



ANNA UNIVERSITY
Chennai-25.
Syllabus for

M.E.(Full Time) Construction Engineering and Management

CN131 Modern Construction Materials **3 0 0 100**

1. CONCRETES **10**

High strength and High performance concrete-Fiber Reinforced concrete

2. METALS **10**

New Alloy steels-Aluminium and its products-Other alloys

3. COMPOSITES **10**

Plastics-Reinforced polymers-FRP-Celular cores

4. OTHER MATERIALS **10**

Water proofing compounds-Non -weathering Materials-Flooring and Facade Materials .

5. SMART AND INTELLIGENT MATERIALS **5**

Brief outline and uses

Total No of periods: 45

References:

1. Shan Somayaji, " *Civil Engineering Materials* ", 2nd Edititon, 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* ", 4th Edition, Prentice Hall Inc., 1999.
4. Aitkens, " *High Performance Concrete* ", McGraw Hill, 1999.

CN132 Construction Equipment

3 0 0 100

1. CONSTRUCTION EQUIPMENT MANAGEMENT 10

Identification-Planning-Equipment management in projects -Maintenance management-Replacement-Cost control of equipment-Depreciation Analysis-Safety Mangement

2. EQUIPMENT OF EARTHQUAKE 10

Fundamentals of earthwork operations-Earth moving opertions-Types of Earthwork Equipmwnt-Tractors, Motor Graders, Scrapers, Front end waders, Earth Movers

3. 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

4. MATERIALS HANDLING EQUIPMENT 5

Forklifts and Related Equipment-Portable Material Bins-Conveyors-Hauling Equipment

5. EQUIPMENT FOR PRODUCTION OF AGGREGATE AND CONCRETING 10

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

Total No of periods: 45

References:

1. *Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., " Construction Planning, Equipment and Methods ", 5th 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 ", Metro-politan Book Company, New Delhi-, 1983.*

CN133 Project Formulation and Appraisal

3 0 0 100

1. 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

2. PROJECT COSTING

10

Project cash flows-Time value of Money-Cost of Capital

3. PROJECT APPRAISAL

15

NPV-BCR-IRR-ARR-Urgency-pay back period-Assessment of Various Methods-Indian Practice of Investment Appraiasal-International practice of Appraisal-Analysis of Risk-Different Methods-Selection of a Project and Risk Analysis in Practice

4. PROJECT FINANCING

5

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

5. PRIVATE SECTOR PARTICIPATION

5

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

Total No of periods: 45

References:

1. *Prasanna Chandra, " Projects-Planning Analysis Selection Implementation & Review Fourth Edition ", Tata Mc Graw Hill Publishing Co., 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., " HandBook of Mangement Consulting Services ", McGraw Hill, New York, 1986.*

1. BASIC OCEPTS OF QUEUING THEORY	12
Probability-Random variables-Moments-Moment generating functions-standard distribution s-Functions of Random Variables-Two dimensional random variables-Two dimensional random variables-correlation and regression	
2. ESTIMATION THEORY	8
Principles of Least squares-Multiple and partial Correlation-Regression -Estimation of parameters-Maximum likelihood estimates-Method of moments	
3. TESTING OF HYPOTHESIS	9
Sampling of distributions-Test based on Normal ,t,chi-square and F distributions-Analysis of variance-one way and two way classifications	
4. DESIGN OF EXPERIMENTS	9
Completely Randomised Design-Randomised Block Design-Latin square design-2 square Factorial design	
5. QUEUING THEORY	7
Single and Multiple server Markovian Queuing Models-Customer impatience-M/G/1 Queuingb sytem-Queuing applications	

Total No of periods: 45

References:

1. Taha, H.A., " *Operations Research : An Introduction* ", Prentice - Hall of India, 6th Edition, New Delhi, 1997.
2. Freund, J.E. and Miller, I.R., " *Probability and Statistics for Engineers* ", Prentice - Hall of India, 5th Edition, New Delhi, 1994.
3. Gupta, S.C. and Kapur, V.K., " *Fundamentals of Mathematical Statistics* ", Sultan Chand & Sons, New Delhi, 1999
4. Goel B.S., and Mittal,S.K., " *Operations Research* ", Pragati Prakashan, Meerut, 2000.

