

**MAHARSHI DAYANAND UNIVERSITY
ROHTAK**

**PROPOSED SCHEME OF STUDIES AND
EXAMINATIONS**

FOR

MASTER OF TECHNOLOGY

IN

**CONSTRUCTION TECHNOLOGY AND MANAGEMENT
(CTM)**

SESSION 2013-14

M.Tech (CTM) Scheme & Syllabus

1st Year - SEMESTER-I

Course No.	Course Title	Teaching Schedule			Credits	Marks Weightage		Total Marks	Duration of Exam
		L	T	P		Sessional	External		
MTCTM-101	Project Planning, Scheduling & Controls	4	-	-	4	50	100	150	3
MTCTM -102	Quantitative Methods	4	-	-	4	50	100	150	3
MTCTM -103	Construction & Concrete Technology	4	-	-	4	50	100	150	3
MTCTM -104	Construction Techniques	4	-	-	4	50	100	150	3
MTCTM -105	Management Theory in Construction	4	-	-	4	50	100	150	3
MTCTM -106	Construction & Concrete Technology Lab	0	-	2	1	50	50	100	3
MTCTM -107	Quantitative Methods Lab	0	-	2	1	50	50	100	3
Total		20		4	22	350	600	950	

1st year - SEMESTER-II

Course No.	Course Title	Teaching Schedule			Credits	Marks Weightage		Total Marks	Duration of Exam
		L	T	P		Sessional	External		
MTCTM -201	Construction Contract Management	4	-	-	4	50	100	150	3
MTCTM -202	Construction Economics & Finance	4	-	-	4	50	100	150	3
MTCTM -203	Functional Planning, Building Services & Maintenance Management	4	-	-	4	50	100	150	3
	Elective-I	4	-	-	4	50	100	150	3
	Elective-II	4	-	-	4	50	100	150	3
MTCTM -204	Project Management Lab	-		2	1	50	50	100	3
Total		20		2	21	300	550	850	

Course Code Elective I

MTCTM -210	Urban Hydrology & Waste Management
MTCTM -211	Advanced Foundation Engineering & Field practices
MTCTM -212	Public Private Partnership Concepts in Construction
MTCTM -213	Composite Materials

Course Code Elective II

MTCTM -220	Geomatics Engineering
MTCTM -221	Pavement Construction & Maintenance
MTCTM -222	Advanced Construction Finance
MTCTM -223	Expert system in Civil Engineering

Note:

1. Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section
2. The sessionals of Theory and Practical Courses shall also be evaluated on the basis of above marks.
3. The grading system will be according to rules of M.D.University
4. Use of Scientific calculator will be allowed in the examination. However Programmable calculator and cellular phone will not be allowed

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2nd Year- SEMESTER-III

Course No.	Course Title	Teaching Schedule			Credits	Marks Weightage		Total Marks	Duration of Exam
		L	T	P		Sessional	External		
MTCTM -301	Construction Cost Management	4	-	-	4	50	100	150	3
MTCTM -302	Disaster Management	4	-	-	4	50	100	150	3
	Elective III	4	-		4	50	100	150	3
MTCTM -303	Project	-	-	3	3	50	50	100	3
MTCTM -304	Seminar		-	2	2	50	-	50	3
MTCTM -305	Dissertation Phase-I		-	6	5	100	-	100	3
	Total	12		11	22	350	350	700	

Course Code Elective III

- MTCTM -310 Project Management
- MTCTM -311 Infrastructure Project Management
- MTCTM -312 Financial Management for Civil Engineering Projects
- MTCTM -313 Human Resource Management
- MTCTM -314 Environmental Impact Assessment
- MTCTM -315 Embankment Construction & Management
- MTCTM -316 Planning & Designing of an Integrated Large Township

2nd Year - SEMESTER-IV

Course No.	Course Title	Teaching Schedule			Credits	Marks Weightage		Total Marks	Duration of Exam
		L	T	P		Sessional	External		
MTCTM -401	Dissertation Final Phase	-	-	24	12	200	400	600	3
	Total			24	12	200	400	600	

Note:

1. Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section
2. The sessionals of Theory and Practical Courses shall also be evaluated on the basis of above marks.
3. The grading system will be according to rules of M.D.University
4. Use of Scientific calculator will be allowed in the examination. However Programmable calculator and cellular phone will not be allowed

M.Tech (CTM) Scheme & Syllabus

M.D. University, Rohtak (Haryana) Scheme of Studies & Examination for Master of Technology in Construction Technology And Management (CTM)

The performance of the students of M.Tech (Construction Technology & Management) Course shall be graded on the basis of percentage of marks and corresponding grades are mentioned below:

A)

Marks		Grade		Marks
85	≤	A+	≤	100
75	≤	A	<	85
65	≤	B	<	75
50	≤	C	<	65
40	≤	D	<	50
00	≤	E	<	40
Letter Grades		Performance		Divisionn
A+		Excellent		First
A		Very Good		First
B		Good		First
C		Fair		Second
D		Pass		Third
E		Repeat		Fail

Note:

The candidate who have passed all the semester examinations in the first attempt obtaining at least 75% marks in aggregate shall be declared to have passed in the first division with Distinction mentioned in the degree.

- B) Actual percentage of Marks Obtained and Corresponding grades should be mentioned on detailed marks certificate of student. To obtain 'D' grade a student must have secure at least 40% marks in each subject of the semester Examination.
- C) Student who earned and 'E' grade or less than 40% marks in any subject shall have reappear in that subject.

M.Tech (CTM) Scheme & Syllabus

Semester-I

MTCTM-101 PROJECT PLANNING, SCHEDULING & CONTROLS

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section – I

Project Planning:

Introduction to Project Planning Process. Types of Project Plans-Project feasibility plan, Project preliminary plan, Project construction plan. Introduction to network techniques – CPM, PERT and Precedence network.

Project Work Breakdown – Levels of Project work breakdown. Identification of construction activities by work breakdown structure. Identification of building construction activities using CI/SfB Manual. Activity duration and methods of estimating activity duration – One time estimate three time estimates, trapezoidal distribution estimate. Duration estimation procedure.

