



**M.E CONSTRUCTION ENGINEERING AND MANAGEMENT  
(TWO YEAR FULL TIME)  
CURRICULUM – 2008  
SEMESTER I**

Code No.	Course Title	L	T	P	C
<b>THEORY</b>					
YCM 101	Engineering Statistics and Research Methodologies	3	1	0	4
YCM 102	Construction Equipment	3	0	0	3
YCM 103	Modern Construction Materials	3	0	0	3
YCM 104	Project Formulation and Appraisal	3	0	0	3
YCM 105	GIS for Construction Management Applications	3	0	0	3
YCM 106	Quality Control and Assurance in Construction	3	0	0	3
YCM 107*	Elective – I	3	0	0	3
YCM 108*	Elective II	3	0	0	3

Total Hours: 25

Total Credits: 25

**SEMESTER II**

Code No.	Course Title	L	T	P	C
<b>THEORY</b>					
YCM 201	Advanced Construction Techniques	3	1	0	4
YCM 202	Computer Applications in Construction Engineering and Planning	3	0	0	3
YCM 203	Construction Planning, Scheduling and Control	3	0	0	3
YCM 204	Contract Laws and Regulations	3	0	0	3
YCM 205	Advanced Concrete Technology	3	0	0	3
YCM 206*	Elective III	3	0	0	3
YCM 207*	Elective IV	3	0	0	3
<b>PRACTICAL</b>					
YCM 208	Computer Aided Planning and Scheduling Lab	0	0	3	2

Total Hours: 25

Total Credits: 25

\* Denotes A, B, C and D

### SEMESTER III

Code No.	Course Title	L	T	P	C
<b>THEORY</b>					
YCM 301	Project Work (Phase I)	0	0	17	9

Total Hours: 17

Total Credits: 9

### SEMESTER IV

Code No.	Course Title	L	T	P	C
Practical					
YCM 401	Project Work (Phase II)	0	0	3	17

Total Hours: 34

Total Credits: 17

**Over all Credits: 75**

L - Lecture    T – Tutorial    P – Practical            C - Credit

## List of Electives

### Elective I

Code No.	Course Title	L	T	P	C
YCM107A	Maintenance and Rehabilitation of Structures	3	0	0	3
YCM107B	Building Acoustics	3	0	0	3
YCM107C	Town Planning	3	0	0	3
YCM107D	Optimization Techniques in Construction	3	0	0	3

### Elective II

Code No.	Course Title	L	T	P	C
YCM108A	Resource Management and Control in Construction	3	0	0	3
YCM108B	System Integration in Construction	3	0	0	3
YCM108C	Energy Conservation Techniques in Building Construction	3	0	0	3
YCM108D	Building Services	3	0	0	3

### Elective III

Code No.	Course Title	L	T	P	C
YCM206A	Construction Project Management	3	0	0	3
YCM206B	Safety in Construction Engineering	3	0	0	3
YCM206C	Smart Materials and Smart Construction	3	0	0	3
YCM206D	Services in building Complex	3	0	0	3

### Elective IV

Code No.	Course Title	L	T	P	C
YCM207A	Human Resource Management in Construction	3	0	0	3
YCM207B	Business Economics and Finance Management	3	0	0	3
YCM207C	Shoring, Scaffolding and Formwork	3	0	0	3
YCM207D	Building Bye Laws	3	0	0	3

**UNIT – I      INTRODUCTION**

Definition of Research, Qualities of Researcher, Components of Research Problem, Various Steps in Scientific Research, Types of Research; Hypotheses Research Purposes - Research Design - Survey Research - Case Study Research.

**UNIT-II      DATA COLLECTION**

Sources of Data: Primary Data, Secondary Data; Procedure Questionnaire - Sampling Merits and Demerits - Experiments - Kinds - Procedure; Control Observation - Merits - Demerits - Kinds - Procedure - Sampling Errors - Type-I Error - Type-II Error.

