.
3. "Concrete Repair and Maintenance Illustrated", Peter H. Emmons, Galgotia Publications Pvt. Ltd., 2001.
4. "Practical Foundation Engineering Handbook", Robert Wade Brown, McGraw Hill Publications, 1995.
5. "Construction Technology", Sankar, S.K. and Saraswati, S., Oxford University Press, New Delhi, 2008.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	1	2
2	2	1	3	3	2	3
3	1	1	3	3	2	1
4	1	1	3	3	1	1
5	2	1	3	3	3	3
AVg.	**1.4**	**1**	**3**	**3**	**1.8**	**2**

1-low, 2-medium, 3-high

23MCME05	FUNCTIONAL PLANNING, BUILDING SERVICES AND MAINTENANCE MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I URBAN FORMS, STREET SYSTEMS AND NEIGHBOURHOOD 9

Components of urban forms, methods of measurement, case studies. Planning of urban forms-ULB's-JNNURM, Smart City. Urban street system, street forms-Concepts-Neighborhood Module-Layout of a neighborhood.

MODULE II PLANNING 9

Development Control Guidelines, Functional planning of buildings, Circulation - Optimization of space - Spatial Synthesis graphical techniques, heuristic procedures - Formulation of linear and non-linear optimization problems.

MODULE III FIRE RESISTANCE 9

Standard for fire safety - Fire resistance/ Firefighting and extinguishing systems - Classification of buildings -Means of escape, alarms, etc - Space requirements and relationships for typical buildings like residential, offices, hospitals, etc.

MODULE IV ENGINEERING SERVICES 9

Engineering services in building system- Lighting, Ventilation and Psychometric charts, Air Conditioning Introduction, Lifts & Escalators, Cold and Hot water systems - Waste water systems - Electrical systems.

MODULE V MAINTENANCE MANAGEMENT 9

Building Maintenance/ Facilities Management -Planning-Handover, Scheduled and contingency maintenance - M I S for building maintenance - Maintenance standards and maintenance contracts -Economic maintenance decisions.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Review the development of modern urban form, street and neighborhood pattern.

CO2: Explain the current development and regulatory guidelines applicable to local urban bodies.

CO3: Evaluate fire protection and resistance systems for multi-storied buildings as per regulatory guidelines.

CO4: Apply engineering principles to evaluate building services applicable to multi-storied buildings.

CO5: Develop maintenance plans post-handover and subsequent maintenance programme. Understand facility management aspects.

TOTAL: 45 PERIODS

REFERENCES:

1. “Dimensions of the Sustainable City”, Mike Jenks, Colin Jones, Springer, 2009.
2. “Creating Neighbourhoods and Places in the Built Environment”, D. Chapman, 1996.
3. “Streets and Patterns”, Stephen Marshall, 2005.
4. “Building Services Engineering”, David V. Chadderton, 5th edition, 2007.
5. “Practical Optimization Methods - With Mathematica Applications”, M. Bhatti, Springer, 2000.
6. “Optimization Modelling: A Practical Approach”, Ruhul Amin Sarker, Charles S. Newton, 2007.
7. “Building Maintenance Management”, Barrie Chanter, Peter Swallow, Wiley-Blackwell, 2007.
8. “National Building Code”, NBC 2016 - Vol 1, Vol II.
9. “Lighting and Ventilation”, SP 32, 1986.
10. “National Electrical Codes”, SP 30, 2011.
11. “Handbook on Water Supply and Drainage”, SP 35.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	2	2	3	1	1
2	1	2	3	3	1	1
3	1	1	3	3	1	2
4	2	1	3	3	2	2
5	1	1	2	2	1	1
AVg.	**1.4**	**1.4**	**2.6**	**2.8**	**1.2**	**1.4**

1-low, 2-medium, 3-high

23MCME06	CONSTRUCTION RISK MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I RISK CONCEPTS **9**

Definitions of risk - Importance and types of risk - Elements of risk management - Causes of risk - Principles of risk management -Risk management process - Risk identification and assessment – Aspects of risk management - Risk management plan and evaluation - Risk treatment - Role of Human Resource Management in risk Management.

MODULE II PLANNING FOR RISK **9**

Components of risk management - Planning for risk management - Project charter - Risk management policies - roles and responsibilities - examining stakeholder tolerance - risk management plan template - revisiting the work breakdown structure - risk management plan - risk registers - creating the risk management plan - risk analysis – tracking.

MODULE III RISK IDENTIFICATION **9**

Identifying risk - preparing for risk identification - risk categories - referring to historical information - identifying the project risks - reviewing project documents - brainstorming - the Delphi technique - analyzing SWOT - diagrammatic techniques.

MODULE IV RISK RESPONSE **9**

Preparing for risk response - creating risk response - result of risk response planning - risk monitoring and control - risk communication - informing public about risk and responding to express concerns – education.

MODULE V RISK MANGEMENT ASPECTS **9**

Risk planning and management case studies - engineering contracts, project delivery -strategies and international project risk - management of risk in construction industry - dealing with uncertainties - risk mitigation - by elimination, reducing, transferring, avoiding, absorbing or pooling.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Discover various risk management principles and to implement risk management program in construction projects.

CO2: Identify the various issues associated with construction risk.

CO3: Adapt techniques to identify and quantify construction risks.

CO4: Develop risk containment and risk reduction policies.

CO5: Manage risk effectively for better decision making

TOTAL: 45 PERIODS

REFERENCES:

1. “PMP Project Management Professional Study Guide”, Joseph Phillips, McGraw-Hill.
2. “Project Risk Management”, Bruce Barkley.
3. “Risk and Decision Analysis in Projects”, John R. Schuyler, Cases in Project and Program

Management Series.
4. “Project Risk Management: Process, Techniques and Insights”, Chris Chapman and Stephen Ward..

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	3	3	2	2
2	1	1	2	3	1	1
3	2	1	3	3	2	2
4	1	1	3	3	2	3
5	1	1	3	3	2	2
AVg.	**1.2**	**1.2**	**2.8**	**3**	**1.8**	**2**

1-low, 2-medium, 3-high

23MCME07	SHORING, SCAFFOLDING AND FORMWORK	L	T	P	C
		3	0	0	3

MODULE I PLANNING SITE EQUIPMENT & PLANT FOR FORMWORK 9

Introduction - Formwork as a temporary structure - Requirements for formwork - classification of formwork- Formwork elements - Key areas of cost reduction of formwork - Economical planning of form materials- Planning for Safety - Overall Planning - Detailed planning - Standard units - Corner units - Pass units - Calculation of labour constants - Formwork hours - Labour Requirement - Overall programme - Detailed programme - Costing - Planning crane arrangements - Site layout plan - Transporting plant - Scaffold frames.

MODULE II FORMWORK MATERIALS, ACCESSORIES, PROPRIETARY PRODUCTS & PRESSURES 9

Lumber - Types - Finish - Sheathing boards working stresses - Repetitive member stress - Plywood - Types and grades - Jointing Boarding - Textured surfaces and strength - Reconstituted wood - Steel - Aluminum - Hardware and fasteners - Nails in Plywood -Allowable withdrawal load and lateral load. Pressures on formwork - Examples - Vertical loads for design of forms - Uplift on shores - Laterals loads.

MODULE III DESIGN OF FORMS AND SHORES 9

Basic simplification - Beam formulae - Allowable stresses - Deflection, Bending - Lateral stability - Shear, Bearing - Design of Wall forms - Slab forms - Beam forms - Column forms - Examples in each. Simple wood stresses - Slenderness ratio - Allowable load vs length - Form lining - Design Tables for Wall formwork - Slab Formwork - Column Formwork - Tubular steel shores patented shores - Steel Tower Frames - Safety practices.

MODULE IV BUILDING AND ERECTING THE FORM WORK 9

Carpentry Shop and job mill - Forms for Footings - Wall footings - Column footings - Sloped footing forms - Strap footing - Stepped footing - Slab form systems - Flying system forms- Prefabricated panel systems -Giant forms- curved wall forms- Beam or girder forms - suspended forms - Various causes of failures - ACI - Design deficiencies - Permitted and gradual irregularities.

MODULE V FORMS FOR DOMES AND TUNNELS, SLIP FORMS AND SCAFFOLDS 9

Formwork for domes - Tunnel forming components - Curb forms invert forms - Arch forms - Concrete placement methods - Cut and cover construction - Bulk head method - Pressures on tunnels - Continuous Advancing Slope method. Slip Forms – Principles -Types - advantages - Functions of various components - Safety in slip forms special structures built with slip form Technique - Types of scaffolds - timber scaffolds, metal scaffolds and some proprietary scaffolds - possible causes for collapse of scaffold systems.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Identify the various formwork systems and prepare cost effective overall and detailed planning of formwork, plant and site equipment.

CO2: Select material accessories for formwork connection and analyze pressures on formworks.

CO3: Apply the design principles of formwork for various elements such as slabs, beams, columns, and walls.

CO4: Apply the knowledge of erecting forms for beams, slabs, columns, walls, and assess the causes of failures.

CO5: Apply the knowledge of forms and their erection for domes and tunnels, types of slip forms, and scaffolds.

