**KONGU ENGINERING COLLEGE, PERUNDURAI, ERODE- 638 052**
**(Autonomous Institution affiliated to Anna University of Technology, Coimbatore)**

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

**CURRICULUM**

(For the candidates admitted from academic year 2011-12 onwards)

**SEMESTER – I**

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CA | ESE | Total |
| | **THEORY** | | | | | | | |
| 11CM101 | Applied Probability and Statistics | 3 | 1 | 0 | 4 | 50 | 50 | 100 |
| 11CM102 | Management Principles and Risk Analysis | 3 | 1 | 0 | 4 | 50 | 50 | 100 |
| 11CM103 | Advanced Concrete Technology | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| 11CM104 | Modern Construction Materials | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| 11CM105 | Project Formulation and Appraisal | 3 | 1 | 0 | 4 | 50 | 50 | 100 |
| 11CM106 | Construction Equipments and Management | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| | **PRACTICAL** | | | | | | | |
| 11CM107 | Construction Engineering Laboratory | 0 | 0 | 3 | 1 | 100 | 0 | 100 |
| | | | | **Total** | **22** | | | |

CA – Continuous Assessment, ESE – End Semester Examination

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**(FULL TIME)**

**CURRICULUM**

(For the candidates admitted from academic year 2011-12 onwards)

**SEMESTER – II**

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CA | ESE | Total |
| | **THEORY** | | | | | | | |
| 11CM201 | Advanced Construction Techniques | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| 11CM202 | Maintenance and Rehabilitation of Structures | 3 | 1 | 0 | 4 | 50 | 50 | 100 |
| 11CM203 | Construction Planning, Scheduling and Control | 3 | 1 | 0 | 4 | 50 | 50 | 100 |
| 11CM204 | Contract Laws and Regulations | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| | Elective – I | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| | Elective – II | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| | **PRACTICAL** | | | | | | | |
| 11CM205 | Computational Laboratory for Construction Management | 0 | 0 | 3 | 1 | 100 | 0 | 100 |
| | | | | **Total** | **21** | | | |

CA – Continuous Assessment, ESE – End Semester Examination

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

**CURRICULUM**

(For the candidates admitted from academic year 2011-12 onwards)

**SEMESTER – III**

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CA | ESE | Total |
| | **THEORY** | | | | | | | |
| | Elective – III | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| | Elective – IV | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| | Elective – V | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| | **PRACTICAL** | | | | | | | |
| 11CM301 | Project Work – Phase I | 0 | 0 | 12 | 6 | 50 | 50 | 100 |
| 11CM302 | Practical Training (4 weeks in previous summer) | 0 | 0 | 0 | 2 | 50 | 50 | 100 |
| | | | | **Total** | **17** | | | |

CA – Continuous Assessment, ESE – End Semester Examination

**SEMESTER – IV**

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CA | ESE | Total |
| 11CM401 | Project Work – Phase II | 0 | 0 | 24 | 12 | 100 | 100 | 200 |
| | | | | **Total** | **12** | | | |

CA – Continuous Assessment, ESE – End Semester Examination

**Over all credit 72**

| LIST OF ELECTIVES | | | | | |
|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **L** | **T** | **P** | **C** |
| 11CM011 | Shoring, Scaffolding and Formwork | 3 | 0 | 0 | 3 |
| 11CM012 | Computer Applications in Construction Engineering and Planning | 3 | 0 | 0 | 3 |
| 11CM013 | System Integration in Construction | 3 | 0 | 0 | 3 |
| 11CM014 | Energy Conservation Techniques in Building Construction | 3 | 0 | 0 | 3 |
| 11CM015 | Construction Project Management | 3 | 0 | 0 | 3 |
| 11CM016 | Construction Personnel Management | 3 | 0 | 0 | 3 |
| 11CM017 | Business Economics and Finance Management | 3 | 0 | 0 | 3 |
| 11CM018 | Quality Control and Assurance in Construction | 3 | 0 | 0 | 3 |
| 11CM019 | Project Safety Management | 3 | 0 | 0 | 3 |
| 11CM020 | Management Information Systems | 3 | 0 | 0 | 3 |
| 11CM021 | Resource Management and Control in Construction | 3 | 0 | 0 | 3 |
| 11CM022 | Construction of Bituminous Pavements | 3 | 0 | 0 | 3 |
| 11CM023 | GIS in Construction Engineering and Management | 3 | 0 | 0 | 3 |
| 11CM024 | Functional Planning, Building Services and Maintenance Management | 3 | 0 | 0 | 3 |
| 11CM025 | Construction Engineering Practices | 3 | 0 | 0 | 3 |
| 11CM026 | Modern Structural Materials and System Design | 3 | 0 | 0 | 3 |
| 11CM027 | Building Information Management | 3 | 0 | 0 | 3 |