**UNIT-III      STATISTICAL ANALYSIS**

Introduction to Statistics - Probability Theories - Conditional Probability, Poisson Distribution, Binomial Distribution and Properties of Normal Distributions, Point and Interval Estimates of Means and Proportions; Hypothesis Tests, One Sample Test - Two Sample Tests / Chi-Square Test, Association of Attributes - t-Test - Standard deviation - Co-efficient of variations - Index Number, Time Series Analysis, Decision Tree.

**UNIT –IV      STATISTICAL APPLICATIONS**

Correlation and Regression Analysis - Analysis of Variance, Completely Randomized Design, Randomized Complete Block Design, Latin Square Design - Partial and Multiple Correlation - Discriminate Analysis - Cluster Analysis - Factor Analysis and Conjoint Analysis - Multifactor Evaluation, Two-factor Evaluation Approaches.

**UNIT – V      RESEARCH REPORTS**

Structure and Components of Research Report, Types of Report, Good Research Report, Pictures and Graphs, Introduction to SPSS.

**REFERENCES:**

1. Wilkinson & Bhandarkar: METHODOLOGY AND TECHNIQUES OF SOCIAL RESEARCH.
2. Pauline Vyoung: SCIENTIFIC SOCIAL SURVEYS AND RESEARCH.
3. Panneerselvam, R., RESEARCH METHODOLOGY, Prentice Hall of India, New Delhi, 2004.
4. Kothari: RESEARCH METHODOLOGY.
5. Festinger. L & D. Katz: RESEARCH METHODS IN BEHAVIOURAL SCIENCE.
6. Sellitz, et al: RESEARCH METHODS IN SOCIAL RELATIONS.

**YCM 102 CONSTRUCTION EQUIPMENT 3 0 0 3**

**UNIT - I CONSTRUCTION EQUIPMENT MANAGEMENT 10**

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

**UNIT - II EQUIPMENT FOR EARTHWORK 10**

Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Waders, Earth Movers

**UNIT - III OTHER CONSTRUCTION EQUIPMENT 10**

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 MATERIALS HANDLING EQUIPMENT 5**

Forklifts and related equipment - Portable Material Bins – Conveyors - Hauling Equipment

**UNIT - V EQUIPMENT FOR PRODUCTION OF AGGREGATE AND CONCRETING 10**

Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Mixing Equipment - Hauling, Pouring and Pumping Equipment – Transporters

**L:45; P:30; Total:75**

**REFERENCES:**

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., Construction Planning, Equipment and Methods, 5<sup>th</sup> Edition, McGraw-Hill, Singapore, 1995
2. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 1988.
3. Deodhar, S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 1988.
4. Dr.Mahesh Varma, Construction Equipment and its planning and Application, Metropolitan Book Company, New Delhi. 1983.
5. Journal of new building materials

<b>YCM103</b>	<b>MODERN CONSTRUCTION MATERIALS</b>	<b>3 0 0 3</b>
<b>UNIT - I</b>	<b>CONCRETES AND SHORTCRETE</b>	<b>10</b>
High Strength - High Performance Concrete – Fibre Reinforced Concrete – Short Crete - Cellular Concrete - Waste Concrete		
<b>UNIT - II</b>	<b>METALS</b>	<b>10</b>
New Alloy Steels - Aluminium and its Products – Roof sheets		
<b>UNIT – III</b>	<b>COMPOSITES</b>	<b>10</b>
Plastics –Reinforced Polymers - FRP		
<b>UNIT - IV</b>	<b>OTHER MATERIALS</b>	<b>10</b>
Water Proofing Compounds - Non-weathering Materials – Materials for Flooring and Facing Work – Concrete Chemicals		
<b>UNIT- V</b>	<b>SMART MATERIALS AND TESTING EQUIPMENTS</b>	<b>5</b>
Sensars, Radars - Nano Materials – Testing methods and procedure		

**L:45; P:30; Total:75**

**REFERENCES:**

1. Shan Somayaji, Civil Engineering Materials, 2<sup>nd</sup> Edition, Prentice Hall Inc., 2001
2. Mamlouk, M.S. and Zaniewski, J.P., Materials for Civil and Construction Engineers, Prentice Hall Inc., 1999
3. Derucher, K. Korfiatis.G. and Ezeldin, S., Materials for Civil and Highway Engineers, 4<sup>th</sup> Edition, Prentice Hall Inc., 1999
4. Aitkens, High Performance Concrete, McGraw-Hill, 1999
5. Journal of new building materials

