## DEPARTMENT OF CIVIL ENGINEERING
### M.E. (CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT)
### SCHEME OF INSTRUCTION AND EXAMINATION
#### I-SEMESTER

<table>
<thead>
<tr>
<th>Code No</th>
<th>Course title</th>
<th>Scheme of Instruction</th>
<th>Scheme of examination</th>
<th>Total Marks</th>
<th>Credits</th>
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<tr>
<td></td>
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<td>Lec. Lab Duration of Exam. (hrs) Theory/Lab/viva Sessionals</td>
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<td>CTPM 1.1</td>
<td>Construction management</td>
<td>4 - 3 3 70 30</td>
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#### III- SEMESTER

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#### IV- SEMESTER

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<tbody>
<tr>
<td>CTPM 4.1</td>
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Total Marks =1500 Total No. of Credits=80

Notes:
1. Dissertation which will commence from the beginning of III semester will be industry oriented done in the industry with two guides one from University and one from industry.
2. The viva voce for the labs by design projects shall be held with course instructor and one external member from academic institution/ industry/ R&D organizations.
DEPARTMENT OF CIVIL ENGINEERING
M.E. (CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT)

CTPM 1.1 CONSTRUCTION MANAGEMENT

UNIT – I

UNIT – II

UNIT – III

UNIT – IV

UNIT – V

Reference Books:
1. Raina, C.M. “Construction Management and Practice.” Tata McGraw-Hill,

CTPM 1.2 MATERIAL TECHNOLOGY

UNIT – I

UNIT – II
Fresh concrete : (a) Properties – Workability and its measurement, Segregation, Bleeding, setting of Concrete (b) Industrial Production of Concrete – batching, mixing, Transporting, Placing, Compaction, Finishing and Curing Methods (c) Tools – Mixer and its Maintenance, Truck Mixer, Dumper, Transport of Materials and concrete, Belt, Conveyors, Pumps and Pipeline, Pin and form Vibrators, their use, steam Chamber for Curing (d) Construction details for pile, raft and individual foundations, columns, Beams, Slabs and Filler Walls, Tremie Concreting.

UNIT – III
Hardened Concrete : (a) Properties : Strength and Factors affecting strength, high strength and high performance, elasticity, creep, shrinkage and factors affecting (b) Durability Significance, Permeability, Factors Contributing cracks and their prevention (c) Joints in Concrete – Construction, Expansion, Contraction, isolation Joints (d) Action of Chemicals, Sulphate attack, Alkalie Aggregate
Attack, chloride attack, Acid attack, Carbonation, Corrosion of Steel and methods of minimizing their affects.

UNIT – IV
Testing (a) Compression Test – Types of failures, Cube and Cylinder Strength, Factors affecting, flexural tensile strengths and relations of strength and other properties (b) Nondestructive testing procedures – Rebound hammer, penetration and pull out tests, pulse velocity methods, determination of cement content and original W/C ratio (c) I.S. Codal Provisions for strength, workability, mixing time, desheetering, curing, covers, durability requirements, accepting criteria for concrete (d) Special Concretes : Light Weight Concrete, No fines Concrete, Fibre Reinforcement Concrete, Ferro-cement, Polymer Concrete, Polymer Modified and ingrained concrete, Guniting, Hot and Cold Weather Concreting, Vacuum Concrete, Ready; Mixed Concrete, Pre-cast Concrete elements.