1. SUB STRUCTURE CONSTRUCTION 15

Box jacking -Pipe Jacking-Under Water Construction of diaphragm walls and basement-Tunneling techniques-piling techniques-driving well and caisson-sinking cofferdam-cable anchoring and grouting-driving diaphragm walls,sheet piles-laying operations for built up offshore system-shoring for deep cutting-Large reservoir construction with membranes and Earth system-well points-Dewatering and stand by Plant equipment for underground open excavation

2. SUPER STRUCTURE CONSTRUCTION 20

Vacuum Dewatering of concrete flooring-Concrete paving technology-Techniques of construction for continuous concreting operation in Tall buildings of various shapes and Varying sections-Launching Techniques-Suspended from work-erection techniques of tall structures,Large span structures-Launching techniques for heavy decks-insitu prestressing in high rise structures,areial transporting handling erecting light weight components on tall structures-erection of lattice toweras and rigging of transmission line structures-Costruction sequences in cooling towers,Silos Chimney,Sky scrapers,bow string bridges,cable stayed bridges-Launching and pushing of box decks-Advanced construction Techniques in Offshore construction practice-construction sequence and methods in domes and prestress domes-Support structure for heavy Equipment and conveyor and machinery in heavy industries-erection of articulated structures,braced domes and space decks

3. REPAIR CONSTRUCTION 10

Mud jacking grout through slab foundation-micropiling for strengthening floor and shallow profile-pipeline laying-protecting sheet piles,screw anchors-sub grade water proofing under pining advanced techniques and sequence in demolition and dismantling

Total No of periods: 45

References:

1. *Robertwade Brown, " Practical foundation engineering hand book ", McGraw Hill Publications, 1995.*
2. *Patrick Powers. J., " Construction Dewatering: New Methods and Applications ", John Wiley and Sons, 1992.*
3. *Jerry Irvine, " Advanced Construction Techniques ", CA Rocketr, 1984.*

CN142 Contract Laws and Regulations

3 0 0 100

1. 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

2. 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

3. ARBITRATION 5

Comparison of Actions and Laws-Agreements ,subject matter-Violations-Appointment of Arbitrators-Conditions of Arbitrations-Powers and duties of Arbitrator-Rules of Evidence-Enforcement of Award-costs

4. 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 customs duties and their influence on construction costs-Legal requirements for planning-Property Law-Agency Law-Local Government Laws for Approval-Statutory Regulations

5. LABOUR REGULATION 10

Social Security-Welfare Legislation-Laws relating to wages,Bonus and Industrial Disputes,Labour Administration-Insurance and Safety Regulations-Workmen's Compensation Act-Other Labour laws

Total No of periods: 45

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 ", 2nd Edition, McGraw Hill, 2001.*
4. *Joseph T. Bockrath, " Contracts and the Legal Environment for Engineers and Architects ", 6th Edition, McGraw Hill, 2000.*

1. CONSTRUCTION PLANNING 9

Basic concepts in the development of construction plans-choice of Technology and Construction method-Defining Work Tasks-Definition-Defining Precedence relationships Among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems

2. 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-node 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 simulations-crashing and time/cost trade offs-scheduling in poorly structured problems-Improving the Scheduling process

3. 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

4. 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 by Sampling and Variables-Safety.

5. ORGANIZATION AND USE OF PROJECT INFORMATION 9

Types of project information-Accuracy and Use of Information-Computerized organization and use of information-Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized databases Management systems-Databases and application programs-Information transfer and Flow

Total No of periods: 45

References:

1. Chitkara, K.K. " *Construction Project Management Planning* ", *Scheduling and Control*, Tata McGraw Hill Publishing Co., New Delhi, 1998.
2. Calin M. Popescu, Chotchai Charoengam, " *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 - Fundamentals Concepts for Owners* ", *Engineers, Architects and Builders*, Prentice Hall, Pittsburgh, 2000.
4. Moder.J., C.Phillips and Davis, " *Project Management with CPM* ", *PERT and Precedence Diagramming*, Van Nostrand Reinhold Co., Third Edition, 1983.
5. Willis., E.M., " *Scheduling Construction projects* ", John Wiley and Sons 1986.
6. Halpin,D.W., " *Financial and cost concepts for construction Management* ", John Wiley and Sons, New York, 1985.

