Department of Civil Engineering

SCHEME OF INSTRUCTION & SYLLABUS
FOR

M.Tech. (CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT)

(with effect from 2019-20 Admitted Batch)

Department of Civil Engineering
A.U. College of Engineering (A)
Visakhapatnam

Department of Civil Engineering
M.Tech. (CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT)
Scheme of Instruction and Examination
(with effect from 2019-20 Admitted Batch)

I – SEMESTER

Code No.	Course Title	Scheme of Instruction			Scheme of Examination			Total	Credits
		Lec.	Tut.	Total	Exam (hrs)	Ext.	Sess.		
CTPM1.1	Principles of Construction Management	4	--	4	3	70	30	100	3
CTPM1.2	Construction Planning and Scheduling	4	--	4	3	70	30	100	3
CTPM1.3	Construction Equipment and Methods	4	--	4	3	70	30	100	3
Program Elective –I CTPM1.4	(a) Advanced Foundation Engineering (b) Urban Transportation Planning	4	--	4	3	70	30	100	3
Program Elective –II CTPM1.5	(a) Advanced Concrete Technology (b) Construction Economics	4	--	4	3	70	30	100	3
CTPM1.6	Computer Applications in Structural Engineering	-	3	3	Viva	50	50	100	1.5
CTPM1.7	Case Studies	-	3	3	Viva	50	50	100	1.5
Total		**20**	**6**	**26**		**450**	**250**	**700**	**18**

II – SEMESTER

Code No.	Course title	Scheme of Instruction			Scheme of Examination			Total	Credits
		Lec.	Tut.	Total	Exam. (hrs)	Ext.	Sess.		
CTPM2.1	Project Administration	4	--	4	3	70	30	100	3
CTPM2.2	Contracts and Legal Issues	4	--	4	3	70	30	100	3
CTPM2.3	Safety Management	4	--	4	3	70	30	100	3
Program Elective –III CTPM2.4	(a) Disaster Management (b) Ground Improvement Techniques	4	--	4	3	70	30	100	3
Program Elective –IV CTPM2.5	(a) Prestressed Concrete (b) Strategic Management of Construction Projects	4	--	4	3	70	30	100	3
CTPM2.6	Repairs and Rehabilitation of Structures	--	3	3	Viva	50	50	100	1.5
CTPM2.7	Construction Engineering Laboratory	--	3	3	Viva	50	50	100	1.5
CTPM2.8	Seminar	--	3	3	Viva	50	50	100	2
Total		**20**	**9**	**29**		**500**	**300**	**800**	**20**

III SEMESTER

Code No.	Course title	Scheme of Instruction			Scheme of Examination			Total	Credits
		Lec	Tut	Total	Exam (hrs)	Ext	Sess		
Program Elective –V CTPM3.1	(a) Environmental Impact Assessment (b) Operations Research	4	--	4	3	70	30	100	3
Program Elective– VI CTPM3.2	(a) Management Information Systems (b) Infrastructure Valuation	4	--	4	3	70	30	100	3
CTPM3.3	Dissertation (Preliminary)	--	--	--	Viva	--	100	100	8
Total		**8**	--	**8**		**140**	**160**	**300**	**14**

IV SEMESTER

Code No.	Course title	Scheme of Examination			Total	Credits
		Exam. (hrs)	Ext.	Sess.		
CTPM4.1	Dissertation (Final)	Viva	100	--	100	16
Total						**16**

Department of Civil Engineering
M.Tech. (CONSTRUCTION TECHNOLOGY AND MANAGEMENT)
Syllabus
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I – SEMESTER

CTPM1.1 PRINCIPLES OF CONSTRUCTION MANAGEMENT

Introduction, History of Construction Management, Functions and Responsibilities of Construction Manager, Future of Construction Management. Major problems in Construction Industry,

Decision Making in Construction Industry – Benefit-Cost Analysis, Replacement Analysis, Break Even Analysis.

Project Cost and Value Management – Cost Planning, Cost Budgeting, Cost Controlling. Fundamentals of Value Engineering, Application of Value Engineering to Construction Industry.