Section - II

Project Network Analysis:

Elements of Network, development of network, Numbering of events, Event times – Earliest events time and latest event time. Slack, critical events. Activity times – Earliest start time, Latest finish time, Float and critical activities. Network critical path and its significance. Network analysis by CPM – Defining scope of work, determining activities, establishing work package logic, preparation of network logic program and draft network. Development of structured network using network drawing rules, Numbering of events and computation of critical path. Numerical problems.

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Section-III

Network Analysis by PERT & PN:

Modeling PERT Network. Estimation of expected activity duration and computation of critical path. Uncertainty in project duration estimation.

Precedence Network Analysis – Modeling procedure analysis of time in PN. Use of PN in repetitive works network. Difference between PN and CPM. Application of Network techniques and their limitations.

Section-IV

Resource Planning:

Planning construction Manpower, Scheduling Construction site workers. Planning Construction Materials Materials quantity estimation. Constrained and unconstrained resource scheduling. Resource usage profile, Resource smoothing, Resource leveling.

Cost Control: Project cost:

Direct and indirect, slope of direct cost curve, Total project cost and optimum duration, Contracting the network for cost optimization.

Text Books:-

- 1) PERT & CPM Principle and application by L.S. Srinath
- 2) Construction Engineering and management by S. Seetharaman
- 3) Project Planning and control with PERT & CPM by B.C. Punmia & Khandelwal

Reference Books:

1. Project Planning Scheduling and Control : The Ultimate Hands-on Guide to Bringing Projects in on Time and on Budget, James P. Lewis, Tata Mcgraw Hill Education (2011)
2. Project Management: A Systems Approach to Planning, Scheduling and Controlling , Harold Kerzner, Wiley(2012)
3. Construction Project Management : Planning, Scheduling and Controlling , K. K. Chitkara, Tata Mcgraw Hill Education(2010)

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4. Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Calin M. Popescu, Chotchai Charoengam, , Wiley, NewYork, 1995.
5. Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Chris Hendrickson and Tung Au, , Prentice Hall, Pittsburgh, 2000.
6. Project Management with CPM, PERT and Precedence Diagramming, Moder, J., C. Scheduling Construction Projects, Phillips and E. Davis, Van Nostrand Reinhold Company, Third Edition, 1983., Willis, E. M., , John Wiley & Sons, 1986.
7. Halpin, D. W., Financial and Cost Concepts for Construction Management, John, Wiley & Sons, New York, 1985

M.Tech (CTM) Scheme & Syllabus

Semester-I

MTCTM -102

QUANTITATIVE METHODS

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

System Engineering: System theory & principles; Decision theory & analysis; Decision under uncertainty & certainty, Risk analysis, Optimization theory for constrained and unconstrained & its techniques.

Section-II

Theory of Probability: Definition of probability; Theorems of probability; Statistical methods; Probability distribution functions & its applications e.g. Normal, Log normal, Beta, Gamma, Pearson and Poisson's distribution; Introduction to correlation and regression; Simple & Multiple regression, Bivariate and Multivariate correlation.

Section-III

Programming Techniques-I: Basics of Optimization, Functions of single and several variables, Constrained and unconstrained Optimality Criteria, Linear programming & applications, Graphical methods, Simplex method; Modified simplex method

Section-IV

Programming Techniques-II: Transportation problem; Assignment Problem, Goal Programming; Integer Programming; Dynamic Programming; Non – Linear Programming. **System Models:** Deterministic models; Probabilistic Models; Queuing model, Game theory; Simulation (Monte Carlo's Simulation)

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Text Books:-

- 1) Engg. Optimization, Theory & Practice by S.S. Rao
- 2) Operation Research: An Introduction by HA Taha
- 3) Operation Research by S.D. Sharma

Reference Books

1. Systems Engineering and Analysis Benjamin S. Blanchard , Wolter J. Fabrycky , (Prentice Hall International Series)
2. Gupta, S.C., and Kapoor, V.K., Fundamentals of mathematical statistics, Sultan Chand and sons, Reprint 2003
3. Gupta, S.C., and Kapoor, V.K., Fundamentals of Applied statistics, Sultan Chand and sons, 2003
4. Veerarajan.T., Probability Statistics and Random processes, TMH, First reprint, 2004
5. Vohra, N.D. " Quantitative Techniques in Management ", Tata McGraw Hill Co., Ltd, New Delhi, 1990
6. Seehroeder, R.G., " Operations Management ", McGraw Hill, USA, 1982
7. Levin, R.I, Rubin, D.S., and Stinsonm J., " Quantitative Approaches to Management" McGraw Hill Book Co., 1988
8. Frank Harrison, E., " The Managerial Decision Making Process ", Houghton Miffin Co. Boston, 1975
9. Varshney, R.L. and Maheswari, K.L., " Managerial Economics ", Sultan Chand, 1975

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Semester-I

MTCTM -103

CONSTRUCTION & CONCRETE TECHNOLOGY

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section I

Introduction of Concrete materials: Admixtures, Fly Ash, Silica fume, blast furnace slag, Rubber fibre, Polymers, Properties of Concrete, Early Age Properties, Strength, Permeability & Durability.

Principles of Concrete mix design: Concrete Mix Design procedure by: IS/ACI/British Standards. Ready Mix Concrete, Concreting Operations-Practices and Equipment, Batching; Mixing; Transporting; Placing and Compacting, Curing.

Section II

Properties and technique of construction: for concrete, Fiber reinforced concrete, light weight concrete, Heavy weight concrete, Foam concrete, High performance Concrete. Special concrete operations, shot Crete, grouting, grunting, under water concreting, hot and cold weather concrete, pumpabale concrete.

Section III

Construction techniques for reinforced concrete: elements-materials, Principles and procedures for beams, slabs, columns, Foundations, walls and tanks, design and fabrication of form work for R.C.C elements,

Prestressed concrete construction-Principle, methods, materials, Tools and equipment for the construction of a prestressed bridges by false work, crane, gantry girder
Inspection and Quality Control of Concrete Construction-Stages, Principles, Checklist, Statistical Controls, procedures.