TOTAL: 45 PERIODS

REFERENCES:

1. "Formwork For Concrete Structures", Robert L. Peurifoy and Garold D. Oberlender, McGraw-Hill, 1996.
2. "Formwork for Concrete", Hurd, M.K., Special Publication No.4, American Concrete Institute, Detroit, 1996.
3. "Formwork for Concrete Structures", Kumar Neeraj Jha, McGraw Hill Education (India) Private Limited, New Delhi, 2017.
4. "Formwork for Concrete", Austin, C.K., Cleaver-Hume Press Ltd., London, 1996.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	1	2
2	1	1	3	3	1	2
3	1	1	3	3	1	3
4	1	1	3	3	1	2
5	1	1	3	3	1	1
AVg.	**1**	**1**	**3**	**3**	**1**	**2**

1-low, 2-medium, 3-high

23MCME08	ADVANCED CONCRETE TECHNOLOGY	L	T	P	C
		3	0	0	3

MODULE I CONCRETE MAKING MATERIALS 9

Aggregates classification IS Specifications, Properties, Grading, Methods of combining aggregates, specified gradings, Testing of aggregates - Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, special cements - Water - Chemical admixtures, Mineral admixture.

MODULE II MIX DESIGN 9

Principles of concrete mix design, Methods of concrete mix design, IS Method, ACI Method, DOE Method – Mix design for special concretes- changes in Mix design for special materials.

MODULE III CONCRETING METHODS 9

Process of manufacturing of concrete, methods of transportation, placing and curing, cracking, plastic shrinkage, Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete.

MODULE IV SPECIAL CONCRETES 9

Light weight concrete Fly ash concrete, Fiber reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self-Compacting Concrete, Geo Polymer Concrete, Waste material-based concrete – Ready mixed concrete.

MODULE V TESTS ON CONCRETE 9

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage Durability of concrete. Non-destructive Testing Techniques - microstructure of concrete.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Develop knowledge on various materials needed for concrete manufacture.
CO2: Apply the rules to do mix designs for concrete by various methods.
CO3: Develop the methods of manufacturing of concrete.
CO4: Explain about various special concrete.
CO5: Explain various tests on fresh and hardened concrete.

TOTAL: 45 PERIODS

REFERENCES:

1. “Concrete Technology”, Gupta, B.L., Amit Gupta, Jain Book Agency, 2017.
2. “Concrete Technology”, Shetty, M.S., S. Chand and Company Ltd., Delhi, 2019.
3. “Concrete Technology”, Gambhir, M.L., McGraw Hill Education, 2006.
4. “Properties of Concrete”, Neville, A.M., Prentice Hall, London, 1995.
5. “Concrete Technology”, Job Thomas, Cengage Learning India Private Ltd, New Delhi, 2015.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	2	3	1	1
2	1	1	3	3	1	2
3	1	1	3	3	1	2
4	1	2	2	3	1	1
5	1	2	2	3	1	1
AVg.	**1**	**1.4**	**2.4**	**3**	**1**	**1.4**

1-low, 2-medium, 3-high

23MCME09	VALUATION OF REAL PROPERTIES	L	T	P	C
		3	0	0	3

MODULE I PRINCIPLES OF VALUATION & VALUATION OF LAND & BUILDING 9

Cost, Price and Value - Purposes and Methods of Valuation - Concepts of Valuation of Land and - Building- Valuation by Direct Sales Comparison Method, Land and Building Method and Rent Capitalization Method-Introduction to Arbitration

MODULE II FREE HOLD AND LEASE HOLD PROPERTIES & FIXATION OF FAIR RENT 9

Lease hold Properties - Lease, Rent and Licence, Reversion - Valuation of Lessor' Rights and Lessee's Rights - Building Rent - Fixation of Fair Rent as per Tamil Nadu Buildings (Lease & Rent Control) Act 1960 subsequently amended in 1973 & 1980 and The Tamil Nadu Regulations of Rights and Responsibilities of Landlords and Tenants Act 2017.

MODULE III VALUATION OF APARTMENTS 9

Related Definitions -Composite Rate - Different Methods of Valuation -Stage Value of a flat -Joint Venture Agreement -Real Estate (Regulation and Development) Act 2016 and its Significance in Valuation.

MODULE IV VALUATION FOR BANKS 9

Purposes- Valuation of Building under Construction, Ready Built House, Flats under construction, Ready built Flats - Valuation of under SARFAESI (Securitisation and Reconstruction of Assets and Enforcement of Security Interest) Act 2002- Insolvency and Bankruptcy Code (IBC) 2016and its Implications on Valuation - Compliance to International Valuation Standards.

MODULE V VALUATION FOR TAXATION 9

Valuation for Income Tax -Cost of Construction - Valuation for Capital Gains Tax -Section 50C of Income Tax Act - Exercise Using of Excel Spread Sheet for Valuation of Cost of Construction by all the Methods.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Value different types of land used for construction of buildings.

CO2: Value different types of buildings.

CO3: Apply appropriate method for valuation specific to the purpose.

CO4: Infer the emerging property valuation concept.

CO5: Explain the laws and acts relating to immovable properties

TOTAL: 45 PERIODS

REFERENCES:

1. “Valuation of Immovable Properties - Basics for Beginners”, K. Divakar, Published by Vahini Divakar, Coimbatore 641045, 2019.
2. “Valuation of Real Properties”, Rangwala, S.C. (Late) and Ketki B. Dalal, 10th Edition, Charotar Publishing House Pvt. Ltd., Anand, Gujarat, 2020.
3. “Practical Valuation, Volumes IX, X, XII, XIII, XIV & XV”, B. Kanagasabapathy, No 1, Prestige Flats, Reynolds Road, Trichy.
4. “Valuation Principles & Procedures”, Ashok Nain, Dew Drops Education Pvt. Ltd., July 2010.
5. “Valuation Practice of Immovable Properties”, C.H. Gopinatha Rao, Chennai, 17th Edition2014.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	1	2
2	1	1	3	3	1	2
3	1	1	3	3	2	3
4	2	1	2	3	1	1
5	1	2	2	3	1	1
AVg.	**1.2**	**1.2**	**2.6**	**3**	**1.2**	**1.8**

1-low, 2-medium, 3-high

23MCME10	BUILDING INFORMATION MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I STRUCTURAL SYSTEM 9

Systems for enclosing Buildings, Functional aesthetic system, Materials Selection and specification.

MODULE II ENVIRONMENTAL ASPECTS AND SERVICES 9

Qualities of enclosure necessary to maintain a specified level of interior environmental quality - Weather resistance - Thermal infiltration - Acoustic Control -Transmission reduction - Air quality - Illumination.

MODULE III SYSTEM INTEGRATION 9

Relevant systems integration with structural systems, Plumbing - Electricity -Vertical circulation and their interaction. Technological and methodological demands on construction management in infrastructure development projects.

MODULE IV CONSTRUCTION AND INFRASTRUCTURE 9

Construction component of various infrastructure sectors - highway - Ports and aviation - Oil and gas - Power - Telecom - Railways - Irrigation. Current scenario - future needs.

MODULE V MAINTENANCE AND SAFETY 9

Component longevity in terms of operation performance and resistance to deleterious forces - Planning systems for least maintenance materials and construction - Access for maintenance - Feasibility for replacement of damaged components - Maintenance free exposed and finished surfaces, Ability of systems to protect fire - preventive systems - fire escape system design - planning for pollution free construction- environmental - Hazard free Construction execution.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Illustrate the concept of structural system of a building.

CO2: Identify the Environmental aspects required for a building.

CO3: Plan Buildings with respect to system integration.

CO4: Analyze the various construction components required in infrastructure sector.

CO5: Relate the safety and maintenance system in construction.

TOTAL: 45 PERIODS

REFERENCES:

1. “Designing for Fire Safety”, E.C. Butcher and A.C. Parnell, John Wiley and Sons, 1993.
2. “Energy Economics and Building Design”, William T. Mayer, McGraw-Hill Book Company, 1983.
3. “Building Services”, Peter R. Smith and Warren G. Julian, Applied Science Publishers Ltd., London.
4. “BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors”, Eastman, C., Teicholz, P., Sacks, R., & Liston, C., John Wiley & Sons, 2011.
5. “BIM and Construction Management: Proven Tools, Methods, and Workflows”, Hardin, B., & McCool, D., John Wiley & Sons, 2015.
6. “Green BIM: Successful Sustainable Design with Building Information Modeling”, Krygiel, E., & Nies, B., John Wiley & Sons, 2008.
7. “Management Information Systems”, Kenneth J. Sousa, Effy Oz, 7th Edition.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	2	3	1	1
2	1	1	2	3	1	1
3	1	1	3	3	2	3
4	1	1	3	3	1	2
5	1	1	2	3	1	1
AVg.	**1**	**1**	**2.4**	**3**	**1.2**	**1.6**

1-low, 2-medium, 3-high

23MCME11	CONSTRUCTION SAFETY AND HEALTH MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I CONSTRUCTION ACCIDENTS **9**

Accidents and their Causes - Human Factors in Construction Safety - Costs of Construction Injuries - Occupational and Safety Hazard Assessment - Legal Implications.

MODULE II SAFETY PROGRAMMES **9**

Problem Areas in Construction Safety - Elements of an Effective Safety Programme - Job-Site Safety Assessment - Safety Meetings - Safety Incentives - Contractual Obligations - Safety Clauses in Construction Contracts - Substance Abuse - Safety Record Keeping.