## 11CM101 APPLIED PROBABILITY AND STATISTICS

**3 1 0 4**

**Objective:**

On completion of the course the students are expected

- To understand the basic concepts and properties of random variables.
- To understand types of distributions.
- To understand partial and multiple correlation, regression.
- To know about the sample tests.
- To know the test of hypothesis for more than two samples.

**MODULE - I** **15**

**Random variable**: Probability function – Probability density function – Cumulative distribution function – Properties – Moments - Moment Generating function.

**Discrete distributions:** Binomial distribution – Poisson distribution – Geometric distribution.

**MODULE - II** **15**

**Continuous distributions**: Uniform distribution – Exponential distribution – Normal Distribution.

**Principles of least squares**: Fitting of straight line y = ax+b – Fitting of second degree parabola

**Correlation**: Multiple correlation – partial correlation – Regression: Multiple regression.

**MODULE - III** **15**

**Testing of Hypothesis:** Definition – Population and Samples – Test of significance for small samples – t- test – F- test– Chi-square test of goodness of fit – Independent of attributes.

**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. Gupta, S.C. and Kapur, V.K. "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, 2010.
2. Kandasamy. P, Thilagavathi. K & Gunavathy. K, "Probability, Statistics and Queueing Theory", S.Chand & Company Ltd., Reprint 2010.
3. Veerarajan.T, "Probability, Statistics and Random Process", Tata McGraw Hill Publication Company Ltd., 2010.
4. Fruend, J.E. and Miller, I, "Probability and Statistics for Engineers", Prentice Hall of India Ltd. 1994

## 11CM102 MANAGEMENT PRINCIPLES AND RISK ANALYSIS

**3 1 0 4**

**Objective:**

- To review the basics of operations research
- To study the production and financial management principles
- To understand the decision making principles
- To apply the knowledge about managerial economics

**MODULE - I** **15**

**Operations Research:** Introduction to Operations Research - Linear Programming - Graphical and Simplex Methods, Duality and Post - Optimality Analysis - Transportation and Assignment Problems.

**MODULE - II** **15**

**Production and Financial Management:** Inventory Control - EOQ - Quantity Discounts - Safety Stock - Replacement Theory -PERT and CPM - Simulation Models - Quality Control.
Working Capital Management - Compound Interest and Present Value methods -Discounted Cash Flow Techniques - Capital Budgeting.

**MODULE - III** **15**

**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. Sehroeder, 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.

## 11CM103 ADVANCED CONCRETE TECHNOLOGY

**3 0 0 3**

**Objective:**

- To review the basics of concrete ingredient
- To study the properties of fresh and hardened concrete properties
- To understand the durability of concrete

**MODULE - I** **15**

**Concrete Ingredients:** Composition of OPC - Manufacture - Modified Portland Cements - Hydration Process of Portland Cements - Structure of Hydrated Cement Pastes - Mineral Admixtures - Slags - Pozzolans and Fillers - Chemical Admixtures - Solutes - Retarders - Air Entraining Agents - Water Proofing Compounds - Plasticizers and Super Plasticizers - Shape and Mechanical Properties - Absorption and Physical Durability - Chemical Stability -Packing Characteristics

**MODULE - II** **15**

**Fresh and Hardened Concrete:** Workability - Mix Proportioning – Mixes incorporating Fly - Ash, Silica fume, GGBS -Mixes for High Performance Concrete - Mix Design methods - variations in concrete strength - Interfacial Transition Zone - Fracture Strength - Mechanical Properties - High Strength Concrete - Shrinkage - Creep - Other Properties- NDT systems