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SECTION-IV

Bridge Construction:

Basic Bridge Terms: Superstructure, Substructure, Spans and Span Length, Simple and Continuous Spans; **Bridge Plans:** Title and Index Sheet, Boring Data Sheets, Layout Sheet, General Plan, Detail Plan Sheets, Bridge Summary and Estimate of Quantities Sheets, Standard Drawings, Contractor Plans or Drawings; **Construction Controls and Layout:** Horizontal Controls, Vertical Controls, Bridge Construction Layout; **Bridge Construction Techniques:** Pre-cast, Cast in-situ and other methods

Text Books

1. Concrete Technology by M.L. Gambhir
2. Concrete Technology, by Neville and Brooks
3. Properties of Concrete by Neville.
4. Concrete Microstructure, Properties and Materials
5. Concrete Technology – M.S. Shetty.
6. Prestressed Concrete, Krishna Raju, TMH

ReferenceBooks

1. V. Shantha Kumar, Concrete, Oxford University press.
2. A.M. Neville, Properties of concrete, Pearson
3. R.L. Peurifoy & C.L. Schexnaydev, Construction Planning, Equipment and methods, Mc-Graw Hill Higher Edition.
4. Construction equipment, its planning and application by Dr. Mahesh Verma, Pub. Metropolitan Book Co.(P) Ltd.

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Semester-I

MTCTM -104

CONSTRUCTION TECHNIQUES

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

Foundations: Techniques of construction of piles, Cessions, Wells, Cofferdams and diaphragms, Drilling blasting, Underpinning, Shoring and shuttering of foundation.

Section-II

Formwork: Design and construction of different types of formworks and temporary structures, Stationary and slip formwork techniques, Formwork of special structures eg. Shells, Bridges, Towers etc.

Steel Construction: Shop and insitu construction techniques, Different connections, Clearances and tolerances, Erection of steel structures like bridges. Chimneys and trusses.

Section-III

Prefabrication: Modular construction and standardization, Special equipments and plants for industrial production of prefabricated components.

Prestressing: Special equipments and plants for industrial production of prestressed components, Prestressing of bridge girders, Types of bearings, Water tanks and special structures. Bridge construction techniques.

Section-IV

Advanced pavement construction Techniques: Pavement construction using bitumen hot mix plant, Concrete road construction, Fibre reinforced pavement construction, Low cost road construction techniques.

Text Books:

1. Soil Mechanics by Gopal Ranjan , New Age Publishers.

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2. Mahesh Verma, Construction Equipment, its planning & Application, Metropolitan Book Co.(P) Ltd.,
3. Foundation Design Manual by Narayan V. Nayak
4. Prestressed concrete by Rajagopalan
5. Highway Engg by Justo and Khanna
6. Prestressed concrete by T.Y. Lin

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Semester-I

MTCTM -105 MANAGEMENT THEORY IN CONSTRUCTION

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

Special Features of Construction Industry: Significance and importance of construction VIS AVIS other industry Importance of construction industry in National economy. Recognition of construction as industry. Significant differences between construction & other manufacturing. Production and process industry with special reference to planning. Execution finance and other aspects.

Section-II

Management Principles: Concepts and theory. Historical developments. Management functions and processor. Forecasting. Planning, Organizing, Directing, coordinating, Motivating, Controlling and Evaluating. Problems of construction industry influencing management process.

Behavioral Sciences: Principles. Historical development. Individual and group behavior. Group dynamics, Motivational theories, Leadership, Under action.

Section-III

Organization Theory: Introduction. Historical development, Growth and various models. Type of construction organization. Design of organization. Organization systems. Goals, Culture & environment. Developing and self learning organizations.

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Section-IV

Different Management Requirements: Entrepreneurship. Business policy. Corporate planning, SWOT and Goal analysis.

Construction Management:- Principle of Sales, Purchase, Marketing Stores & Site Management on Construction Projects.

Text Books:

- 1) Construction Management & Planning by R. Sengupta
- 2) Handbook of Construction Management by P.K. Joy
- 3) Organizational Behaviour by L.M. Prasad

Reference Books

- 1) Management Machines and Methods in Civil Engineering-John,Christan, John Wiley and Sons
- 2) Quantitative Approaches to Management Levin, R.I, Rubin, D.S., and Stinson J., ,McGraw-Hill Book Co., 1988
- 3) The Managerial Decision Making Process, Frank Harrison, E., , Houghton Mifflin Co., Boston, 1975.
- 4) Managerial Economics Varshney, R.L. and Maheswari, K.L., , Sultan Chand, 1975

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Semester-I

MTCTM -106

CONSTRUCTION & CONCRETE TECHNOLOGY LAB

**L-T-P
0-0-2**

**Sessional Marks: 50
External Marks: 50
Total Marks: 100
Exam duration: 3 hrs**

LIST OF EXPERIMENTS

1. Testing of aggregates-fine and coarse as per BIS procedure.
2. Testing of cement with reference to IS specifications and Cement Grade.
3. Concrete Mix Design for desired grade from given materials.
4. a) Design and testing of workability of concrete for a given C.C. proportion.
b) Design and determination of Cube Strength with given materials and proportions.
c) Design of Concrete Mix proportions.
5. Study of effect of compaction on strength of concrete.
6. Study of effect of plasticizers on workability of concrete.
7. Study of permeability of concrete.
8. Chemical analysis of hardened concrete to determine the cement content.
9. Inspection of a concrete construction site and preparation of report showing correct and incorrect practices.

NOTE:-The students will be required to carry out the seven experiments from the above list and any other two experiments either from the above list or designed by the department.

Reference Books

1. Concrete Technology by M.L. Gambhir
2. Concrete Technology, by Neville and Brooks
3. Properties of Concrete by Neville.
4. Concrete Microstructure, Properties and Materials
5. P.K. Mehta and PJM Monteiro
6. Concrete Technology – M.S. Shetty.

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Semester-I

MTCTM -107

QUANTITATIVE METHODS LAB

L-T-P
0-0-2

Sessional Marks: 50
External Marks: 50
Total Marks: 100
Exam duration: 3 hrs

The students will be required to carry out the following exercise, that are based on the theory course MTCTM-102, Numerical & Optimization Methods, with the help of MatLab /C /C++software, on personal computer.