CN144 Computer Applications in Construction Engineering and Planning **3 0 0 100**

1. INTRODUCTION **5**

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

2. OPTIMIZATION TECHNIQUES **10**

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

3. INVENTORY PROBLEMS **10**

Deterministic and Probabilistic Inventory Models-Software Development

4. SCHEDULING APPLICATIONS **15**

PERT and CPM-Software Development - Use of PRIMAVERA

5. OTHER PROBLEMS **5**

Decision Making-Bayes Theory-Simulation-Models

Total No of periods: 45

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 Primavera Project Planner* ", Prentice Hall Inc., 1999.

1. CEMENT	8
Composition of OPC-Manufacture-Modified Portland cements-Hydration process of portland cements-Structure of Hydrated cement Pastes	
2. ADMIXTURES	8
Mineral admixtures-Slags-Pozolanas and Fillers-Chemical Admixtures-Solutes Retarders-Air Entraining Agents-Water proofing compounds-Plasticizers and Super Plasticizers	
3. AGGREGATES	5
Shape and Mechanical properties-Absorption and Physical durability-Chemical stability and packing charecteristics	
4. FRESH CONCRETE	5
Workability-Mix proportioning-Mixes incorporating Fly -Ash -Mixes for High performance concrete	
5. PROPERTIES OF CONCRETE	9
Interfacial Transition zone-Fracture strength-Mechanical properties-High strength concrete-Shrinkage-Creep-Other properties	
6. DURABILITY OF CONCRETE	5
Basic consideration-Stability of constituents-Chemical Attack-Corossion of Reinforcing steel	
7. SPECIAL TOPICS	5
Manipulation of strength of concrete-Fiber reinforced concrete-Quality control.	
Total No of periods:	45

References:

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. *Mindaas and Young, " Concrete ", Prentice Hall, 1998.*

1. PLANNING 5

Overall planning-Detailed Planning-Standard units-Corner units - Schedule for column form work-Formwork Elements-Planning at tender stage-Development of basic system-Planning for maximum reuse-Economical form construction-Planning examples-crane size, effecting scheduling Estimate-Recheck plan details-Detailing the forms

10. SLIP FORMS AND SAFETY PRACTICES FOR SCAFFOLDS 4

Principles-Typeas-Advantages-Functions of Various components-Planning-Desirable Charecteristics of concrete-common problems faced-Safety in slip forms special structures built with slip form technique-Codal provisions-Types of Scaffolds-Putlog and independent Scaffold-Single pole scaffolds-Fixing ties-Spacing of ties plan-Bracing-Knots-Safety net-General safety requirwements-precautions against particular hazards-Truss suspended-Gantry and system scaffolds

2. SITE EQUIPMENT AND PLANT 3

Crane arrngements-site layout plan-Transporting plant-Formwork beams-Formwork ties-Wales and ties-Scaffold frames from accessories-Vertical transport table from work

3. PRESSURES ON FORM WORK 5

Concrete density-Height of discharge-Temperature-Rates of placing-consistency of concrete-Live loads and wind pressure-Vibration hydrostatic pressure and pressure distribution-Examples-Vertical loads-Uplift on shores-Adjustment for non-standard conditions

4. MATERIALS,ACCESSORIES PROPRIETARY PRODUCTS 3

Lumber-Types-Finish-Sheating boards working stresses-Repetitive member stress-Plywood-Types and grades-Textured surfaces and strength-Reconstituted wood-Steel-aluminium form lining materials-Hardware and fasteners-Nails anin plywoods-Bolts lag screws and connectors-Bolt loads

5. FORM DESIGN 5

Basic simplification-Beam formulas-Allowable stress-Deflection bending-Lateral stability-Shear,Bearing-Examples in wall forms-Slab forms-Beam forms-Ties,Anchors and Hangers-Column forms-Examples in each