Concept and importance of Safety in Construction Industry, Unsafe Conditions and Unsafe Acts, Safety Benefits to Employers, Employees and Customers, Construction Safety Problems, Approaches to improve Construction Safety.

Project Monitoring and Control Systems, Communication Systems, Cost and Progress Control, Fundamentals and Significance of Management Information Systems, Application of Management Information Systems in Construction Industry.

Reference Books

1. *Construction Management and Practice. Raina, C.M. Tata McGraw-Hill,*
2. *Construction Management by Williams, Cengage publishing Pvt Ltd*
3. *Construction Project Management, K N Jha, Pearson publications*

CTPM1.2 CONSTRUCTION PLANNING AND SCHEDULING

Introduction to methods of planning and scheduling, Work Break Down Structures.

Bar charts and Milestone Charts – Development of Bar charts – Shortcomings – Remedial measures – Milestone charts.

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.

Time estimates – Optimistic, Pessimistic and Most likely time estimates – Earliest Expected time and Latest Allowable Occurrence time. Critical Path – Slack – Identification of Critical Path – Probability of Completion of projects.

CPM – Construction of network – Earliest Possible Occurrence time and Latest Possible Occurrence time – Start and Finish times of activities – Floats – Identification of Critical Path using floats.

Cost Time Optimization – Direct and Indirect project costs – Total costs – Cost Slopes – Crashing - Cost and Time Optimization.

Updating – Importance of updating – Process of updating – Updating Cycle and Updated networks.

Resource allocation – Resources – Usage profiles – Histograms – Resource Smoothing – Resource leveling.

Reference Books

1. *PERT and CPM – BC Punmia and KK Khandelwal*
2. *PERT and CPM – LS Srinath.*
3. *A management guide to PERT/CPM by Wiest Levy, PHI Publications*

CTPM1.3 CONSTRUCTION EQUIPMENT AND METHODS

Construction Equipment:
Introduction, significance of equipment in construction industry - laboratory setting including plan reading, specification reading, construction scheduling and estimating, Job layout and its importance.

Construction Equipment Management:
Equipment Management- Introduction, Differences between men and manpower, Extent of Mechanisation, Equipment planning, Selection of equipment, Forward planning, Purchase of Equipment, Specifications for ordering equipment.
Maintenance Management – Introduction, Objectives, Functions, Maintenance planning, Maintenance control, Types of maintenance.
Equipment cost – Operating cost – Cost Control of Equipment - Depreciation Analysis – Replacement of Equipment- Replacement Analysis - Safety Management

Equipment for Earthwork:
Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment –Excavation equipment- Power Shovels, Back Hoe, Drag line, Clamshell – Excavating and Earth Moving Equipment – Scrapers, Bull Dozers, Tractors, Hauling Equipment – Dump trucks, Dumpers Loaders, trucks, Earth Compaction Equipment-Tamping Rollers, Smooth Wheel Rollers, Sheepsfoot Roller, Pneumatic-tyred Roller, Vibrating Compactors, Vibrocompaction methods.

Other Construction Equipment:
Pile driving Equipment - Erection Equipment – Cranes, Derrick Cranes, Mobile cranes, Overhead cranes, Traveller cranes, Tower cranes - Types of pumps used in Construction - Grouting - Material Handling Conveyors –Industrial Trucks, Forklifts and related equipment .

Equipment for Concrete and Road laying:
Aggregate production equipment- Different Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Aggregate Mixing Equipment - Asphalt Plant, Asphalt Pavers, Asphalt compacting Equipment – Ready mix concrete equipment, Concrete mixers, Concrete batching and mixing plant, Transportation of concrete mix, Concrete pouring and pumps, concrete compaction equipment.

Text Books

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", McGraw Hill, Singapore, 2006.
2. Sharma S.C. "Construction Equipment and Management", Khanna Publishers, New Delhi, 1988.

