



Sunrise University

Approved by Govt. of Rajasthan vide Sunrise University Act, 2011
Recognized by UGC Act, 1956 u/s 2 (f)

Department of Civil Engineering
SCHEME OF INSTRUCTION &
SYLLABUS FOR
M.Tech. (CONSTRUCTION MANAGEMENT)
(with effect from 2020-21 Admitted Batch)

Department of Civil Engineering
SUNRISE
UNIVERSITY

COURSE-M. TECH. BRANCH- CONSTRUCT
1st YEAR SEMESTER - I

Code	Subject	Hrs./Week		
		L	T	P
Theory				
1MCM01	Management	3	1	0
1MCM02	Construction Planning and Scheduling	3	1	0
1MCM03	Construction Equipment and Methods	3	1	0
1MCM04	Urban Transportation	2	1	0
Practicals & Sessions				
Code	Subject	Hrs./Week		
		L	T	P
1MCM05	Construction Engineering Laboratory	0	0	2
	GRAND TOTAL			



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**SUNRISE UNIVERSITY, AL CIVIL ENGINEERING DEPAR
COURSE- M. TECH.**

**BRANCH-
CO I
YEAR**

SEMESTER - II

Code	Subject	Hrs./Week		
		L	T	P

Theory				
Code	Subject			
2MCM01	Project Administration	3	1	0
2MCM02	Contracts and Legal Issues	3	1	0
2MCM03	Safety Management	3	1	0
2MCM04	Construction Economics	3	1	0
Practicals & Sessions				
Code	Subject	Hrs./Week		
		L	T	P
2MCM05	Seminar			
	GRAND TOTAL			

SUNRISE UNIVERSITY AL CIVIL ENGINEERING DEPAR

COURSE -M. TECH. BRANCH- CONSTRUCT

I YEAR

SEMESTER - III

Code	Subject	Hrs./Week		
		L	T	P
Theory				
3MCM01	Management Information Systems	3	1	0
3MCM02	Infrastructure Valuation.	3	1	0
Practicals&Sessionals				
Code	Subject	Hrs./Week		
		L	T	P
3MCM03	Dissertation Part -I	0	0	0
3MCM04	Seminar	0	0	0



COURSE M. TECH.

**BRANCH- CO
II YEAR
SEMESTER - IV**

Practicals&Sessionals				
Code	Subject	Hrs. /Week		
		L	T	P
4MCM01	Dissertation Part-II	0	0	3
GRAND TOTAL				

Exam Hrs.	Maximum Marks				
	MS1	MS2	END TERM	IA	Total
3	10	10	60	20	100
3	10	10	60	20	100
3	10	10	60	20	100
3	10	10	60	20	100



Is

Exam Hrs.	IA (60%)		EA (40%)		Total
	MP1*	MP2*	Pr.W		
	30%	30%	40%		
3	30	30	40		100
					500

WAR TMENT NSTRUCTION MANAGEMENT

Exam Hrs.	Maximum Marks				
	MS1	MS2	END	IA	Total

3	10	10	60	20	100
3	10	10	60	20	100
3	10	10	60	20	100
3	10	10	60	20	100

Is

Exam Hrs.	IA (60%)		EA (40%)		Total
	MP1*	MP2*	Pr.W		
	30%	30%	40%		
					100
					500



WAR TMENT
ION MANAGEMENT

Exam Hrs.	Maximum Marks				
	MS1	MS2	END TERM	IA	Total
3	10	10	60	20	100
3	10	10	60	20	100
Exam Hrs.	IA (60%)		EA (40%)	Total	
	MP1* 30%	MP2* 30%	Pr.W 40%		
0	0	0	200		200
0	0	0	100		100
					500



INSTRUCTION MANAGEMENT

Exam Hrs.	IA (60%)		EA (40%)	Total
	MP1* 30%	MP2* 30%	Pr.W 40%	
0	0	0	400	400
				400

Syllabus



I

– SEMESTER

Department of Civil Engineering M.Tech. (CONSTRUCTION MANAGEMENT)

Syllabus

(with effect from 2020-21 Admitted Batch)

I– SEMESTER

1MCM01- 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*

1MCM02- 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.

Syllabus



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*

1MCM03 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.

1MCM04-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 of 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.

1MCM05-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.

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II-SEMESTER

2MCM01 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) Addison Wesley Longman,

2MCM02-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 BMDhir.

2MCM03-SAFETY 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 Book-

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.

1. *Disaster Management: Future Challenges and opportunities* by Jagbir Singh
2. *Natural Disaster Management*, Jon Ingleton
3. *Disaster Management*, Rajib Shaw and RR Krishnamurthy, Universities Press, Hyderabad.



2MCM04 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.

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

3MCM01 MANAGEMENT INFORMATION SYSTEMS

Importance of Management Information Systems (MIS), Manager'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, NewDelhi.*
2. *Construction Project Administration, Kwakye, A.A.(1997), Adisson WesleyLongman,*
3. *Management Information Systems by Sumner, Tata McGraw HillPublication*



3MCM02-INFRASTRUCTUREVALUATION

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.*

3MCM03-THESIS(PRELIMINARY(DESSERTATION PART -I

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.

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I

-SEMESTER

4CM01 THESIS (FINAL) DESSERTATION PART-II

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.