MODULE III DESIGNING FOR SAFETY **9**

Safety Culture - Safe Workers - Safety and First Line Supervisors - Safety and Middle Managers - Top Management Practices, Company Activities and Safety - Safety Personnel - Sub contractual Obligation - Project Coordination and Safety Procedures - Workers Compensation.

MODULE IV HEALTH MANAGEMENT IN CONSTRUCTION SITES **9**

Occupational Health - Effects of Material Handling on Health - Health Hazards in Construction Site - Disease Prone Environment in Construction Site - Precautionary Measures - Health Monitoring and Treatment - Safety Measures during Material Handling.

MODULE V OWNERS' AND DESIGNERS' OUTLOOK **9**

Responsibilities of owners - Precautions to be taken - Insurance for Workers and Materials – Commitments in case of Accidents - Legal Requirements from Owners' Perspective - Design for Safety in Constructions - Designers Commitments in Design with Safety Perspectives.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Interpret and Explain the various safety concepts, requirements applied to construction projects.

CO2: Explain the importance of managing health and safety in construction and the related key legislation.

CO3: Develop a safe working environment in construction industry by implementing safety procedures.

CO4: Inference on construction accidents and their causes.

CO5: Perceive towards responsibility of owners and designers in construction projects.

TOTAL: 45 PERIODS

REFERENCES:

1. “Construction Safety”, Jimmy W. Hinze, Prentice Hall Inc., 1997.
2. “Construction Safety and Health Management”, Richard J. Coble, Jimmie Hinze, and Theo C. Haupt, Prentice Hall Inc., 2001.
3. “Tamilnadu Factory Act”, Department of Inspectorate of Factories, Tamil Nadu.
4. “BIS Code of Practice for Safety Management”

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	2	3	1	1
2	1	2	2	3	1	1
3	1	1	3	3	2	3
4	2	1	2	3	2	2
5	1	1	2	3	1	1
AVg.	**1.2**	**1.4**	**2.2**	**3**	**1.4**	**1.6**

1-low, 2-medium, 3-high

23MCME12	LEAN CONSTRUCTION CONCEPTS, TOOLS AND PRACTICES	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION **9**

Introduction and overview of the construction project management -Review of Project Management & Productivity Measurement Systems - Productivity in Construction- Daily Progress Report-The state of the industry with respect to its management practices -construction project phases - Essential features of contemporary construction management techniques - The problems with current construction management techniques- Current production planning.

MODULE II LEAN MANAGEMENT **9**

Introduction to lean management - Toyota's management principle-Evolution of lean in construction industry - Production theories in construction -Lean construction value - Value in construction - Target value design - Lean project delivery system- Forms of waste in construction industry - Waste Elimination.

MODULE III CORE CONCEPTS IN LEAN **9**

Concepts in lean thinking - Principles of lean construction - Variability and its impact - Traditional construction vs lean construction - Traditional project delivery - Lean construction and workflow reliability - Work structuring - Production control.

MODULE IV LEAN CONSTRUCTION TOOLS AND TECHNIQUES **9**

Value Stream Mapping - Work sampling - Last planner system - Flow and pull based production - Last Planner System - Look ahead schedule - Constraint analysis - Weekly planning meeting- Daily Huddles - Root cause analysis - Continuous improvement - Just in time.

MODULE V LEAN CONSTRUCTION IMPLEMENTATION **9**

Lean construction implementation- Enabling lean through information technology - Lean in design - Design Structure Matrix - Location Based Management System-BIM (Building Information Modeling) - IPD (Integrated Project Delivery) - Sustainability through lean construction approach.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Identify the salient aspects of the contemporary management techniques and address the problems with present management techniques.

CO2: Explain the fundamental management principles and concepts of Lean techniques.

CO3: Apply core concepts of lean and its principles in construction industry

CO4: Use various lean construction tools and techniques to achieve better productivity in construction projects.

CO5: Implement lean concepts in design to achieve sustainability in construction projects.

TOTAL: 45 PERIODS

REFERENCES:

1. “Implementing Lean in Construction: Lean and the Sustainability Agenda”, Corfe, C. and Clip, B., CIRIA, 2013.
2. “Lean Construction Management: The Toyota Way”, Shang Gao and Sui Pheng Low, Springer, 2014.
3. “Implementing Lean in Construction: Lean Construction and BIM”, Dave, B., Koskela, L., Kiviniemi, A., Owen, R., and Tzortzopoulos, P., CIRIA, 2013.
4. “Lean Construction Tools and Techniques”, Ballard, G., Tommelein, I., Koskela, L., and Howell, G., 2002.
5. “Site Implementation and Assessment of Lean Construction Techniques”, Salem, O., Solomon, J., Genaidy, A., and Luegring, M., Lean Construction Journal, 2005.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	2	2	3	2	1
2	1	2	2	3	1	1
3	1	1	3	3	2	2
4	1	1	3	3	2	3
5	1	1	3	3	3	3
AVg.	**1.2**	**1.4**	**2.6**	**3**	**2**	**2**

1-low, 2-medium, 3-high

23MCME13	CONSTRUCTION PERSONNEL MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I MANPOWER PLANNING **9**

Manpower Planning – Organizing – Staffing – Staffing Plan – directing and controlling – Managerial Staffing – Recruitment – Selection – Factors influencing supply and demand of human resources, Personnel Principles.

MODULE II ORGANIZATION **9**

Organization – Organization structure – Organization Hierarchical charts, Span of Control, Job descriptions – Organization Charts – Development and Operation of human resources — Managerial Staffing –Recruitment Placement, Training and Development.

MODULE III HUMAN BEHAVIOUR **9**

Introduction to the field of people management - basic individual psychology; motivation - Job design and performance management - Managing groups at work - self-managing work teams, human relations - Intergroup behaviour and conflict in organizations – Leadership – Behavioural aspects of decision-making and communication for people management.

MODULE IV MANAGEMENT AND DEVELOPMENT METHODS **9**

Performance management and Performance appraisal – Employee hand book and personnel manual — Special Human resource problems – Productivity of Human resources, training and development – Discipline and discharge - Concept of quality of work life.

MODULE V WELFARE MEASURES **9**

Wages and Salary- Compensation, Employee Benefits, employee appraisal and assessment - Employee services – Safety and health – GPF – EPF – Group Insurance – Housing - Pension – Laws related to welfare measures.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Infer and plan the manpower efficiently.

CO2: Apply organizational strategies for effective organization system and human resource development.

CO3: Assess the human behavior and use them in a productive way.

CO4: Implement performance management, address human resource challenges, and enhance the quality of work life.

CO5: Evaluate and apply comprehensive welfare measures, including compensation, benefits, and legal considerations in personnel management.

TOTAL: 45 PERIODS

REFERENCES:

1. “The Complete Standard Handbook of Construction Personnel Management”, Carleton Counter II and Jill Justice Coutler, Prentice-Hall, Inc., New Jersey, 1989.
2. “Personnel Management (Human Resource Principles, Concepts, Trends, Emerging Challenges)”, Dr. Rao V.S.P, Dr. Mamoria C.B, Himalaya Publishing Co., 2023.
3. “Handbook of Human Resources Administration”, Josy J. Familaro, McGraw-Hill International Edition, 1987.
4. “Management”, Charles D. Pringle, Justin Gooderi Longenecter, CE Merril Publishing Co., 1981.
5. “Human Relations and Organisational Behaviour”, Dwivedi R.S, Macmillan India Ltd., 2008..

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	2	2
2	1	1	3	3	2	3
3	1	1	3	3	2	1
4	1	1	3	3	3	2
5	1	2	2	3	1	1
AVg.	**1**	**1.2**	**2.8**	**3**	**2**	**1.8**

1-low, 2-medium, 3-high

23MCME14	DESIGN OF ENERGY EFFICIENT BUILDINGS	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION **9**

Climate adapted and climate rejecting buildings – Heat Transfer – Measuring Conduction – Thermal Storage – Measurement of Radiation – The Greenhouse Effect – Convection – Measuring latent and sensible heat – Psychrometry Chart – Thermal Comfort – Microclimate, Site Planning and Development – Temperature – Humidity – Wind – Optimum Site Locations – Sun Path Diagrams – Sun Protection – Types of Shading Devices – Design responses to energy conservation strategies.

MODULE II PASSIVE SOLAR HEATING AND COOLING **9**

General Principles of passive Solar Heating – Key Design Elements – Sunspace – Direct gain – Trombe Walls, Water Walls – Convective Air loops – Concepts – Case Studies – General Principles of Passive Cooling – Ventilation – Principles – Case studies – Courtyards – Roof Ponds – Cool Pools – Predicting ventilation in buildings – Window Ventilation Calculations – Room Organization Strategies for Cross and Stack Ventilation – Radiation – Evaporation and dehumidification – Wind Catchers – Mass Effect – Zoning – Load Control – Air Filtration and odor removal.

