

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE – 638 052
(Autonomous)

M.E. DEGREE IN CONSTRUCTION ENGINEERING AND MANAGEMENT
(FULL TIME)

CURRICULUM

(For the candidates admitted from academic year 2014 – 15 onwards)

SEMESTER – I

Course Code	Course Title	Hours/ Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14AMT11	Probability Theory and Statistical Techniques	3	1	0	4	40	60	100
14CMT11	Management Principles and Risk Analysis	3	1	0	4	40	60	100
14CMT12	Functional Planning and Building Management	3	0	0	3	40	60	100
14CMT13	Modern Construction Materials	3	0	0	3	40	60	100
14CMT14	Project Formulation and Appraisal	3	1	0	4	40	60	100
14CMT15	Construction Equipments and Management	3	0	0	3	40	60	100
	PRACTICAL							
14CML11	Computational Laboratory for Construction Management	0	0	3	1	100	0	100
Total					22			

CA - Continuous Assessment, ESE – End Semester Examination

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CURRICULUM

(For the candidates admitted from academic year 2014 – 15 onwards)

SEMESTER – II

Course Code	Course Title	Hours/ Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14CMT21	Advanced Construction Techniques	3	0	0	3	40	60	100
14CMT22	Energy Conservation Techniques in Building Construction	3	1	0	4	40	60	100
14CMT23	Construction Planning, Scheduling and Control	3	1	0	4	40	60	100
14CMT24	Contract Laws and Regulations	3	1	0	4	40	60	100
	Elective – I (Professional)	3	0	0	3	40	60	100
	Elective – II (Professional)	3	0	0	3	40	60	100
	PRACTICAL							
14CML21	Construction Engineering Laboratory	0	0	3	1	100	0	100
Total					22			

CA - Continuous Assessment, ESE – End Semester Examination

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CURRICULUM

(For the candidates admitted from academic year 2014 – 15 onwards)

SEMESTER – III

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14CMT31	Resource Management and Control in Construction	3	0	0	3	40	60	100
	Elective – III (Professional)	3	0	0	3	40	60	100
	Elective – IV (Open)	3	0	0	3	40	60	100
	PRACTICAL							
14CMP31	Project Work – Phase I	0	0	12	6	50	50	100
14CMI31	Industrial Training	0	0	0	1	100	0	100
Total					16			

CA - Continuous Assessment, ESE – End Semester Examination

SEMESTER – IV

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	PRACTICAL							
14CMP41	Project Work – Phase II	0	0	24	12	100	100	200
Total					12			

CA - Continuous Assessment, ESE – End Semester Examination

Total Credits: 72

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M.E. DEGREE IN CONSTRUCTION ENGINEERING AND MANAGEMENT
(PART TIME)

CURRICULUM

(For the candidates admitted from academic year 2014 – 15 onwards)

SEMESTER – I

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14AMT11	Probability Theory and Statistical Techniques	3	1	0	4	40	60	100
14CMT11	Management Principles and Risk Analysis	3	1	0	4	40	60	100
14CMT12	Functional Planning and Building Management	3	0	0	3	40	60	100
	PRACTICAL							
14CML11	Computational Laboratory for Construction Management	0	0	3	1	100	0	100
Total					12			

CA - Continuous Assessment, ESE – End Semester Examination

SEMESTER – II

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14CMT21	Advanced Construction Techniques	3	0	0	3	40	60	100
14CMT22	Energy Conservation Techniques in Building Construction	3	1	0	4	40	60	100
14CMT23	Construction Planning, Scheduling and Control	3	1	0	4	40	60	100
	PRACTICAL							
14CML21	Construction Engineering Laboratory	0	0	3	1	100	0	100
Total					12			

CA - Continuous Assessment, ESE – End Semester Examination

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(PART TIME)

CURRICULUM

(For the candidates admitted from academic year 2014 – 15 onwards)

SEMESTER – III

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14CMT13	Modern Construction Materials	3	0	0	3	40	60	100
14CMT14	Project Formulation and Appraisal	3	1	0	4	40	60	100
14CMT15	Construction Equipments and Management	3	0	0	3	40	60	100
Total					10			

CA - Continuous Assessment, ESE – End Semester Examination

SEMESTER – IV

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14CMT24	Contract Laws and Regulations	3	1	0	4	40	60	100
	Elective – I (Professional)	3	0	0	3	40	60	100
	Elective – II (Professional)	3	0	0	3	40	60	100
Total					10			

CA - Continuous Assessment, ESE – End Semester Examination

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(PART TIME)

CURRICULUM

(For the candidates admitted from academic year 2014 – 15 onwards)

SEMESTER – V

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14CMT31	Resource Management and Control in Construction	3	0	0	3	40	60	100
	Elective – III (Professional)	3	0	0	3	40	60	100
	Elective – IV (Open)	3	0	0	3	40	60	100
	PRACTICAL							
14CMP31	Project Work – Phase I	0	0	12	6	50	50	100
14CMI31	Industrial Training	0	0	0	1	100	0	100
Total					16			

CA - Continuous Assessment, ESE – End Semester Examination

SEMESTER – VI

Course Code	Course Title	Hours/Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	PRACTICAL							
14CMP41	Project Work – Phase II	0	0	24	12	100	100	200
Total					12			

CA - Continuous Assessment, ESE – End Semester Examination

Total Credits: 72

LIST OF ELECTIVES					
Course Code	Course Title	Hours/Week			Credit
		L	T	P	
14CME01	Shoring, Scaffolding and Formwork	3	0	0	3
14CME02	Computer Applications in Construction Engineering and Planning	3	0	0	3
14CME03	System Integration in Construction	3	0	0	3
14CME04	Building Information Management	3	0	0	3
14CME05	Construction Project Management	3	0	0	3
14CME06	Construction Personnel Management *	3	0	0	3
14CME07	Business Economics and Finance Management	3	0	0	3
14CME08	Quality Control and Assurance in Construction	3	0	0	3
14CME09	Project Safety Management*	3	0	0	3
14CME10	Management Information Systems	3	0	0	3
14CME11	Maintenance and Rehabilitation of Structures	3	0	0	3
14CME12	Construction of Bituminous Pavements	3	0	0	3
14CME13	GIS in Construction Engineering and Management	3	0	0	3
14CME14	Construction Engineering Practices	3	0	0	3

*- Open Elective

14AMT11 PROBABILITY THEORY AND STATISTICAL TECHNIQUES

3 1 0 4

UNIT – I

9

Random Variables: Discrete and Continuous random variables – Moments – Moment generating functions – Discrete distributions – Binomial distribution – Poisson distribution – Geometric distribution.

