COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University, Chennai)

COIMBATORE - 641 014, TAMILNADU, INDIA

DIAMOND JUBILEE

(1956 - 2016)

DEPARTMENT OF CIVIL ENGINEERING

M.E. CONSTRUCTION MANAGEMENT

Curriculum and Syllabi

Under Choice Based Credit System

(For the students admitted during 2019 - 2020 and onwards)

INDEX

COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University, Chennai)

VISION AND MISSION OF THE INSTITUTE

VISION

The Institute strives to inculcate a sound knowledge in Engineering along with realized social responsibilities to enable its students to combat the current and impending challenges faced by our country and to extend their expertise to the global arena.

MISSION

The Mission of the institute is to impart high quality education and training to its students to make them world-class Engineers with a foresight to the changes and problems and pioneers to offer innovative solutions to benefit the nation and the world at large.

DEPARTMENT OF CIVIL ENGINEERING
COIMBATORE INSTITUTE OF TECHNOLOGY

VISION AND MISSION OF THE DEPARTMENT OF CIVIL ENGINEERING

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

To impart quality education with necessary skills to meet the requirements of the industry and to perform with professional ethics and an attitude for innovation in Civil Engineering through state-of-the-art technology.

COIMBATORE INSTITUTE OF TECHNOLOGY

(Government Aided Autonomous Institution Affiliated to Anna University, Chennai)

DEPARTMENT OF CIVIL ENGINEERING

M.E. CONSTRUCTION MANAGEMENT

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. To equip graduates with knowledge, capable of managing various construction projects with expertise as a team member as well as leader.
2. To encourage graduates to take up continued research and development in the field of construction engineering and management.
3. To practice ethically and with social responsibility

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DEPARTMENT OF CIVIL ENGINEERING

M.E. CONSTRUCTION MANAGEMENT

PROGRAMME OUTCOMES (POs)

1. An ability to independently carry out research/investigation and development work to solve practical problems
2. An ability to write and present a substantial technical report/document
3. 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
4. Ability to apply principles and modern tools for the effective management of construction projects.
5. Ability to provide feasible solutions to critical construction issues with care towards health, safety and culture of the society and environment.
6. Able to work with experts from various engineering disciplines involved in construction projects as a team member as well as a leader to manage projects efficiently.

COIMBATORE INSTITUTE OF TECHNOLOGY

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M.E. CONSTRUCTION MANAGEMENT

(Curriculum from the Academic Year 2019 - 2020 onwards)

Semester I

Course Code	Course Name	Category	L	T	P	C
19MCM11	Statistical Methods and Research Methodology for Construction Management	FC	3	-	-	3
19MCM12	Construction Project Management	PC	3	-	-	3
19MCM13	Construction Project Formulation and Appraisal	PC	3	-	-	3
19MCM14	Construction Resource Planning and Management	PC	3	-	-	3
19MCM15	Construction Economics and Financial Management	PC	3	-	-	3
	Program Elective - 1	PE	3	-	-	3
19MCM16	Data Analysis Laboratory for Construction Management	PC	-	-	4	2
	Total		**18**	**0**	**2**	**20**

Semester II

Course Code	Course Name	Category	L	T	P	C
19MCM21	Construction Planning, Scheduling and Control	PC	3	-	-	3
19MCM22	Contract Management and Dispute Resolution	PC	3	-	-	3
19MCM23	Quantitative Techniques in Construction Management	PC	3	-	-	3
	Program Elective - 2	PE	3	-	-	3
	Program Elective - 3	PE	3	-	-	3
	Program Elective - 4	PE	3	-	-	3
19MCM24	Project Planning Laboratory for Construction Management	PC	-	-	4	2
	Total		**18**	**0**	**2**	**20**

Semester III

Course Code	Course Name	Category	L	T	P	C
	Program Elective - 5	PE	3	-	-	3
	Program Elective - 6	PE	3	-	-	3
	Open Elective / Program Elective - 7	PE	3	-	-	3
19MCM31	Practical Training	EEC	-	-	-	2
	One Credit course	EEC			-	1
	Total		**9**	**-**	**-**	**12**

Semester IV

Course Code	Course Name	Category	L	T	P	C
19MCM41	Project Work	EEC	-	-	-	18
	Total		**-**	**-**	**-**	**18**

Total Credits to be Earned for the Award of the Degree = 70

FC - Foundation Courses
PC - Professional Core
PE - Professional Electives
EEC - Employment Enhancement Courses

PROFESSIONAL ELECTIVE COURSES (PE)

Course Code	Course Name	Category	L	T	P	C
19MCME01	Advanced Construction Materials and Equipment	PE	3	-	-	3
19MCME02	Quality Management for Construction Projects	PE	3	-	-	3
19MCME03	Management Information systems	PE	3	-	-	3
19MCME04	Advanced Construction Techniques	PE	3	-	-	3
19MCME05	Functional Planning, Building Services and Maintenance Management	PE	3	-	-	3
19MCME06	Construction Risk Management	PE	3	-	-	3
19MCME07	Shoring, Scaffolding and Formwork	PE	3	-	-	3
19MCME08	Advanced Concrete Constructions	PE	3	-	-	3
19MCME09	Valuation of Real Properties	PE	3	-	-	3
19MCME10	Building Information Management	PE	3	-	-	3
19MCME11	Construction Safety and Health Management	PE	3	-	-	3
19MCME12	Lean Construction Concepts, Tools and Practices	PE	3	-	-	3

ONE CREDIT COURSE

Course Code	Course Name
19MCOC01	Practical Geotechnical Engineering
19MCOC02	Green buildings
19MCOC03	Geo informatics laboratory
19MCOC04	Sustainable architecture

PG OPEN ELECTIVES

Course Code	Course Name	Category	L	T	P	C
19MCEOE01	Disaster Management	OE	3	-	-	3
19MCEOE02	Energy efficient buildings	OE	3	-	-	3
19MCMOE01	Landscaping and Architecture	OE	3	-	-	3
19MENOE01	Climate change and adaptation	OE	3	-	-	3

* Add / Include Syllabus for one Credit Course & Open Electives

I SEMESTER

19MCM11 - STATISTICAL METHODS AND RESEARCH METHODOLOGY FOR CONSTRUCTION MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVES

- *To study and understand the concepts of Statistical methods and its applications in Engineering.*
- *To study the effect of estimation theory, testing of hypothesis, correlation and regression, randomized design, and multivariate analysis.*

COURSE OUTCOMES

CO1 *: The students will able to understand the fundamentals of statistics and their applications to engineering designs.*

CO2 *: The students will able to make use of a variety of statistical methods to model the engineering systems with uncertainty.*

ESTIMATION THEORY

Estimators: Unbiasedness, Consistency, Efficiency and Sufficiency - Maximum Likelihood Estimation - Method of moments. **(9)**

TESTING OF HYPOTHESIS

Tests based on Normal t, X^2 and F distributions for testing of means, variance and proportions - Analysis of r x c tables - Goodness of fit. **(9)**

CORRELATION AND REGRESSION

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 - Regression and Partial correlations in terms of lower order co-efficient. **(9)**

DESIGN OF EXPERIMENTS

Analysis of variance - One-way and two-way classifications - Completely randomized design -Randomized block design - Latin square design. **(9)**

MULTIVARIATE ANALYSIS

Random vectors and Matrices - Mean vectors and Covariance matrices - Multivariate Normal density and its properties - Principal components: Population principal components - Principal components from standardized variables. **(9)**

TOTAL : 45

REFERENCES

1. *Gupta.S.C., and Kapoor, V.K., "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, Eleventh Edition, 2002*
2. *J.E. Freund, "Mathematical Statistical", 5th Edition, Prentice Hall of India, 2001.*
3. *Jay L.Devore, "Probability and statistics for Engineering and the Sciences", 5th Edition,Thomson and Duxbury, Singapore, 2002.*
4. *Murray.R. Spiegel and LarryJ.Stephens, "Schaum'souTlines- Statistics", Third Edition, Tata McGraw-Hill, 2000.*
5. *R.A.Johnson and C.B.Gupta, "Miller & Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th Edition, 2007.*
6. *Richard A.Johnson and Dean W.Wichern, "Applied Multivariate Statistical Analysis", Pearson Education, Asia, 6th Edition, 2007.*

19MCM12 - CONSTRUCTION PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OUTCOMES

On Completion of the Course the Student will exhibit ability to

CO1 *: Appreciate 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*

CONSTRUCTION PROJECT PERSPECTIVES

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. **(9)**

CONSTRUCTION PROJECT COST ESTIMATION & MANAGEMENT

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. **(9)**

RESOURCE PLANNING AND MANAGEMENT

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. **(9)**

CONSTRUCTION PLANNING, MONITORING AND CONTROL

Types of Project Plans - Work Breakdown Structure - Resource Levelling - Resource Allocation -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. **(9)**

PROJECT CLOSURE

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. **(9)**

TOTAL : 45

REFERENCES

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

19MCM13 - CONSTRUCTION PROJECT FORMULATION AND APPRAISAL

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To study and understand the formulation, costing of construction projects, appraisal, finance and private sector participation.*

COURSE OUTCOMES

CO1 : *The students will able to design and implement an integrated project formulation & business planning framework, defining relevant processes, tools, information needs and reports.*

CO2 : *The students will able to estimate time value of money, cash flows and project costing.*

CO3 : *The students will able to apply the project appraisal techniques and analyze risks in construction projects.*

CO4 : *The students will able to assess the various sources of finance, key financial indicators and its merits.*

CO5 : *The students will able to recognize the implication of private sector participation and technology transfer in construction projects.*

PROJECT FORMULATION

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. **(9)**

PROJECT COSTING

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. **(9)**

PROJECT APPRAISAL

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. **(9)**

PROJECT FINANCING

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. **(9)**

PRIVATE SECTOR PARTICIPATION

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. **(9)**

TOTAL : 45

REFERENCES

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

19MCM14 - CONSTRUCTION RESOURCE PLANNING AND MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

The course intended to provide planning and management of resources such as time, labour, material, equipment.

COURSE OUTCOMES

CO1 *: The student will be able to have the necessary skills required for effective resource planning and its management in construction activities.*

CO2 *: The students will be able to assess and control various resources involved in construction.*

CO3 *: The students will be able toknow the effect of resource planning ,resource management, resource allocation and resource levelling in construction.*

RESOURCE PLANNING

Introduction to resources - Types of resources - Resource Planning - Material and Money - Resource Planning - Manpower and Equipment - Scheduling Concepts **(9)**

PLANNING FOR CONSTRUCTION

Methods of Estimating project cost (An overview) - Classification of Construction cost - Planning resources unit rate, Cost inflation - Types of Construction cost - Escalation and Contingencies - Earned value budget - Project master budget - Contractors cost control system **(9)**

LABOUR, MATERIALS AND EQUIPMENT

Establishing Worker production standards- scheduling construction site workers-grouping project manpower-Inventory Planning - EOQ problems-Classification of construction materials-wastage standards-inventory planning process-Classification of major equipment-earthwork,cutting,hauling,compacting,gradingequipment,concrete plant equipment-cost consideration. **(9)**

TIME MANAGEMENT

Equipment: Planning and selecting, Extension of Equipment - Types, Cost control Methods - Depreciation and Replacement - Labour Administration - Labour, Classes of Labour, Cost of Labour - Labour schedule, optimum use Labour **(9)**

RESOURCE ALLOCATION AND LEVELLING

Resource list - Resource Allocation - Resource Leveling and Smoothening - Time-cost trade off - Value Management **(9)**

TOTAL : 45

REFERENCES

1. *Chitkara .K.K, "Construction Project Management", McGraw Hill, 2012*
2. *Sharma .S.C, "Construction Engineering and Management", Khanna Publishers, 2008*
3. *Senguptha .B, "Construction Management and Planning", Tata McGraw Hill, 2005.*

19MCM15 - CONSTRUCTION ECONOMICS AND FINANCIAL MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To study the basics of managerial economic concept and various ways of financial management. Also to provide the knowledge of accounting methods.*

COURSE OUTCOMES

CO1 : *Student is expected to understand the concepts of Managerial Economics.*

CO2 : *Student is expected to interpret the relationship between the Economic concepts with Construction Economics*

CO3 : *Student is expected to govern the financial system of an organization.*

CO4 : *Student can able to perform the Financial Statement for an firm.*

CO5 : *The background of the course will be useful to the student while accounting and auditing.*

MANAGERIAL ECONOMICS

Economics : Concepts and Importances - 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. **(9)**