MODULE III DAYLIGHTING AND ELECTRICAL LIGHTING **9**

Materials, components and details – Insulation – Optical materials – Radiant Barriers – Glazing materials – Glazing Spectral Response – Day lighting – Sources and concepts –Building Design Strategies – Case Studies – Daylight apertures – Light Shelves – Codal requirements – Day lighting design – Electric Lighting – Light Distribution – Electric Lighting control for day lighted buildings – Switching controls – Coefficient of utilization – Electric Task Lighting – Electric Light Zones – Power Adjustment Factors.

MODULE IV HEAT CONTROL AND VENTILATION **9**

Hourly Solar radiation – Heat insulation – Terminology – Requirements – Heat transmission through building sections – Thermal performance of Building sections – Orientation of buildings – Building characteristics for various climates – Thermal Design of buildings – Influence of Design Parameters - Mechanical controls – Examples. Ventilation – Requirements – Minimum standards for ventilation - Ventilation Design – Energy Conservation in Ventilating systems – Design for Natural Ventilation -Calculation of probable indoor wind speed.

MODULE V DESIGN FOR CLIMATIC ZONES **9**

Energy efficiency – An Overview of Design Concepts and Architectural Interventions – Embodied Energy – Low Embodied Energy Materials – Passive Downdraft Evaporative Cooling – Design of Energy Efficient Buildings for Various Zones – Cold and cloudy – Cold and sunny – Composite – Hot and dry – Moderate – Warm and humid – Case studies of residences, office buildings and other buildings in each zones – Commonly used software packages in energy efficient building analysis and design - Energy Audit – Certification.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Assess the principles for designing energy-efficient buildings, considering climate adaptation and sustainable construction.

CO2: Apply key design elements for passive solar heating, cooling, and efficient lighting strategies.

CO3: Discuss the various aspects of day-lighting and electrical lighting in a building.

CO4: Predict and design building ventilation and heat control for indoor comfort.

CO5: Design a building for climatic zone and apply simulation programs of buildings to perform energy calculations

TOTAL : 45 PERIODS

REFERENCES:

1. Energy Conservation Building Code, Bureau of Energy Efficiency, New Delhi, 2018.
2. "Sun, Wind and Light - Architectural Design Strategies", Brown, G.Z. and DeKay, M., 3rd Edition, John Wiley and Sons Inc., 2014.
3. Handbook on Functional Requirements of Buildings Part 1 to 4 SP : 41 (S and T), 1995.
4. "Residential Energy: Cost Savings and Comfort for Existing Buildings", John Krigger and Chris Dorsi, Saturn Resource Management, 2013.
5. "Energy-Efficient Buildings in India", Majumdar, M. (Ed), Tata Energy Research Institute, Ministry of Non-Conventional Energy Sources, 2009.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	2	3	3	3	1
2	1	1	3	3	2	3
3	1	1	2	3	1	1
4	1	1	3	3	2	2
5	1	1	3	3	3	3
AVg.	**1.2**	**1.2**	**2.8**	**3**	**2.2**	**2**

1-low, 2-medium, 3-high

23MCME15	MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3

MODULE I MAINTENANCE AND REPAIR STRATEGIES 9

Maintenance, Repair and Rehabilitation, retrofit and strengthening, need for rehabilitation of structures- Service life behaviour - importance of Maintenance, causes and effects of deterioration. Non-destructive Testing Techniques.

MODULE II STRENGTH AND DURABILITY OF CONCRETE 9

Quality assurance for concrete based on Strength, Durability and Microstructure of concrete - NDT techniques- Cracks- different types, causes – Effects due to Environment, Fire, Earthquake, Corrosion of steel in concrete, Mechanism, quantification of corrosion damage.

MODULE III REPAIR MATERIALS AND SPECIAL CONCRETES 9

Repair materials-Various repair materials, Criteria for material selection, Methodology of selection, Special mortars and concretes- Polymer Concrete and Grouting materials- Bonding agents-Latex emulsions, Epoxy bonding agents, Protective coatings-Protective coatings for Concrete and Steel, FRP sheets.

MODULE IV PROTECTION METHODS AND STRUCTURAL HEALTH MONITORING 9

Concrete protection methods – reinforcement protection methods- cathodic protection - Sacrificial anode - Corrosion protection techniques – Corrosion inhibitors, concrete coatings-Corrosion resistant steels, Coatings to reinforcement, Structural health monitoring.

MODULE V REPAIR, RETROFITTING AND DEMOLITION OF STRUCTURES 9

Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Repair to active cracks, Repair to dormant cracks. Repair of various corrosion damaged of structural elements (slab, beam and columns) Jacketing Techniques, Strengthening Methods for Structural Elements. Engineered Demolition -Case studies

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Explain the importance of maintenance assessment and repair strategies

CO2: Acquire knowledge of strength and durability properties and their effects due to climate and temperature.

CO3: Discuss recent developments in repair.

CO4: Adapt the techniques for repair and protection methods

CO5: Develop the repair, rehabilitation and retrofitting of structures and demolition methods.

TOTAL : 45 PERIODS

REFERENCES:

1. “Concrete Structures, Protection, Repair and Rehabilitation”, Dodge Woodson, Butterworth-Heinemann, Elsevier, New Delhi, 2012.
2. “Design and Construction Failures”, Dov Kominetzky, Galgotia Publications Pvt. Ltd., 2001.
3. “Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures”, Ravishankar K., Krishnamoorthy T.S., Allied Publishers, 2004.
4. Handbook on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.
5. Handbook on “Repair and Rehabilitation of RCC Buildings” – Director General Works CPWD, Govt of India, New Delhi, 2002.
6. BS EN 1504 - Products and Systems for the Protection and Repair of Concrete Structures - Definitions, Requirements, Quality Control and Evaluation of Conformity

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	2	3	1	1
2	1	1	3	3	1	1
3	2	1	2	3	1	1
4	1	1	3	3	2	2
5	1	1	3	3	3	3
AVg.	**1.2**	**1.2**	**2.6**	**3**	**1.6**	**1.6**

1-low, 2-medium, 3-high

23MCME16	ENVIRONMENTAL IMPACT ASSESSMENT FOR CONSTRUCTION ENGINEERS	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION **9**

Sustainable Development challenges and needs - Key approaches for Impact Assessment – EIA approach: historical development - Legal and Regulatory aspects in India - Types and Objectives, Components, Process of EIA.

MODULE II PREDICTION AND ASSESSMENT **9**

Prediction and Assessment: tools - impact on air, water, soil & Noise - Role of Biodiversity impact Assessment - Identification, Prediction and Evaluation of Impacts on Biodiversity - Techniques of Biodiversity impact assessment - EIA Report Preparation - Environmental Management Plan: Preparation and implementation - Mitigation and Rehabilitation plans - Post Project Audit.

MODULE III HEALTH AND SOCIO-ECONOMIC IMPACT ASSESSMENT **9**

Health Assessment: Impact of Environment on Health - Developing framework for Health impact analysis, tools, and techniques - Socio-Economic Impact Assessment: Overview and Scope of Social Impact Assessment - SIA model and the planning process - Land acquisition: Legal aspects, Resettlement & Rehabilitation, and Development.

MODULE IV INTEGRATED ANALYSIS **9**

Integrated Analysis of Environmental, Social, and Health Impacts - Challenges for Integrated Approach - Scope for Integrated approach in economic analysis - CBA, Social CBA, and Cost-effectiveness Analysis - Analytic Hierarchy process-based Approach - Emerging Dimensions and Future Directions.

MODULE V IMPACT OF INFRASTRUCTURE AND ENVIRONMENTAL SERVICES **9**

Case Studies: EIA for Mining, extraction of natural resources and power generation - Primary Processing and Material Production - Material Processing, Manufacturing/Fabrication - Service Sectors - Physical Infrastructure including Environmental Services - Building and Construction Projects - Area Development Projects and Townships - Strategic Environmental Assessment, Technological Assessment, and Risk Assessment.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Apply the knowledge of science and engineering fundamentals to sustainable development challenges.

CO2: Explain the identification, prediction, and evaluation of impacts that will be caused by projects or industries on biodiversity.

CO3: Identify the legal requirements of environmental impact assessment for projects.

CO4: Develop the ability to perform integrated analysis by considering environmental, social, and health impacts.

CO5: Select appropriate methods for environmental impact assessment for Infrastructure and environmental service..

TOTAL : 45 PERIODS

REFERENCES:

1. "Environmental Impact Assessment Methodologies", Anjaneyulu, Yerramilli, and Valli Manickam, Third Edition, BS Publications, Hyderabad, 2022.
2. "Environmental Impact Assessment – Practical Solutions to Recurrent Problems", Lawrence, D.P., Wiley-Interscience, New Jersey, 2003.
3. "Handbook of Environmental Impact Assessment", Petts, J., Vol. I and II, Blackwell Science, London, 1999.
4. "Environmental Impact Assessment", Canter, L.W., McGraw Hill, New York, 1996.
5. World Bank – Source Book on Environmental Impact Assessment, 2010.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	2	2
2	1	2	3	3	1	2
3	1	1	2	3	1	1
4	1	1	3	3	3	3
5	1	1	3	3	2	2
AVg.	**1**	**1.2**	**2.8**	**3**	**1.8**	**2**

1-low, 2-medium, 3-high

23MCME17	SUPPLY CHAIN MANAGEMENT & LOGISTICS IN CONSTRUCTION	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION **9**

Definition of Logistics and SCM: Evolution, Scope, Importance - Supply chain stages and decision phases process view of a supply chain - Supply chain flows- Examples of supply chains- Competitive and supply chain strategies- Achieving strategic fit- Expanding strategic scope- Drivers of supply chain performance- Framework for structuring drivers -Obstacles to achieving fit.