Reference Books

1. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi, 1988.
2. Dr.MaheshVarma, "Construction Equipment and its planning and Application", Metropolitan Book Company, New Delhi. 1983.

CTPM1.4(a) ADVANCED FOUNDATION ENGINEERING

Common Syllabus for SMFE1.2, CTPM1.4(a), TE1.4(a) and ST1.4(a)

Introduction
Principles of Design of Foundations, Types of shear failures in foundation soils, Types of foundations, Design Loads, Basic Concepts of safe and allowable bearing capacity.
Shallow Foundations
Bearing Capacity Analysis: Bearing capacity theories – Terzaghi, Meyerhof, Skempton, Hansen, Vesic and IS Methods, Bearing capacity evaluation from Standard Penetration test and Plate load test.
Settlement Analysis: Uniform and Differential Settlements, Elastic and Consolidation Settlements, Settlement analysis in cohesionless soils by Schemartmann and Hartman method, Penetration tests; Permissible settlements as per IS 1904-1978, causes of settlement, settlement Control.
Proportioning of footings: Isolated column footings, Strip, combined Footings and Strap Footing.
Raft Foundations: Bearing capacity of raft foundation, floating raft, Types of rafts, Beam on Elastic foundation and Conventional methods of Design, determination of modulus of subgrade reaction.
Deep Foundations
Pile Foundations: Types, load capacity- dynamic formulae, static formula; pile load tests- Vertical load test, lateral load test, Cyclic load test; settlement of piles and pile groups, negative skin friction on single pile and pile groups; laterally loaded piles - Broom's Analysis, IS Code method; Under reamed piles – Load capacity, design and construction.

Well Foundations: Types, Bearing Capacity of well foundations, Construction of pneumatic caissons, Tilts and Shifts: precautions, Remedial measures; Lateral stability analysis by Terzaghi's Method, Design aspects of Components of well foundation.

Foundations in Expansive Solis

Introduction, Identification of expansive soils, Swell potential and swelling pressure, Active depth, Foundation Problems, Foundation practices in expansive soils, Soil Replacement and 'CNS' concepts.

Foundations of Transmission Line Towers

Introduction, Necessary information, Forces on tower foundations, General design criteria, Choice and type of foundation, Design procedure.

Text Books

1. *Analysis and Design of Substructures by Swami Saran, Oxford & IBH Publishing Co. Pvt. Ltd.*
2. *Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R. Rao, New Age International Publications*

Reference Books

1. *Foundation Analysis and Design by J.E. Bowles, Mc Graw Hill Publishing Co.*
2. *Foundation Design by W.C. Teng, John Wiley, New York.*
3. *Analysis and Design of Substructures by Swami Saran, Oxford &IBH Publishing Co.*
4. *Foundation Engineering by P.C. Vargheese, Prentice Hall of India*

CTPM1.4(b) URBAN TRANSPORTATION PLANNING

Travel Demand Concept: Demand function: Independent variables: Travel attributes; Assumptions in Travel demand estimation; Sequential, Sequential recursive and Simultaneous process.

Data Collection and Inventories: Study area definition; Zoning principles; Travel data collection - Road side interview, Home interview; IPT surveys; Sampling techniques; Expansion factors; Use of Secondary sources in data collection.

Travel Demand Estimation: Four step Travel Demand Forecasting approach; Trip generation Analysis; Zonal models Category analysis; Household models; Trip attraction of work centres.

Trip Distribution: Mode Factor methods; Gravity model; opportunity model.

Mode Split Analysis: Mode choice behavior; computing modes; Diversion curves; Probabilistic approaches.

Traffic Assignment: Traffic network and coding; Minimum path trees; All or nothing assignment; Capacity restraint assignment; Corridor Identification; Plan preparation and Evaluation; Deficiency analysis.