UNIT – II

9

Continuous Distributions: Uniform distribution – Exponential distribution – Normal distribution.
Correlation and Regression: Simple and linear correlation – Multiple and partial correlation - Rank correlation – Simple and Multiple regression.

UNIT- III

9

Parameter Estimation: Point Estimation – Characteristics of estimators – Unbiasedness – Consistency – Efficiency – Sufficiency – Methods of point estimation – Method of moments – Method of Maximum likelihood – Curve fitting – Straight line fit – Parabolic fit - Exponential curve.

UNIT IV

9

Testing of Hypothesis: Definition – Population and Samples – Large Sample tests – Tests for Mean and Proportions – Test of significance for small samples – t- test – F- test– Chi-square test of goodness of fit – Independent of attributes.

UNIT - V

9

Design of Experiments: Basic Definitions – Analysis of variance – One way classification – Completely Randomised Design – Two way classification – Randomised Block Design – Latin Square Design.

Lecture: 45, Tutorial: 15, TOTAL: 60

REFERENCE BOOKS

1. Jay.L. Devore, “Probability and Statistics for Engineering and the Sciences”, Thomson and Duxbury, Singapore, 8th Edition, 2012.
2. Richard Johnson, Miller & Freund’s “Probability and Statistics for Engineers”, Prentice Hall of India, Seventh Edition, 2007.
3. Gupta S.C. and Kapoor V.K. “Fundamentals of Mathematical Statistics” Sultan Chand and Sons, 11th Edition 2002.
4. Dallas E.Johnsons, “Applied Multivariate Methods for Data Analysis”, Thomson and Duxbury press, 1998.
5. J.E.Freund, “Mathematical Statistics”, 5th Edition, Prentice Hall of India, 2001.

Course Outcomes:

On completion of the course the students will be able to

- utilize probabilistic concepts in engineering problems
- use a sample to compute point estimate
- develop various tests of significance for attributes and variables
- adopt design of experiments techniques in construction fields

14CMT11 MANAGEMENT PRINCIPLES AND RISK ANALYSIS

3 1 0 4

UNIT – I

9

Introduction: Operations Research - Introduction to Operations Research - Linear Programming - Graphical and Simplex Methods.

UNIT – II

9

Optimality Analysis: Duality and Post - Optimality Analysis - Transportation and Assignment Problems.

UNIT – III

9

Production and Financial Management: Inventory Control - EOQ - Quantity Discounts - Safety Stock - Replacement Theory -PERT and CPM - Simulation Models - Quality Control.

UNIT – IV

9

Working Capital Management: Compound Interest and Present Value methods -Discounted Cash Flow Techniques - Capital Budgeting.

UNIT – V

9

Decision Theory and Managerial Economics: Decision Theory - Decision Rules - Decision making under conditions of certainty, risk and uncertainty - Decision trees - Utility Theory. Cost Concepts - Break-even analysis - Pricing Techniques - Game theory Applications.

Lecture:45, Tutorial:15, TOTAL: 60

REFERENCE BOOKS:

1. Vohra, N.D. "Quantitative Techniques in Management", Tata McGraw-Hill Company Ltd, New Delhi, 1990.
2. Schroeder, R.G. "Operations Management", McGraw-Hill, New York, 1982.
3. Levin, R.I, Rubin, D.S. and Stinson, J. "Quantitative Approaches to Management", McGraw-Hill Book Co., New York, 1988.

Course Outcomes:

On completion of the course the students will be able to

- formulate and solve linear programming problems and find optimal solution
- calculate effective utilization of resources and also ensure cost effectiveness of projects
- take decisions under various constraints in a project and apply techniques to find the profit

UNIT – I **9**

Planning: Components of urban forms - Planning of urban forms-Concepts- Neighbourhood module Street system - Layout in a neighbourhood- Functional planning of buildings - Optimization of space - Spatial Synthesis graphical techniques, heuristic procedures - Formulation of linear and non-linear optimization problem.

UNIT – II **9**

Fire Resistance: Standard fire, fire resistance - Classification of buildings - Means of escape, alarms, etc. Space requirements and relationships for typical buildings like residential, offices, hospitals, etc.,

UNIT – III **9**

Engineering Services:Engineering services in a building system- Lifts, escalators, cold and hot water systems - waste water systems - electrical systems.

UNIT – IV **9**

Lighting :Design of modern lighting – Lighting for stores and house lighting - Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in buildings.

UNIT – V **9**

Maintenance Management: Building Maintenance - Scheduled and contingency maintenance - planning. M.I.S. for building maintenance. Maintenance standards - Economic maintenance decisions.

TOTAL : 45**REFERENCE BOOKS:**

1. Moore F, "Environmental Control System", McGraw-Hill, New York, 1994.
2. Brown G Z, "Sun, Wind and Light: Architectural Design Strategies", John Wiley and Sons, New York, 1985.
3. Cook J Award, "Winning Passive Solar Design", McGraw-Hill, New York, 1984.

Course Outcomes:

On completion of the course the students will be able to

- utilize the concepts of functional planning of buildings
- design the lighting and other services
- use the methods and tools in various engineering services
- utilize the concepts of maintenance management

14CMT13 MODERN CONSTRUCTION MATERIALS

3 0 0 3

UNIT – I

9

Concrete and Metals: High Strength Concrete and High Performance Concrete – Applications- Properties of steel - New alloy steels - Aluminium and its products – applications.