**MODULE - III** **15**

**Durability of Concrete:** Basic Consideration - Stability of Constituents - Chemical Attack - Corrosion of Reinforcing Steel

**Special Concretes:** Fibre Reinforced Concrete - Self Compacting Concrete - Polymer Concrete – Geopolymer Concrete - Super Plasticized Concrete – Light Weight Concrete – Roller Compacted Concrete – Reactive Powder Concrete – RMC – Basalt Fibre Concrete – Whishper Concrete – High Density Concrete – HVFA Concrete- Vacuum Concrete- Foam Concrete- Bacterial Concrete

**TOTAL : 45**

**REFERENCE BOOKS**


1. Nevile, A.M. "Properties of Concrete", 4th edition, Longman, 1995.
2. Metha, P.K. and Montreio, P.J.M., "Concrete Structure Properties and Materials", 2nd edition Prentice Hall, 1998.
3. Mindass and Young, "Concrete", Prentice Hall, 1998.

## 11CM104 MODERN CONSTRUCTION MATERIALS

**3 0 0 3**

**Objective:**

- To study about the modern materials used for construction
- To study about the composite materials used for construction
- To bring an awareness on smart materials

**MODULE – I** **15**

**Concrete and Metals:** High Strength Concrete and High Performance Concrete - Applications Properties of Steel - New Alloy Steels - Aluminium and its Products - Applications -Other Alloys - Market forms - Uses - Light Weight Metals - Copper and Zinc Alloys.

**MODULE – II** **15**

**Composites and Other Materials:** Plastics -Reinforced Polymers - Fibre Reinforced Plastics - Cellular Cores - Types of Polymer Concrete Composites - Properties of Composites - Ferro-cement – Applications**.** Water Proofing Compounds - Non-weathering Materials - Flooring and Facade Materials - Accelerating Mixtures - Air Entraining Admixtures - Mineral Admixtures –Super - plasticizers - Applications.

**MODULE - III** **15**

**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.

## 11CM105 PROJECT FORMULATION AND APPRAISAL

**3 1 0 4**

**Objective:**

- To study elements of project formulation and appraisal
- To study the costing and financial aspects of projects
- To study the implications of private sector participation in construction projects

**MODULE - I** **15**

**Project Formulation and Costing:** 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.

Project Cash Flows - Time Value of Money - Cost of Capital

**MODULE - II** **15**

**Project Appraisal and Financing:** 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.

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

**MODULE - III** **15**

**Private Sector Participation:** Private sector participation in Infrastructure Development Projects – PPP Models- BOT, BOLT, BOOT - Technology Transfer and Foreign Collaboration - 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 Organisation (UNIDO) "Manual for the preparation of Industrial Feasibility Studies". Bombay: IDBI Reproduction, 1987.

## 11CM106 CONSTRUCTION EQUIPMENTS AND MANAGEMENT

**3 0 0 3**

**Objective:**

- To introduce various construction equipment like equipment for earthwork, material handling and other miscellaneous equipment.
- To study the working of the equipment mentioned above and apply scientific principles for effectively utilizing them.

**MODULE - I** **15**

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

**MODULE - II** **15**

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

**MODULE - III** **15**

**Equipment for Materials Handling and Concreting:** Forklifts and related equipment - Portable Material Bins - Conveyors - Hauling Equipment- Crushers - Feeders - Screening Equipment - Handling Equipment - Batching and Mixing Equipment - Hauling, Pouring and Pumping Equipment – Transporters.

**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.

## 11CM107 CONSTRUCTION ENGINEERING LABORATORY

**0 0 3 1**

**Objective:**

- To study the properties of construction materials
- To study the usage and applications of non-destructive testing of concrete.