Reference Books

1. *Introduction to Transportation Planning by M.J.Bruton; Hutchinson cf London Ltd.*
2. *Introduction to Urban System Planning by B.G.Hutchinson; Mc Gra Hill.*
3. *Urban Transportation Planning Guide - Roads & Transportation AS~C(i<:tion of Canada; University of Toronto Press.*
4. *Traffic Engineering and Transport Planning by Kadiyali L.R. Khanna Publishers.*

CTPM1.5(a) ADVANCED CONCRETE TECHNOLOGY

Common Syllabus for ST1.5(a), CTPM1.5(a) and SMFE1.5(a)

Durability of concrete and concrete construction: Durability concept, pore structure and transport processes, reinforcement corrosion, fire resistance, frost damage, sulphate attack, alkali silica reaction, delayed ettringite formation, methods of providing durable concrete, short-term tests to assess long-term behaviour.

Mix design: Review of methods and philosophies of IS, BS and ACI methods, mix design for special purposes. Acceptance criteria for compressive strength of concrete

Special concretes: Lightweight concrete, autoclaved aerated concrete, no-fines concrete, lightweight aggregate concrete and foamed concrete, High strength concrete, refractory concrete, high density and radiation-shielding concrete, polymer concrete, fibre-reinforced concrete, mortars, renders, recycled concrete, Ferro Cement, Self Compacting Concrete.

Special processes and technology for particular types of structure: Sprayed concrete, underwater concrete, grouts, grouting and grouted concrete, mass concrete, slip form construction, pumped concrete, concrete for liquid retaining structures, vacuum process, concrete coatings and surface treatments.

Test methods: Analysis of fresh concrete, Accelerated testing methods, Tests on hardened concrete, Core cutting and testing, partially destructive testing, Non-destructive testing of concrete structures

Text Books

1. *Properties of Concrete, A.M.Neville, Longman 1995.*
2. *Concrete Technology Theory and Practice, M.S.Shetty, S.Chand & Company Ltd, New Delhi.*

Reference

1. *Concrete micro-structure, Properties and Materials, P.K.Mehta, J.M.Monteiro, Printice Hall INC & McGraw Hill, USA.*

CTPM1.5(b) CONSTRUCTION ECONOMICS

Economic Decision Making – payback period, Rate of return on investment, Cash-flow diagrams, time, Value of money.
Cost benefit analysis, Break-even analysis, assessment of time for arriving break even.
Risks, Uncertainties and Management decision in capital budgeting, Uncertainties due to improper planning.
Work pricing, Client's estimation of project costs, Bidding price, Price Escalation, Revision.
Construction accounting, income statement, depreciation and amortization, Taxation and inflation, effect of inflation on cash-flow.
Working capital management, International finance and budgeting, Budgetary performance appraisal.

Text Books

1. *Construction Economics: A new Approach by Danny Myers, Taylor and Francis Publisher, 2004.*
2. *The Construction Industry Aspects of its Economics and Management, Singapore University Press, 1990.*

CTPM1.6 COMPUTER APPLICATIONS IN STRUCTURAL ENGINEERING

Application of software's in Structural Engineering (by using STAAD Pro,ETABS, STRAP, STRUDS etc) for the following problems.

1. Analysis and Design of Beams.
2. Analysis and Design of Footings.
3. Analysis and Design of Trusses.
4. Analysis and Design of Two Dimensional Frames.
5. Analysis and Design of Three Dimensional Frames.
6. Analysis and Design of Water Tanks.
7. Analysis and Design of Steel Members.
8. Implementation of Concepts of FEM using a Computer Language

CTPM1.7 CASE STUDIES

Candidates have to submit TWO case studies of construction projects of considerable size with all details related to various aspects like planning, design, construction, safety, EIA of the project, labour management, legal and other aspects etc, in a report format.