UNIT – II

9

Alloys: Other Alloys - Market forms - Uses - Light weight metals - Copper and Zinc alloys

UNIT – III

9

Composites: Plastics -Reinforced Polymers - Fibr Reinforced Plastics - Cellular cores - Types of Polymer concrete composites - Properties of composites - Ferro-cement

UNIT – IV

9

Other Materials: Applications. Water proofing compounds - Non-weathering materials - Flooring and facade Materials - Accelerating mixtures - Air entraining admixtures - Mineral admixtures –Super - plasticizers - Applications.

Bitumen: Bitumen chemistry – Traditional properties – Susceptibility parameters – ageing of bitumen.

UNIT – V

9

Smart and Intelligent Materials: Brief outline and uses - Smart materials - Types of smart and intelligent materials - Usage in advanced construction - Smart structures - energy efficient building constructions.

TOTAL : 45

REFERENCE BOOKS:

1. Somayaji, Shan. "Civil Engineering Materials". - 2nd edition, Prentice Hall Inc, 2001
2. Siddique, Rafat. "Special Concretes". Ist edition, Galgotia Publications, New Delhi 2000.
3. Mamlouk, M.S. and Zaniewski, J.P. "Materials for Civil and Construction Engineers". Prentice Hall Inc., 1999.
4. Aitain."High Performance Concrete", ESPON Publications, Canada, 2003

Course Outcomes:

On completion of the course the students will be able to

- select suitable materials for modern construction
- select composite materials used for manufacturing ultra high strength concrete
- utilize smart materials in advanced construction

UNIT – I 9

Project Formulation and Costing: Generation and Screening of Project ideas - Project identification -Preliminary Analysis, Market, Technical, Financial, Economic and Ecological report.

UNIT – II 9

Project Costing and report: Pre-Feasibility Report and its Clearance, Project Estimates and Techno-Economic Feasibility Report, Detailed Project Report - Time Value of Money - Cost of Capital.

UNIT – III 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 - Different Methods - Selection of a Project and Risk Analysis in Practice.

UNIT – IV 9

Project Financing: Project Financing - Means of Finance - Financial Institutions - Special Schemes - Key Financial Indicators.

UNIT – V 9

Private Sector Participation: Private sector participation in Infrastructure Development Projects – PPP Models- BOT, BOLT, BOOT - Technology Transfer and Foreign Collaboration - Case studies- Scope of Technology Transfer.

Lecture:45, Tutorial:15, TOTAL: 60

REFERENCE BOOKS:

1. Prasanna Chandra, "Projects: Planning Analysis Selection Implementation and Review", 4th edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1995.
2. Joy, P.K. "Total Project Management - The Indian Context". New Delhi: Macmillan India Ltd, 1992.
3. United Nations Industrial Development Organization (UNIDO) "Manual for the preparation of Industrial Feasibility Studies". Bombay: IDBI Reproduction, 1987.

Course Outcomes:

On completion of the course the students will be able to

- plan for the different clearances required for a project
- relate the different Financial Institutions funding for construction projects and the risks involved in it
- visualize the need for Technology Transfer

14CMT15 CONSTRUCTION EQUIPMENTS AND MANAGEMENT

3 0 0 3

UNIT – I

9

Construction Equipment Management - Identification - Planning - Equipment Management in Projects - Maintenance Management - Replacement - Unit Operating Cost - Cost Control of Equipment - Depreciation Analysis - Safety Management.

UNIT – II

9

Construction Equipments - Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Loaders, Earth Movers.

UNIT – III

9

Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting - Equipment for Compaction - Erection Equipment - Types of pumps used in Construction - Equipment for Dewatering and Grouting - Foundation and Pile Driving Equipment.

UNIT – IV

9

Equipment for Materials Handling - Forklifts and related equipment - Portable Material Bins - Conveyors - Hauling Equipment- Crushers - Feeders - Screening Equipment.

UNIT – V

9

Concreting equipments - Batching and Mixing Plant layout - Equipment - Hauling, Pouring and Pumping Equipment – Transporters – RMC plant – equipments.

TOTAL : 45

REFERENCE BOOKS:

1. Sharma, S.C. "Construction Equipment and Management", Khanna Publishers, New Delhi, 2006.
2. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C. "Construction Planning, Equipment and Methods", 5th edition, McGraw-Hill, Singapore, 2006.
3. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi, 1988.

Course Outcomes:

On completion of the course the students will be able to

- execute control over the scheduling, management and operating cost of equipments used in construction projects
- select suitable type of equipment required for the job
- select and recommend the equipment needed for material handling and concreting

14CML11 COMPUTATIONAL LABORATORY FOR CONSTRUCTION MANAGEMENT

0 0 3 1

LIST OF EXPERIMENTS:

1. Quantity takeoff, Preparation and delivery of the bid or proposal of an engineering construction project
2. PERT and CPM - Software Development - Use of MS Project & PRIMAVERA
3. Estimation of a single storey building.
4. Scheduling of a small construction project using tools like MS project scheduling systems including reports and tracking. .
5. Scheduling and allocation of resources.
6. Scheduling of a small construction project using Primavera scheduling systems including reports and tracking.
7. Resource leveling, resource list, resource allocation, Resource loading, Cumulative cost
8. Deterministic and Probabilistic Inventory Models - Software applications
9. Decision Making – Baye’s Theory.

TOTAL : 45

Course Outcomes:

On completion of the course the students will be able to

- execute the computer application in optimization and sequencing problems
- solve the resource planning, management, allocation and resource leveling in construction Control aspects in planning, systems, management, assurance and improvement techniques

UNIT – I **9**

Sub Structure Construction: Trenchless techniques – box jacking - pipe jacking - Pipe line Laying- Under water construction of diaphragm walls - Tunneling techniques - Piling techniques - Driving well and caisson foundations – cable anchoring and grouting - sinking cofferdam - shoring for deep cutting - well points.

UNIT – II **9**

Super Structure Construction: Vacuum dewatering of concrete flooring – concrete paving technology – techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – suspended form work – launching techniques for large span heavy decks – Prestressing in high rise structures – erection techniques for tall structures.