CONSTRCUTION ECONOMICS

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. **(9)**

FINANCING

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. **(9)**

ANALYSIS OF FINANCIAL STATEMENTS

Balance Sheet - Profit and Loss account - Cash flow and Fund flow analysis - Ratio analysis - Investment and financing decision - Financial Control - Centralized management. **(9)**

ACCOUNTING METHOD

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. **(9)**

TOTAL : 45

REFERENCES

1. *ShashiK.Gupta, R.K. Sharma., "Management Accounting- Principles and Practice", Kalyani Publishers, 2016.*
2. *Arthur O'Sullivan, "Urban Economics", McGraw Hill Publication, 2019.*
3. *C.Paramasivan,T.Subramanian, "Financial Management", New Age International Publishers, 2018.*
4. *Halpin, D.W., "Financial and Cost Concepts for Construction Management", John Wiley & Sons, New York, 1985.*
5. *Warneer Z Hirsch, "Urban Economics", Macmillan, New York, 1993.*
6. *Prasanna Chandra, "Project Selection, Planning, Analysis, Implementation and Review", Tata McGraw Hill Publishing Company, Eighth Edition, 2014.*

7. *Kwaku A, Tenah and Jose M.Guevara, "Fundamental of Construction Management and Organisation", Prentice - Hall of India, 1995.*
8. *T. Horngren Charles, L. Sundern Gary, A. Elliott John, "Introduction to Financial Accounting" Pearson Publications, 2017.*

19MCM16 - DATA ANALYSIS LABORATORY FOR CONSTRUCTION MANAGEMENT

L	T	P	C
0	0	4	2

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

CO1 *: The student will be able to interpret the data using various statistical analysis methods with charts and graphs using spreadsheets.*

CO2 *: The student will be able to formulate Simulation models for project risk analysis.*

CO3 *: The student will be able to design simple information systems.*

LIST OF EXERCISES

1. Descriptive Statistics: Types of data, frequency distribution, Applications (Charts, Graphs etc.)
2. Tests to find frequency and percentage of levels of dataset.
3. Inferential analysis - t- test for single mean, t -test for independent samples, ANOVA.
4. Simple regression and multiple regression.
5. Design of a simple equipment information system for a construction project.
6. Simulation models for project risk analysis.

SEMESTER II

19MCM21 - CONSTRUCTION PLANNING, SCHEDULING AND CONTROL

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To study and understand the concept of planning, scheduling, cost and quality control, safety during construction, organization and use of project information necessary for construction project.*

COURSE OUTCOMES

CO1 : *The student will be able to do effective construction planning with right selection of technologies, estimation of duration and resources of construction projects.*

CO2 : *The student will be able to prepare work break down structure and schedule the activities of construction projects using network analysis.*

CO3 : *The student shall be able to evaluate the project budget required for the particular construction project and monitor the projects through effective cost control techniques and procedures.*

CO4 : *The student will be able to apply the elements of quality control and safety of construction projects and recognize quality control tools in the construction industry.*

CO5 : *The student will be able to organize the project information in databases and use the right information at right time for projects.*

CONSTRUCTION PLANNING

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. **(9)**

SCHEDULING PROCEDURES AND TECHNIQUES

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. **(9)**

COST CONTROL, MONITORING AND ACCOUNTING

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. **(9)**

QUALITY CONTROL AND SAFETY DURING CONSTRUCTION

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. **(9)**

ORGANIZATION AND USE OF PROJECT INFORMATION

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. **(9)**

TOTAL : 45

REFERENCES

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

19MCM22 - CONTRACT MANAGEMENT AND DISPUTE RESOLUTION

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OUTCOMES

On Completion of the Course the Student will exhibit ability

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

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

CO3 *: To recommend resort to appropriate alternate dispute resolution method for settling dispute.*

CO4 *: To 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.*

CONSTRUCTION CONTRACTS

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. **(9)**

TENDERS

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. **(9)**

CONTRACT ADMINISTRATION AND MANAGEMENT

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. **(9)**

ALTERNATE DISPUTE RESOLUTION

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. **(9)**

ADJUDICATION AND DISPUTE RESOLUTION BOARD

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. **(9)**

TOTAL : 45

REFERENCES

1. *Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, M.M.Tripathi Private Ltd., Bombay, 1982.*
2. *Jimmie Hinze, Construction Contracts, McGraw Hill, 2001.*
3. *Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, McGraw Hill, 2000.*
4. *Kwaku, A., Tenah, P.E. Jose M.Guevara, P.E., Fundamentals of Construction Management and Organisation, Printice Hall, 1985.*
5. *Patil. B.S, Civil Engineering Contracts and Estimates, Universities Press (India) Private Limited, 2006.*

19MCM23 - QUANTITATIVE TECHNIQUES IN CONSTRUCTION MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

To study and understand the various applications of optimization techniques in management of construction projects

COURSE OUTCOMES

CO1 : *The students will able to understand the elementary concepts and techniques of business research methods, and to appreciate how statistical and mathematical analysis can materially help in business decision-making.*

CO2 : *The students will able to apply the concepts studied to inventory, scheduling and other related problems.*

BASIC PRINCIPLES

Definition - Objective function - Constraints - Design space - local and global optima.

LINEAR PROGRAMMING

Formulation of problems - Graphical solutions - Analytical methods - Standard form - Canonical form - Basic feasible solution - Simplex Method - Two phase method - Penalty method - Duality theory - Primal and Dual algorithm. **(9)**

ALLOCATION MODELS IN CONSTRUCTION

Transportation Model - Assignment Models - Sequencing Problems. **(9)**

DYNAMIC PROGRAMMING

Bellman's principle of optimality - Multistage Decision problem - Sub-optimization problems. **(9)**

UNCERTAINITY AND COMPETITION IN CONSTRUCTION

Decision Model and Analysis - Competitive Situation - Games and Gaming Models - Bidding Situation and Bidding Models.**(9)**

SIMULATION OF CONSTRUCTION SYSTEMS

Simulation Approach and Models - Generation of Data - Monte-Carlo Simulation - Decision Making -Planning, Design and Management Construction Games. **(9)**

TOTAL : 45

REFERENCES

1. *N.D. Vohra, "Quantitative techniques in management", McGraw Hill Education India Private Limited. Fourth Edition (2009).*
2. *J.K. Sharma, "Quantitative techniques in management", Laxmi Publications, Third Edition (2014).*

19MCM24 - PROJECT PLANNING LABORATORY FOR CONSTRUCTION MANAGEMENT

L	T	P	C
0	0	4	2

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

CO1 : *The students will able to prepare Bid for a construction projects using spread sheets programs.*

CO2 : *The students will able to structure the project and schedule the project, allocate the resources and optimize the project plan.*

CO3 : *The student will be able to track, update and control a construction project and report its performance.*

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.

ELECTIVE SYLLABUS

19MCME01 - ADVANCED CONSTRUCTION MATERIALS AND EQUIPMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVES

- *To understand the properties of construction materials and its application in Civil Engineering.*
- *To provide a knowledge on production and construction equipments.*

COURSE OUTCOMES

CO1 : *The students are expected to apply new special concretes in the construction field.*

CO2 : *The students will be able to handle the smart materials and metals efficiently.*

CO3 : *The students will gain information regarding green materials, structural applications of FRP and geotextiles.*

CO4 : *The student will be able to be familiar with the operation of various earthwork equipments and materials handling equipments.*

CO5 : *The student will be able to explore the working of production and construction equipments.*

SPECIAL CONCRETE

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. **(9)**

METALS AND SMART MATERIALS

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. **(9)**

COMPOSITES AND GREEN MATERIALS

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. **(9)**

EQUIPMENT FOR EARTHWORK AND MATERIALS HANDLING

Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end loaders, Earth Movers -Forklifts and related equipment - Portable Material Bins - Conveyors. **(9)**

PRODUCTION AND OTHER CONSTRUCTION EQUIPMENTS

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. **(9)**

TOTAL : 45

TEXT BOOKS

1. *Gambhir, M. L. and Neha Jamwal, "Building Materials - Products, Properties and Systems", Tata McGraw Hill Education Pvt. Ltd. New Delhi, 2011.*
2. *Siddique, R "Special Concretes" Galgotia Publications, New Delhi, 1st Edition 2000.*
3. *Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., Construction Planning, Equipment and Methods, McGraw Hill, Singapore, 2006.*

REFERENCES

1. *Shan Somayaji, "Civil Engineering Materials", Prentice Hall Inc., 2nd Edition, 2001.*
2. *Mamlouk, M.S. and Zaniewski, J.P., Materials for Civil and Construction Engineers, Prentice Hall Inc., 2000.*
3. *Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 1988.*
4. *Deodhar, S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 1988.*
5. *Dr.Mahesh Varma, Construction Equipment and its planning and Application, Metropolitan Book Company, New Delhi. 1983.*

19MCME02 - QUALITY MANAGEMENT FOR CONSTRUCTION PROJECTS

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

To study the concepts of total quality management and International standards.

COURSE OUTCOMES

CO1 *: The students will able to understand the concepts of quality Assurance and quality control.*

CO2 *: The students will able to understand the methods and techniques in quality standards.*

CO3 *: The students will able to understand the International standards used in quality management in construction Industry.*

INTRODUCTION

Quality: Necessity for improving Quality in the context of Global Challenges - Concept of Quality Control, Quality Assurance, Quality Management and Total Quality Management (TQM). **(9)**

QUALITY STANDARDS, METHODS & TECHNIQUES

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. **(9)**

QUALITY MANAGEMENT

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. **(9)**

QUALITY CONTROL & ASSURANCE

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. **(9)**

INTERNATIONAL STANDARDS

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. **(9)**

TOTAL: 45

REFERENCES

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

19MCME03 - MANAGEMENT INFORMATION SYSTEMS

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To study the concepts of information systems and their applications, system development, implementation and control, and system audit.*

COURSE OUTCOMES

CO1 : *The students will able to explain the role and significance of various management information systems, and design the structured programs by computer based methods.*

CO2 : *The students will have the ability to explain fundamental database concepts and apply these concepts to the design of management information system for the project.*

CO3 : *The students will have the ability to perform the validation of the computer model and assess the risk of information system and information security.*

CO4 : *The students will have the ability to perform software quality assurance, verification and validation.*

CO5 : *The student will demonstrate knowledge on interface management systems with interface tools.*

INTRODUCTION

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. **(9)**

INFORMATION SYSTEMS

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. **(9)**

IMPLEMENTATION AND CONTROL

Control - Testing Security - Coding Techniques - Detection of Error - Validating - Cost Benefit Analysis - Assessing the value and risk of Information System. **(9)**

SYSTEM AUDIT

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. **(9)**

INTERFACE MANAGEMENT

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. **(9)**

TOTAL: 45

REFERENCES

1. *Kenneth C Laudon and Jane Price Laudon, Management Information Systems - Organisation and Technology, Prentice Hall, 1996.*
2. *Gordon B. Davis, Management Information System: Conceptual Foundations, Structure and Development, McGraw Hill, 1974.*

3. *Joyce J Elam, Case series for Management Information Systems , Simon and Schuster, Custom Publishing, 1996.*
4. *Ralph H Sprague and Huge J Watson, Decision Support for Managers, Prentice Hall, 1996.*
5. *Michael W. Evans and John J Marciniah, Software Quality assurance and Management, John Wiley and Sons, 1987.*
6. *Card and Glass, Measuring Software Design quality , Prentice Hall, 1990.*

19MCME04 - ADVANCED CONSTRUCTION TECHNIQUES

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To study and understand the latest construction techniques applied to engineering construction for sub structure, super structure, special structures, rehabilitation and strengthening techniques and demolition techniques.*

COURSE OUTCOMES

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

CO2 : *To propose and evaluate alternative construction systems and methods in response to given building performance requirements.*

CO3 : *To appreciate and prepare for the management of innovative practice in the field of construction technology.*

CO4 : *Ability to 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.*

SUB STRUCTURE CONSTRUCTION

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. **(9)**

SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS

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. **(9)**

CONSTRUCTION OF SPECIAL STRUCTURES

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. **(9)**

REHABILITATION AND STRENGTHENING TECHNIQUES

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. **(9)**

DEMOLITION

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. **(9)**

TOTAL: 45

REFERENCES

1. *Jerry Irvine, Advanced Construction Techniques, CA Rocketr, 1984 Patrick Powers. J., Construction Dewatering: New Methods and Applications, John Wiley & Sons, 1992.*
2. *Peter.H.Emmons, "Concrete repair and maintenance illustrated", Galgotia Publications Pvt. Ltd., 2001.Press, 2008.*
3. *Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications, 1995.*
4. *Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.*
5. *Patrick Powers. J., Construction Dewatering: New Methods and Applications, John Wiley & Sons, 1992.*