MODULE II STRATEGIC PERSPECTIVES **9**

Challenge of construction logistics-Aggregating global products for just-in-time delivery to construction sites – Construction Logistics – Supply of bulk materials – Effective management of a construction project supply chain – Construction supply chain management strategy.

MODULE III INTEGRATED DATA MANAGEMENT **9**

Impact of BIM and new data management capabilities on supply chain management in construction - Data management for integrated supply chains in construction.

MODULE IV MONITORING CONSTRUCTION LOGISTICS AND SUSTAINABILITY **9**

Role of logistics in achieving sustainable construction – Resource efficiency benefits of effective logistics.

MODULE V LOGISTICS OPERATIONS **9**

Role of the construction logistics manager – Third-party logistics operators in construction – Managing construction logistics for confined sites in urban areas - Consolidation centers in construction logistics – Delivery management systems.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Describe the conceptual and theoretical backgrounds of Supply Chain Management and logistics.

CO2: Apply the strategy in logistics functions ranging from planning to execution and control.

CO3: Identify the Impact of BIM and new data management capabilities on supply chain management in construction.

CO4: Analyze the implications of various strategic choices and decide on a better course of action.

CO5: Explain the role of construction logistic Managers and Delivery management systems.

TOTAL : 45 PERIODS

REFERENCES:

1. "Supply Chain Management and Logistics in Construction: Delivering Tomorrow's Built Environment", Greger Lundesjö, Kogan Page Publishers, 2015.
2. "Supply Chain Management, Strategy, Planning, and Operation", Sunil Chopra, Peter Meindl, Kalra, Pearson Education, 2011.
3. "Supply Chain Engineering: Models and Applications", A. Ravi Ravindran, Donald P. Warsing, CRC Press, 2012.
4. "Quantitative Models in Operations and Supply Chain Management", G Srinivasan, PHI Learning (P) Ltd, New Delhi, 2010.
5. "Logistics", David J. Bloomberg, Stephen Lemay, Joe B. Hanna, PHI, 2010.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	2	2	3	1	1
2	1	1	3	3	2	3
3	2	1	2	3	2	1
4	1	1	3	3	3	3
5	1	2	2	3	1	2
AVg.	**1.4**	**1.4**	**2.4**	**3**	**1.8**	**2**

1-low, 2-medium, 3-high

23MCME18	RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION	L	T	P	C
		3	0	0	3

MODULE I RESOURCE PLANNING 9

Resource Planning, Procurement, Identification, Personnel, Planning for material, Labour, time schedule and cost control- Mobilization -Types of resources, manpower, Equipment, Material, Money, Time.

MODULE II LABOUR MANAGEMENT 9

Systems approach, Characteristics of resources, Utilization, measurement of actual resources required, Tools for measurement of resources, Labour, Classes of Labour, Cost of Labour, Labour schedule, optimum use Labour.

MODULE III MATERIALS AND EQUIPMENT 9

Material: Time of purchase, the quantity of material, sources, Transportation, Delivery, and Distribution Equipment: Planning and selecting by optimistic choice with respect to cost, Time, Source, and handling.

MODULE IV TIME MANAGEMENT 9

Personnel time, Management and planning, managing time on the project, forecasting the future, Critical path measuring the changes and their effects – Cash flow and cost control.

MODULE V RESOURCE ALLOCATION AND LEVELLING 9

Time-cost trade-off, Computer application – Resource levelling, resource list, resource allocation, Resource loading, Cumulative cost – Value Management.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Identify the different types of resources in a construction industry.

CO2: Evaluate the labour productivity and the influencing factors.

CO3: Calculate the equipment output and the operation condition of construction equipment.

CO4: Enumerate the terms of cash inflow, cash outflow, and balance sheet.

CO5: Categorize the time and cost-related information in a construction sector.

TOTAL : 45 PERIODS

REFERENCES:

1. "Construction Equipment Management", Sharma, S.C., Khanna Publishers, Delhi, 2016.
2. "Construction Project Management", Kumar Neeraj Jha, Pearson Publishers, 2015.
3. "Handbook of Engineering Management", Andrew, D., Szilagyi, 1982.
4. "Management Techniques Applied to the Construction Industry", Oxley Rand Poslcit, Granda Publishing Ltd., 1996.
5. "Construction Project Management: Tips and Insights", Paul Netscher, Panet Publications, 2017.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	2	3	1	1
2	1	1	3	3	2	2
3	1	1	3	3	2	2
4	1	1	2	2	1	1
5	1	1	2	3	1	2
AVg.	**1**	**1**	**2.4**	**2.8**	**1.4**	**1.6**

1-low, 2-medium, 3-high

23MCME19	GIS IN CONSTRUCTION MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I GIS TECHNIQUES **9**

Map - Types of Maps - Development of GIS - Components of GIS - Hardware, software, organization.

MODULE II GIS DATA ANALYSIS **9**

Types of data - Spatial and non-spatial data - Point, Line and Polygon - Vector and Raster data - Database structures - Files - Vector and Raster data structures. Data Retrieval - Query - Simple Analysis - Spatial Analysis - Overlay - Vector Data Analysis - Raster Data Analysis.

MODULE III GIS MODELING **9**

Modeling using GIS - Digital Elevation Model - Cost and path analysis - Expert Systems - Artificial Intelligence - Integration with GIS Data Output – Types.

MODULE IV HARDWARE REQUIREMENT AND ERROR ANALYSIS **9**

Devices used - Raster and Vector Display Devices - Printers - Plotters - Photo write Devices - Sources of Errors - Types of Errors - Elimination - Accuracies.

MODULE V GIS APPLICATIONS IN RESOURCE MANAGEMENT **9**

Fields of Applications - Cadastral Records -- Utility Network Management - Integration with Remote Sensing - Knowledge based techniques - Multicriteria Techniques - Introduction to Object Oriented Data base Models. Output - Case study.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Apply GIS techniques in construction management.

CO2: Gain knowledge about the background materials which will be useful in terms of quality management and resource management measures using GIS.

CO3: Manage by implementing Arc GIS / QGIS in civil engineering projects

CO4: Improve the performance by applying knowledge of GIS to different fields of civil engineering

CO5: Formulate various types of data, data analysis methods and data quality requirements in Civil engineering projects

TOTAL : 45 PERIODS

REFERENCES:

1. "Principles of GIS for Land Resources Assessment", Burrough, P.A., Oxford Publication, 1998.
2. "Fundamentals of Spatial Information Systems", Robert Laurini, Derek Thompson, Academic Press, 1996.
3. "Remote Sensing and Geographical Information Systems", Reddy, BS Publications, 2001.
4. "Geographical Information System", Ian Heywood et al., Pearson, 2019.
5. "Remote Sensing and GIS", Bhatta B., Oxford University Press, New Delhi, 2008.
6. "Concepts and Techniques of Geographical Information Systems", Lo C.P., Yeung Albert K.W., Prentice-Hall of India Pvt. Ltd., New Delhi, 2006.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	2	3
2	2	1	2	3	1	1
3	1	1	3	3	2	2
4	1	1	3	3	2	2
5	2	2	3	3	1	2
AVg.	**1.4**	**1.2**	**2.8**	**3**	**1.6**	**2**

1-low, 2-medium, 3-high

23MCME20	DIGITAL DESIGN AND CONSTRUCTION	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION TO BIM FOR CONSTRUCTION 9

Fundamentals of BIM – terminology, CAD & BIM. IFCs, schemas, interoperability, parametric modeling.

MODULE II DEVELOPMENT OF DESIGN PROCESS 9

BIM-based design process and analysis - design coordination. BIM-based construction process – 4D, 5D BIM.

MODULE III CHALLENGES IN BIM IMPLEMENTATION 9

BIM-based operation issues – facility management. Drivers and barriers in BIM adoption, BIM global practices.

MODULE IV CONSTRUCTION AUTOMATION 9

Automation in design and construction, virtual experiments – augmented reality, virtual reality, use of sensors in construction.

MODULE V MODERN DIGITAL TECHNOLOGIES IN CONSTRUCTION 9

Robots in construction, autonomous robots, and 3D printing technology in construction. Drones for Construction monitoring, Internet of Things, Smart Manufacturing, etc.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Apply the knowledge of science and engineering fundamentals to create a BIM model in Construction industry

CO2: Develop the construction design process using BIM.

CO3: Appraise the identification, prediction, and evaluation process for the challenges in BIM implementation.

CO4: Adapt and develop automation techniques in construction.

CO5: Select appropriate methods to implement modern digital technologies in construction industry.