UNIT – III **9**

Repair Construction: Micro piling for strengthening floor and shallow profile - aerial transporting-handling, erecting lightweight components on tall structures – mud jacking grout through slab foundation – sub grade – water proofing.

UNIT – IV **9**

Construction of Special Structures: Erection of lattice towers and rigging of transmission line structures – construction sequence in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges - construction sequence and methods in domes and prestress domes – erection of articulated structures.

UNIT – V **9**

Latest Techniques: Advanced construction techniques in offshore construction practice – construction sequence and methods in RCC domes and prestressed domes – sequence in demolition and dismantling.

TOTAL : 45**REFERENCE BOOKS:**

1. Robertwade Brown, “Practical Foundation Engineering Handbook”, McGraw-Hill, New York, 1995.
2. Jerry Irvine, “Advanced Construction Techniques”, CA Rocketr, 1984.
3. Patrick Powers. J., “Construction Dewatering: New Methods and Applications”, John Wiley & Sons, New York, 1992.

Course Outcomes:

On completion of the course the students will be able to

- utilize the concepts for substructure design and construction
- design the elements of superstructure and select the suitable techniques used for it
- proceed the construction sequence of special structures to the latest

UNIT – I 9

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

UNIT – II 9

Environmental and Design Considerations: Energy and resource conservation - Design of green buildings - Evaluation tools for building energy - Embodied and operating energy - Peak demand - Comfort and Indoor air quality - Visual and acoustical quality - Land, water and materials -Airborne emissions and waste management.

UNIT – III 9

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

UNIT – IV 9

Services and Energy Management: Energy in building design - Energy efficient and environment friendly building - Thermal phenomena - thermal comfort - Indoor Air quality - Climate, sun and solar radiation, -Psychometrics - passive heating and cooling systems - Energy analysis - Active HVAC systems - Preliminary Investigation - Goals and policies - Energy audit.

UNIT – V 9

Energy flow diagram: Energy flow diagram - Energy consumption / Unit Production - Identification of wastage- Priority of conservative measures - Maintenance of energy management programme- Energy management of electrical equipment - Improvement of power factor -Management of maximum demand - Energy savings in pumps - Fans - Compressed air systems - Energy savings in Lighting systems - Air conditioning systems - Applications - Facility operation and maintenance.

Lecture:45, Tutorial:15, TOTAL: 60

REFERENCE BOOKS

1. Moore, F. "Environmental Control System". McGraw-Hill Inc, New York, 1994.
2. Brown, GZ, "Sun, Wind and light: Architectural Design Strategies", John Wiley & Sons, New York, 1985.
3. Mayer, William T. "Energy Economics and Build Design", McGraw-Hill Book Company, New York, 1983.

Course Outcome:

On completion of the course the students will be able to

- conduct energy economic analysis with the knowledge of energy conservation techniques and audits
- design a structure with energy efficient concepts and environment friendly
- implement energy management programme in construction

UNIT – I 9

Construction Planning and Scheduling: 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.

UNIT – II 9

Scheduling with Constraints: The Critical Path Method - Scheduling with Resource Constraints and Precedence - Use of Advanced Scheduling Techniques - Calculations for Monte Carlo Schedule Simulation - Crashing and Time/Cost Tradeoffs

UNIT – III 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 - Relating Cost and Schedule Information.

UNIT – IV 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.

UNIT –V 9

Database Model: Relational Model of Databases - Other Conceptual Models of Databases - Centralized Database Management Systems - Databases and Applications Programs - Information Transfer and Flow.

Lecture: 45, Tutorial: 15, TOTAL: 60

REFERENCE BOOKS:

1. Chitkara, K.K. “Construction Project Management: Planning, Scheduling and Control”, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2. Calin M. Popescu, Chotchai Charoenngam, “Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications”, Wiley, New York, 1995.
3. Chris Hendrickson and Tung Au, “Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders”, Prentice Hall, Pittsburgh, 2000. (Cost Control, Monitoring & Accounting)

Course Outcomes:

On completion of the course students will be able to

- plan and schedule the resources available for a project
- control the cash flow and monitor the profit and loss account of an organization
- differentiate the types of project information and models used for it

UNIT – I **9**

Construction Contracts: Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts.

UNIT-II **9**

Tenders: Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamilnadu Transparency in Tenders Act.

UNIT – III **9**

Arbitration: Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Arbitration Act - Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs -Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations.

UNIT –IV **9**

Legal Requirements: Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs

UNIT-V **9**

Labour Regulations: Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen’s Compensation Act – Indian Factory Act – Tamilnadu Factory Act – Child Labor Act - Other Labor Laws.

Lecture: 45, Tutorial: 15, TOTAL: 60

REFERENCE BOOKS

- 1 Gajaria G.T., “Laws Relating to Building and Engineering Contracts in India”, M.M.Tripathi Private Ltd., Bombay, 1982.
- 2 Tamilnadu PWD Code, 1986.
- 3 Jimmie Hinze, “Construction Contracts”, Second Edition, McGraw-Hill, New York, 2001. Mamlouk, M.S. and Zaniewski, J.P.
- 4 Joseph T. Bockrath, “Contracts and the Legal Environment for Engineers and Architects”, Sixth Edition, McGraw-Hill, New York, 2000.

Course Outcomes:

On completion of the course the students will be able to

- draft a contract document with all necessary elements
- bid for a tender and plan a contract as per legal requirement
- implement labour regulations in construction projects

LIST OF EXPERIMENTS:

1. Determination of Specific Gravity of Cement and Mineral Admixtures using Le- Chatlier Flask.
2. Draw Stress Strain curve for Ductile and Brittle material in tension.
3. Draw Stress Strain curve for Ductile and Brittle material in compression.
4. Determination of Water Quality (Chloride, Sulphate, pH and Hardness Tests).
5. Determination of CBR Value.
6. Determination of Setting Time of Concrete using Penetration Test.
7. Determination of Workability of Concrete by Flow Table Test and Vee-Bee Consistometer Tests.
8. Determination of Flow ability Tests of Self Compacting Concrete.
9. Determination of Modulus of Elasticity of Concrete using Deflectometer.
10. Mortar bar expansion test
11. Determination Flexural Strength of Concrete Beam using Two Point Loading Method.
12. Determination of Concrete Quality using Non-Destructive Tests using USPV and Rebound Hammer.