UNIT – V

Reference Books:
2. A. Tretyakov – “Concrete and Concreting”, 1968, Mir Publications

CTPM 1.3 CONSTRUCTION PLANNING AND SCHEDULING

UNIT I
Introduction to Project Management, Project Planning, Scheduling and Controlling- Introduction to methods of planning and scheduling.
PERT- Elements of Networks – Event, Activity, and Dummy Activity – Guidelines for the construction of the network – Development of PERT network – Numbering - Fulkerson’s rule - Skip numbering.
UNIT II
Time estimates – Optimistic, Pessimistic and Most likely time estimates – Earliest Expected time and Latest Allowable Occurrence time.
UNIT III
UNIT IV
Cost Analysis – Direct and Indirect project costs – Total costs – Cost Slopes – Crashing - Cost and Time Optimization.
UNIT V

References:

1. PERT and CPM – BC Punmia and KK Khandelwal
2. PERT and CPM – LS Srinath.

**CTPM 1.4 CONSTRUCTION EQUIPMENT AND METHODS**

**UNIT I**
Skills related to Construction Management will be covered in a laboratory setting including plan reading, specification reading, construction scheduling and estimating using industry standard state-of-the-art software and hardware, and other applied tasks.

**UNIT II**
Course Description: Study of construction operations as dynamic production processes. Utilization of equipment and other resources to achieve highest levels of productivity, safety, and quality. Covers a wide range of traditional and state-of-the-art construction methods.

**UNIT III**
Working of GPS and Total Stations for road alignment, project lay out and marking. Particulars of related Software.

**UNIT IV**
Description and Working of equipment related to Earth Work, Concrete, Road Laying.

Attachments components parts – Compactors, Cranes, Crawler Loaders, Dozers, Drills, Dumpets, Excavators, Forklifts, Graders, Hoists, Lifts, Loader Backhoe, mixers, Pavers, Rollers, Scrapers, Skid Steer Loaders, Skidders, Trucks, Truck (Off Highway), Wheel Loaders and others.

**UNIT V**
Equipment related to repairs rehabilitation and renovation.

**CTPM 1.5 CONSTRUCTION ENGINEERING LABORATORY - I**

2. Development of correlation between Non-Destructive and Destructive Tests using Rebound Hammer & UPV instruments.
3. Influence of following parameters on NDT readings – experimental observations.
   I. Aggregate – Cement ratio
   II. Water Cement Ratio
   III. Excess / Deficient Cement
   IV. Excess / Deficient Water
   V. Aggregate Type.
   (Some of the above parameters may be considered depending upon time).
4. Strain and deflection measurement for a structural member under single point / two point loading – crack propagation observation, measurement and plotting.

**CTPM 2.1 PROJECT ADMINISTRATION**

**UNIT – I**
Construction Administration, Control of Quality in Construction, Organizational Structure, Design Build Contracts, Responsibility for Coordination of the trades.

**UNIT – II**
Lines of Authority on Construction Projects, Responsibility, Familiarization with construction documents, Staffing Responsibilities.
UNIT – III
Certainty, Risk and Uncertainty, Risk Management, Identification and Nature of Construction Risks, Contractual allocations of Risk, Types of Risks, Minimizing risks and mitigating losses, use of expected values, utility in investment decisions, decision trees, sensitivity analysis.

UNIT – IV
Specifications and drawings – Specifications, Conflicts due to drawings and specifications, unenforceable phrases, content of the specifications, CSI specifications format, allowances and tolerances in specifications, problems.

UNIT – V
Preconstruction Operations – Constructability Analysis, Issuance of Bidding Documents, Prequalification of Bidders, Bonds, Opening Acceptance and Documentation of Bids.

Reference Books:

CTPM 2.2 COMPUTER AIDED DESIGN AND APPLICATIONS

UNIT – I

C-Language: C-Character set, identifiers and keywords, data types, constants, variables, arrays, declarations, expressions, statement and symbolic constants, Data input and output. Arithmetic, unary and relational operators, expressions, assignment and conditional operators, library functions, control statements and functions.

UNIT – II
File Management: File management, Pointers and their applications, structures and pointers, arrays and strings, processing of arrays.

Object Oriented programming: Introduction to object oriented programming, basic concepts of object oriented programming and its advantages.

UNIT – III
Computer Graphics: Introduction, Devices and world co-ordinates, transformation principles, windowing and clipping, display devices, graphics input devices, graphical input techniques, realism in graphics, geometric modeling, drafting and computer graphics in CAD.