TOTAL : 45 PERIODS

REFERENCES:

1. "Digital Transformation of the Design, Construction and Management Processes of the Built Environment", Daniotti, Bruno, Gianinetto, Marco, Della Torre, Stefano (Eds.), Research for Development, Springer Open, 2020.
2. "The BIM Manager's Handbook: Guidance for Professionals in Architecture, Engineering, and Construction", Dominik Holzer, Wiley, 2016.
3. "Implementing Successful Building Information Modeling", Erica Epstein, Artech House, 2012.
4. "Automation in Construction Management", Javad Majrouhi Sardroud, Scholars' Press, 2014.
5. "Robotics and Automation Handbook", Thomas R. Kurfess, CRC Press, 2018.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	2	2
2	1	1	3	3	2	3
3	2	1	2	3	3	1
4	1	1	3	3	3	2
5	1	1	3	3	2	2
AVg.	**1.2**	**1**	**2.8**	**3**	**2.4**	**2**

1-low, 2-medium, 3-high

	3D PRINTING AND DESIGN	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION AND BASIC PRINCIPLES 9

3D printing - 3D printing technologies – Fused Deposition Modeling (FDM) - Stereolithography (SLA) - Selective Laser Sintering (SLS) - concrete printing, - Benefits and limitations of 3D printing in construction in terms of Cost, speed, sustainability, design freedom, constructability challenges - Applications in different construction phases - Prefabricated components - on-site printing - architectural elements - building services integration.

MODULE II CONSTRUCTION MATERIALS AND 3D PRINTING WORKFLOW 9

Types of construction-grade 3D printing materials - Concrete mixes – polymers – Composite materials - other printable materials for construction applications, their properties, and performance characteristics - Overview of the 3D printing workflow in construction projects - Integration of 3D printing into the construction project lifecycle

MODULE III DESIGN FOR 3D PRINTING IN CONSTRUCTION 9

Design for 3D Printing - Design for Manufacturing (DFM) and Assembly - Core DFM for 3D Printing Concepts and Objectives - 3D Printing Unique Capabilities - Exploring Design Freedoms - Design Tools for 3D Printing - Guidelines for Process Selection - Selection Methods for a Part, Challenges of Selection, Preliminary Selection, Production Planning and Control - Software for 3D Printing - Preparation of CAD Models - STL File - Additional Software to Assist 3D Printing.

MODULE IV PROJECT MANAGEMENT FOR 3D PRINTING CONSTRUCTION 9

Planning and scheduling - Considering printing time – logistics - site preparation - integration with other construction activities - Cost estimation - Material costs - printing costs - labor costs - lifecycle analysis compared to traditional methods - Identifying potential risks associated with 3D printing - mitigation strategies - quality control procedures.

MODULE V THE FUTURE OF 3D PRINTING IN CONSTRUCTION 9

Use of Multiple Materials in 3D Printing - Discrete Multiple Material Processes - Porous Multiple Material Processes - Blended Multiple Material Processes - Embedded Component 3D Printing - Commercial Applications Using Multiple Materials - Business Opportunities and Future Directions - Integration with artificial intelligence and machine learning.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Understanding 3D printing technologies employed in construction, considering their applications and limitations.

CO2: Identify materials for 3D printing in construction projects, taking into account their suitability and characteristics.

CO3: Utilize design software to create tailored 3D printing designs specifically tailored for construction applications.

CO4: Apply the knowledge to manage and optimize 3D printing construction projects effectively.

CO5: Analyze of multiple materials in 3D printing and assess their applications in commercial contexts.

TOTAL : 45 PERIODS

REFERENCES:

1. "3D Printing for Construction", Dirk Hollmann, Michael Rüther, and Markus Koch, John Wiley & Sons, 2020.
2. "Additive Manufacturing: Products, Processes, Applications", Liou Liangsheng, Springer, 2017.
3. "Design for Additive Manufacturing: Tools and Considerations for the Designer", Tom Mueller, CRC Press, 2020.
4. "3D Printing & Design", Dr. Sabrie Soloman, LAP LAMBERT Academic Publishing, 2014.
5. "3D Printing for Dummies", Chris Bryant, John Wiley & Sons, 2017.

ONLINE RESOURCES:

1. https://onlinecourses.swayam2.ac.in/ntr24_ed17

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	3	3	2	2
2	1	1	3	3	2	3
3	1	1	3	3	2	1
4	1	1	3	3	3	2
5	1	2	2	3	1	1
AVg.	**1**	**1.2**	**2.8**	**3**	**2**	**1.8**

1-low, 2-medium, 3-high

ONE CREDIT COURSES

23MCOC01	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION TO RESEARCH PAPER WRITING **5**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

MODULE II PRESENTATION SKILLS **5**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

MODULE III DESIGN FOR 3D PRINTING IN CONSTRUCTION **5**

Key skills needed when writing a Title, key skills needed when writing an Abstract, key skills a needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Develop the ability to present their research findings clearly and coherently

CO2: Demonstrate essential writing skills, including crafting attention-grabbing titles, writing concise and informative abstracts, engaging introductions, thorough literature reviews, methods, results, discussions, and well-supported conclusions.

CO3: Proficient in conducting the final review and proofreading of their research papers, ensuring accuracy, coherence, and adherence to formatting and citation guidelines before submission.

TOTAL : 15 PERIODS

REFERENCES:

1. "Academic Writing for Graduate Students", John M. Swales and Christine B. Feak, 2018.
2. "The Craft of Research", Wayne C. Booth, Gregory Colomb, and Joseph Williams, 2020.
3. "Writing for Social Scientists", Howard Becker, 2017.
4. "Bird by Bird: Some Instructions on Writing and Life", Anne Lamott, 2019.
5. "The Elements of Style", William Strunk Jr. and E.B. White, 2017

ONLINE RESOURCES:

1. https://writingcenter.unc.edu/
2. https://www.oxfordtefl.com/

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	3	2	2	1	1
2	1	3	2	2	1	1
3	1	2	2	2	1	1
AVg.	**1**	**2.66667**	**2**	**2**	**1**	**1**

1-low, 2-medium, 3-high

23MCOC02	CONSTITUTION OF INDIA	L	T	P	C
		3	0	0	3

MODULE I HISTORY OF MAKING OF THE INDIAN CONSTITUTION 5

History, Drafting Committee, (Composition & Working), Preamble, Salient Features, Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

MODULE II ORGANS OF GOVERNANCE 5

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

MODULE III LOCAL ADMINISTRATION & ELECTION COMMISSION 5

District's Administration head: Role and Importance Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy(Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Demonstrate a comprehensive understanding of the key features and principles enshrined in the Indian Constitution

CO2: Assess the knowledge of the structure and functions of various organs of governance in India, such as Parliament, Executive, and Judiciary,

CO3: Compare the powers and functions of different levels of local administration, including Municipalities and Panchayati Raj

TOTAL : 15 PERIODS

REFERENCES:

1. "The Constitution of India, 1950 (Bare Act)", Government Publication.
2. M.P. Jain, "Indian Constitution Law", 7th Edn., Lexis Nexis, 2014.
3. Dr. S.N. Busi, Dr. B.R. Ambedkar Framing of Indian Constitution, 1st Edition, 2015.
4. D.D. Basu, "Introduction to the Constitution of India", Lexis Nexis, 2015.

ONLINE RESOURCES:

1. https://lawmin.gov.in/
2. https://www.constitutionofindia.net/

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	2	2	2	1	1	1
2	2	2	2	1	1	1
3	2	2	2	1	1	1
AVg.	**2**	**2**	**2**	**1**	**1**	**1**

1-low, 2-medium, 3-high

23MCOC03	GREEN BUILDINGS	L	T	P	C
		1	0	0	1

MODULE I INTRODUCTION **5**

Life Cycle impacts of materials and products - sustainable design concepts - strategies of design for the Environment -The sun- earth relationship and the energy balance on the earth's surface, climate, wind - Solar radiation and solar temperature - Sun shading and solar radiation on surfaces - Energy impact on the shape and orientation of buildings - Thermal properties of building materials.

MODULE II ENERGY EFFICIENT BUILDINGS **5**

Passive cooling and day lighting - Active solar and photovoltaic- Building energy analysis methods- Building energy simulation- Building energy efficiency standards- Lighting system design- Lighting economics and aesthetics- Impacts of lighting efficiency Energy audit and energy targeting- Technological options for energy management.

MODULE III INDOOR ENVIRONMENTAL QUALITY MANAGEMENT **5**

Psychometry- Comfort conditions- Thermal comfort- Ventilation and air quality-Air conditioning requirement- Visual perception- Illumination requirement-Auditory requirement- Energy management options- Air conditioning systems- Energy conservation in pumps- Fans and blowers- Refrigerating machines - Heat rejection equipment- Energy efficient motors- Insulation.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Interpret the impact of different construction materials and methods on embodied energy and carbon footprint apply different energy analysis methods and standards to assess building performance.

CO2: Develop strategies for managing energy quality in buildings, including efficient systems and user behaviour

CO3: Design and implement sustainable building solutions that minimize energy use while optimizing occupant comfort and environmental well-being.