**LIST OF EXPERIMENTS**

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

## 11CM201 ADVANCED CONSTRUCTION TECHNIQUES

**3 0 0 3**

**Objective:**

- To study the substructure construction techniques like box jacking, sheet piling etc
- To create awareness on superstructure construction elements like slipform techniques, launching techniques erection procedures etc associated with tall, large span and off shore structures
- To study the elements of repair construction using mud jacking etc and demolition

**MODULE - I** **15**

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

**MODULE - II** **15**

**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 – aerial transporting handling erecting lightweight components on tall structures

**MODULE - III** **15**

**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 – launching and pushing of box decks – construction sequence and methods in domes and prestress domes – erection of articulated structures - pipeline laying.

**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

## 11CM202 MAINTENANCE AND REHABILITATION OF STRUCTURES

**3 1 0 4**

**Objective:**

- To bring about an exposure to serviceability and durability criteria
- To study the development of maintenance and repair strategy
- To study the development of repair materials

**MODULE - I** **15**

**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, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.

**MODULE - II** **15**

**Maintenance and Repair Strategies:** Definitions: Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration - testing techniques.

**MODULE - III** **15**

**Materials and Techniques for Repair:** Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebar during repair foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning.

**Lecture: 45, Tutorial: 15, TOTAL: 60**

**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, 2006

## 11CM203 CONSTRUCTION PLANNING, SCHEDULING AND CONTROL

**3 1 0 4**

**Objective:**

- To study the elements of construction planning and scheduling and to apply appropriate tools and techniques like networks and coding systems
- To study the monitoring of projects through cost control
- To study the elements of quality control and safety of construction projects
- To study the concept of gathering and using project information

**MODULE - I** **15**

**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 - Coding Systems.

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

**MODULE - II** **15**

**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.

**MODULE - III** **15**

**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.

**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)

## 11CM204 CONTRACT LAWS AND REGULATIONS

**3 0 0 3**

**Objective:**

- To study the elements of concluding, and administering contracts
- To achieve awareness on arbitrations and legal procedures
- To study labour regulations and their impact on managing of contracts

**MODULE - I** **15**

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

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.

**MODULE - II** **15**

**Arbitration and Contract Laws:** 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 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

**MODULE - III** **15**

**Legal Requirements and Labour Regulations:** Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory 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 Labour Act - Other Labour Laws

**TOTAL: 45**

**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.
4. Joseph T. Bockrath, "Contracts and the Legal Environment for Engineers and Architects", Sixth Edition, McGraw-Hill, New York, 2000.

**11CM205 COMPUTATIONAL LABORATORY FOR CONSTRUCTION MANAGEMENT**

**0 0 3 1**

**Objective:**

- To bring about an understanding of use of computers for solving inventory, scheduling and other relates problems by applying optimization and simulation techniques.

**LIST OF EXPERIMENTS**

1. Introduction to System Hardware - Languages - Data Base Management - Spread Sheets -Applications.
2. Linear programming.
3. Estimation and quantity survey.
4. Network preparation and computations.
5. Scheduling and allocation of resources.
6. Statistical quality control problems.
7. Branch and Bound Techniques.
8. PERT and CPM - Software Development - Use of MS Project & PRIMAVERA.
9. Decision Making - Bayes Theory.
10. Software Application to Equipment Replacement problems.
11. Decision Tree Analysis.
12. Utility Curves.

## 11CM011 SHORING, SCAFFOLDING AND FORMWORK

**3 0 0 3**

**Objective:**

- To study the materials associated with formwork
- To study the design aspects of formwork under various requirements
- To study the planning and erection aspects of form work
- To study about a few special types of forms

**MODULE - I** **15**

**Planning, Equipment and Plant for Form Work:** Overall and Detailed Planning – Units-Schedule for column formwork - Formwork elements - Planning at Tender stage - Development of basic system - Economical form construction -Detailing the forms - Crane arrangement - Formwork beams - Formwork ties - Wales - Scaffold frames - Form accessories - Vertical transport table form work

**MODULE - II** **15**

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

**MODULE - III** **15**

**Forms Types and Safety Practices for Scaffolds:** Form for Shells structures - Tunnel forming components - Curb and Invert forms - Arch and Wall - Slipforms - Principles - Types - Advantage - Functions of various components - Planning of Slipform operations - 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.

## 11CM012 COMPUTER APPLICATIONS IN CONSTRUCTION ENGINEERING AND PLANNING

**3 0 0 3**

**Objective:**

- To review the basics of computer hardware
- To study the optimization techniques and simulation of models
- To apply the concepts to inventory, scheduling and other related problems

**MODULE - I** **15**

**Optimization Techniques:** Linear, Dynamic and Integer Programming-Branch and Bound Techniques-Application to Production Scheduling, Equipment Replacement, Material Transportation and Work Assignment Problems-Software Development

**MODULE - II** **15**

**Inventory Problems:** Inventory Models -Types of inventory-Lead time- ROL-EOQ-Deterministic and Probabilistic inventory models- Inventory models with price breaks- Selective Control techniques on Inventories-Software development

**MODULE - III** **15**

**Scheduling Applications:** CPM- Network computations-Floats- PERT- Time estimates- Cost considerations in PERT and CPM – Crashing -Software Development - Use of Management Software Decision theory- Types of decision making environment-EMV-EVPI-Posterior probabilities and Bayesian analysis- Decision Tree analysis –Decision making with utilities-Simulation Models

**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 Primevera Project Planner", Prentice Hall Inc., New Jersey, 1999.

## 11CM013 SYSTEM INTEGRATION IN CONSTRUCTION

**3 0 0 3**

**Objective:**

- To study the various systems involved in construction
- To study the various maintenance aspects in construction
- To understand the safety aspects in construction

**MODULE - I** **15**

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

**MODULE - II** **15**

**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.

**MODULE - III** **15**

**Maintenance:** 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 - 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.

## 11CM014 ENERGY CONSERVATION TECHNIQUES IN BUILDING CONSTRUCTION

**3 0 0 3**

**Objective:**

- To study the sources of energy and energy production in relation to heating, ventilating and air conditioning
- To study the elements related to quality of energy utilization
- To study the concepts underlying energy management by adopting appropriate design methodology in providing energy related services

**MODULE - I** **15**

**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.

**MODULE - II** **15**

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

**MODULE - III** **15**

**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 - 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.

**TOTAL: 45**

**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.

## 11CM015 CONSTRUCTION PROJECT MANAGEMENT

**3 0 0 3**

**Objective:**

- To study how the owner view a project in consideration with project life cycle, construction agencies legal requirements etc
- To study the various types of organization and their impact on and suitability to construction projects
- To study the design and construction procedures along with labour material and equipment utilization
- To study the elements of cost of a project

**MODULE - I** **15**

**Organizing for Project Management:** Project Management - Trends in Modern Management - Strategic Planning and Project Programming - Organization of Project Participants - Traditional Designer - Constructor Sequence - Professional Construction Operation - Leadership and Motivation -Interpersonal Behavior in Project Organizations - Perceptions of Owners and Contractors

**MODULE - II** **15**

**Design and Construction Process:** Design and Construction as an Integrated System - Innovation and Technological Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design - Value Engineering - Construction Planning - Industrialized Construction and Pre-fabrication - Computer-Aided Engineering - Labor Productivity - Factors Affecting Job-Site Productivity

**MODULE - III** **15**

**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 - Allocation of Construction Costs Over Time - Computer Aided Cost Estimation - Estimation of Operating Costs.

**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.

## 11CM016 CONSTRUCTION PERSONNEL MANAGEMENT

**3 0 0 3**

**Objective:**

- To bring about awareness on fundamentals of human behaviour under varying stress conditions
- To apply the studied behaviour pattern to manpower planning in organizational setups
- To study the means of management of construction personnel and utility of training as a tool for improvement

**MODULE - I** **15**

**Manpower Planning and Organisation:** Manpower Planning, Organising, Staffing, directing, and controlling - Personnel Principles - Organisation - Span of Control - Organisation Charts - Staffing Plan - Development and Operation of human resources - Managerial Staffing - Recruitment - Selection -Placement, Training and Development

**MODULE - II** **15**

**Human 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 - Behavioural aspects of decision-making; and communication for people management.

**MODULE - III** **15**

**Management and Development Methods:** 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 - 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.

## 11CM017 BUSINESS ECONOMICS AND FINANCE MANAGEMENT

**3 0 0 3**

**Objective:**

- To bring about awareness on fundamentals of construction economics
- To study the financing and accounting methods

**MODULE - I** **15**

**Construction 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-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.