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II – SEMESTER

CTPM2.1 PROJECT ADMINISTRATION

Preconstruction Operations – Constructability Analysis, Issuance of Bidding Documents, Prequalification of Bidders, Bonds, Opening Acceptance and Documentation of Bids.
Construction Administration, Organizational Structure, Lines of Authority on Construction Projects, Responsibility, Staffing Responsibilities, Design Build Contracts, Responsibility for Coordination of the trades.
Familiarization with construction documents,
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.
Control of Quality in Construction

Reference Books

1. *Construction Project Administration by E.R.Fisk, (2000) Prentice hall International, London.*
2. *Construction Project Administration by A.A.Kwakye, (1977) Adission Wesley Longman,*

CTPM2.2 CONTRACTS AND LEGAL ISSUES

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.
Contract document – Conditions of Contract – Tender notice – Bidding procedure – Scrutiny and acceptance of tender, award of contract – Earnest money deposit and Security deposit - Termination of contract. Disputes – Settlement through arbitration – Indian Arbitration Act 1940 – Clauses and advantages of arbitration.
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.
Labour legislation – Factory Act 1948, Contract Labour Act 1970, Trade Union Act, Minimum Wages Act 1948, Workmen Compensation Act 1923, Industrial Disputes Act 1947. Labour Welfare – Labour welfare fund act 1965, Employees State Insurance act 1948, Incentives,

Labour welfare measures.

Reference Books

1. *Construction Management and Accounts by B.L.Gupta and Amit Gupta*
2. *Construction Management and Projects by B.Sengupta and H Guha*
3. *Construction Planning and Management by P.S.Gelhot and BM Dhir.*

CTPM2.3 SAFEY MANAGEMENT

Safety management function, line versus staff authority, safety responsibility and accountability in construction industry.
Safety and its importance in construction industry, hazards in construction projects, causes of accidents, cost of an accident.
Experience Modification Rating, Workers insurance, general safety programs in construction industry, construction safety problems.
Case based reasoning, case indexing, retrieval, accident prevention and forecasting using CBR method.
Systems safety analysis, faulty tree analysis, failure modes and effects analysis in construction industry.

Reference Books

1. *Safety Management by John V. Grimaldi, (1996). AITBS Publishers & Distributors, New Delhi, India.*
2. *Construction Project Administration by A.A.Kwakye, (1997), Adisson Wesley Longman, London.*

CTPM2.4(a) DISASTER MANAGEMENT

Common Syllabus for CTPM2.4(a) and EEM2.4(a)

Types of Disasters:
Disaster - concept and definitions of disaster, causes of disasters, types – natural disasters – floods, droughts, cyclones, earthquakes, landslides, avalanches, volcanic eruptions, heat and cold wave, global warming, sea level rise, ozone depletion. Man-made disasters: Sociological – political – industrial and human disasters.
Risk Assessment and Analysis
Concept and elements of Hazards, Risks and Vulnerability – Policies of Disaster Management, Identification of Crisis Situation, strategic developments, roles and responsibilities of recovery team, importance of team building in disaster management.
Disaster Preparedness:
Prevention and Preparedness – Plan, Action and Accountability, Concept and Nature of Disaster Preparedness, Plan of Disaster Preparedness for People with Special Needs/Vulnerable Groups,

with Relevance to Housing, Infrastructure and Livestock, Community Based Disaster Preparedness Plan, Role of Information technology, Education, Communication and training. Medical and health preparedness plan.
Disaster Damage Assessment and Response:
Needs and Damage Assessment– Control process and measurement – modern and traditional methods of response, Disaster Response Plan – roles of response teams and forces. Epidemiological Study of Disasters - Medical and Health Response to Different Disasters - Role of Information and Communication Technology in Health Response
Disaster Mitigation and Recovery:
Disaster Mitigation – meaning and concept – structural mitigation and non-structural mitigation – mitigation strategies and emerging trends. Reconstruction and rehabilitation for development, Medium and long-term recovery aspects, Participative Rehabilitation Process: Community involvement and development of infrastructure.

References:

1. *Disaster Management by Dr. Mrinalini Pandey, Wiley India Pvt. Ltd.*
2. *Natural Hazards & Disaster Management by R.B.Singh*
3. *Disaster Management: Future Challenges and opportunities by Jagbir Singh4*
4. *Natural Disaster Management ,Jon Ingleton*
5. *Disaster Management,Rajib Shaw and RR Krishnamurthy, Universities Press, Hyderabad.*

CTPM2.4(b) GROUND IMPROVEMENT TECHNIQUES

Common Syllabus for SMFE2.4(b), CTPM2.4(b), ST2.4(b) and TE2.4(a)

Compaction: Theory of compaction, Shallow Surface Compaction - Equipment, Placement water content, factors affecting shallow compaction; Deep compaction: Methods - Vibrofloatation, Terra probe method, Pounding, Blasting, Compaction piles; Compaction Control.