TOTAL : 45**Course Outcomes:**

On completion of the course the students will be able to

- determine the various properties of construction Materials

UNIT – I **9**

Resource Planning: Resource Planning, Procurement, Identification, Personnel, Planning for material, Labour, time schedule and cost control.

UNIT – II **9**

Resource Allocation: Types of resources- Manpower- Equipment, Material, Money - Time-cost trade off - Resource loading, Cumulative cost ETC - Value Management.

UNIT – III **9**

Labor and Materials: Systems approach in resource management, Characteristics of resources, Resources, Utilization, Tools for measurement of resources, Classes and cost of Labor - Labour schedule - Time of purchase - Quantity of material – Sources.

UNIT – IV **9**

Equipments: Transportation, Delivery and Distribution. Equipment - Planning and selecting by optimistic choice with respect to cost - Time, Source and handling.

UNIT – V **9**

Time and Cost Management: Personnel time - Time and quality - Management and planning - Managing time on project, forecasting the future, Critical path measuring the changes and their effects. Cost control: Cash flow and cost control, objectives of cost.

TOTAL : 45

REFERENCE BOOKS:

1. Szilagg, Andrew D. "Hand Book of Engineering Management", 1982.
2. Sears, Glenn A. and Clough, Reichard H. "Construction Project Management", John Wiley & Sons, Inc. New York, 1979.
3. Oxley Rand Poslcit, "Management Techniques applied to the Construction Industry", Granda Publishing Ltd., 1980.

Course Outcomes:

On completion of the course the students will be able to

- allocate the resources needed for a construction project
- optimize the resource and material delivery
- manage and control the time and cost without affecting the project

14CME01 SHORING, SCAFFOLDING AND FORMWORK

3 0 0 3

UNIT – I 9

Planning and Equipment Form Work: Overall and Detailed Planning – Units- Schedule for column formwork - Formwork elements - Planning at Tender stage - Development of basic system - Economical form construction.

UNIT –II 9

Plant for Form Work: Detailing the forms - Crane arrangement - Formwork beams - Formwork ties - Wales - Scaffold frames - Form accessories - Vertical transport table form work - Advantages - Functions of various components - Planning of Slip form operations.

UNIT - III 9

Shores and Forms for Buildings: Type of shores - Size and spacing - Safety practices - Horizontal shores - Basic simplification - Beam formulae - Allowable stresses – Deflection, bending and lateral stability - Shear, Bearing - Examples in wall forms - Slab forms - Beam form - Ties, Anchors and Hangers - Column forms.

UNIT –IV 9

Materials for forms: Lumber - Types - Finish - Sheathing boards - Plywood - Reconstituted wood - Steel -Aluminum - Form lining materials - Hardware and fasteners - Pressures on Formwork -Height of discharge - Temperature - Rates of Placing - Consistency of concrete - Live loads and wind pressure – Vibration- Hydrostatic Adjustment for non standard condition.

UNIT –V 9

Forms Types and Safety Practices for Scaffolds: Form for Shells structures - Tunnel forming components - Curb and Invert forms - Arch and Wall - Slipforms - Principles - Types of scaffolds General safety requirements - Precautions against particular hazards - Scaffolding systems.

TOTAL: 45

REFERENCE BOOKS

1. Peurifoy, Robert L. and Oberlender, Garold D. "Formwork for Concrete Structures", Third Edition, McGraw-Hill, New York, 1996.
2. Hurd, M.K. "Formwork for Concrete". Sixth Edition Special Publication No. 4. American Concrete Institute, Detroit, 1995.
3. Austin, C.K. "Formwork for Concrete", Cleaver - Hume Press Ltd, London, 1996.

Course Outcomes:

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

- schedule the formwork for different structural elements
- design shores and forms for buildings
- apply the different types of forms and safety standards in formwork

**14CME02 COMPUTER APPLICATIONS IN CONSTRUCTION ENGINEERING AND
PLANNING**

3 0 0 3

UNIT – I **9**
Optimization Techniques: Linear, Dynamic and Integer Programming-Branch and Bound Techniques-Application to Production Scheduling -Software Development

UNIT – II **9**
Inventory Problems: Inventory Models -Types of inventory-Lead time- ROL-EOQ-Deterministic and Probabilistic inventory models- Safety Stock- Selective Control techniques on Inventories- Software for Inventory

UNIT – III **9**
Scheduling Applications: CPM- Network computations-Floats- PERT- Time estimates- Cost considerations in PERT and CPM – Crashing - Use of Management Software.

UNIT –IV **9**
Decision theory: Types of decision making environment-EMV-EVPI-Posterior probabilities and Bayesian analysis- Decision Tree analysis –Decision making with utilities.

UNIT –V **9**
Programming Techniques: Steps in program development – Algorithm – Flowchart - Evolution and classification of programming languages.

TOTAL: 45

REFERENCE BOOKS

1. Gillet, Bily E., “Introduction to Operation Research: A Computer Oriented Algorithmic Approach”, Tata McGraw-Hill, New Delhi, 1990.
2. Paulson, B.R., “Computer Applications in Construction”, McGraw-Hill, New York, 1995.
3. Feigenbaum L., “Construction Scheduling with Primavera Project Planner”, Prentice Hall Inc., New Jersey, 1999.

Course Outcomes:

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

- optimize the resources used for construction
- analyze the effective method for inventory and supply chain management
- relate the interrelationship among activities and schedule accordingly

14CME03 SYSTEM INTEGRATION IN CONSTRUCTION

3 0 0 3

UNIT – I 9

Structural and Environmental Systems- Structural System, Systems for enclosing Buildings, Functional aesthetic system, Materials Selection and Specification. Qualities of enclosure necessary to maintain a specified level of interior environmental quality.