UNIT – IV
Civil Engineering Applications: Preparing and running complete programs in C for Civil Engineering problems such as analysis of beams, trusses and determinate frames, design of pipes, pavements and footings, slope stability analysis and construction engineering problems – exposure to graphics primitives.

UNIT – V
Computer Aided Design: Computer aided design of civil engineering problems such as plane frame and space frame analysis and construction engineering and management problem – exposure to software packages such as NISA & STAD-PRO.

Reference Books:
CTPM 2.3 MANAGEMENT INFORMATION SYSTEMS

UNIT – I
Importance of Management Information Systems (MIS), Logical Foundation of MIS, Manager’s View of Information systems, Functions of Management, managerial role, Activities of an Construction Organization.

UNIT – II

UNIT – III
Strategic Uses of Information Technology, Inter Organizational Systems, Strategic Information Systems related to Construction Industry.

UNIT – IV

UNIT – V

Reference Books :

CTPM 2.4 CONTRACTS AND LEGAL ISSUES

UNIT I
Execution of Works – Direct execution by Department – Muster Roll (form 21) – Piece work agreement – Work Order.
Execution through contractor – Definitions – Types of contracts – Lump sum contract, Item rate contract, Cost plus fixed fee contract, Cost plus percentage contract, Special contracts.

UNIT II
Disputes – Settlement through arbitration – Indian Arbitration Act 1940 – Clauses and advantages of arbitration.

UNIT III
Specifications – Importance, Design and Writing of Specifications – Types of Specifications – General, Detailed, Standard, Special, Restricted and Manufacturer’s specifications.
Accounts – Advances, Earnest money and Security deposits, First and final bills, Fines, Recovery, Closing of accounts.

UNIT IV

UNIT V

References Books:
2. Construction Management and Projects – B Sengupta and H Guha

CTPM 2.5 SOFT SKILLS & SOFTWARE LABORATORY

Training in the following software & packages

1) Packages related to Construction & Project Management like:
   a. STAAD
   b. PRIMAVERA
   c. ESTIMATION Software etc.

2) Communication skills like:
   a. audio visual and interpersonal
   b. Listening skills, show and tell skills and skills to manage difference.
   c. Social skills
   d. Skills in dealing with selected work groups: clients, construction workers, government inspectors, trade unionists.
   e. Skills in understanding the socio-political state of projects and groups

3) GIS Software like:
   a. ARCInfo
   b. ARCView
   c. ILWIS

CTPM 3.1 ENVIRONMENTAL IMPACT ASSESSMENT

UNIT I
Concept of Environment – Definition of EIA and EIS – Elements of EIA – Guidelines for the preparation of EIS – Governmental policies for environmental protection.

UNIT II
Environmental setting – Environmental attributes – air, water, soil, noise, ecological, social, economical, cultural, human and aesthetic aspects – Environmental indices.

UNIT III
Methodology for the identification of Impacts – Criteria for the selection of methods – Methodologies- Adhoc, checklist, Overlaying, Matrix and Network methods.

UNIT IV
Prediction and Assessment of Impacts on – air, water, soil, noise, ecological, social, economical, cultural, human environments and aesthetic aspects.

UNIT V

References Books:


CTPM 3.2 SAFETY MANAGEMENT IN CONSTRUCTION

UNIT – I
Safety management function, line versus staff authority, safety responsibility and accountability in construction industry.

UNIT – II
Safety and its importance in construction industry, hazards in construction projects, causes of accidents, cost of an accident.

UNIT – III
Experience Modification Rating, Workers insurance, general safety programs in construction industry, construction safety problems.

UNIT – IV
Case based reasoning, case indexing, retrieval, accident prevention and forecasting using CBR method.

UNIT – V
Systems safety analysis, faulty tree analysis, failure modes and effects analysis in construction industry.

Reference Books: