## M TECH (CONSTRUCTION ENGINEERING AND MANAGEMENT)

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<td>CIE-502</td>
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<td>CIE-669</td>
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ELECTIVE – I
CIE-561– RECENT ADVANCES IN CONCRETE TECHNOLOGY
CIE-562– VALUATION TECHNIQUES IN ENGINEERING
CIE-563– FUNCTIONAL PLANNING SERVICES AND MAINTENANCE MANAGEMENT
CIE-564– MAINTENANCE AND REHABILITATION OF STRUCTURES

ELECTIVE – II
CIE-565– ORGANIZATIONAL BEHAVIOUR AND HUMAN RESOURCES MANAGEMENT
CIE-566 – CONSTRUCTION SAFETY ENGINEERING & MANAGEMENT
CIE-567 – APPLIED SOCIAL PSYCHOLOGY
CIE- 568 – MANAGEMENT BY VALUES

ELECTIVE – III
CIE-569 – CONSTRUCTION MATERIAL MANAGEMENT
CIE-570 – CONSTRUCTION QUALITY MANAGEMENT
CIE-571 – VALUE ENGINEERING

OPEN ELECTIVE
CIE – 554 – ADVANCED STRENGTH OF MATERIALS
CIE – 556 – NON-DESTRUCTIVE TESTING OF MATERIALS
CIE–558– ENERGY AND ENVIRONMENT
I SEMESTER

MAT 505 STATISTICS, PROBABILITY AND RELIABILITY [3 1 0 4]

**Basics of Statistics**: Random Variables and its properties. Applications of Mean, Median, Mode, Standard deviation, Correlation coefficient in analyzing quality related data. Preliminary analysis of data by graphical representation, Measure of central tendency dispersion, peakedness in context with construction industry and quality control problems. Dependent Variables, Co-relation, Co-relation Coefficient and it’s significance.


Goodness of fit tests: Chi-square test, Kolmogorov-Smirnov Goodness of fit test and two sample test. Monte-Carlo Simulation.


**References**:

Introduction: Construction Projects- Concept, Project Categories, Characteristic of projects, project life cycle phase. 

Project Management- Project Management Function, Role of Project Manager. Organising For Construction - Principles of organisation, type of organisation structure

Project Feasibility Reports:

Project planning Scope: Planning Process, Objectives, Types of Project plans, Resource Planning Process

Scheduling: Introduction, Scheduling using Net work analysis- PERT and CPM Network, and related problems


Time Cost relationship: Direct and indirect cost, step in optimization of cost, related problem.


Project updating using CPM network.

References:

Introduction to Operation Research: Origin, development, scope, characteristics and limitation. Phases of OR - Classification of OR models.

Decision Theory: Decision strategies - Decision under certainty, risk and uncertainty - Formulation - Decision criteria and decision under competitive situations-Decision trees.

Game Theory: Classification of games - two person zero sum games, formulation of pay - off matrix - saddle points - games with pure and mixed, strategies - value of the game. Solution to 2 x 2, 2 x n and m x n pay - off matrix:- Graphical, algebraic and linear programming methods.

Linear Programming: Formulation, general and standard forms of LPP, dual of LPPs. Solution methods -Graphical method, Simplex techniques, Big M method and Two phase methods.


Dynamic Programming: Introduction – Recursive equation approach, solution of Discrete DPP, Solution of LPP by Dynamic Programming


Queuing Theory/Waiting Line Theory: Introduction - General structure of a queuing system – operating characteristics of queuing system.

Waiting line models: Poisson - Exponential single server model – infinite and finite population, Poisson - Exponential multiple server model – infinite population.

Post optimality analysis: Monte - Carlo system simulation

References:

CIE 505 CONSTRUCTION METHODS AND EQUIPMENTS [3 1 0 4]

Conventional and modern methods of construction of building elements, different stages of construction, types of form works, elements of precasting and prefabricated construction, use of prestressing.


References:

Management: Definition, functions, levels, role of different levels of management in planning, decision making and control.

Information: Definition, Attributes and Value of information, Types of decision and value of information, Age of information.

System: Definition, Description, Types of systems, Decoupling and Control of Systems, Stress in systems.

MIS: Definition, Characteristics, Problems, Classification.

Computer hardware and software for MIS, Database, DBMS.

MIS in practice: Transaction processing systems, Information reporting systems, Decision support systems, Expert systems and Office automatic systems.

Project Planning, Analysis and Design of MIS: MIS as system, Software development life cycles, Feasibility study, Requirement analysis, data flow diagram and data dictionary, Process description. Software requirement specifications, Systems design, Structures Charts, Input-output design Development - testing, implementation and maintenance of MIS.

References:

Mechanics of Research Methodology: Types of research, Significance of research, Research framework, Case study method, Experimental method, Sources of data, Data collection using questionnaire, Interviewing, and experimentation.


Sampling Methods: Introduction to various sampling methods and their applications. Data Analysis- Sources of data, Collection of data, Measurement and scaling technique, and Different techniques of Data analysis.


References:

Part I
Spread sheet programming. Programming management problems such as price forecasting, regression analysis, inventory models, Operation Research and project management problems. Database Management using popular DBMS like Access.

Introduction to Project Management Softwares- MS Project & Primavera
Working on Practical Projects

Part II
Modelling / Hadling actual practical project management projects.

References:
5. Step by step Microsoft access(CD ROM),PHI Delhi
9. AICTE Continuing Education Programme, "Quantitative Methods in Construction Management"
II SEMESTER
CIE 502 CONTRACTS MANAGEMENT [3 1 0 4]

Introduction to contracts: Definitions, Essentials for a legally valid contract, Salient features of a contract, Discharging of a contract, Documents for an Engineering Contract; Types of contracts: Classification Based on – Tendering Process, Economic Consideration, Tasks Involved; Main and Sub Contracts, Features, Merits, Demerits, Applicability of the various types of contracts.


Breach of contract: Definition and Classification, Common Breaches by – Principal, Contractor, Damage Assessment, Claims for Damages, Quantum Meruit, Force Majeure or Frustration.


References:


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Management Accounting: Meaning, importance and scope. Techniques or Tools of Management Accounting - Comparative and Common sized Balance sheet - Ratio analysis.

Financial Management: Meaning, scope and importance – Investment evaluation- capital budgeting, Budgets and Budgetary Control.


Accounting through computers

References:

Introduction to Recent Advances in Concrete & Review of Conventional/Normal Concrete:
Introduction, Merits and Demerits of concrete, Features of Recent Advances in Concrete, Types of Concrete to be dealt; Terminologies, Ingredients, Properties of Fresh & Hardened concrete, related tests, Production and use of concrete.

High Performance Concretes: Definition & Introduction, Classification, general properties, Advantages, Disadvantages, Applications, Description of types, Guidelines for Mix design and use of following concretes:

Special Concretes: Definition & Introduction, General properties, Advantages, Disadvantages, Applications, Concreting practices, Guidelines for Mix design and use of following concretes:
Heavy weight concrete, Shrinkage compensating concrete, Mass concrete, Roller compacted concrete.

Durability of Concrete: Definitions, Deterioration processes – Physical, Chemical, Environmental & Biological; Measures for ensuring durability, Corrosion of reinforcing steel, protective measures.

Testing and Quality Control of Concrete: Classification of test methods, In-situ, Non-Destructive & Partially–Destructive tests for fresh concrete, hardened concrete and durability of concrete.

References:

Purpose of valuation, Different forms of values.

Outgoings: Municipal & Govt. Taxes, insurance, Loss of rent, collection charges, sinking fund, Annual repairs & maintenance. Depreciation. Methods of calculation of depreciation

Year’s Purchase, Capitalized value, Obsolescence, Amortization.


Rent: Definition, Forms of rents.

Cost of structure, BIS rules for measuring plinth area and cubical contents.

Valuation of land with buildings: Rental method, Land and building method, Valuation on profit basis, Direct comparison of capital value, Residual or Development method.

Valuation of agricultural/farm lands

Rights and Liabilities of Lessor & Lessee, Leasehold properties, freehold Properties.

Easements: Self-imposed, Legally created, Dominant and Servient heritage Effect of easements on valuation.

Market: Real Estate market and market value, fair market value, open market value, affecting parameters

Case Studies: Valuation of real properties.

References:

Components of urban forms and their planning. Concepts of neighborhood unit, Street system and layout in a neighborhood, Functional planning buildings. Optimization of space: Spatial Synthesis graphical techniques, heuristic procedures. Space requirements and relationships for typical buildings, like residential offices, hospitals, etc. Standard fire, fire resistance, classification of buildings, means of escape, alarms, etc.

Engineering services in a building as a systems. Lifts, escalators, cold and hot water systems, waster water systems, and electrical systems.


Environmental factors; Thermal performance of buildings; Comfort factors and measurements; climatic design; Solar control and shading devices, Louver design, ventilation; Introduction to lighting; units of light, colour lamps, luminaries, Daylight design of general lighting schemes; Energy management and lighting; acoustical design of auditoria and noise control in buildings.

References:

Performance of construction materials and components in services; Causes of deterioration; preventive measurements and maintenance; principles of assessment of weathering and durability.


Special repairs, maintenance inspection and planning, Budgeting and management.

References:

Organizational Behaviour: Nature of organizational behaviour: Definition key elements, scope, model. Stages of evolution of OB, Researches in OB.


References

Construction Safety: meaning and scope

Current Situation in Safety of Construction: Technological aspects, Organizational aspects, Behavioural aspects

Safety clauses in contract document: Safety rules in Construction

Planning for safety in construction projects: Legal requirements, Reporting occurrence of accidents and hazards, Action to be taken by site engineer in case of accidents, First aid/Ambulance room/dispensary

Fire prevention and Control: Causes- Types of extinguishers and uses, Fire prevention planning, Fire prevention and control features.

Role of various parties in Construction Safety Management: Designers, Workers, Manufacturers/Dealers, Employers. Site safety management, Site organization.

Safety remedies for common hazards: Dust, Vibration, Lead poisoning, Noise, Movement, Material, Lighting.

Safety in Use of Construction equipments.

Human Factors in Construction Safety management

Motivation: Management, Supervisors, Workers. Motivational scheme- Possible areas of improvement.

Safety in Construction Operation: Drilling and Blasting operation, Excavation, Concrete framed structure.

Accident Investigation, Records and Cost: Purpose of investigation, Measuring safety and records to be maintained.

Hazard Analysis Technique: Job hazard analysis, Fault tree analysis, Failure mode analysis.

ISI Standards for safety for building and Civil Engineering Projects.

References:


References:


References:

Integrated material Management: Meaning, Functions, and Advantages.
Selective Control, Codification and Standardization.
Material planning and budgeting.
Price forecasting, Purchasing under uncertainties, Purchasing Capital equipments.
Source selection.

Stores management: Principles and Practice

Inventory management: Different inventory costs, Static risk model, EOQ, Practical systems, -P and Q systems, Probability base inventory control, OR Techniques in Material Management.
Statistical methods and application of computers.

References:


TQM Tools: An overview of Flowcharts, Check sheets, Histogram, Cause and effect diagrams, Pareto diagram, Scatter diagram and Control charts.

Planning: Policy, Strategy and goal deployment, Partnership and resources, Design for quality.


People: Human resource management(Introduction only), Cultural change, Innovation and learning, Leadership and commitment.

Implementing TQM: TQM and management of change, Planning and implementation of TQM, Sustained improvement, TQM models in practice.

ISO 9000 quality systems, Six sigma practice. Customer-Supplier Chain, Continuous improvement.

ISO 14001 quality systems.

References:


References:

5. AICTE, "Value Engineering", New-Delhi, 1990.
OPEN ELECTIVES

CIE 554 ADVANCED STRENGTH OF MATERIALS [3 0 0 3]

**Torsion**: Torsion of non-circular sections - Torsion of thin walled sections.

**Unsymmetrical bending of straight beams**: stress distribution - shear centre - shear flow in thin walled beam cross sections - shear centre for thin walled sections.

**Bending of Curved Beams**: Crane hooks, closed rings - correction factor for flanged cross sections.

**Bending of beams curved in plan.**

**Beams on Elastic foundation**: Infinite beams - Semi - infinite beams - short beams.

**References:**

Introduction, Need, Tensile test, Fatigue test, creep test, hardness test, impact test, Basic elements of NDT, Rebound hammer test, Magnetic particle test, liquid Particle test, ultrasonic test, Radiography, Acoustic Emission Test, Eddy current test, Leak test, New methods, reliability, case studies.

References:

7. TMEH Hand Book.
Introduction: Global energy, Environmental resources, energy needs, energy crisis.

Indian scenario - Energy consumption, needs and crisis.

Energy production, utilization, Laws and Principles

Renewable sources of energy and Environmental aspects - Bio gas, Bio- Mass,

Hydro power, ocean energy, solar energy, geothermal energy, wind energy

Urban waste derived energy, agricultural waste derived energy.

Non-renewable sources of energy and Environmental aspects – energy norm, coal, oil , natural gas, Nuclear energy,

Global temperature, Green house effects, global warming.

Acid rain - Causes, effects and control methods.

Regional impacts of temperature change.

References:

Concrete mix design, Tests on fiber reinforced concrete, Tests on concrete with different binders, Tests related to self compacting concrete, Pretensioning System, Non destructive tests, Corrosion tests.

Applications of statistics in analyzing data for construction quality management.

Model making.

References

2. Gahlot P S, “Concrete mix design”, Indian society for technical education, Mysore.