List of exercises:

1. Write a programme that finds the solution of an equation in single variable using the method of successive bisection.
2. Write a programme that finds the solution of non-linear equation in single variable using the Newton Raphson/Secant method
3. Write a programme that finds the solution of a system of simultaneous algebraic equations using the Gaussian elimination procedure.
4. Write a programme that finds the solution of a system of simultaneous algebraic equations using the Gauss-Seidel iterative method.
5. Write a programme that finds the numerical solution of an ordinary differential equation using the Euler's method.
6. Write a programme that finds the numerical solution of an ordinary differential equation using the Predictor-corrector method.
7. Write a programme that finds the numerical solution of an ordinary differential equation using the Predictor-corrector method.
8. Write a programme that finds the numerical solutions of Elliptic, Parabolic and Hyperbolic partial differential equations using the method of Finite Differences.
9. Write a programme that finds the minimum point of a single variable function in a specified interval using golden section search algorithm.
10. Write a programme that finds the minimum point of a multi variable function using Cauchy's steepest descent algorithm.

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11. Write a programme that finds the minimum point of a constrained optimization problem using penalty function method.
12. Write a programme that finds the optimum point of a constrained optimization problem using genetic algorithm

NOTE:-The students will be required to carry out the seven experiments from the above list and any other two experiments either from the above list or designed by the department.

Reference Books

- 1) MATLAB MANUAL
- 2) Programming with C or C++

Software Packages Required

- 1) MATLAB

Software Languages

- 2) C, C++

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Semester-II

MTCTM -201 CONSTRUCTION CONTRACT MANAGEMENT

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

Quantity Surveying: Basic principles of estimating, Construction costs, Different methods and stages of estimating. Specification of construction items and method of statement. Principles of rate analysis and valuation.

Section-II

Claims and Arbitration: Indian contract act and arbitration act. Variations in work and conditions. Claims and disputes. Liquidated damages. Rights. Responsibilities and duties of client (Owner). Architect. Engineer. Contractor etc. Purchase order as contracts insurance contract and claims.

Section-III

Bidding strategies: Combinatorial and single round auctions, Average bid method: Friedman's Proportions, Competitive bidding, Competition strategies: Lower bid strategies, Joint venture strategies, Public Relation Strategies, Risk Control strategies, Claim Strategies.

Legal Frame Work of Construction: Contract labors act 1970 and other acts and laws, Relating to labors management. Wages. Bonus and Industrial disputes.

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Section-IV

Contract Conditions: Important contract clauses. Terms of payments. Retention. Acceptance and final payment. Time of completion. Extension of time. Maintenance period etc.

Construction Contracts: International contract rules and regulation.

Special Contracts: BOT, BOLT, BOOT, BLT projects, Variation in BOT projects. Infra structural projects.

Text Books

1. Estimating and Costing by B.N. Dutta
2. Estimating and Costing by G.S. Birdie
3. Estimating and Costing by Chakaraborty

Reference books

1. Construction and Contract Management, V. K. Raina, Shroff (2009)
3. Oracle Primavera Contract Management Bi Version 14, Stephen D. Kelly, Steve Kelly, Packt(2012)
4. Contracts and their Management, B. S Ramaswamy, LexisNexis India (2008)
5. Civil Engineering Contracts and Estimates, B.S. Patil, Universities Press
6. Civil Engineering Contracts: An Introduction to Construction Contracts and the IceModel Form of Contract (Engineering Management), Stephen Wearne, Amer Society Of Civil Engineers

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Semester-II

MTCTM -202 CONSTRUCTION ECONOMICS & FINANCE

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

Basic Economic Theories: Principles of managerial economics. Economic theories. Demand analysis and forecasting. Demand elasticity. Cost and production analysis. Production function. Pricing decisions. Policies & practice. Break even analysis. Cash flow discounted cash flow etc cash flow forecasting.

Section-II

Money: Time value of money. Different methods & comparisons. Financial ratios and statements. Ratio and statement analysis. Sinking fund provisions. Project appraisals.

Section-III

Risk Management: Risk and uncertainties in financial decisions. Project risk and firm's risk. Financial risk management. Benefit cost ratio.

Capital Budgeting: Working capital. Capital budgeting and performance budgeting. Project selection. Control and evaluation. Pre and post project evaluation.

Section-IV

Financial Accounting: Book keeping processes of construction industry. The accountancy cycle. Journals. Forms and ledgers etc. for accounting and monitoring labour. Equipment and material costs. PWD a counting procedure and types of financial statements in Government.

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Capital Generation: Banking and other financial institutions like IFCI & IDBI Finance corporation. Stocks and shares. Equity capital. International financing of construction project.

Project Financing: Public-Private Partnership, BOT, BOLT, BOOT, BLT methods

Text Books :

- 1) Mueller, F.W. Integrated cost and schedule control for construction projects.
- 2) Gobourne: Cost control in the construction industry.
- 3) Schedule of rates, specification manuals etc from PWD.
- 4) Chris hendrickson and Tung Au: project Management for construction.
- 5) Datta: material Management procedures, Text and Cases, 2e. Prentice Hall
- 6) Gopalakrishanan, P, Sundaresan, M Material Management- an Integrated Approach, Prentice Hall
- 7) Dobbler and Bart: Purchasing and supplies Management, Text and Cases, 6e.
- 8) Chitkara, K.K. Construction Project Mangement, Tata-McGraw Hill.

Reference Books

- 1) Construction Finance and Economics, Pearson Education Limited
- 2) Construction Economics: A New Approach, Danny , Taylor & Francis Group
- 3) Capital Rules: The Construction of Global Finance , Rawi Abdelal, Harvard University Press
- 4) Value Management in Design and Construction: The Economic Management of Projects, John Kelly, Steven Male, Taylor & Francis Group

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Semester-II

MTCTM- 203

FUNCTIONAL PLANNING, BUILDING SERVICES & MAINTENANCE MANAGEMENT

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section I

Importance of building services, type of services required to keep facility usable, planning of services. Organization structures of services management. Role and administrative functions of supervisors.

Section II

Fire Fighting:

Basic requirement of the works for fighting system, various components of the fire fighting system. Maintenance required of the system, fire fighting in high-rise buildings, commercial/industrial complexes. Public buildings, checklist for fire safety.

Lifts/Elevators, Escalators:

Legal formalities for elevators, various types of lifts, working mechanisms of lift and escalators. Indian standard codes for planning & installations of elevator, inspection & maintenance of lifts.

Section III

Plumbing Services:

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Basics of Plumbing systems. Requirement of Plumbing works, Agency, Activity flow chart for plumbing work. Quality, checking of materials.