UNIT – II 9

Weather resistance - Thermal infiltration - Acoustic Control - Transmission reduction - Air quality - Illumination - Relevant systems integration with structural systems.

UNIT – III 9

Building Services and Safety- Ability of systems to protect fire - Preventive systems - Fire escape system design -Planning for pollution free construction environmental - Hazard free construction execution. Plumbing - Electricity - Vertical circulation and their interaction.

UNIT – IV 9

Maintenance- Component longevity in terms of operation performance and resistance to deleterious forces - Planning systems for least maintenance materials and construction - Access for maintenance.

UNIT – V 9

Feasibility for replacement of damaged components - Equal life elemental design - maintenance free exposed and finished surfaces.

TOTAL: 45

REFERENCE BOOKS

1. Butcher, E.C and Parnell, A.C. "Designing for Fire Safety", John Wiley and Sons, New York, 1993.
2. Mayer, William T. "Energy Economics and Build Design", McGraw-Hill Book Company, New York, 1983.
3. Elder, A.J and Martiz Vinden Barg. "Handbook of Building Enclosure", McGraw-Hill Book Company, New York, 1983.

Course Outcomes:

On completion of the course the students will be able to

- design the facility with proper acoustic, thermal and environmental considerations
- plan the structure with safety and hazard and pollution free functioning
- design the structure with least possible maintenance

14CME04 BUILDING INFORMATION MANAGEMENT

3 0 0 3

UNIT – I 9

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

UNIT – II 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.

UNIT – III 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.

UNIT – IV 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.

UNIT – V 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.

TOTAL : 45

REFERENCE BOOKS:

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.

Course Outcomes:

On completion of the course the students will be able to

- structure about the system enclosure and material selection for buildings
- validate the aspects of environmental quality and its specifications
- focus on the need for safety and maintenance of a construction project

14CME05 CONSTRUCTION PROJECT MANAGEMENT

3 0 0 3

UNIT -I 9
Organizing for Project Management -Project Management - Trends in Modern Management - Strategic Planning and Project Programming - Organization of Project Participants - Traditional Designer - Contractor Sequence.

UNIT-II 9
Professional Construction Operation - Leadership and Motivation -Interpersonal Behaviour in Project Organizations - Perceptions of Owners and Contractors

UNIT-III 9
Design and Construction Process - Design and Construction as an Integrated System - Innovation and Technological Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design .

UNIT-IV 9
Value Engineering - Construction Planning - Industrialized Construction and Pre-fabrication - Computer-Aided Engineering - Labour Productivity - Factors Affecting Job-Site Productivity

UNIT – V 9
Cost Estimation - Costs associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities.

TOTAL: 45

REFERENCE BOOKS

1. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders", Prentice Hall, Pittsburgh, 2000.
2. Chitkara, K.K. "Construction Project Management: Planning, Scheduling and Control", Tata McGraw-Hill Publishing Company, New Delhi, 1998.
3. Choudhury, S. "Project Management", Tata McGraw-Hill Publishing Company, New Delhi, 1988.

Course Outcomes:

On completion of the course the students will be able to

- co-ordinate effectively with all the project participants
- apply value engineering practices and measures to improve job site productivity
- estimate costs associated with construction projects

14CME06 CONSTRUCTION PERSONNEL MANAGEMENT

3 0 0 3

UNIT -1 9

Manpower Planning: Manpower Planning and Organisation - Manpower Planning, Organising, Staffing, directing, and controlling - Personnel Principles - Organisation - Span of Control - Organisation Charts.

UNIT - II 9

Organization: Staffing Plan - Development and Operation of human resources - Managerial Staffing -Recruitment - Selection -Placement, Training and Development

UNIT – III 9

Human Relations and Organizational Behaviour: Introduction to the field of people management - basic individual psychology; motivation - Job design and performance management - Managing groups at work - self-managing work teams - intergroup behaviour and conflict in organisations – Leadership.

UNIT – IV 9

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

UNIT – V 9

Management and Development Methods: Safety and Health - Discipline and discharge - Special Human resource problems, Performance appraisal. - Employee hand book and personnel manual - Job descriptions and organization structure and human relations - Productivity of Human resources.

TOTAL: 45

REFERENCE BOOKS:

1. Carleton Counter and Jill Justice Coutler, "The Complete Standard Handbook of Construction Personnel Management",; Prentice-Hall Inc, New Jersey, 1989.
2. Memoria, C.B. "Personnel Management", Himalaya Publishing Co., Bombay, 1992.
3. Pringle Charles. "Management". Longenecker Emerricle Publishing Company, 1981.

Course Outcomes:

On completion of the course the students will be able to

- execute manpower planning and operation in the organization
- manage work team and exhibit leadership skills
- select suitable motivational plan to improve the productivity of human resources

UNIT – I 9

Economics: Role of Civil Engineering in Industrial Development - Advances in Civil Engineering - Engineering Economics - Support matters of Economy as related to Engineering -Market demand and supply - Choice of Technology - Quality control and Quality Production - Audit in economic law of returns governing production.

UNIT – II 9

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

UNIT – III 9

Financing: Need and type of financial management - Internal generation of funds - External commercial borrowings - Assistance from government budgeting support and international finance corporations - Analysis of financial statements - Balance Sheet -Profit and Loss account - Cash flow and Fund flow analysis - Ratio analysis - Investment and financing decision - Financial Control - Job Control and centralized management.

UNIT – IV 9

Accounting Method: General Overview - Cash basis of a accounting - Accrual basis of accounting - Percentage completion method - Completed contract method - Accounting for tax reporting purposes and financial reporting purpose.

UNIT – V 9

Lending to Contractors: Loans to Contractors - Interim construction financing - Security and risk aspects.

TOTAL : 45**REFERENCE BOOKS:**

1. Hirsch, Warner Z. "Urban Economics", Macmillan, New York, 1993.
2. Prasanna Chandra, "Projects: Selection, Planning, Analysis, Implementation and Review". Tata McGraw-Hill Publishing Company, New Delhi, 1995.
3. Halpin, D.W., "Financial and Cost Concepts for Construction Management", John Wiley & Sons, New York, 1985.

Course Outcomes:

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

- realize the role of economics played in civil engineering sector
- translate the need and types of financial management
- solve the methods of accounting lending to contractors

UNIT – I 9

Construction Organization: Types of organization - Inspection - Quality Management Systems and method - Responsibilities and authorities in quality assurance and quality control - Quality circle.

UNIT – II 9

Quality Planning: Quality policy - Objectives and methods in Construction Industry - Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance - Taguchi's concept of quality - Document - Contract and construction programming - Inspection procedures - Processes and products - Total QA / QC programme and cost implication.

UNIT – III 9

Quality Assurance: Objectives - Regularity agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC - Different aspects of quality.

UNIT – IV 9

Factors of construction quality: Appraisals - Critical, major failure aspects and failure mode analysis, -Stability methods and tools, optimum design - Reliability testing, reliability coefficient and reliability prediction.

UNIT – V 9

Quality Control: Total Quality Control- Quality Control by statistical methods – Sampling by attributes and by variables - Selection of new materials - Influence of drawings, detailing, specification, standardization - Bid preparation - Construction activity, environmental safety, social and environmental factors - Natural causes and speed of construction - Life cycle costing -Value engineering and value analysis.

TOTAL : 45**REFERENCE BOOKS:**

1. O'Brian, James J. "Construction Inspection Handbook - Quality Assurance and Quality Control", Van Nostrand, New York, 1989.
2. Tenah, Kwaku A. and Guevara, Jose M., "Fundamentals of Construction Management and Organization", Reston Publishing Co., Inc., Virginia, 1985.
3. Oglesby, Clarkson H. "Productivity Improvement in Construction", McGraw-Hill, New Delhi, 1989.

Course Outcomes:

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

- plan quality circle of an organization
- do quality planning of projects
- maintain quality in construction with value engineering practices

14CME09 PROJECT SAFETY MANAGEMENT

3 0 0 3

UNIT – I

9

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

UNIT – II

9

Safety Programs: Problem areas in Construction Safety - Elements of an Effective Safety Programme -Job-Site Safety Assessment - Safety Meetings - Safety Incentives - Safety in Construction Contracts - Substance Abuse - Safety Record Keeping.

UNIT – III

9

Designing for Safety: Safety Culture - Safe Workers - Safety and First Line Supervisors - Safety and Middle Managers - Top Management Practices, Company Activities and Safety.

UNIT – IV

9

Contractual Obligation Safety Personnel - Sub contractual Obligation - Project Coordination and Safety Procedures -Workers Compensation - Safety concerns in construction - Organizing for safety.

UNIT – V

9

Safety During Construction: Safety concern construction Role of owners in safety and health management - Proactive position as an owner -Allocation of responsibility for safety - Fostering total safety culture -Promote job site safety - Additional concerns of owners.

TOTAL : 45

REFERENCE BOOKS:

1. Hinze, Jimmy W. "Construction Safety", Prentice Hall Inc. New Jersey, 1997.
2. Coble, Richard J. Hinze, Jimmie and Haupt, Theo C. "Construction Safety and Health Management", Prentice Hall Inc. New Jersey, 2001.
3. Raymond E. Levitt, and Nancy Morse Samelson., "Construction Safety Management", Second Edition, 1993.

Course Outcomes:

On completion of the course the students will be able to

- assess the causes of construction site accidents and able to plan an effective safety programme
- design and execute safety practices among personnel involved in projects
- promote job site safety

14CME10 MANAGEMENT INFORMATION SYSTEMS

3 0 0 3

UNIT – I 9

Introduction: Information Systems - Establishing the Framework - Business Models - Evolution of Information Systems. Modern Information System.

UNIT – II 9

System Development: System Development Life Cycle - Structured Methodologies - Designing Computer Based Methods, Procedures, Control - Designing Structured Programs.

UNIT – III 9

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

UNIT – IV 9

Implementation and Control: Control - Testing Security - Coding Techniques - Defection of Error – Validating – Cost Benefit analysis – Assessing the value and risk of Information System.

UNIT – V 9

System Audit: Cost 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.

TOTAL : 45

REFERENCE BOOKS:

1. Laudon, Kenneth C and Laudon, Jane Price. "Management Information Systems: Organization and Technology", Elam, Joyce J. "Case Series for Management Information Systems, Simon and Schuster", Custom Publishing, 1996Prentice Hall of India, New Delhi, 1996.
2. Elam, Joyce J. "Case Series for Management Information Systems, Simon and Schuster", Custom Publishing, 1996.
3. Sprague, Ralph H and Watson, Huge J. "Decision Support for Managers", Prentice Hall, New Jersey, 1996.

Course Outcomes:

On completion of the course the students will be able to

- establish the framework for information systems
- select the methodologies used for system development
- assess the value and risk of information system with software

14CME11 MAINTENANCE AND REHABILITATION OF STRUCTURES

(Common to Construction Engineering Management & Structural Engineering)

3 0 0 3

UNIT – I

9

Introduction: Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking. Effects due to climate, temperature, chemicals, wear and erosion.

UNIT – II

9

Corrosion: Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection.

UNIT – III

9

Maintenance and Repair strategies: Facets of maintenance, importance of Maintenance, Preventive measures on various aspects of Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration - testing techniques.

UNIT – IV

9

Materials and Techniques for repair: Special concretes and mortar, concrete chemicals, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete. Rust eliminators and polymers coating for rebar during repair foamed concrete, mortar and dry pack, vacuum concrete, Guniting and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning.

UNIT – V

9

Demolition Techniques: Engineered demolition and other case studies.

TOTAL : 45

REFERENCE BOOKS:

1. Campbell-Allen, Denison and Roper, Harold., "Concrete Structures: Materials, Maintenance and Repair", Longman Scientific and Technical UK, 1991.
2. Allen, R.T and Edwards, S.C, "Repair of Concrete Structures", Blakie and Sons, UK, 1987.
3. Shetty, M.S, "Concrete Technology - Theory and Practice", S.Chand and Company, New Delhi, 2008.

Course Outcomes:

On completion of the course the students will be able to

- test the quality of structures in the construction field
- plan repair and maintenance strategies for structures
- select suitable techniques for demolition of structures

UNIT – I **9**

Properties of Bituminous Mixtures: Classification, testing and applications of road making aggregates - Road binders -Rheology of bituminous binders - Special binders - Resistance of bituminous mixtures to permanent deformation - Flexibility and brittleness.

UNIT – II **9**

Test for Bituminous Mixtures: Common mechanical tests - Permeability characteristics - Weathering of bituminous road surfacing - Adhesion of bituminous binders to road aggregates - Effect of aggregate size in bituminous courses - Temperature susceptibility of bituminous courses.

UNIT – III **9**

Construction Practice for Base course: Base courses - Bituminous macadam - Dense bituminous macadam -bituminous concrete - Semi Dense Bituminous Concrete - Construction methods - Marshall method of mix design for dense bituminous courses.

UNIT – IV **9**

Construction Practice for Surface course: Surface courses - Surface dressing, Premix carpet, Mix seal surfacing - Mastic asphalt - Construction methods - Quality Control measures - Sampling and analysis of bituminous binders and mixtures.

UNIT – V **9**

Machineries and Latest Advancements: Road making machineries - Road formation, bituminous constructions, road surface evaluation. Methods to improve bitumen quality - Rheological and chemical additives - Polymer modified bitumen - Super pave concepts - Recycling of bituminous courses.

TOTAL : 45**REFERENCE BOOKS:**

1. The Asphalt Institute, "Mix Design Methods for Asphalt Concrete and other Hot Mix Types MS 2", Sixth Edition, 1997.
2. Robert N. Hunter, "Bituminous Mixtures in Road Construction", Thomas Telford Services Ltd, London, 2007.
3. Kamyar C. Mahboub and K. Wayne Lee, "Asphalt mix design and construction: past, present and future", American Society of Civil Engineers, 2006.

Course Outcomes:

On completion of the course the students will be able to

- test the properties of the road construction materials
- design the bituminous mixtures for pavement construction
- plan and formulate the bituminous pavement construction practice to be followed in the field

14CME13 GIS IN CONSTRUCTION ENGINEERING AND MANAGEMENT

3 0 0 3

UNIT – I 9

GIS Techniques and Data Input: Map – Types of Maps – Development of GIS – Components of GIS – Hardware, software, organization – Types of data – Spatial and non-spatial data – Print, Line and Polygon – Vector and Raster data – Database structures – Files – Vector and Raster data structures.

UNIT – II 9

Data Analysis: Data Retrieval – Query – Simple Analysis – Spatial Analysis – Overlay – Vector Data Analysis – Raster Data Analysis – Modeling using GIS – Digital Elevation Model – Cost and path analysis – Expert Systems – Artificial Intelligence – Integration with GIS.

UNIT – III 9

Data Output & Error Analysis: Data Output – Types – Devices used – Raster and Vector Display Devices – Printers – Plotters – Photo write Devices – Sources of Errors – Types of Errors – Elimination – Accuracies.

UNIT – IV 9

GIS Applications in Resource Management: Fields of Applications – Natural Resources – Agriculture – Soil – Water Resources – Social Resources - Cadastral Records – LIS - Maps, Graphs, Charts, Plots , Reports - Printers - Plotters - Fields of application - Natural Resource Management-Utility Network Management.

UNIT – V 9

Integration with Remote Sensing: Knowledge based techniques – Multicriteria Techniques – Introduction to Object Oriented Data base Models. Output - Case study.

TOTAL : 45

REFERENCE BOOKS:

1. Burrough, P.A., “Principles of GIS for Land Resources Assessment”, Oxford Publication, 1998.
2. Robert Laurini and Derek Thompson, “Fundamentals of Spatial Information Systems”, Academic Press, 1996.
3. Reddy, “Remote Sensing and Geographical Information Systems”, BS Publications 2001.

Course Outcomes:

On completion of the course the students will be able to

- select suitable concepts of DBMS in GIS
- analyze raster and vector data and modeling with GIS
- utilize GIS in land use, disaster management and resource information system
- achieve competency in the use of the RS and GIS software packages
- design and execute a workflow of GIS techniques appropriate to the required field

UNIT – I **9**

Concreting Methods: Concrete Construction methods - form work design and scaffolding - slip form and other moving forms - pumping of concrete and grouting - mass concreting (roller compacted concrete). Accelerated curing - Hot and cold weather concreting - Under water concreting - Prestressing. Ready mix- concrete - various methods of placing and handling of concrete.

UNIT – II **9**

Special Construction Methods: Steel and composites construction methods - Fabrication - erection of structures including heavy structures. Prefabricated construction - Industrialized construction - Modular co- ordination. Special construction methods - Construction in marine environment.

UNIT – III **9**

Advanced Topics: High rise construction - Bridge construction including segmental construction - Incremental construction and push launching techniques - River valley projects.

UNIT-IV **9**

Construction Equipment: Line diagram - sizes, output- uses - factors affecting selection of each equipment, economic life of equipment - maintenance and repair cost. Plants for grading, batching, mixing-types of mixers, concrete pumps, bitumen plants.

UNIT-V **9**

Estimates: Method of building estimates - types - site plan- index plan - layout plan – plinth Area - floor area. Technical sanction - administrative approval - estimate of buildings – roads-Earthwork - R.C.C works - sloped roof - roof truss - masonry platform - complete set of Estimate.

TOTAL: 45**REFERENCE BOOKS:**

1. Robertwade Brown, “Practical Foundation Engineering Handbook”, McGraw Hill Publications, New York, 1995.
2. Patrick Powers .J, “Construction Dewatering: New Methods and Applications”, John Wiley & Sons, New York, 1992
3. Jerry Irvine, “Advanced Construction Techniques” CA Rockers, 1984.

Course Outcomes:

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

- visualize the different types of concreting and methods of concreting.
- plan the erection of special constructions.
- utilize the current techniques used for high rise buildings