TOTAL : 15 PERIODS

REFERENCES:

1. "Sustainable Construction: Green Building Design and Delivery", C. Kibert, John Wiley & Sons, 2016.
2. "An Energy Approach- Air-conditioning Principles and Systems", Edward G Pita, Pearson Education, 2018.
3. "A Proven Approach to Energy Efficient Construction", Bareither et al., 4th Edition, 2019.
4. "Building Energy Modeling with EQUEST", Crawley et al., 2017.
5. "ASHRAE Handbook - Fundamentals", ASHRAE, 2021.
6. "Green Building Design and Delivery", Cole, 5th Edition, 2017.
7. "Green Building Regulations: An International Comparison", Feria & Martinez, 2nd Edition, 2018

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	3	2	3	3	2	1
2	3	2	3	3	2	1
3	2	1	2	3	2	1
AVg.	**2.7**	**1.7**	**2.7**	**3**	**2**	**1**

1-low, 2-medium, 3-high

23MCOC04	PRACTICAL GEOTECHNICAL ENGINEERING	L	T	P	C
		0	0	2	1

LIST OF EXPERIMENTS

1. Soil Exploration and Site Characterization.
2. Assessment of Index Properties of Soil.
3. Assessment of Flow and Consolidation Properties of Soil.
4. Assessment of Shear Strength Parameters of Soil.
5. Assessment of Bearing Capacity of Soil.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Select the most appropriate method(s) based on the specific site conditions and project requirements.

CO2: Apply knowledge to distinguish between major soil types based on their index properties.

CO3: Interpret strength and settlement characteristics of soils and determine Safe Bearing Capacity of soils and select appropriate foundations.

TOTAL : 15 PERIODS

REFERENCES:

1. "Soil Engineering Laboratory Instruction Manual", Department of Civil Engineering, CIT, Coimbatore, 2008.
2. "Manual of Soil Laboratory Testing (Vol 1 to 3)", K.H. Head, John Wiley and Sons, Chichester, 1998.
3. "Soil Testing for Engineers", T.W. Lambe, John Wiley & Sons, New York, 1990.
4. IS 2720: Indian Standard Code of Practice for Methods of Tests for Soil.
5. "Measurement of Engineering Properties of Soils", E. Saibaba Reddy and K. Rama Sastri, New Age International, 2002

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	2	3	1	2	3
1	2	1	3	3	2	1
2	2	1	2	3	2	1
3	3	1	3	3	2	1
AVg.	2.3	1.0	2.7	3	2	1

1-low, 2-medium, 3-high

23MCOC05	GEO INFORMATICS LABORATORY	L	T	P	C
		0	0	2	1

MODULE I GIS INTRODUCTION **5**

Exploring - GIS functions - features - layers - map scale - connecting to folder - reordering of layers - symbolize layer - identify features - using of identify tool - hyperlink tool - zoom pan tools - map document saving.

MODULE II GIS MAP **5**

Layer attribute table - feature attribute relationship- creating map layout - making map layout in reverse - pinning down geographic data.

MODULE III I GEOGRAPHY STUDY **5**

Vector and raster data - geographic data work with item description - query based on attributes and locations - analyze data using buffer and overlay - applying GIS analysis process.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Apply remote sensing and GIS techniques to address diverse industrial requirements.

CO2: Evaluate environmental changes through various methods

CO3: Explain the pivotal role of these techniques in supporting decision-making systems

TOTAL : 15 PERIODS

TEXT BOOK:

1. Mastering ArcGIS Pro (8th Edition) by Bishop & Davis (2023)
2. The GIS Handbook (4th Edition) by Sheppard & Crighton (2021)

REFERENCES:

1. Spatial Analysis in Ecology and Agriculture: A Beginner's Guide (2nd Edition) by Fortin & Dale (2020)
2. ArcGIS Pro: The Essential Guide for GIS Professionals (2nd Edition) by Esri Press (2020)
3. Spatial Analysis Methods for Social and Environmental Sciences (2nd Edition) by Dorling & Thrift (2021)
4. Applying Geographic Information Systems (4th Edition) by Maguire et al. (2017)

ONLINE RESOURCES:

1. https://www.esri.com/training/catalog/
2. https://earthobservatory.nasa.gov/

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	3	1	2	3	2	1
2	3	1	2	3	2	1
3	3	2	2	3	2	1
AVg.	**3.0**	**1.3**	**2.0**	**3**	**2**	**1**

1-low, 2-medium, 3-high

23MCOC06	SUSTAINABLE ARCHITECTURE	L	T	P	C
		1	0	0	1

MODULE I SUSTAINABLE CONCEPTS - PEOPLE, ENVIRONMENT AND BUILDING 5

Introduction -sustainable development goals- Components and factors governing sustainable development- Relationship between people and environment, impact of people on environment and vice versa, extent of the energy and environmental crises facing the world, Need for implementing energy efficiency on an international, national and individual basis in the context of the building industry & environmental issues. Introduction to Indoor environment - spatial environment, Thermal environment, visual environment, sonic environment and olfactory environment.

MODULE II ENERGY AUDIT & ENVIRONMENTAL IMPACT ASSESSMENT 5

General Aspects of Energy Management & Energy Audit. Energy Efficiency in Thermal Utilities and Energy Efficiency in Electrical Utilities, Energy Performance Assessment for building envelope, fenestration and embodied energy. - Introduction and components such as physical, biological and socio-economical of Environmental impact assessment (EIA) in India based on the Environmental Protection Act (EPA), 1986, Ministry of Environment and Forest (MoEF) January 1994 for Environmental Clearance (EC) known as EIA Notification, 1994

MODULE III I WASTE UTILIZATION & MANAGEMENT, WATER AND BUILT FORMS 5

The primary goal is to provide a comprehensive understanding of waste management from an environmental public health perspective. Sustainable techniques in municipal solid waste management. Recycling and Reuse. Energy development and Management of urban waste services. - water demand, growing water misuse, pollution, threat to environment, social implications, sustainability of water recourses, ground water management, issues related to urban water supply.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Analyze the interdependencies between people, environment, and buildings within the context of sustainable development goals, energy efficiency, and indoor environmental quality

CO2: Conduct basic energy audits and understand the principles of environmental impact assessment (EIA) within the legal framework of India, applying these concepts to evaluate building energy performance and potential environmental impacts

CO3: Propose sustainable strategies for waste management and water conservation, considering their impact on built forms and urban environments

TOTAL : 15 PERIODS

TEXT BOOK:

1. Sustainable Architecture with Wood (2nd Edition) by Depla & Bahri (2018)
2. Principles and Practice for a Sustainable Future (3rd Edition) by Kibert (2020)

REFERENCES:

1. "Water in Sustainable Architecture (2nd Edition)", Rogers & Kopf, 2017.
2. "The Living Building Challenge: Vol. 3.1", 2020.
3. "Life Cycle Assessment for Building and Construction (2nd Edition)", Hauschild & Rossier, 2017.
4. "Promise vs. Reality", Beatley, 2017

ONLINE RESOURCES:

1. https://www.worldgbc.org/
2. https://www.buildinggreen.com/

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	3	2	3	3	2	1
2	3	2	3	3	2	1
3	3	1	2	3	2	1
AVg.	**3.0**	**1.7**	**2.7**	**3**	**2**	**1**

1-low, 2-medium, 3-high

ONE CREDIT COURSES

23MSEOE01	DISASTER MANAGEMENT	L	T	P	C
		3	0	0	3

MODULE I NATURAL DISASTERS **9**

Exploring - GIS functions - features - layers - map scale - connecting to folder - reordering of layers - symbolize layer - identify features - using of identify tool - hyperlink tool - zoom pan tools - map document saving.

MODULE II MAN MADE DISASTERS **9**

Layer attribute table - feature attribute relationship- creating map layout - making map layout in reverse - pinning down geographic data.

MODULE III GEOSPATIAL TECHNOLOGY **9**

Vector and raster data - geographic data work with item description - query based on attributes and locations - analyze data using buffer and overlay - applying GIS analysis process.

MODULE IV RISK ASSESSMENT AND MITIGATION **9**

Vector and raster data - geographic data work with item description - query based on attributes and locations - analyze data using buffer and overlay - applying GIS analysis process.

MODULE V DISASTER MANAGEMENT **9**

Legislative responsibilities of disaster management- Disaster management act 2005- post disaster recovery & rehabilitation, Relief & Logistics Management; disaster related infrastructure development- Post Disaster, Emergency Support Functions and their coordination mechanism - Role of Engineers in Disaster Management.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Identify natural and manmade disasters.

CO2: Explain in detail about causes and effects of natural and manmade disasters.

CO3: Apply geospatial techniques (including GIS) that can enhance vulnerability assessments.

CO4: Identify and analyse the factors that give rise to differential vulnerabilities and levels of community resilience and suggest necessary mitigation plans.

CO5: Assess and manage these vulnerabilities through disaster planning and policy-making.

TOTAL: 45 PERIODS

REFERENCES:

1. "Disaster Management", R. Subramanian, Vikas Publishing House Pvt. Ltd., New Delhi, 2018.
2. "Disaster Science and Management", Tushar Bhattacharya, McGraw Hill India Education Pvt. Ltd., 2017.
3. "Disaster Management in India- A Status Report", National Disaster Management Institute, Ministry of Home Affairs, Govt. of India, 2004.
4. "Disaster Management: Text and Case Studies", D. B. N. Murthy, Deep and Deep Publications (P) Ltd., New Delhi, 2007.
5. "Disaster Management", Sundar I. and Sezhiyan T., Sarup and Sons, New Delhi, 2007.
6. "Disaster Management", J.P. Singhal, Laxmi Publications, 2010.
7. "All You Wanted To Know About Disasters", B.K. Khanna, New India Publishing Agency, New Delhi, 2005.
8. "Disaster Management", Ramana Murthy, Dominant, New Delhi, 2004.
9. "Disaster Management and Rehabilitation", Rajdeep Dasgupta, Mittal Publishers, New Delhi, 2007

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	2	3	1	1
2	1	2	2	3	2	1
3	1	1	3	3	2	3
4	2	1	3	3	3	3
5	2	2	3	3	3	3
AVg.	**1.4**	**1.4**	**2.6**	**3**	**2.2**	**2.2**

1-low, 2-medium, 3-high

23MSEOE02	ENERGY EFFICIENT BUILDINGS	L	T	P	C
		3	0	0	3

MODULE I INTRODUCTION **9**

Conventional versus Energy Efficient buildings - Historical perspective - Water - Energy - IAQ-requirement analysis - Future building design aspects - Criticality of resources and needs of modern living.