Water Supply System:

Water supply and distribution system in high-rise building & other complexes, pumps and pumping mechanisms. Operation & maintenance of fittings & fixtures of water supply & sanitary. Do's & Don'ts for water pipe networks.

Section IV

Telecommunication network, computer network LAN, Electrical network & appliances. Basics of single phase & three phase electrification, precautions and safety measures during electrification. Indian standard codes for electrical appliances & wiring operations & maintenance of network & appliances. Landscaping & Horticulture. Building maintenance management, applications of computer in service management.

Air-Conditioning and Heating:

Flowcharts of air conditioning & heating. Centralised systems, monitoring and working of the equipments, Checklist of inspection, Performance testing. Water proofing. Damp proofing & Termite proofing. Working procedure & stages of work of water proofing for W.C., Bathrooms, Terrace, sloping roof, Basements, tanks. Use of chemicals for water proofing treatment. Role of consultants. Damp proof course. Causes and precautions for Dampness. Anti-termite treatment at pre-construction and post-construction. Routine treatment and precautions.

Text Books :

1. Building Technology IVOR H. Seeley, Mac Millian.
2. Building Finishes, fittings and domestic service Chudley, longman, Scientific and Technical.
3. Fred Hall, Building Services & Equipment, Longman Scientific and Technical.
4. Lee Smith, Harry Slecter, Plumbing Technology, Design and installation Delmar Publisher INC.
5. Fred Hall, Plumbing Cold water supplies, Drainage and Sanitation, Longman Scientific

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& Technical.

6. Roger Greeno, Building Services, Technology and Design, Longman.

7. Norbert Lechner, Heating Cooling, Lighting John Wiley & Sons.

8. Maintenance of Buildings A.C. Panchadari New age international (P) limited
Publishers

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Semester-II

MTCTM -204

PROJECT MANAGEMENT LAB

**L-T-P
0-0-2**

**Sessional Marks:50
External Marks: 50
Total Marks:100
Exam duration: 3 hrs**

List Of Experiments

- 1) To Prepare a L-3 Schedule on Primavera of a Construction Project
- 2) Drawing of S- Curve of a project
- 3) Resource allocation in a schedule
- 4) Manpower Deployment schedule
- 5) Equipment deployment Schedule
- 6) Financial analysis of the project
- 7) Cash Flow analysis
- 8) Progress Monitoring
- 9) Preliminary Cost Estimates
- 10) Sketch Design Cost Estimates
- 11) Tender Document Cost Estimates
- 12) Preparation of Bills of Quantities

Software Packages required:

PRIMAVERA, MS PROJECT, BID Master & 2000 Estimator

NOTE:- The students will be required to carry out nine experiments from the above list and any other two experiments either from the above list or designed by the department.

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Semester-II

MTCTM -210

URBAN HYDROLOGY & WASTE MANAGEMENT

(Elective I)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

Utilization of industrial waste in construction industry, Flyash as building material, ceramic insulator scrap as aggregate in concrete, Use of cement stabilized soil block as an alternative to burnt clay brick, urban solid waste and sludge as building material. Cement and building material from industrial waste, Fa-G brick. Pollution free production of innovative building materials and components, Concrete aggregate from demolition waste. Structural concrete using industrial waste.

Section-II

Industrial Waste: Problem associated with industrial waste. Equalization, neutralization, volume reduction. House keeping method and Advanced treatments like adsorption, Ion exchange, Chemical oxidation. Phosphorus removal, Nitrification, chemical precipitation, Reverse-osmosis, Electrodialysis.

Section-III

Wastewater Treatment: Waste water generation. Collection, Construction of sewer lines. Sewer appurtenances. Disposal of wastewater & refuse. Recycling and reuse.

Hydrology: History of hydrology. Hydrology and its application in engineering, Precipitation, its types, forms & measurements. Rainfall data. DAD curve. Methods of Average rainfall and Losses.

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Section–IV

Ground Water: Zones, aquifer properties, groundwater properties, types and problems, well hydraulics, well losses, ground water investigation.

Hydrographs: Run off-discharge measurement, stage discharges, runoff computation, runoff simulation model, concept of hydrograph, component of hydrograph, Section hydrograph and its derivation. S-hydrograph, IUH hydrograph and its derivation, Synthetic Section hydrograph, Flood estimation techniques.

Text Books:

- 1) Solid Waste management in developing countries by AD Bhide
- 2) Management of Municipal Solid wastes- status and options. Control of Urban Pollution Series, Central Pollution Control Board Delhi
- 3) Applied Hydrology by VT Chow
- 4) Engineering Hydrology by K Subramanya

Semester-II

MTCTM -211 **ADVANCED FOUNDATION ENGINEERING & FIELD PRACTICES**

(Elective-I)

**L-T-P
4-0-0**

**Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs**

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

SECTION-1

Criteria for foundation choice, bearing capacity, total and differential settlement, tolerance for various types of structures. Interpretation of soil profile for design parameters like Modulus of compressibility, modulus of sub grade reaction. Poisson ratio etc.

SECTION-II

Raft foundations for buildings and tower structures including effects of soil structure interaction and non-linearity, different types of rafts and, methods of analysis, precautions for construction of shallow foundations

SECTION-III

Pile foundations, types, method of installation codal practices for permissible loads under vertical and lateral loads, Diaphragm walls, design and construction, foundations for heavy structures., Well and Caisson foundations,

SECTION-IV

Soil Stability.

Retaining walls-Types Elements for design, construction of cantilever and counterfort

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retaining walls. Unbraced excavations, Braced excavations. Sheet Piles and Bulkheads- Types and design of cantilever and Anchored sheet piles; Anchors and Tie backs. Shorting and Underpinning- Necessity, methods & Purpose:

Improvement of Foundation Soils.

Purpose and Methods, a) Improvement of Granular Soils: b) Improvement of Cohesive soils : Preloading or Dewatering, Methods of installing sand drains, drain wicks, Electrical and Thermal methods. c) Grouting : Purpose, Functions Types of grouts; Soil Bentonite-cement mix, cement mix, emulsions, solutions : Grout Injection methods.

d) Geosynthetics : Types, Functions, Manufacturing of geotextiles, Classification of geotextiles. Specific Applications : Bearing capacity improvement, Reinforcement, Retaining walls, Embankment etc. Testing of geosynthetics usage in India and a case study.

Special Considerations in Foundation Design and construction:

Elementary Principles of design and construction of foundations subjected to earthquake Or dynamic loads Special measures for foundations constructed under water. Equipment for foundation subjected to dynamic loads. Underground structures, strategies for instrumentation and monitoring of foundation performance.

Text Books

- 1) Foundation engg-Pech, Hansen and Thornburn
- 2) Foundation Design and Construction, Tomlinson Mj. ELBS Longman, 6, 1996.
- 3) Foundation Analysis and Design, Bowles Joseph E, McGraw Hill, 4 e, 1988.
- 4) Foundation Engineering, Brahma, SP Tata McGraw Hill 1985.
- 5) Construction and Geotechnical Methods in Foundation Koerner, Robert M, Engineering McGraw Hill, 1985.
- 6) Pile foundations, Dinesh Mohan, Oxford & IBH, 1998.
- 7) Modern Foundations , Kurian, N.P., Tata McGraw Hill, 1982. Fang H.Y. Foundation Engineering Handbook, Van Nostrand Reinhold, 2e,
- 8) Application Potential of Geosynthetics in Civil Engineering, Proceedings
- 9) of Workshop Jan. 4-6, 1989 Tata McGraw Hill.

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- 10) Soil Engineering in Theory and practice, Alam Singh & G.R. Chowdhry, CBS Publishers, 2e, 1990.
- 11) Soil Mechanics, Gopal Ranjan
- 12) Soil Mechanics & Foundation Engineering, B.C.Punmia
- 13) soil sampling and Testing, Ramana et-al-TTTI, Chandigarh.

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MTCTM -212 Semester-II PUBLIC PRIVATE PARTNERSHIP CONCEPTS IN CONSTRUCTION

(Elective -1)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section I

Highway Planning in India – Objects, need for highway planning, types of planning, planning surveys, Interpretation, Preparation of Master plans, NTP and NTPC in India. 20 year road development plan including 1st and 2nd 20 year plan in brief and 3rd and 4th 20 year plan in detail. Sources of finance for development and maintenance of road infrastructure. Principles of road use charging, central and state road funds, toll financing and toll policy.

Highway Engineering Economics: principle, supply and demand models, equilibrium, sensitivity of travel demand and elasticity – types, models (Kraft demand model) consumer surplus cost – cost elasticity pricing and subsidy policies, rates of interest, Vehicle operation cost, direct and indirect benefits due to road improvement, Total transportation cost, fixed and variable costs. Road user cost studies in India.

Section II

Economic analysis: different methods, determination of annual cost, benefit cost ratio, IRR, FIRR, NPV. Sensitivity of economic analysis, risk and uncertainties and management decision in capital budgeting. Examples of economic analysis for different

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types of road improvement measures, pavement options, construction of bypasses and upgrading of intersections. Project priorities, methods of dealing with uncertainties.

PPP concepts: Basic concepts of Public Private Partnerships and Built-Operate-Transfer Models: BOT(Toll), BOT(Annuity), Shadow Tolls, DBFO concepts, maintenance – operate – and transfer models. Concerns of various stakeholders – government, concessionaire, lenders and road users. Legal and financial framework. Viability gap funding.

Section III

Risk Allocation and Mitigation: Identification, allocation and mitigation of risks in delivery of BOT projects in road sector. Rights and obligations of parties. Rights of lenders. Model Concession Agreement. Dispute resolution mechanism.

Procurement of PPP projects: Preparation of Feasibility Reports covering technical, social and environmental aspects (for 2lane/4lane/6lane/Expressway) including procurement of consultancy services. Technical schedules for inviting bids for selection of sponsor. Preparation of RFQ, RFP. Bidding criteria. Selection of sponsor. Award of concessions. Pre-construction activities viz. Land Acquisition, Rehabilitation and resettlement of project affected persons, tree cutting, environment management plan, utilities shifting, etc.

Section IV

Financial Issues: Financial assessment (by Government, by prospective bidders and by selected sponsor). Revenue and traffic projections. Cash flow Models including cost recovery, sensitivity analysis. Financial structuring, debt and equity aspects, financial close. Shareholders agreement. Case Studies.

Contract Management: Principles of contract management for PPP projects. Basic differences between FIDIC conditions of contract and Model Concession Agreement. Selection and Role of Independent Engineer.

Text Books

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1. Khanna and Justo, “**Highway Engineering**”- NemChand Publication, Roorkee
2. Kadiyali L.R. “**Traffic Engineering and Transport Planning**”-Khanna Publishers, New Delhi
3. Ian G. Heggie, “**Transportation Engineering Economics**”-McGraw Hill Book Co.
4. Jotin Chisty.C and Kent Lall B “**Transportation Engineering An Introduction**”- PHI, New Delhi.
5. Prasanna Chandra “**Financial Management**”-Tata McGraw, New Delhi.
6. Woods, K.B., Berry, D.S. and Goetz, W.H., “**Highway Engineering**”-McGraw Hill Book Co.
7. Hewes, C.I. and Oglesby, C.H., “**Highway Engineering**”-Asia Publishing House

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Semester-II

MTCTM -213

COMPOSITE MATERIALS

(Elective -1)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-1

FIBRE REINFORCED CONCRETE: Properties of Constituent Materials, Mix Proportions, Mixing and Casting Procedures, Properties of Freshly mixed FRC, Mechanics and properties of Fibre reinforced concrete, Composite Material approach, Application of fibre reinforced concrete.

FLY ASH CONCRETE: Classification of Indian Flyashes, Properties of Flyash, Reaction Mechanism, Proportioning of Flyash concretes, Properties of Flyash concrete in fresh and hardened state, Durability of flyash concrete.

Section-II

POLYMER CONCRETE: Terminology used in polymer concrete, Properties of constituent materials, Polymer impregnated concrete, Polymer modified concrete, Properties and applications of polymer concrete and polymer impregnated concrete.

FERRO CEMENT: Constituent materials and their properties, Mechanical properties of ferro cement, Construction techniques and application of ferro cement.

Section-III

HIGH PERFORMANCE CONCRETE: Materials for high performance concrete, Supplementary cementing materials, Properties and durability of high performance concrete, Introduction to silica fume concrete, Properties and applications of silica fume concrete.

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Section IV

LIGHT WEIGHT CONCRETE: Properties of light weight concretes, Pumice concrete, Aerated cement mortars, No fines concrete, Design and applications of light weight concrete.

Text Books

1. Concrete Technology-A.M. Neville
2. Concrete Technology-M.L. Gambhir.

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Semester-II

MTCTM -220

GEOMATICS ENGINEERING

(Elective -II)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section I

Remote sensing : Physics of remote sensing, Ideal remote sensing system, Remote sensing satellites and their data products, Sensors and orbital characteristics, Spectral reflectance curves, resolution and multiconcept, FCC, Interpretation of remote sensing images. Digital image processing : Satellite image – characteristics and formats, Image histogram, Introduction to image rectification, Image enhancement, Land use and land cover classification system.

Section III

Global positioning system (GPS) : Introduction, Satellite navigation system, GPS- space segment, Control segment, User segment, GPS satellite signals, Receivers; Static, Kinematic and Differential GPS.

Geographic information system (GIS) : Basic concept of geographic data, GIS and its components, Data acquisition, Raster and vector formats, Topography and data models, Spatial modelling, Data output.

Implementing a GIS: Awareness, Developing System Requirements, Evaluation of alternative systems, System justification and Development of an implementation plan, System acquisition and start up, Operation of the system.

Section IV

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Applications in Transportation Engineering: Intelligent Transport System, Urban Transport Planning, Highway Alignment, Traffic Congestion analysis and Accident Studies. Environmental impact assessment, Transport System Management, Road Network Planning, Collecting Road Inventory., Urban Water Hyrology.

Text Books

1. GIS A Management, Perspenfi Stan Aronoff, WDL Publisher.
2. Peter A Burrough Rachael A Mc Donnel, “Principles of GIS” (Oxford), 2000.
3. Christopher Jones, “GIS and Computer cartography” (Longman), 2000.
4. Remote Sensing and geographic Information System, AM, Chanra & S.K. Ghosh, Narosa Pub.
5. Concepts of Geographic Information System, C.P Yeung & Loe, PHI
6. Introduction to Remote Sensing, Lillesand & keifer
7. Global Positioning System, theory & practice, Hofmann and wellenhof, Springer India

Software Packeges & Instruments required

1. GIS & Image Processing Software
2. GPS Unit

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Semester-II

MTCTM -221 PAVEMENT CONSTRUCTION & MAINTENANCE (Elective -II)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section I

Earthwork Machinery: Brief introduction to earthwork machinery: shovel, hoe, clamshell, dragline, bulldozers, cleaning and grubbing, excavation for road and drain, principles of field compaction of embankment/subgrade, compacting equipments.

Construction of Granular and Low Cost Roads: soil stabilization techniques, Construction steps of GSB, WBM and WMM.

Section II

Construction of cement concrete roads: construction of cement concrete pavements, machinery involved in construction, slip-form pavers, and joints in CC pavements, IRC and MORTH specifications.

Construction of bituminous pavements: various types of bituminous constructions. Prime coat, tack coat, seal coat and surface dressing. Construction of premix carpet, BM, DBM and AC.

Section III

Machinery for Construction of Bituminous Roads: bitumen boiler, sprayer, pressure distributor, hot-mix plant, cold-mix plant, tipper trucks, mechanical paver or finisher, rollers. Mastic asphalt. Introduction to various IRC and MORTH specifications.

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Construction of other types of pavements: basic concepts of the following: reinforced cement concrete pavements, prestressed concrete pavements, roller compacted concrete pavements and fibre reinforced concrete pavements. Use of fly ash in cement concrete road construction.

Section IV

Highway maintenance: pavement distresses, condition and evaluation survey, Present serviceability index, Methods of measuring condition, skid resistance, Principles of maintenance, Methods of structural evaluation. Maintenance operations. Maintenance of WBM, bituminous surfaces and cement concrete pavements. Functional and structural evaluation of pavements, pavement maintenance, maintenance management.

Special problems in construction & maintenance of hill roads, land slide, causes, investigation, and preventive and remedial measures, protection of embankment and cut slopes. Drainage –Construction of surface and subsurface drainage system for roads. Drainage of urban roads.

Text Books

1. Khanna and Justo, “Highway Engineering”- Nem Chand and Bros., Roorkee.
2. Khanna and Justo, “Highway Materials Testing”- Nem Chand and Bros., Roorkee.
3. Peurifoy, R.L., and Clifford, JS “Construction Planning Equipment and Method”- McGraw Hill Book Co. Inc.
4. MoRTH ‘Specifications for Roads and Bridges Works’- Indian Roads Congress
5. “Soil Mechanics for Road Engineers”- HMSO Publication
6. “Bituminous materials in Road Construction”-HMSO Publication
7. W.Ronald Hudson, Ralph Haas and Zeniswki “Modern Pavement Management”- Mc Graw Hill and Co.

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8. MoRTH “Manual for Construction and Supervision of Bituminous Works”- 2001, Indian Roads Congress
9. MoRTH “Manual for Maintenance of Roads”- 1989, Indian Roads Congress
10. IRC: 42-1994, IRC:15-2002, IRC SP :11-1988, , 55-2001,57-2001,58-2001, IRC 19-1977, 27-1967,29-1988, 34-1970, 36-1970,48-1972,61-1976, 63-1976, 68-1976, 81-1997,82-1982,84-1983,93-1985, 94-1986, 95-1987, 98-1997, 105-1988, Indian Roads Congress.

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Semester-II

MTCTM -222

ADVANCED CONSTRUCTION FINANCE

(Elective-II)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

An introduction to Indian Financial System and Financial Management. Overview Time value of money. Risks and returns – Portfolio theory. Financial Statements: Financial statement analysis. Funds flow analysis leverages – operating. Financial and total cost volume profit analysis.

Section-II

Budgeting and Financial Forecasting: Responsibility budgeting preparation of operating budget. Performance – budget analysis growth with internal equity. Sales forecast.

Working Capital Management: Working capital leverage. Analysis of working capital components. Inventory management. Financing current assets. Regulation of Bank finance.

Section-III

Capital Budgeting: Tax considerations in investment appraisal, Payback period. Net present value method. Problems with internal rate of return method. Conflicts in ranking as per DCF criteria and their resolution. Capital budgeting under capital rationing and other constraints. Risk analysis of capital investments. Decision tree analysis. Applied utility theory. Cost of capital.