19MCME05 - FUNCTIONAL PLANNING, BUILDING SERVICES AND MAINTENANCE MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *Familiarize students with urban forms and urban street patterns. Highlight development guidelines and planning aspects for buildings with an emphasis on fire fighting and fire protection. Introduce building services and maintenance aspects.*

COURSE OUTCOMES

CO1 : *Review the development of modern urban/street form with current development and regulatory guidelines.*

CO2 : *Apply fire protection and fire resistance systems for multi-storied buildings as per regulations.*

CO3 : *Understand the scope of building services and be able to generate relevant outputs for multi-storied buildings followed by handover and subsequent maintenance.*

URBAN FORMS, STREET SYSTEMS AND NEIGHBOURHOOD

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. **(9)**

PLANNING

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. **(9)**

FIRE RESISTANCE

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. **(9)**

ENGINEERING SERVICES

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. **(9)**

MAINTENANCE MANAGEMENT

Building Maintenance/ Facilities Management -Planning-Handover, Scheduled and contingency maintenance - M I S for building maintenance - Maintenance standards and maintenance contracts -Economic maintenance decisions. **(9)**

TOTAL : 45

REFERENCES

1. *Mike Jenks, Colin Jones-Dimensions of the Sustainable City -Springer (2009).*
2. *D. Chapman-Creating Neighbourhoods and Places in the Built Environment(1996).*
3. *Stephen Marshall-Streets and Patterns(2005).*
4. *David. V. Chadderton-Building Services Engineering, 5th edition (2007).*
5. *M. Bhatti-Practical Optimization Methods - With Mathematica Applications-Springer (2000).*
6. *Ruhul Amin Sarker, Charles S. Newton-Optimization Modelling, A Practical Approach (2007).*
7. *Barrie Chanter, Peter Swallow-Building Maintenance Management -Wiley-Blackwell (2007).*
8. *Time Saver Standards for Architectural Design Data(1997).*
9. *NBC 2016 - National Building Code.*
10. *SP 32 (1986) - Lighting and Ventilation.*
11. *SP 30 (2011) - National Electrical Codes.*
12. *SP 35 - Handbook on water supply and Drainage.*

13. *IS 14665 (2000)- Part I, Part II, Part IV- Lifts.*
14. *IS 1172(Reaffirmed 2002) -Code for basic Requirement for Water Supply, Drainage and Sanitation.*
15. *IS 2065(Reaffirmed 1996) - Code of Practice for Water Supply in Buildings.*
16. *IS 1742(Reaffirmed 2002) - Code of practice for building drainage.*
17. *IS 12183(Reaffirmed 2004) - Code of Practice for Plumbing in Multi-Storeyed Buildings.*
18. *IS 13727(Reaffirmed 2004) - Cluster Planning For Housing.*
19. *IS 15105(2002)- Code of Practice for Fire Sprinklers.*
20. *IS 1641 to IS 1646- Code of Practice for Fire Safety in Buildings.*
21. *IRC 73-1980 - Geometric Design For Rural (Non-Urban).*
22. *IRC 86-1983 - Geometric Standards for Urban Roads in Plains.*

19MCME06 - CONSTRUCTION RISK MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To develop the understanding of strategic and operational risk in construction industry.*

COURSE OUTCOMES

CO1 *: The students will be able to discover various risk management principles and to implement risk management program in construction projects.*

CO2 *: TheStudents will be able to identify, analyze and mitigate project risk in construction industry.*

RISK CONCEPTS

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 **(9)**

PLANNING FOR RISK

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 **(9)**

RISK IDENTIFICATION

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 **(9)**

RISK RESPONSE

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 **(9)**

RISK MANGEMENT ASPECTS

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. **(9)**

TOTAL: 45

REFERENCES

1. *Joseph Phillips, McGraw - Hill, PMP Project Management Professional Study Guide*
2. *Bruce Barkley, Project risk management (Project Management)*
3. *John R Schuyler, Risk and decision analysis in projects (Cases in project and program management series)*
4. *Chris Chapman and Stephen Ward, Project risk management: Process, Techniques and Insights*

19MCME07 - SHORING, SCAFFOLDING AND FORMWORK

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

To study and understand the various types of scaffolding, formworks, shoring methods and techniques.

COURSE OUTCOMES

CO1 : *The student will be able to identify the various formwork systems and prepare cost effective overall and detailed planning of formwork, plant and site equipment.*

CO2 : *The student shall recognize the various types of form materials, hardware accessories for formwork connection and pressures on formworks.*

CO3 : *The student will able to apply the design principles of formwork for various elements such as slabs, beams, columns, and walls.*

CO4 : *The student will able to effectively build, erect and inspect the formwork in construction projects.*

CO5 : *The students will be able to know the latest methods of form construction for high rise and complicated structures like domes and tunnels with deep insights on slip form and scaffolds.*

PLANNING SITE EQUIPMENT & PLANT FOR FORMWORK

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. **(9)**

FORMWORK MATERIALS, ACCESSORIES, PROPRIETARY PRODUCTS & PRESSURES

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. **(9)**

DESIGN OF FORMS AND SHORES

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. **(9)**

BUILDING AND ERECTING THE FORM WORK

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. **(9)**

FORMS FOR DOMES AND TUNNELS, SLIP FORMS AND SCAFFOLDS

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. **(9)**

TOTAL: 45

REFERENCES

1. *Robert L. Peurifoy and Garold D. Oberlender, Formwork For Concrete Structures, McGraw - Hill , 1996.*
2. *Hurd, M.K., Formwork for Concrete, Special Publication No.4, American Concrete Institute, Detroit, 1996.*
3. *Kumar Neeraj Jha., Formwork for concrete structures, McGraw Hill Education (India) Private Limited, New Delhi,2017.*
4. *Michael P. Hurst, Construction Press, London & New York, 2003.*
5. *Austin, C.K., Formwork for Concrete, Cleaver - Hume Press Ltd., London, 1996.*

19MCME08 - ADVANCED CONCRETE CONSTRUCTIONS

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To study the properties of concrete and to know the state of the art developments in concrete*