6. SHORES 5

Simple wood stresses-Slenderness ratio-Allowable load-Tubular steel shores patented shores-Site preparation,Size and spacing-Steel Tower Frames-Safety practices-Horizontal shores shoring for multistories-More concentrated shore loads T-heads-Tow Tier Wood shores-Ellis Shores-Dayton sure grip and baker Ross shores-Safway Symons shores-Beaver-advanced shores dead shore-Raking and Flying shores

7. BUILDING AND ERECTING THE FRAMEWORK 5

Location of job mill-storage-equipment-Footings-Wall footings slopped footing forms-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-Concrete joint construction-Flying system forms

8. FAILURES OF FORMWORK AND ACI PROVISIONS 5

Causes of failures-Inadequate shoring inadequate bracing of members-Improper vibration-Premature stripping-Errors in design-Failure to follow codes-How formwork affects concrete quality-ACI-Case studies-planning for safety-Achieving economy-Finished of concrete design deficiencies-Safety factors-Reshore installation-Prevention of rotation-Stripping sequence-Advantages of reshoring Material properties

Total No of periods:

9. DOMES FORMS AND TUNNEL FORMS 5

Hemispherical,Parabolic,Translational typical barrel vaults,Hyperbolic Folded plates-Shell form Design
 Consideration loads-Inserts,Anchors bolts-Building the form-Placing the concrete-Form removed-Strength
 requirements-Tunnel forming components-Curb forms invert forms-Arch forms-Concrete placement methods-
 Cut and cover construction-General design considerations influence of placing equipment-Tolerances-Form
 construction-Shafts

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References:

1. Robert L.Peurifoy and Garold D.Oberlander, " Formwork For concrete Structures ", McGraw-Hill, 1996.
2. Hurd.M.K., " Formwork for concrete ", Special Publication No.4, Fifth Edition, American Concrete Institute, Detroit, 1983.
3. Michael P. Hurst, " Construction Press ", London & NewYork, 1983.
4. Austin, C.K., " Formwork for concrete ", Cleaver - Hume Press Ltd., London, 1986.
5. Tudor Dinescu and Constantin Radulescu, " Slip Form Techniques ", Abacus Press, Turn Bridge Wells, Kent, 1982.
6. Guide for concrete formwork, " American concrete institute ", Box No.19150, Detroit, Michigan, 48219.
7. Safety Requirements for Scaffolding, " American National Standards Institute ", 1430 Broadway, New York, 10018.

CN033 System Integration in Construction

3 0 0 100

1. STRUCTURAL 9

Structural system, Systems for enclosing buildings, Functional aesthetic system, Materials selection and Specification

2. 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

3. SERVICES 9

Plumbing-Electricity-Vertical circulation and their interaction

4. MAINTENANCE 9

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

5. SAFETY 9

Ability of systems to protect fire-Preventive systems-Fire escape system design-Planning for pollution free construction environmental-Hazard free Construction execution.

Total No of periods: 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 Co., 1983.*
3. *Peter R.Smith and Warren G.Jullian, " Building services ", Applied Science Publishers Ltd., London.*
4. *A.J.Elder and Martiz Vinden Barg, " Handbook of Buildings and Enclosure ", Mc Graw-Hill Book Co., 1983.*
5. *Jane taylor and Gordin Cooke, " The Fire Precautions Act in Practices ", 1987.*

1. 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	
2. 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 accoustical quality-Land, water and materials-Airborne emissions and Waste management	
3. 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	
4. SERVICES	12
Energy in building design-Energy efficient and environmental 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 investigations-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	
5. 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-Steamleakage-Steam flash and condense return	

Total No of periods: 45

References:

1. Moore F., " *Environmental control systems* ", McGraw Hill, Inc., 1994.
2. Brown, G.Z, Sun, " *Wind and Light: Architectural design Strategies* ", John Wiley & Sons., 1985.
3. Cook, J, " *Award - Winning Passive Solar Design* ", McGraw Hill, 1984.