Vertical Drains: Sand drains, Sand wicks, Rope drains, Design of vertical drains, Stone columns, application of the techniques to Marine clays.

Stabilization: Introduction, objectives, Methods of stabilization – Mechanical, Cement, Lime, Bituminous, Calcium chloride; construction methods, factors affecting stabilization of soils; Deep Mixing methods – Soil lime Columns and Cement Lime Columns, applications

Dewatering: Definition, necessity, Methods of dewatering – Interceptor ditch, Single, Multistage and Vacuum well points, Horizontal wells, Electro-osmosis. Permanent drainage by Foundation drains and Blanket drains.

Grouting: Definition, Objectives of grouting, Grouts and their properties, Categories of Grouting, Grouting methods: Asending, Descending and Stage Grouting in Soils, Hydrofracture, Grouting Equipment, Post grouting tests.

In-situ Reinforcement: Ground Anchors, Tiebacks and Soil Nailing, Micropiles.

Text Book

1. Ground Improvement Techniques by P. Purushothama Raj, Laksmi Publications, New Delhi.

Reference Books

1. *Engineering Principles of Ground Modification by Monfred R Hausmann, Mc Graw Hill Publishing Co.*
2. *Reinforced Soil and Its Engineering Applications by Swami Saran, I.K. International Pvt. Ltd.*

CTPM2.5(a) PRESTRESSED CONCRETE

Common Syllabus for ST2.5(a) and CTPM2.5(a)

Introduction: Basic concepts of prestressing need for high strength steel and concrete, advantages of prestressed concrete. Materials for prestressed concrete, high strength concrete and high strength steel.

Prestressing systems and losses of prestress: (1) Freyssinet Anchorage System (2) Gifford Udall System (3) Magnel-Blaton System, Tensioning devices, anchoring devices. (d) Pretensioning and Post tensioning. Prestressing losses, Elastic shortening, loss due to shrinkage, loss due to creep, loss due to friction, loss due to slip etc. I.S.code provisions.

Analysis of prestressed Concrete Beams: Assumptions, Analysis of prestress, Resultant stresses at a section, pressure or thrust line, concept of load balancing, cable profile, kern distance, stress in tendons as per IS 1343, cracking moment.

Shear and Torsional Resistance of Prestressed Concrete Members: Shear and Principal Stresses, Ultimate Shear Resistance of Prestressed Concrete Members, Design of Shear Reinforcements, Prestressed Concrete members In Torsion, Design of Reinforcements for Torsion, Shear and Bending

Transfer of prestress in Pretensioned members: Transmission length, bond stress, Transverse tensile stress, End Zone reinforcement, flexural bond stress, I.S. Code Provisions.

Anchorage zone in post tensioned members: Introduction, stress distribution in End block, Investigation on Anchorage Zone Stresses- Magnel's method, Guyon's method of approach of analysis of end block (Not more than 2 cables).

Deflection of Prestressed Concrete Members: Importance of Control of Deflections, Factors Influencing Deflections, Short-Term Deflection of Uncracked members, Prediction of Long

Time Deflections, Deflection of Cracked Members, Requirements of various Codes of Practice.