COURSE OUTCOMES

On completion of the course the students will be able to:

CO1 *: Apprehend the knowledge of concrete ingredients and special concretes*

CO2 *: Acquire knowledge about durability of concrete*

CO3 *: Assess the fresh and hardened properties of concrete as per codes of practices*

INTRODUCTION AND ADMIXTURES

Composition of OPC - Manufacture - Modified Portland Cements - Hydration Process of Portland Cements - Structure of Hydrated Cement Paste.Mineral Admixtures - Hydration of Admixtures - Slags - Pozzolanas and Fillers - Chemical Admixtures - Solutes - Retarders - Air Entraining Agents - Water Proofing Compounds - Plasticizers and Super plasticizers - Compatibility issues with Chemical Admixtures. **(9)**

SPECIAL CONCRETES

Fibre Reinforced Concrete - High performance concrete - Ultra high strength concrete - Self Compacting Concrete - Polymer Concrete - Sulphur concrete - Geo polymer concrete. **(9)**

CONCRETING UNDER SPECIAL CIRCUMSTANCES

Underground construction - concreting in marine environment - underwater construction - extreme weather concreting **(9)**

MECHANICAL PROPERTIES OF CONCRETE

Interfacial Transition Zone - Fracture Strength - Compressive strength - Tensile strength - Impact strength - Bond strength - Creep - Shrinkage. **(9)**

DURABILITY OF CONCRETE

Factors affecting durability - Tests on permeability - chemical attack - Carbonation - Chloride penetration - water absorption - Sulphate attack - fire - frost action **(9)**

TOTAL : 45

TEXT BOOKS

1. *Santhakumar.A.R, "Concrete Technology", Oxford University press, New Delhi 2015.*
2. *Gambhir.M.L, "Concrete Technology", Tata McGraw Hill Book Co. Ltd., Delhi, 2004.*
3. *Neville.A.M, "Properties of Concrete", Pearson Education Ltd., New Delhi, 2013.*

REFERENCES

1. *Metha.P.K and Montreio.P.J.M, "Concrete Microstructure, Properties and Materials", Prentice Hall, 2005.*
2. *Gupta.B.L and Amit Gupta, "Concrete Technology", Standard Publishers and Distributers, New Delhi, 2004.*
3. *Shetty.M.S, "Concrete Technology", S.Chand and Company, New Delhi, 2010.*
4. *IS 456-2000 : Plain and Reinforced Concrete - Code of Practice.*

19MCME09 - VALUATION OF REAL PROPERTIES

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OUTCOMES

On completion of the course the students will demonstrate ability to

CO1 *: Select the suitable method of valuation of the asset given its purpose and conduct a fair valuation*

CO2 *: Determine the Rent for rental and leasehold premises*

CO3 *: Prepare an unambiguous valuation report and defend the same in case of disputes*

PRINCIPLES OF VALUATION & VALUATION OF LAND & BUILDING

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. **(9)**

FREE HOLD AND LEASE HOLD PROPERTIES & FIXATION OF FAIR RENT

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. **(9)**

VALUATION OF APARTMENTS

Related Definitions -Composite Rate - Different Methods of Valuation -Stage Value of a flat -Joint Venture Agreement -Real Estate (Regulation and Development) Act 2016and it's Significance in Valuation. **(9)**

VALUATION FOR BANKS

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. **(9)**

VALUATION FOR TAXATION

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. **(9)**

TOTAL : 45

REFERENCES

1. *K.Divakar, "Valuation of Immovable Properties - Basics for Beginners", Published by Vahini Divakar, Coimbatore 641045,(kdcitce@gmail.com) 2019.*
2. *Rangwala S.C. (Late) and Ketki B. Dalal, "Valuation of Real Properties" Charotar Publishing House Pvt. Ltd. Anand, Gujarat, 10th Edition 2020.*
3. *Kanagasabapathy, B., "Practical Valuation, Volumes IX, X, XII, XIII, XIV & XV" No 1, Prestige Flats, Reynolds Road, Trichy*
4. *Ashok Nain, "Valuation Principles & Procedures, Dew Drops Education Pvt. Ltd. , July 2010.*
5. *Gopinatha Rao, C.H., Valuation Practice of Immovable Properties, Chennai, 17th Edition 2014.*

19MCME10 - BUILDING INFORMATION MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To study in the various aspects of Building service requirements and its problems related in it.*

COURSE OUTCOMES

CO1 *: The background materials will familiarize the student about Building services and its structure.*

CO2 *: The student is expected to plan Buildings with respect to system integration.*

STRUCTURAL SYSTEM

Systems for enclosing Buildings, Functional aesthetic system, Materials Selection and specification. **(9)**

ENVIRONMENTAL ASPECTS AND SERVICES

Qualities of enclosure necessary to maintain a specified level of interior environmental quality - Weather resistance - Thermal infiltration - Acoustic Control -Transmission reduction - Air quality - Illumination. **(9)**

SYSTEM INTEGRATION

Relevant systems integration with structural systems, Plumbing - Electricity -Vertical circulation and their interaction. Technological and methodological demands on construction management in infrastructure development projects. **(9)**

CONSTRUCTION AND INFRASTRUCTURE

Construction component of various infrastructure sectors - highway - Ports and aviation - Oil and gas - Power - Telecom - Railways - Irrigation. Current scenario - future needs. **(9)**

MAINTENANCE AND SAFETY

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. **(9)**

TOTAL : 45

REFERENCES

1. *E.C. Butcher and A.C. Parnell, Designing for Fire Safety, John Wiley and Sons, 1993.*
2. *William T. Mayer, Energy Economics and Build Design, McGraw-Hill Book Company, 1983.*
3. *Peter R. Smith and Warren G. Julian, Building Services, Applied Science Publishers Ltd., London.*
4. *Eastman, C., Teicholz, P., Sacks, R., & Liston, C. (2011). BIM handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors. John Wiley & Sons.*
5. *Hardin, B., & McCool, D. (2015). BIM and construction management: proven tools, methods, and workflows. John Wiley & Sons.*
6. *Krygiel, E., &Nies, B. (2008). Green BIM: successful sustainable design with building information modeling. John Wiley & Sons.*
7. *Kenneth J. Sousa, Effy Oz, Management Information Systems, 7th Edition.*