1. THE OWNER'S PERSPECTIVE 5

Introduction-The project life cycle-Major Types of Construction-Selection of Professional Services-Construction contractors-Financing of constructed facilities-Legal and regulatory Requirements-The changing Environment of the construction Industry-The Role Project Managers

2. ORGANIZING FOR PROJECT MANAGEMENT 9

What is 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 behaviour in project organization-perceptions of Owners and Contractors

3. THE DESIGN AND CONSTRUCTION PROCESS 9

Design and construction as an intergrated system-Innovation and technological Feasibility-Innovation and technological feasibility-Design Methodology-Functional Design-Physical Structures-Geo-Technical Engineering Investigation-Construction Site Environment-Value engineering-Construction Planning-Industrialized Construction and Prefabrication-Computer -Aided Engineering

4. LABOUR,MATERIAL AND EQUIPMENT UTILIZATION 9

Historical Perspective-Labour Productivity-Factors Affecting Job-Site Productivity-Labor Relations in construction-Problems in collective bargaining-Materials Management-Materials Procurement and Delivery-Inventory control-Tradeoffs of cost in Material Management-Construction Equipment-Choice of Equipment and Standard production Rates-Construction Processes Queues and Resource Bottlenecks

5. COST ESTIMATION 9

Costs Associated with Construction 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 Engineers List of Quantities-Allocation of Construction costs over time-Computer Aided cost Estimation-Estimation of operating costs

Total No of periods: 41

References:

1. *Chris Hendrickson and Tung Au, " Project mangement 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 Co., New Delhi, 1998.*
3. *Frederick E.Gould, " Construction Project Management ", Wentworth Institute of Technology, Vary E.Joyce, Massachussetts Institute of Technology, 2000.*
4. *Choudhury, S., " Project Management ", Tata McGraw Hill Publishing Co., New Delhi, 1988.*
5. *Ernest E. Ludwig, " Applied project Engineering and Management ", Gulf Publishing Co., Houston, Texas, 1988.*
6. *Harold Kerzner, " Project Mangement - 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.*

CN042 Quantitative Techniques in Management

3 0 0 100

1. OPERATIONS RESEARCH 9

Introduction to Operations research-Linear programming-Graphical and Simplex Methods,Duality and Post-Optimality Analysis-Transportation and Assignment Problems

2. PRODUCTION MANAGEMENT 9

Inventory control,EOQ,Quantity Discounts,Safety Stock-Replacement Theory-PERT and CPM-Simulation Models-Quality Control

3. FINANCIAL MANAGEMENT 9

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

4. DECISION THEORY 9

Decision Theory-Decision Rules-Decision making under conditions of certainty,risk and uncertainty-Decision trees-Utility Theory

5. MANAGERIAL ECONOMICS 9

Cost concepts-Break-even -Analysis-Pricing techniques-Game Theory applications

Total No of periods: 45

References:

1. Vohra, N.D. " *Quantitative Techniques in Management* ", Tata McGraw Hill Co., Ltd , New Delhi, 1990.
2. Seehroeder, R.G., " *Operations Management* ", McGraw Hill, USA, 1982.
3. Levin, R.I, Rubin, D.S., and Stinsonm J., " *Quantitative Approaches to Management* ", McGraw Hill Book Co., 1988.
4. Frank Harrison, E., " *The Managerial Decision Making Process* ", Houghton Miffin Co. Boston, 1975.
5. Varshney, R.L. and Maheswari, K.L., " *Managerial Economics* ", Sultan Chand, 1975.

CN043 Construction Personnel Management

3 0 0 100

1. MANPOWER PLANNING 9

Manpower Planning, Organising, Staffing, directing and Controlling-Personnel Principles.

2. ORGANISATION 12

Organisation-Span of control-Organisation charts-Staffing plan-Development and Operation of Human resources-Managerial Staffing-Recruitment-Selection-Placement, Training and Development

3. HUMAN BEHAVIOUR 12

Introduction to the field of management-basic individual psychology-motivation-job design and performance management-Managing groups at work-self managing work teams-Inter group behaviour and conflict in organisations-Leadership-Behavioural aspects of decision-making; and communication for people management

4. MANAGEMENT AND DEVELOPMENT METHODS 12

Compensation-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 No of periods: 45

References:

1. Carleton Counter II and Jill Justice Coulter, " The Complete Standard Hand Book 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 Longnecker " Emerricle Publishing Co., 1981.
5. R.S.Dwivedi, " Human Relations and Organisational Behaviour ", BH - 1987.