Text Book

1. *Prestressed Concrete by N.Krishna Raju, Tata McGraw-HillPublishing Company Limited.*

Reference Books

1. *Prestressed Concrete by N.Rajagopalan, Alpha Science.*
2. *Prestressed Concrete Structures by P. Dayaratnam, Oxford & Ibh*
3. *Design of Prestressed Concrete Structures by T.Y. Lin and Ned. H. Burns, John Wiley and Sons.*

CTPM2.5(b) STRATEGIC MANAGEMENT OF CONSTRUCTION PROJECTS

Introduction to Strategic Management Concepts-necessity and significance of strategic management.
Different approaches of Strategy Formation and Implementation-procedures- problems encountered.
External and Internal Environment Analysis.
Financial Strategies-budget allocation for different tasks -Decision and Analytical Tools.
Corporate Strategic Events, Leadership and Decision-making, Corporate Social Responsibility.

Text Books

1. *David Langford, Steven Male, Strategic Management in Construction, 2nd Edition, John Wiley and Sons, 2008*
2. *Richard Fellows, Construction Management in Practice, 2nd Edition, Blackwell Science*

CTPM2.6 REPAIR AND REHABILITATION OF STRUCTURES

Materials: Construction chemicals, Mineral admixtures, Composites, Fibre reinforced concrete, High performance concrete, Polymer-impregnated concrete.

Techniques to Test the Existing Strengths: Destructive and non-destructive tests on concrete.

Repairs of Multi-storey Structures: Cracks in concrete, Possible damages to the structural element beams, Slab, Column, Footing, etc., Repairing techniques like Jack Chu, Grouting, External pre-stressing, Use of chemical admixtures, Repairs to the fire damaged structure.

Repairs to Masonry Structures & Temples: Damages to masonry structures – Repairing techniques, Damages to temples – Repairing techniques.

Foundation Problems: Settlement of soils – Repairs, Sinking of piles – Repairs.

Corrosion of Reinforcement: Preventive measures – Coatings – Use of SBR modified

cementitious mortar, Epoxy resin mortar, Acrylic modified cementitious mortar, Flowing concrete.

Temporary Structures: Need for temporary structures under any Hazard, Various temporary structures, Case-studies.

Case Studies: At least 2 case studies per each student.

Text Books

1. *Forensic Engineering by Raikar, R.N.*
2. *Deterioration, Maintenance and Repair of Structures by Johnson, McGraw Hill.*

Reference Books

1. *Renovation of Structures by Perkins.*
2. *Repairs of Fire Damaged Structures by Jagadish, R.*

CTPM2.7 CONSTRUCTION ENGINEERING LABORATORY

Concrete Mix Design – by BIS, ACI and BS method – proportioning, Batching, Mixing, Moulding of specimens for compression, Modulus of Elasticity and Modulus of Rupture – Testing of specimens as per relevant of practice (comparative study).
Development of correlation between Non-Destructive and Destructive Tests using Rebound Hammer & UPV instruments.
Influence of following parameters on NDT readings – experimental observations.
Aggregate – Cement ratio, Water Cement Ratio, Excess / Deficient Cement, Excess / Deficient Water, Aggregate Type.
Strain and deflection measurement for a structural member under single point / two point loading crack propagation observation, measurement and plotting.

CTPM2.8 SEMINAR

The student has to give series of oral presentations on a selected topic and submit a brief report and attend a formal viva-voce examination at the end of the semester.

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III – SEMESTER

CTPM3.1(a) ENVIRONMENTAL IMPACT ASSESSMENT

Concept of Environment – Definition of EIA and EIS – Elements of EIA – Guidelines for the preparation of EIS – Governmental policies for environmental protection.
Environmental setting – Environmental attributes – air, water, soil, noise, ecological, social, economical, cultural, human and aesthetic aspects – Environmental indices.
Methodology for the identification of Impacts – Criteria for the selection of methods – Methodologies- Adhoc, checklist, Overlaying, Matrix and Network methods.
Prediction and Assessment of Impacts on – air, water, soil, noise, ecological, social, economical, cultural, human environments and aesthetic aspects.
Review of Environmental Impact Statement – Cost benefit analysis – Measures for environmental impact mitigation and control – Case Studies.