**YCM104 PROJECT FORMULATION AND APPRAISAL 3 0 0 3**

**UNIT - I PROJECT FORMULATION 10**

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

**UNIT – II FINANCIAL APPRAISAL - I 10**

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

**UNIT – III FINANCE APPRAISAL 15**

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 PROJECT FINANCING 5**

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

**UNIT – V PRIVATE SECTOR PARTICIPATION 5**

Private sector participation in Infrastructure Development Projects - BOT, BOLT, BOOT - Technology Transfer and Foreign Collaboration - Scope of Technology Transfer

**L:45; P:30; Total:75**

**REFERENCES:**

1. Prasanna Chandra, Projects – Planning Analysis Selection Implementation & Review Fourth Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi., 1995
2. Joy P.K., Total Project Management - The Indian Context (Chapters 3 - 7), New Delhi, Macmillan India Ltd., 1992
3. United Nations Industrial Development Organisation (UNIDO) Manual for the preparation of Industrial Feasibility Studies, (IDBI Reproduction) Bombay, 1987
4. Barcus, S.W. and Wilkinson. J.W., Hand Book of Management Consulting Services, McGraw Hill, New York, 1986.

## **YCM 105 GIS FOR CONSTRUCTION MANAGEMENT APPLICATIONS**

**3 0 0 3**

### **UNIT I 9**

Definition – Map and map analysis – History and development of GIS – Hardware requirement – System concepts – Coordinate systems

### **UNIT II 9**

Type of data – Spatial and non – spatial data – Data structure – points – Lines – Polygon – Vector and raster – Files and data formats – Data compression

### **UNIT III 9**

Spatial analysis – Data retrieval – Query – Simple analysis – Record – Overlay – Vector data analysis – Raster data analysis – Modeling in GIS – Digital elevation model – DTM – Cost and path analysis Artificial intelligence – Expert system

### **UNIT IV 9**

Types of output data – Display on screen – Printer – Plotter – Other output devices – Sources of errors – Types of errors – Elimination – Accuracies

### **UNIT V 9**

Features and usage of GIS Software Packages – Arc/Info, Modular GIS Environment, Map Info CARIS, Geo – Concept and Construction Sample applications and case studies

**L:45; Total:45**

### **REFERENCES:**

1. Paul curran . P. J. Principles of Remote sensing, ELBS, 1983
2. Lillie sand . T.M. Remote sensing principles and interpretation
3. Geo Information systems – Applications of GIS and related spatial information techniques, ASTER publication co. chestern (England) 1992
4. Jeffery star and John Estes, Geographical Information system – An introduction, prentice – Hall Inc- 1990.

## **YCM 106 QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION**

**3 0 0 3**

### **UNIT I CONSTRUCTION ORGANISATION**

**9**

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.

### **UNIT II CONTRACTS AND DOCUMENTS**

**9**

Documents – Contract and construction programming – Inspection procedures - Processes and products – Total QA / QC programme and cost implication.

### **UNIT III QUALITY PLANNING**

**9**

Quality policy, Objectives and methods in Construction industry - Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance – Taguchi's concept of quality – Codes and Standards

### **UNIT IV QUALITY CONTROL**

**9**

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.

### **UNIT V QUALITY ASSURANCE**

**9**

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.

**L:45; Total:45**

## REFERENCES:

1. James, J.O' Brian, Construction Inspection Handbook – Quality Assurance and Quality Control, Van Nostrand, New York, 1989.
2. Kwaku, A., Tenah, Jose, M. Guevara, Fundamentals of Construction Management and Organization, Reston Publishing Co., Inc., Virginia, 1985.
3. Juran Frank, J.M. and Gryna, F.M. Quality Planning and Analysis, Tata McGraw-Hill, 1982.
4. Hutchins.G, ISO 9000, Viva Books, New Delhi, 1993.
5. Clarkson H. Oglesby, Productivity Improvement in Construction, McGraw-Hill, 1989.
6. John L. Ashford, The Management of Quality in Construction, E & F.N.Spon, New York, 1989.
7. Steven McCabe, Quality Improvement Techniques in Construction, Addison Wesley Longman Ltd, England. 1998.



**YCM202 COMPUTERAPPLICATIONS IN CONSTRUCTION ENGINEERING  
AND PLANNING 3 0 0 3**

**UNIT I INTRODUCTION 5**

Introduction to System Hardware-Languages-Database Management-Spread Sheets-Applications

**UNIT II OPTIMIZATION TECHNIQUES 10**

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

**UNIT III INVENTORY PROBLEMS 10**

Deterministic and Probabilistic Inventory Models-Software Development

**UNIT IV PROJECT SCHEDULING APPLICATIONS 15**

PERT and CPM-Software Development - Use of Management Software

**UNIT V RISK MANAGEMENT TOOLS 5**

Decision Making-Bayes Theory-Simulation Models - Decision Theory – Decision Rules – Decision making under conditions of certainty, risk and uncertainty – Decision trees – Utility Theory

**L:45; P:30; Total:75**

**REFERENCES:**

1. Bily E. Gillet., "Introduction to Operation Research" - A Computer Oriented Algorithmic Approach, Tata McGraw-Hill, 1990.
2. Paulson, B.R., "Computer Applications in Construction", McGraw-Hill, 1995.
3. Feigenbaum., L., "Construction Scheduling With Primevera Project Planner", Prentice Hall Inc., 1999.

## **YCM 203 CONSTRUCTION PLANNING, SCHEDULING AND CONTROL**

**3 0 0 3**

### **UNIT I CONSTRUCTION PLANNING 9**

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

### **UNIT II SCHEDULING PROCEDURES AND TECHNIQUES 9**

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

### **UNIT III COST CONTROL, MONITORING AND ACCOUNTING 9**

The Cost Control Problem - The Project Budget - Forecasting for Activity Cost Control - Financial Accounting Systems and Cost Accounts - Control of Project Cash Flows - Schedule Control - Schedule and Budget Updates - Relating Cost and Schedule Information – Construction of S – Curve – Actual cost of work performance (ACWP); BCWS – BCWP – CPI - SPI

### **UNIT IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION 9**

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

### **UNIT V PROJECT INFORMATION MANAGEMENT SYSTEM (PIMS) 9**

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

**L:45; P:30; Total:75**

## REFERENCES:

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.
4. Moder, J., C. Phillips and E. Davis, Project Management with CPM, PERT and Precedence Diagramming, Van Nostrand Reinhold Company, Third Edition, 1983.
5. Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 1986.
6. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.

**YCM 204      CONTRACT LAWS AND REGULATIONS      3 0 0 3**

**UNIT I CONSTRUCTION CONTRACTS      10**

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 TENDERS      10**

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 ARBITRATION      5**

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

**UNIT IV LEGAL REQUIREMENTS      10**

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 – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations

**UNIT V LABOUR REGULATIONS      10**

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

**L:45; P:30; Total:75**

**REFERENCES:**

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, 2<sup>nd</sup> Edition, McGraw-Hill, 2001
4. Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, 6<sup>th</sup> Edition, McGraw-Hill, 2000

**UNIT I CONCRETE INGREDIENTS 15**

Composition of OPC – Manufacture – Modified Portland Cements – Hydration Process of Portland Cements – Structure of Hydrated Cement Pastes

Mineral Admixtures – Slags – Pozzolanas 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

**UNIT II FRESH CONCRETE 10**

Workability – Mix Proportioning – Mixes incorporating Fly - Ash, Silica fume, GGBS – Mixes for High Performance Concrete – Mix Design methods – variations in concrete strength.

**UNIT III HARDENED CONCRETE 7**

Interfacial Transition Zone – Fracture Strength – Mechanical Properties – High Strength Concrete – Shrinkage – Creep – Other Properties

**UNIT IV DURABILITY OF CONCRETE 8**

Basic Consideration – Stability of Constituents – Chemical Attack – Corrosion of Reinforcing Steel

**UNIT V SPECIAL TOPICS 5**

Manipulation of Strength of Concrete – Fibre Reinforced Concrete – Self Compacting Concrete – Polymer Concrete – Super Plasticized Concrete.

**L:45; Total :45**

**REFERENCES:**

1. Neville, 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

## **YCM 107A MAINTENANCE AND REHABILITATION OF STRUCTURES**

**3 0 0 3**

### **UNIT I GENERAL 5**

Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking.

### **UNIT II INFLUENCE ON SERVICEABILITY AND DURABILITY 8**

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.

### **UNIT III MAINTENANCE AND REPAIR STRATEGIES 8**

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.

### **UNIT IV MATERIALS FOR REPAIR 8**

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

### **UNIT V TECHNIQUES FOR REPAIR 7**

Rust eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete, Guniting and Shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning.

### **UNIT VI EXAMPLES OF REPAIR TO STRUCTURES 7**

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure.

### **UNIT VII 2**

Engineered demolition techniques for Dilapidated structures - case studies

**L:45; Total: 45**

## **TEXT BOOKS:**

1. Denison Campbell, Allen and Harold Roper, "Concrete Structures", Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
2. R.T.Allen and S.C.Edwards, "Repair of Concrete Structures", Blakie and Sons, UK, 1987.

## **REFERENCES:**

1. M.S.Shetty, "Concrete Technology - Theory and Practice", S.Chand and Company, New Delhi, 1992.
2. Santhakumar, A.R., "Training Course notes on Damage Assessment and repair in Low Cost Housing", "RHDC-NBO" Anna University, July, 1992.
3. Raikar, R.N., "Learning from failures - Deficiencies in Design", Construction and Service - R & D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.
4. N.Palaniappan, "Estate Management, Anna Institute of Management", Chennai, 1992.
5. Lakshmiathy, Metal Lecture notes of Workshop on "Repairs and Rehabilitation of Structures", 29 - 30th October 1999.

**UNIT I FUNDAMENTALS****7**

Sound waves, frequency, intensity, wave length, measure of sound, decibel scale, speech and music frequencies, human ear characteristics - Tone structure.

**UNIT II SOUND TRANSMISSION AND ABSORPTION****8**

Outdoor noise levels, acceptable indoor noise levels, sonometer, determinate of density of a given building material, absorption co-efficients and measurements, choice of absorption material, resonance, reverberation, echo, exercises involving reverberation time and absorption co-efficient.

**UNIT III NOISE CONTROL AND SOUND ABSORPTION****8**

Types of noises, transmission of noise, transmission loss, noise control and sound insulation, remedial measures and legislation.

**UNIT IV CONSTRUCTIONAL MEASURES****10**

Walls/partitions, floors/ceilings, widow/doors, insulating fittings and gadgets, machine mounting and insulation of machinery.

**UNIT V ACOUSTICS AND BUILDING DESIGN****12**

Site selection, shape, volume, treatment for interior surfaces, basic principles in designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls and theatres.

**L:45; Total:45****REFERENCES:**

1. Dr.V.Narasimhan - An Introduction to Building Physics - Kabeer Printing Works, Chennai-5 - 1974.
2. D.J.Groomet - Noise, Building and People - Pergumon Press - 1977.
3. Thomas D.Northwood - Architectural Acoustics - Dowden, Hutchinson and Ross Inc. - 1977.
4. B.J.Smith, R.J.Peters, Stephanie Owen - Acoustics and Noise Control - Longman Group Ltd., - New York, USA - 1982.

**WEBSITES:**

<http://www.soundesigns.net>  
<http://www.acs-psu.edu>

## **YCM108A RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION**

**3 0 0 3**

### **UNIT I RESOURCE PLANNING**

**10**

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

### **UNIT II LABOUR**

**5**

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.

### **UNIT III MATERIALS AND EQUIPMENT**

**10**

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.

### **UNIT IV TIME**

**10**

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.

### **UNIT V RESOURCE ALLOCATION AND LEVELLING**

**10**

Project crashing – OR tools- Time-cost trade of, Computer application in resource leveling examples, resource list, resource allocation graph, Resource loading, Cumulative cost ETC - Value Management.

**L:45;Total: 45**

## **REFERENCE**

1. Andrew,D., Szilagg, Hand Book of Engineering Management, 1982.
2. Glenn, A., Sea's and Reichard.H Clough, Construction Project Management, John Wiley and Sons, Inc. 1979.
3. Harvey, A., Levine, Project Management using Micro Computers, Osborne-McGraw-Hill C.A. Publishing Co., Inc. 1988.
4. James.A., Adrain ,Quantitative Methods in Construction Management, American Elsevier Publishing Co., Inc., 1973.

---

Oxley Rand Poslcut, Management Techniques applied to the Construction Industry, Granda Publishing Ltd., 1980.

**UNIT I STRUCTURAL****9**

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

**UNIT II ENVIRONMENTAL****9**

Qualities of enclosure necessary to maintain a specified level of interior environmental quality – weather resistance – Thermal infiltration – Acoustic Control – Transmission reduction – Air quality – Illumination – Relevant systems integration with structural systems.

**UNIT III SERVICES****9**

Plumbing – Electricity – Lifts and Escalators, Air-conditioning, Sanitary fittings

**UNIT IV MAINTENANCE****9**

Component longevity in terms of operation performance and resistance to deleterious forces - Planning systems for least maintenance materials and construction – access for maintenance – Feasibility for replacement of damaged components – equal life elemental design – maintenance free exposed and finished surfaces.

**UNIT V SAFETY****9**

Ability of systems to protect fire – preventive systems – fire escape system design – planning for pollution free construction environmental – Hazard free Construction execution.

**L:45; Total: 45****REFERENCES:**

1. E.C. Butcher and A.C. Parnell, Designing for Fire Safety, John Wiley and Sons, 1993.
2. William T. Mayer, Energy Economics and Build Design, McGraw-Hill Book Company, 1983.
3. Peter R. Smith and Warren G. Julian, Building Services, Applied Science Publishers Ltd., London.
4. A.J.Elder and Martiz Vinden Barg, Handbook of Building Enclosure, McGraw-Hill Book Company, 1983.
5. Jane Taylor and Gordin Cooke, The Fire Precautions Act in Practices, 1987.

**YCM108C ENERGY CONSERVATION TECHNIQUES IN BUILDING CONSTRUCTION 3 0 0 3**

**UNIT I INTRODUCTION 6**

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 ENVIRONMENTAL 7**

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 DESIGN 8**

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.

**UNIT IV SERVICES 12**

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

**UNIT V ENERGY MANAGEMENT 12**

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

**L:45; Total:45**

## REFERENCES

1. Moore F., Environmental Control system McGraw-Hill, Inc. 1994.
2. Brown, GZ, Sun, Wind and light: Architectural design strategies, John Wiley & Sons.,1985.
3. Cook, J, , Award – Winning passive Solar Design, McGraw-Hill, 1984.

**UNIT I MACHINERIES****8**

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

**UNIT II ELECTRICAL SYSTEMS IN BUILDINGS****10**

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

**UNIT III PRINCIPLES OF ILLUMINATION & DESIGN****8**

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lamps of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering.

Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

**UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS****10**

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

## UNIT V FIRE SAFETY INSTALLATION

9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

L- 45;T-0; P- 0; TOTAL - 45

### REFERENCES

1. E.R.Ambrose, "Heat Pumps and Electric Heating", John and Wiley and Sons, Inc., New York, 1968.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.
3. Philips Lighting in Architectural Design, McGraw-Hill, New York, 1964.
4. R.G.Hopkinson and J.D.Kay, "The Lighting of buildings", Faber and Faber, London, 1969.
5. William H.Severns and Julian R.Fellows, "Air-conditioning and Refrigeration", John Wiley and Sons, London, 1988.
6. A.F.C. Sherratt, "Air-conditioning and Energy Conservation", The Architectural Press, London, 1980.
7. National Building Code.