19MCME11 - CONSTRUCTION SAFETY AND HEALTH MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To study and understand the various safety concepts, requirements applied to construction projects.*

COURSE OUTCOMES

CO1 : *The students will able to understand the importance of managing health and safety in construction and the related key legislation.*

CO2 : *The students will able to know how to plan a safe working environment in construction by implementing safety procedures.*

CONSTRUCTION ACCIDENTS

Accidents and their Causes - Human Factors in Construction Safety - Costs of Construction Injuries - Occupational and Safety Hazard Assessment - Legal Implications. **(9)**

SAFETY PROGRAMMES

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. **(9)**

DESIGNING FOR SAFETY

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. **(9)**

HEALTH MANAGEMENT IN CONSTRUCTION SITES

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. **(9)**

OWNERS' AND DESIGNERS' OUTLOOK

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. **(9)**

TOTAL : 45

REFERENCES

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

19MCME12 - LEAN CONSTRUCTION CONCEPTS, TOOLS AND PRACTICES

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OBJECTIVE

- *To study and understand the basics of lean construction, principles, tools and techniques, especially how they are applied in the construction industry.*

COURSE OUTCOMES

CO1 : *The students will be able to identify the salient aspects of the contemporary management techniques and address the problems with present management techniques.*

CO2 : *The students will be able to apply core concepts of lean and its principles in construction industry.*

CO3 : *The students will be able to use various lean construction tools and techniques to achieve better productivity in construction projects.*

CO4 : *The students will be able to implement lean concepts in design to achieve sustainability in construction projects.*

INTRODUCTION

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. **(9)**

LEAN MANAGEMENT

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. **(9)**

CORE CONCEPTS IN LEAN

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. **(9)**

LEAN CONSTRUCTION TOOLS AND TECHNIQUES

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. **(9)**

LEAN CONSTRUCTION IMPLEMENTATION

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.. **(9)**

TOTAL : 45

REFERENCES

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

19MCOC01 - PRACTICAL GEOTECHNICAL ENGINEERING

L	T	P	C
0	0	2	1

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

At the end of this laboratory, the students will be able to

CO1 *: Plan and conduct appropriate soil exploration method based on site condition.*

CO2 *: Classify soils based on their index properties*

CO3 *: Understand strength and settlement characteristics of soils.*

CO4 *: Compute Safe Bearing Capacity of soils and select appropriate foundations.*

LIST OF EXPERIMENTS

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

REFERENCES

1. *"Soil Engineering Laboratory Instruction Manual", Published by the Department of Civil Engineering. CIT, Coimbatore, 2008.*
2. *Head,K.H,"ManualofSoilLaboratoryTesting(Vol-1to3)",JohnWileyandSons,Chichester,1998.*
3. *LambeT.W.,"SoilTestingforEngineers",JohnWiley&Sons,NewYork,1990.*
4. *ISCodeofPractice2720-IndianStandardCodeofPracticeforMethodsofTestsforsoil.*
5. *SaibabaReddy,E.andRamaSastri,K.,"MeasurementofEngineeringPropertiesofSoils",NewAgeInte rnational,2002.*

19MCOC02 - GREEN BUILDINGS

L	T	P	C
1	0	0	1

ASSESSMENT : THEORY

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1 *: Acquire knowledge about energy impact in buildings*

CO2 *: Identify different energy analysis method and standards*

CO3 *: Understand energy quality management in buildings.*

INTRODUCTION

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. **(5)**

ENERGY EFFICIENT BUILDINGS

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. **(5)**

INDOOR ENVIRONMENTAL QUALITY MANAGEMENT

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. **(5)**

Total : 15

TEXTBOOKS

1. *Kibert, C. "Sustainable Construction: Green Building Design and Delivery", John Wiley & Sons, 2016*
2. *Edward G Pita, "An Energy Approach- Air-conditioning Principles and Systems", Pearson Education, 2018*

REFERENCES

1. *Colin Porteous, "The New Eco-Architecture", Spon Press, 2002.*
2. *Energy Conservation Building Codes: www.bee-india.nic.in*
3. *Lever More G J, "Building Energy Management Systems", E and FN Spon, London, 2000.*
4. *Ganesan T P, "Energy Conservation in Buildings", ISTE Professional Center, Chennai, 1999.*
5. *John Littler and Randall Thomas, "Design with Energy: The Conservation and Use of Energy in Buildings", Cambridge University Press, 1984.*

19MCOC03- GEO INFORMATICS LABORATORY

L	T	P	C
0	0	2	1

ASSESSMENT : PRACTICAL

COURSE OUTCOMES

CO1 *: The students will be able to carry out remote sensing and GIS applications of various industrial needs.*

CO2 *: The students will be able to demonstrate the various environmental change detections.*

CO3 *: The students will be able to be instrumental for decision support system.*

GIS INTRODUCTION

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 **(5)**

GIS MAP

Layer attribute table - feature attribute relationship- creating map layout - making map layout in reverse - pinning down geographic data **(5)**

GEOGRAPHY STUDY

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 **(5)**

Total : 15

TEXT BOOKS

1. *Floyd F.Sabins, J.R., WH, "Remote Sensing Principles Interpretation", Freeman and Company and Francis Company, France, 1996.*
2. *Lillesand, Thomas.M and Raiph W.Kiefer, "Remote Sensing and Image Interpretation", John Wiley Sons, 2002.*

REFERENCES

1. *Burrough.P.A., "Principles of GIS for Land Resources Assesment, Oxford Publication, 1998.*
2. *Thomas.M.Lillesand and Ralph.W.Kiefer, Remote Sensing and Image Interpretation, John Wiley and Sons, Inc, 2003.*

19MCOC04 - SUSTAINABLE ARCHITECTURE

L	T	P	C
1	0	0	1

ASSESSMENT : THEORY

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1 *: Understand the concept of sustainable architecture.*

CO2 *: Analyze Impact and perform energy audit for the building*

CO3 *: Apply the various water and waste management sustainable methodology.*

SUSTAINABLE CONCEPTS - PEOPLE, ENVIRONMENT AND BUILDING

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. **(5)**

ENERGY AUDIT & ENVIRONMENTAL IMPACT ASSESSMENT

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 **(5)**

WASTE UTILIZATION & MANAGEMENT, WATER AND BUILT FORMS

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. **(5)**

Total : 15

TEXT BOOKS

1. *Jacqueline Hoyer, Wolfgang Dickhaut, Lukas Kronawitter, Björn Weber "Water Sensitive Urban Design": Principles and Inspirations for Sustainable Storm water Management in the City of theFuture, ISBN 978-3-86859-106-4 03. 2011.*
2. *S. BrySarte, "Sustainable Infrastructure The Guide to Green Engineering and Design", Publisher: Wiley, ISBN: 978-0470453612, September 2010.*