Reference Books

1. *Environmental Impact Analysis by Urban and Jain.*
2. *Environmental Impact Analysis by Canter.*
3. *Environmental Impact Assessment Methodologies by Y Anjaneyulu, and Valli Manikkam, BSP Books PVT Ltd*
4. *Environmental Impact Assessment by Anji Reddy, BSP Books PVT Ltd*

CTPM3.1(b) OPERATIONS RESEARCH

Common Syllabus for CTPM3.1(b) and TE3.1(b)

Linear Programming – Problem Formation, graphical Solution methods

The Simplex Method – Two–Phase Simplex method, Formulation of L.P.P and its solutions by SIMPLEX Method.

Duality in Linear Programming – Fundamental properties of Duality, Duality and Simplex method, Bounded variable simplex algorithm.

The Transportation Problem – The North–West Corner rule, The Row minimum Method, The Column minima method, The Matrix minima method, Vogel's Approximation method, The Transportation Algorithm, Unbalanced Transportation Problems.

Assignment and Routing Problems –The Assignment Problem, Unbalanced Assignment Problem, Travelling Salesman Problem.

Queuing Theory – Characteristics of Queuing systems, Queue discipline, service channels, Poisson process and Exponential distribution, Distribution of Inter-travel times, Classification of Queues, The M/1/1 Queuing system (Model I to IV), The M/M/C Queuing System (Model I to IV), Non – Poisson Queuing Systems.

Text Books

1. *Operation research by Kanti Swarup, Gupta and Manmohan.*
2. *Operation research and statistical analysis by S.D.Sharma*

Reference Books

1. *Operations Research by Ranganath, Yes Dee publishing Pvt Ltd*
2. *Introduction to Optimization: Operation Research by J.C. Pant, Jain Brothers. Delhi.*
3. *Operation Research by Pannerselvam, Prentice Hall of India*
4. *Operation Research by Iyer, TMH*

CTPM3.2(a) MANAGEMENT INFORMATION SYSTEMS

Importance of Management Information Systems (MIS), Manger's View of Information systems, Functions of Management, managerial role in the Construction Organization.
Decision Making in Construction Industry, role of Management Information Systems in decision making.
Strategic Uses of Information Technology, Inter Organizational Systems, Strategic Information Systems related to Construction Industry, Process of Reengineering Work.
Information Technology, Classification of Information Systems, Role of Information Technology in Construction Industry, Impact of Information Technology on the Individuals and Organization.
File Structures and Processing methods in Construction Organizations, Data base Concepts, An Data Base management systems, Knowledge Based management systems.

Reference Books

1. *Management Information Systems - The Manager's View. Robert Schultheis, Mary Sumner. (1999).Tate McGraw Hill Edition, New Delhi.*
2. *Construction Project Administration, Kwakye, A.A.(1997), Adisson Wesley Longman,*
3. *Management Information Systems by Sumner, Tata McGraw Hill Publication*

CTPM3.2(b) INFRASTRUCTURE VALUATION

Function analysis; FAST diagramming; brain storming; criteria scoring matrices.
An introduction to value theory; an introduction to value management.
Value Engineering-Definition and concepts of the creative and structured phases of value engineering.
The workshop approach to achieve value- procedures- merits and demerits-detailed analysis.
Teambuilding theory; target setting; time management.

Text Books

1. *Lawrence D. Miles, Techniques of Value Analysis and Engineering, McGraw-Hill Book Company, 2009.*
2. *M.R.S. Murthy, Cost Analysis for Management Decisions, Tata McGraw-Hill Publishing Company Ltd.,1988.*

CTPM3.3 THESIS (PRELIMINARY)

The student shall submit a brief report on the selected topic of his/her thesis work and attend for a formal viva-voce examination before a committee comprising the Chairman, BOS, Head of the Department and the Guide.

Department of Civil Engineering
M.Tech. (CONSTRUCTION TECHNOLOGY AND MANAGEMENT)
(with effect from 2019-20 Admitted Batch)

IV – SEMESTER

CTPM4.1 THESIS (FINAL)

The student shall submit his/her thesis work and attend for a formal viva-voce examination before a Committee comprising the Chairman, BOS, Head of the Department, the Guide and the External Examiner.