YCM206A CONSTRUCTION PROJECT MANAGEMENT 3 0 0 3

UNIT I THE OWNERS' PERSPECTIVE 9

Introduction - Project Life Cycle - Types of Construction - Selection of Professional Services - Construction Contractors - Financing of Constructed Facilities - Legal and Regulatory Requirements - Changing Environment of the Construction Industry - Role of Project Managers

UNIT II ORGANIZING FOR PROJECT MANAGEMENT 9

Project Management - Trends in Modern Management - Strategic Planning and Project Programming - Effects of Project Risks on Organization - Organization of Project Participants - Traditional Designer-Constructor Sequence - Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team - Interpersonal Behavior in Project Organizations - Perceptions of Owners and Contractors

UNIT III DESIGN AND CONSTRUCTION PROCESS

9

Design and Construction as an Integrated System - Innovation and Technological Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design - Physical Structures-Geo-technical Engineering Investigation - Construction Site Environment - Value Engineering - Construction Planning - Industrialized Construction and Pre-fabrication - Computer-Aided Engineering

UNIT IV LABOR, MATERIAL AND EQUIPMENT UTILIZATION 9

Historical Perspective - Labor Productivity - Factors Affecting Job-Site Productivity - Labor Relations in Construction - Problems in Collective Bargaining - Materials Management - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management. - Construction Equipment - Choice of Equipment and Standard Production Rates - Construction Processes Queues and Resource Bottlenecks

Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint Costs - Historical Cost Data - 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.

L- 45;T-0; P- 0; TOTAL - 45

## REFERENCES

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. Frederick E. Gould, Construction Project Management, Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000.
4. Choudhury, S, Project Management, Tata McGraw-Hill Publishing Company, New Delhi, 1988.
5. Ernest E. Ludwig, Applied Project Engineering and Management, Gulf Publishing Company, Houston, Texas, 1988.
6. Harold Kerzner, Project Management – A Systems Approach to Planning, Scheduling and Controlling, CBS Publishers & Distributors, Delhi, 1988.
7. Joy, P.K., Total Project Management – The Indian Context, Macmillan India Ltd., New Delhi, 1992.



UNIT I MANPOWER PLANNING

10

Manpower Planning, Organising, Staffing, directing, and controlling – Personnel Principles

UNIT II ORGANISATION

10

Organisation – Span of Control – Organisation Charts – Staffing Plan - Development and Operation of human resources - Managerial Staffing – Recruitment – Selection - Placement, Training and Development.

UNIT III HUMAN RESOURCE MANAGEMENT

10

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

UNIT IV WELFARE MEASURES

5

Compensation – Safety and health – GPF – EPF – Group Insurance – Housing - Pension – Laws related to welfare measures.

UNIT V MANAGEMENT AND DEVELOPMENT METHODS

10

Compensation - Wages and Salary, Employee Benefits, employee appraisal and assessment - Employee services - Safety and Health – Discipline and discharge - Special Human resource problems, Performance appraisal. –Rewarding system- Employee handbook and personnel manual - Job descriptions and organization structure and human relations – Productivity of Human resources.

L- 45;T-0; P- 0; TOTAL - 45

REFERENCES

1. Carleton Counter II 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., 1992.
3. Josy. J. Familiaro, Handbook of Human Resources Administration, McGraw-Hill International Edition, 1987.
4. Pringle Charles, Management Longenecker Emerricle Publishing Company, 1981.
5. R.S. Dwivedi, Human Relations and Organisational Behaviour, BH – 1987.

## YCM207B BUSINESS ECONOMICS AND FINANCE MANAGEMENT

3 0 0 3

### UNIT I ECONOMICS

10

Role of Civil Engineering in Industrial Development –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 CONSTRUCTION ECONOMICS

10

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 ACCOUNTING METHOD

5

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.

### UNIT IV FINANCING

12

Projected probability statement, projected cash flow statement, projected balance sheet, Analysis using these statements.

The need for financial management - Types of financing – short term borrowing – Long term borrowing – Leasing – Equity financing – Internal generation of funds – External commercial borrowings – Assistance from government budgeting support and international finance corporations.

### UNIT V LENDING TO CONTRACTORS

2

Loans to Contractors – Interim construction financing – Security and risk aspects.