**MODULE - II** **15**

**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.

**MODULE - III** **15**

**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 purposes - 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.

## 11CM018 QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION

**3 0 0 3**

**Objective:**

- To understand the elements of quality planning and the implication
- To become aware of objectives and advantage of quality assurance
- To be exposed to means of quality control
- To study the relationship between quality control and assurance

**MODULE - I** **15**

**Construction Organisation and Quality Planning:** Types of organizations - Inspection, control and enforcement - Quality Management Systems and method - Responsibilities and authorities in quality assurance and quality control - Architects, engineers, contractors, and special consultants, Quality circle-

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

**MODULE - II** **15**

**Quality Assurance:** Objectives - Regularity agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC - Different aspects of quality - Appraisals, Factors influencing construction quality - Critical, major failure aspects and failure mode analysis, -Stability methods and tools, optimum design - Reliability testing, reliability coefficient and reliability prediction.

**MODULE - III** **15**

**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.

## 11CM019 PROJECT SAFETY MANAGEMENT

**3 0 0 3**

**Objective:**

- To understand the construction accidents and safety programme
- To understand the contractual obligations regarding safety
- To study the safety programme

**MODULE - I** **15**

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

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.

**MODULE - II** **15**

**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.

**MODULE - III** **15**

**Safety During Construction:** Safety concerns in construction – Organizing for safety -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.

## 11CM020 MANAGEMENT INFORMATION SYSTEMS

**3 0 0 3**

**Objective:**

- To bring about an exposure to information systems in a formal manner
- To study the development of information systems
- To study the means of applying information systems models to project management
- To introduce system audit and to study its features

**MODULE - I** **15**

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

**MODULE - II** **15**

**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.

**MODULE - III** **15**

**Implementation and Control:** Control - Testing Security - Coding Techniques - Defection of Error - Validating - 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: Organisation and Technology", Prentice 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.

## 11CM021 RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION

**3 0 0 3**

**Objective:**

- To study and evaluate the resources - material, equipment, labour and time
- To plan and manage the resources studied above using various tools and techniques like allocation, leveling critical path measurement etc

**MODULE - I** **15**

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

Time-cost trade off, Computer application in resource leveling examples, resource list, resource allocation graph, Resource loading, Cumulative cost ETC - Value Management.

**MODULE - II** **15**

**Labour, Materials and Equipment:** Systems approach in resource management, Characteristics of resources, Resources, Utilization, measurement of actual resources required, Tools for measurement of resources, Labour, Classes of Labour, Cost of Labour, Labour schedule, optimum use Labour

Material: Time of purchase, quantity of material, sources, Transportation, Delivery and Distribution

Equipment: Planning and selecting by optimistic choice with respect to cost, Time, Source and handling.

**MODULE - III** **15**

**Time and Cost Management:** Personnel time, Management and planning, Managing time on the project, forecasting the future, Critical path measuring the changes and their effects.

Cost control: Cash flow and cost control, objectives of cost, Time and quality.

**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.

## 11CM022 CONSTRUCTION OF BITUMINOUS PAVEMENTS

**3 0 0 3**

**Objective:**

- To bring about an exposure to road making materials
- To study the properties of bituminous materials
- To study the latest development in road construction practices

**MODULE - I** **15**

**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 - 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.

**MODULE - II** **15**

**Construction Practice:** Base courses - Bituminous macadam - Dense bituminous macadam - bituminous concrete - Semi Dense Bituminous Concrete - Construction methods - Marshall method of mix design for dense bituminous courses - Surface courses - Surface dressing, Premix carpet, Mix seal surfacing - Mastic asphalt - Construction methods - Quality Control measures - Sampling and analysis of bituminous binders and mixtures.

**MODULE - III** **15**

**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. Barth, Edwin J. "Asphalt Science and Technology", Gordon and Breach Science Publishers, New York, 1984.
3. Bituminous, “Materials in Road Construction”, The English Language Book Society and Her Majesty's Stationery Office, 1966.

## 11CM023 GIS IN CONSTRUCTION ENGINEERING AND MANAGEMENT

**3 0 0 3**

**Objective:**

- To introduce the elements of GIS as applied to construction management and achieve awareness on application techniques.
- To study the various types of data, data analysis methods and data quality requirements

**MODULE - I** **15**

**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.

**MODULE - II** **15**

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

**MODULE - III** **15**

**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 - 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

## 11CM024 FUNCTIONAL PLANNING, BUILDING SERVICES AND MAINTENANACE MANAGEMENT

**3 0 0 3**

**Objective:**

- To introduce basic concepts of building planning.
- To achieve familiarization with spatial synthesis graphical techniques and heuristic procedures.

**MODULE - I** **15**

**Planning:** Components of urban forms – Planning of urban forms- Concepts- Neighborhood 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.

**MODULE - II** **15**

**Fire Resistance and Engineering Services:** Standard fire, fire resistance - Classification of buildings - Means of escape, alarms, etc. Space requirements and relationships for typical buildings, like residential offices, hospitals, etc., Engineering services in a building system- Lifts, escalators, cold and hot water systems - waste water systems - electrical systems.

**MODULE - III** **15**

**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.

## 11CM025 CONSTRUCTION ENGINEERING PRACTICES

**3 0 0 3**

**Objective:**

- To bring about a complete understanding of construction techniques in sub structure and super structure.
- To study the substructure construction techniques like box jacking, sheet piling etc

**MODULE - I** **15**

**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 mixed concrete - various methods of placing and handling of concrete.

**MODULE - II** **15**

**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.

**MODULE - III** **15**

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

**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.

## 11CM026 MODERN STRUCTURAL MATERIALS AND SYSTEM DESIGN

**3 0 0 3**

**Objective:**

To bring about an exposure to modern structural materials, the loads, systems, design concepts and repair and retrofitting the systems.

- To study about the modern materials used for construction
- To study the different loads and its importance for design - IS codes
- To study the elements of loading, structural systems used for construction

**MODULE - I** **15**

**Structural Materials:** Materials for structural system - Masonry - materials - masonry units aspects - requirements - Concrete infill - reinforcing steel - Construction systems. Concrete, Steel - behaviour - tension - compression - Reinforced concrete - characteristics - applications. Fibre reinforced concrete - introduction - properties - factors - requirements - orientation - volume fraction - aspect ratio - applications - experience in use. Composite materials - failure modes - concept -behaviour - applications -advantages.

**MODULE - II** **15**

**Loads on Structure:** Type of loads - Static and dynamic loads - Terminologies. Dead load - MODULE weight - materials -building components - store materials. Imposed load - loads on floors - reduction factor - beam - roof - example. Wind load - speed and pressure - forces on structures - Dynamic effects - force on circular sections. Special loads - accidental loads. Earthquake and blast loads - General principle -Recommendations for planning blast resistance - IS codes.

**MODULE - III** **15**

**System Design:** Structural systems - function - understanding - classifications. Floor systems - types - properties -Gravity load transfer systems - Lateral load transfer system - cost of system - Rigid and braced frames - behaviour - limitations- analysis methods. Introduction - process of design - basic requirements - phases of construction- Design parameters - steps in conceptual design - Stages of design - Elements of structural systems - Economy in design - Structural safety during construction.

**TOTAL: 45**

**REFERENCE BOOKS**


1. Cowan H J, "Architecture Systems: An Introduction to Structural Mechanics", American Elsevier, New York 1971.
2. Salvadori and Levy, "Structural Design in Architecture", Prentice Hall Inc. New Jersey, 1983.
3. Weidmann George, Lewis Peter, and Reid Nick. "Structural Materials", Butterworth-Heinemann, 1994.

## 11CM027 BUILDING INFORMATION MANAGEMENT

**3 0 0 3**

**Objective:**

- To bring about an exposure to modern structural systems, Environmental aspects and services of buildings
- To study the about the maintenance and safety aspects of the systems

**MODULE - I** **15**

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

**MODULE - II** **15**

**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 – Relevant systems integration with structural systems, Plumbing – Electricity – Vertical circulation and their interaction.

**MODULE - III** **15**

**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 – equal life elemental design – 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.