1. ECONOMICS 10

Role of Civil Engineering in Industrial Development-Advances in Civil Engineering and engineering economics-Support matters of Economy as related top Engineering-Market demand and supply-Choice of technology-Quality control and Quality Production-Audit in economic law of returns governing production

2. 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.

3. FINANCING 18

The need for financial management-Types of finanacing-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-Analysis of financial statements-Balance sheet-Profit and loss account-Cash flow and fund flow analysis-Ratio anlysis-Investment and financing decision-Financial control-Job control and Centralized management

4. 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

5. LENDING TO CONTRACTORS 2

Loans to Contractors-Interim construction financing-Security and risk aspects

Total No of periods: 45

References:

1. *Warner Z Hirsch, " Urban Economics ", Macmillan, NewYork, 1993.*
2. *Prasanna Chandra, " Projects - Planning Analysis Selection Implementation & Review ", Fourth Edition, Tata McGraw Hill Publishing Co., Ltd, New Delhi, 1995.*
3. *Kwaku A., Tenah and Jose M. Guevera, " Fundamental of Construction Management and Organization ", Prentice Hall of India, 1995 .*
4. *Halpin, D.W., " Financial and cost concepts for construction Management ", John Wiley and Sons, New York, 1985.*
5. *Madura J. and Veit, E.T., " Introduction to Financial Management ", West Publishing Co., St.Paul, 1988.*

1. CONSTRUCTION ORGANIZATION 10

Types of Organization-Inspection,Control and enforcement-Quality Mangement Systems and Method-Responsibilities and authorities in Quality assurance and Quality control-Architects, Engineers,Contractors,and Consultants,Quality circle

2. QUALITY PLANNING 15

Quality policy,Objectives and methods in construction industry-Consumer satisfaction-Ergonomics-Time of Completion-Statistical Tolerance-Taguchi's concept of quality-Codes and standards-Documents-Contract and construction programing-Inspection procedures-Processes and products-Total QA / QC Programme and cost implication

3. QUALITY ASSURANCE AND CONTROL 20

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-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

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1. CONSTRUCTION ACCIDENTS 10

Accidents and their causes-Human factors in construction safety-cost of construction injuries-Occupational and Safety hazard assessment-Legal implications

2. SAFETY PROGRAMMES 10

Problem areas in construction safety-Elements of an Effective an safety programme-Job site Safety assessment-safety meetings-safety incentives

3. CONTRACTUAL OBLIGATIONS 5

Safety in construction contracts-Substance Abuse-Safety record keeping

4. DESIGNING FOR SAFETY 15

Safety culture-Safe workers-Safety and first line supervisors-Safety and Middle Managers-Top Management Practices,Company Activities and Safety-Safety Personnel-Subcontractual obligation=Project Cordination and Safety Procedures-Workers Compensation

5. OWNERS AND DESIGNERS OUTLOOK 5

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1. INTRODUCTION 7

Information systems-Establishing the frame work-Business Models-Information System Architecture-Evolution of Information Systems

2. SYSTEM DEVELOPMENT 8

Modern Information system-System Development Life cycle-Structured Methodologies-Designing computer based Methods,Procedures,Control-Designing structured programs

3. INFORMATION SYSTEMS 10

Intergrated 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

4. IMPLEMENTATION AND CONTROL 10

Control-Testing security-coding Techniques-Defection of error-Validating-Cost Benefit Analysis-Assesing the value and risk of Information System

5. SYSTEM AUDIT 10

Software Engineering Qualities-Design-Production,Service,Software Specification,Software metrics,Software Quality assurance-Systems Methodology-Objectives-Time and Logic,Knowledge and Human Dimension-Software life cycle models-Verification and Validation

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1. GENERAL	5
Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking.	
2. 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.	
3. 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.	
4. 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.	
5. 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.	
6. EXAMPLES OF REPAIR TO STRUCTURES	7
Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure.	
7.	2
Engineered demolition techniques for Dilapidated structures - case studies	
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Text Books:

1. *Denison Campbell, Allen and Harold Roper, " Concrete Structures ", Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.*
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