REFERENCES

1. *Baker Nick and Steamers Koen, "Energy and Environment in Architecture", E & FN Spon, London, 1999.*
2. *Goulding, John, R., Lewis, Owen, J., and Steemers, Theo, C, "Energy in Architecture", Bastford Ltd., London, 1986.*
3. *Givoni, B., "Man, Climate and Architecture", Elsevier, Amsterdam, 1986*
4. *MoncefKrarti, "Energy Audit of Building Systems: an Engineering approach" CRC Press, LLC, Florida 2000.*

19MCEOE01 - DISASTER MANAGEMENT

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OUTCOMES

At the end of this course, the student 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.*

NATURAL DISASTERS

Cyclones, Floods, Drought and Desertification - Earthquake, Tsunami, Landslides and Avalanche. **(9)**

MAN MADE DISASTERS

Chemical industrial hazards, major power breakdowns, traffic accidents, Fire, War, Atom bombs, Nuclear disaster- Forest Fire- Oil fire -accident in Mines. **(9)**

GEOSPATIAL TECHNOLOGY

Remote sensing, GIS and GPS applications in real time disaster monitoring, prevention and rehabilitation- disaster mapping. **(9)**

RISK ASSESSMENT AND MITIGATION

Hazards, Risks and Vulnerabilities - Disasters in India, Assessment of Disaster Vulnerability of a location and vulnerable groups- Preparedness and Mitigation measures for various Disasters- Mitigation through capacity building -Preparation of Disaster Management Plans. **(9)**

DISASTER MANAGEMENT

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. **(9)**

Total : 45

TEXT BOOKS

1. *R.Subramanian" Disaster Management " Vikas Publishing House Pvt. Ltd, New Delhi, 110055, 2018.*
2. *Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2017.*

REFERENCES

1. *Disaster Management in India- A Status Report- Published by the National Disaster Management Institute, Ministry of Home Affairs, Govt. of India, 2004.*
2. *Murthy D. B. N., "Disaster Management: Text and Case Studies", Deep and Deep Publications (P) Ltd., New Delhi, 2007.*
3. *Sundar I. and Sezhiyan T., "Disaster Management", Sarup and Sons, New Delhi, 2007.*
4. *Singhal J.P. "Disaster Management", Laxmi Publications, 2010.*
5. *Khanna B K, "All You Wanted To Know About Disasters", New India Publishing Agency, New Delhi, 2005.*
6. *Ramana Murthy, "Disaster Management", Dominant, New Delhi, 2004.*
7. *RajdeepDasgupta, "Disaster Management and Rehabilitation", Mittal Publishers, New Delhi, 2007.*

19MCEOE02 - ENERGY EFFICIENT BUILDINGS

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OUTCOMES

At the end of the course the student 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 *: Understand 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*

INTRODUCTION

Conventional versus Energy Efficient buildings - Historical perspective - Water - Energy - IAQ- requirement analysis - Future building design aspects - Criticality of resources and needs of modern living. **(9)**

LANDSCAPE AND BUILDING ENVELOPES

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. **(9)**

HEATING, VENTILATION AND AIR-CONDITIONING

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. **(9)**

HEAT TRANSMISSION IN BUILDINGS

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. **(9)**

PASSIVE COOLING & RENEWABLE ENERGY IN BUILDINGS

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. **(9)**

Total : 45

TEXT BOOKS

1. *Krieder J. and Rabi A., "Heating and Cooling of buildings: Design for Efficiency", Mc Graw Hill,1994.*
2. *Ursala Eicker, "Solar Technologies for buildings", Wiley publications, 2003.*

REFERENCE

1. *Guide book for National Certification Examination for Energy Managers and Energy Auditors (Could be downloaded from www.energymanagertraining.com)*

19MCMOE01- LANDSCAPE AND ARCHITECTURE

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OUTCOMES

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

CO4 *: Develop and strengthen the competency in dealing with the analytic, artistic and technical aspects of designing open spaces at different scales.*

OVERVIEW OF ARCHITECTURE

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. **(9)**

ELEMENTS IN LANDSCAPE DESIGN

Ecology, ecological balance - Hard and soft landscape elements; Plant materials - Classification, Characteristics, use and application in landscape design; Water and landform. **(9)**

GARDEN DESIGN

Landscape and garden design in history - Japanese, Italian Renaissance and Moghul gardens in India, Study of notable examples, spatial development in landscape design. **(9)**

SITE PLANNING

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. **(9)**

LANDSCAPING OF FUNCTIONAL AREAS

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. **(9)**

Total : 45

TEXT BOOKS

1. *Michael Laurie, "An Introduction to Landscape Architecture", Elsevier, 1986*
2. *Geoffrey and Susan Jellico, "The Landscape of man", Thames and Hudson, 1987*
3. *Ven Meiss, "Elements of Architecture", Van Nostrand Publications, London 1986*

REFERENCES

1. *Ching, Francis D. K. Architecture--form, Space, & Order. Hoboken, NJ: John Wiley & Sons, 2007. Print.*
2. *TSS for Landscape Architecture, Mc Graw Hill Inc., 1995*
3. *Grant W Reid, Form concept, form in landscape design, Van Nostrand Reinhold Company, 1993*

19MENOE01- CLIMATE CHANGE AND ADAPTATION

L	T	P	C
3	0	0	3

ASSESSMENT : THEORY

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1 *: Understand 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*

EARTH'S CLIMATE SYSTEM

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 - El Nino - LA Nino effect - Solar Radiation - The Earth's Natural Green House Effect - Green House Gases and Global Warming **(9)**

OBSERVED CHANGES AND ITS CAUSES

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. **(9)**

IMPACTS OF CLIMATE CHANGE

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. **(9)**

CLIMATE CHANGE ADAPTATION AND MITIGATION MEASURES

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. **(9)**

CLEAN TECHNOLOGY AND ENERGY

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. **(9)**

Total : 45

TEXT BOOKS

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