MODULE II LANDSCAPE AND BUILDING ENVELOPES **9**

Energy efficient Landscape design - Micro-climates - various methods - Shading, water bodies- Building envelope: Building materials, Envelope heat loss and heat gain and its evaluation, paints, Insulation, Design methods and tools.

MODULE III HEATING, VENTILATION AND AIR-CONDITIONING **9**

Natural Ventilation, Passive cooling and heating - Application of wind, water and earth for cooling, evaporative cooling, radiant cooling - Hybrid Methods - Energy Conservation measures, Thermal Storage integration in buildings.

MODULE IV HEAT TRANSMISSION IN BUILDINGS **9**

Surface co-efficient: air cavity, internal and external surfaces, overall thermal transmittance, wall and windows; Heat transfer due to ventilation/infiltration, internal heat transfer; Sol-air temperature; Decrement factor; Phase lag. Design of day lighting; Estimation of building loads: Steady state method, network method, numerical method, correlations; Computer packages for carrying out thermal design of buildings and predicting performance.

MODULE V PASSIVE COOLING & RENEWABLE ENERGY IN BUILDINGS **9**

Passive cooling concepts : Evaporative cooling, radiative cooling; Application of wind, water and earth for cooling; Shading, paints and cavity walls for cooling; Roof radiation traps; Earth air tunnel. Introduction of renewable sources in buildings, solar water heating, small wind turbines, stand-alone PV systems, Hybrid system - Economics.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Perform energy audits in any type of building and suggest the conservation measures.

CO2: Identify energy efficient landscape and building envelopes.

CO3: Explain natural heating and cooling system for efficient buildings.

CO4: Acquire knowledge about heat transmission and estimation of building loads.

CO5: Integrate the renewable energy systems in the buildings.

TOTAL : 45 PERIODS

REFERENCES:

1. "Heating and Cooling of buildings: Design for Efficiency", J. Krieder and A. Rabi, McGraw Hill, 1994.
2. "Solar Technologies for buildings", Ursula Eicker, Wiley publications, 2003.
3. "Guide book for National Certification Examination for Energy Managers and Energy Auditors", accessed from www.energymanagertraining.com.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	3	3	3	3
2	1	1	3	3	2	3
3	1	1	2	3	2	2
4	1	1	3	3	2	2
5	1	1	3	3	2	3
AVg.	**1.0**	**1.2**	**2.8**	**3**	**2.2**	**2.6**

1-low, 2-medium, 3-high

23MCMOE01	LANDSCAPE AND ARCHITECTURE	L	T	P	C
		3	0	0	3

MODULE I OVERVIEW OF ARCHITECTURE **9**

Definition of architecture - Introduction to architecture - Elements of architecture - - Need and fulfillment - Architecture design - An analysis - Integration of aesthetic and function - Mass and space, visual and emotional effects of geometric forms and their derivatives - Space - Form - Composition - Dimension - Proportion, scale, Balance, Rhythm, Symmetry, Hierarchy, Pattern and axis with building examples - Concept development.

MODULE II ELEMENTS IN LANDSCAPE DESIGN **9**

Ecology, ecological balance - Hard and soft landscape elements; Plant materials - Classification, Characteristics, use and application in landscape design; Water and landform

MODULE III GARDEN DESIGN **9**

Landscape and garden design in history - Japanese, Italian Renaissance and Moghul gardens in India, Study of notable examples, and spatial development in landscape design.

MODULE IV SITE PLANNING **9**

Organization of spaces - Circulation, built form and open spaces, site planning and micro climate, site planning of neighborhood parks, children's play area and campus development.

MODULE V LANDSCAPING OF FUNCTIONAL AREAS **9**

Urban open spaces and principles of urban landscape; Street landscaping; Landscape design for waterfront areas and functional areas in urban centers; Green roofs and walls.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Present architectural designs associated with spaces, mass, visual and emotional effects and design components.

CO2: Familiarize students with various elements landscape architecture and the principle of landscape design.

CO3: Integrate and apply diverse perspectives to design solutions.

CO4: Provide an overview of ecological balance and impacts of human activities and stress the need for environmental protection and landscape consideration.

CO5: Develop and strengthen the competency in dealing with the analytic, artistic and technical aspects of designing open spaces at different scales.

TOTAL : 45 PERIODS

REFERENCES:

1. "Architecture--Form, Space, & Order", Francis D. K. Ching, John Wiley & Sons, Hoboken, NJ, 2007.
2. "TSS for Landscape Architecture", McGraw Hill Inc., 1995.
3. "Form Concept, Form in Landscape Design", Grant W. Reid, Van Nostrand Reinhold Company, 1993.
4. "An Introduction to Landscape Architecture", Michael Laurie, Elsevier, 1986.
5. "The Landscape of Man", Geoffrey Jellico and Susan Jellico, Thames and Hudson, 1987.
6. "Elements of Architecture", Ven Meiss, Van Nostrand Publications, London, 1986

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	2	3	3	2	3
2	1	1	2	3	1	2
3	2	1	3	3	3	3
4	2	1	2	2	2	1
5	1	1	3	3	2	3
AVg.	**1.4**	**1.2**	**2.6**	**2.8**	**2**	**2.4**

1-low, 2-medium, 3-high

23MENOE01	CLIMATE CHANGE AND ADAPTATION	L	T	P	C
		3	0	0	3

MODULE I EARTH'S CLIMATE SYSTEM 9

Introduction - weather and climate - Climate in the spotlight-The Earth's Climate Machine - Climate Classification - Global wind systems - Trade Wind Systems - Trade Winds and the Hadley Cell - Cloud formation and Monsoon Rains - Storms, Hurricanes and Tornado - The Hydrological Cycle - Global Ocean Circulation - EI Nino - LA Nino effect - Solar Radiation - The Earth's Natural Green House Effect - Green House Gases and Global Warming.

MODULE II OBSERVED CHANGES AND ITS CAUSES 9

Observation of Climate Change - Changes in pattern of temperature, precipitation and sea level rise - Observed effects of Climate Changes - Drivers of Climate Change - Climate Sensitivity and Feedbacks - The Montreal Protocol - UNFCCC - IPCC - Evidences of Changes in Climate and Environment - on a Global Scale and in India - Climate Change modeling.

MODULE III IMPACTS OF CLIMATE CHANGE 9

Impacts of Climate Change on various sectors - Agriculture, Forestry and Ecosystem - Water resources - Human Health - Industry, Settlement and Society - Methods and Scenarios - Projected Impacts for different regions - Uncertainties in the Projected Impacts of Climate Change - Risk of irreversible changes.

MODULE IV CLIMATE CHANGE ADAPTATION AND MITIGATION MEASURES 9

Adaptation Strategy/options in various sectors - Water - Agriculture - Infrastructure and Settlement including coastal zones. Human Health - Tourism - Transport - Energy - Key Mitigation Technologies and practices - Energy supply - Transport – Buildings - Industry - Agriculture - Forestry - Carbon sequestration - Carbon Capture and Storage (CCS) - Waste (MSW & Biowaste, Biomedical, Industrial waste - International and Regional co-operation.

MODULE V CLEAN TECHNOLOGY AND ENERGY 9

Clean Development Mechanism - Carbon Trading - Examples of future Clean Technology - Biodiesel - Natural Compost - Eco- friendly Plastic - Alternate Energy - Hydrogen - Bio-fuels - Solar Energy - Wind - Hydroelectric Power.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Explain earth's climate system and the concept of global warming

CO2: Infer the causes for climate change on the earth's surface

CO3: Comprehend the impact of climate change on society

CO4: Apply the various climate change adaptation and mitigation measures

CO5: Evaluate the role of clean technology in climate change adaptation

TOTAL : 45 PERIODS

REFERENCES:

1. "Climate Change - An Indian Perspective", Sushil Kumar Dash, Cambridge University Press India Pvt. Ltd, 2007.
2. "Impacts of Climate Change and Climate Variability on Hydrological Regimes", Jan C. van Dam, IHE, The Netherlands, October 2009.

CO-PO & PSO MAPPING

CO	PO			PSO		
	1	**2**	**3**	**1**	**2**	**3**
1	1	1	2	2	1	1
2	2	1	3	2	2	1
3	2	1	3	2	2	1
4	1	1	3	3	3	3
5	2	1	3	3	2	2
AVg.	**1.6**	**1.0**	**2.8**	**2.4**	**2**	**1.6**

1-low, 2-medium, 3-high