L- 45;T-0; P- 0; TOTAL - 45

### REFERENCES

1. Warneer Z Hirsch, Urban Economics, Macmillan, New York, 1993.
2. Prasanna Chandra, Project Selection, Planning, Analysis, Implementation and Review, Tata McGraw-Hill Publishing Company, 1995.
3. Kwaku A, Tenah and Jose M.Guevara, Fundamental of Construction Management and Organisation, Prentice – Hall of India, 1995.
4. Halpin, D.W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.

5. Madura, J and Veit, E.T., Introduction to Financial Management, West Publishing Co., St. Paul, 1988.

## YCM207C SHORING, SCAFFOLDING AND FORMWORK

3 0 0 3

### UNIT I PLANNING, SITE EQUIPMENT AND PLANT FOR FORM WORK 9

Overall Planning – Detailed Planning – Standard units – Corner units – Schedule for column formwork – Formwork elements – Planning at Tender stage – Development of basic system – Planning for maximum reuse – Economical form construction – Planning examples – Crane size, effective scheduling estimate – Recheck plan details – Detailing the forms.

Crane arrangement – Site layout plan – Transporting plant – Formwork beams – Formwork ties – Wales – Scaffold frames - Form accessories – Vertical transport table form work.

### UNIT II FORM MATERIALS AND PRESSURES ON FORMWORK 9

Lumber – Types – Finish – Sheathing boards - Working stresses – Repetitive member stress – Plywood – Types and grades – Textured surfaces and strength – Reconstituted wood – Steel – Aluminum Form lining materials – Hardware and fasteners – Nails in Plywood – Bolts lag screw and connectors – Bolt loads.

Pressures on Formwork - Concrete density – Height of discharge – Temperature – Rates of Placing – Consistency of concrete – Live loads and wind pressure – Vibration Hydrostatic Adjustment for non standard condition.

### UNIT III FORMWORK FOR BUILDINGS FAILURES

9

Location of job mill – Storage – Equipment – Footings – Wall footing – Column footings Sloped footings – Slab on grade and paving work – Highway and airport paving – Curb and Gutter forms – Wall forms – External vibration – Prefabricated panel systems – Giant forms curved wall forms – wall openings joints – Tolerance for walls – Erection practices – Column heads – Beam or girder forms – Beam pockets – Suspended forms – Suggested Tolerances – Flying system forms – CECO Meyer flange and long forms.

### UNIT IV BUILDINGS FAILURES 9

Causes of failures – Inadequate shoring - Inadequate bracing of members – Improper vibration – Premature stripping – Errors in design – Failure to follow codes – How formwork affects concretes quality – ACI – Case studies – Planning for safety - Achieving economy – Finish of exposed concrete surface - Design deficiencies - Safety factors – Reshore installation – Prevention of rotation – Stripping sequence – Advantage of reshoring.

UNIT V DOME FORMS, TUNNEL FORMS, SLIPFORMS AND SAFETY  
PRACTICES FOR SCAFFOLDS

9

Slipforms – Principles – Types – Advantage – Functions of various components – Planning of Slipform operations – Desirable characteristics of concrete – Common problems faced – Safety in slip forms - Special structures built with Slipform Technique – Codal provisions – Types of scaffolds – Putlog and Independent scaffold – Single pole scaffolds – Fixing ties – Spacing of ties - Plan Bracing – Knots – Safety nets – General safety requirements – Precautions against particular hazards – Truss, Suspended – Gantry and system scaffolds.

L- 45;T-0; P- 0; TOTAL - 45

REFERENCES

1. Robert L. Peurifoy and Garold D. Oberlender, "Formwork for Concrete Structures", Third Edition McGraw-Hill, 1996.
2. Hurd, M.K., "Formwork for Concrete", Special Publication No. 4 Sixth Edition, American Concrete Institute, Detroit, 1995.
3. Michael P. Hurst, "Formwork", Construction Press, London and New York, 1997.
4. Austin, C.K., "Formwork for Concrete", Cleaver – Hume Press Ltd., London 1996.
5. Tudor Dinescu and Constantin Radulescu, "Slipform Techniques", Abacus Press, Turn Bridge Wells, Kent, 1992.
6. "Guide for Concrete Formwork", American Concrete Institute Detroit, Michigan, 1996.
7. "Safety Requirements for Scaffolding", American National Standards Institute, New York, 1994.