Section-IV

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Long Term Financing: Sources of long term finance. Rating of debt securities. Venture capital. Financial innovation. SEBI guidelines on capital issues. Tender method of public issue. Inflation & financial management.

Text Books :

1. Mueller, F.W. Integrated cost and schedule control for construction projects.
2. Gobourne: Cost control in the construction industry.
3. Schedule of rates, specification manuals etc from PWD.
4. Chris hendrickson and Tung Au: project Management for construction.
5. Datta: material Management procedures, Text and Cases, 2e. Prentice Hall
6. Gopalakrishanan, P, Sundaresan, M Material Management- an Integrated Approach, Prentice Hall
7. Dobbler and Bart: Purchasing and supplies Management, Text and Cases, 6e.
8. Chitkara, K.K. Construction Project Mangement, Tata-McGraw Hill.

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Semester-II

MTCTM -223

EXPERT SYSTEM IN CIVIL ENGINEERING

(Elective-II)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

SECTION-1

Introduction, History of expert system research e.g. acquaintance with researchers and their research fields. Current research activities. Conventional programs vs. Expert Systems Advantages and limitations of expert systems.

SECTION-II

Architecture of an expert system, Components of expert system, Knowledge base, Inference mechanism, User Interface

SECTION-III

Knowledge base: Knowledge Engineering. Nature of expert knowledge., Knowledge acquisition and knowledge representative e.g. rule based systems, Semature nets, frames, Validity nature base, working memory

SECTION-IV

Inference Engine and user interface, techniques for inference mechanism, forward chaining and backward chaining. Interface language, terminal interface. Development of expert systems, Problem formulation, Search spaces, Task for expert system, application to engineering analysis and design, consideration, operations representative application in Civil Engg.

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Text Books

1. Expert System Applications for Structural, Transportation, and Environmental Engineering by M. Arockiasamy, CRC Press
2. Expert Systems: Introduction to First and Second Generation and Hybrid Knowledge Based Systems, Chris Nikolopoulos, Nikolopoulos, Publisher: Marcel Dekker
- 3.

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Semester-III

MTCTM -301

CONSTRUCTION COST MANAGEMENT

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

Project Cost Controlling

Development of Network, Development of Cost/Schedule Control System Criteria (C/SCSE), Monitoring of Project Cost, Cost Schedule Algorithms.

Section-II

Cost Time Trade – off Analysis:

Cost time trade – off curves, Non – convex discontinuous and discrete cost time trade – off curves, Crashing of projects, Heuristic methods, Siemen's method of project cost curve, Trade-off problems.

Section – III

Multi criteria Decision Making Methods:

Analytical Hierarchy Process, and its application in planning and management, Introduction to Fuzzy Set Theory and its Application in MCDM.

Section-IV

Value Engineering:

Principles of value engineering in Project Management, Value engineering technique, Job Plans, Life cycle costing and its applications.

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Productivity in Construction: Definition of Productivity. Productivity measurements. Productivity of production components, Labors, Equipment and Material capital productivity. Planning, Designing and execution processes.

Text Books :

- 1) Project Management by Pragya & Chandra
- 2) Mueller, F.W. Integrated cost and schedule control for construction projects.
- 3) Gobourne: Cost control in the construction industry.

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Semester-III

MTCTM -302 DISASTER MANAGEMENT

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

SECTION-1

Disaster Reduction

Earthquake resistant design of structures, Response spectra and design earthquake parameters, Principles and philosophies, Codal provisions, Factors affecting damage to structure, Enforcement of codal provisions, Strong motion instrumentation and data processing, Effective rescue operation, General planning and design aspects, Conventional earthquake resistant design, Seismic base isolation method, retrofitting, Training and lecturing at various levels, Preparedness to meet earthquake disaster, Programmes for public awareness, demonstrations and exhibitions, information management (Safety, emergencies, management and planning, design, response, user experience problems and case studies), proper land use practices, long term disaster preparedness measures.

SECTION-II

Precautions after a major earthquake, preparedness for medical supply Emergency care (First aid, Home remedies), Disposal of dead bodies (Human and Cattle), Care for old and orphans.

SECTION-III

Indirect Damages

Damage due to ground failures, Landslides, rockslides, liquefaction, fire, floods, tsunamis, release of hazardous material like poisonous gas, nuclear radiation.

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SECTION-IV

Disaster Management

Management cell, Central crisis management core group, damage reconnaissance, Management of relief and rehabilitation (Infra-structure rehabilitation, Housing rehabilitation, Social rehabilitation), Role of volunteers, Emergency operation centres, Information system, Danger zone restrictions, Cooperation with local authority, Coordination for international relief, Role of Government, NGO's, Business and donors, Role of remote sensing in relief operations, Information management and related technologies in engineering and disaster management.

The Design and management of Disaster Information Resource Network, Asian Disaster Preparedness Centre, Regional data base, Contacts and Sources, CD-ROM Library for Natural Disaster Management, Regional Disaster Documentation Centre, Non Governmental Organisations.

Text Books:

- 1) Disaster Management & Preparedness by Thomas D. Schneid
- 2) At Risk: Natural Hazards, People vulnerability & Disaster by Ben Wisner

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Semester-III

MTCTM -310

PROJECT MANAGEMENT

(Elective-III)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

Waste Management: Introduction to waste and waste management. The concepts of waste productivity and its interrelationship with productivity. System concept of waste. Complementarily of waste and resource management.

Section-II

Quality Management: Concept of quality management. Product vs. system quality. Quality assurance. Quality circles. Total quality management. ISO-9000 series and construction project.

Materials & Inventory Management: Material management. Requirements and purchases. Different methods of inventory management. Mathematical modeling. Suitable inventory model for construction.

Section-III

Risk Management: Decision theory, Decision under certainty. Probability and uncertainty, Decision risks. Risks involved in decisions pertaining to construction industry. Risk management, Insurance against risks.

Section-IV

Management Information System: Principles of management information systems. Necessity and importance. Requirements of a good M.I.S. as a tool of data collection and

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dissimination. Use of table and charts. Artificial intelligence. Expert systems. Decision support systems.

Text Books:

- 1) Management Information System by W.S. Jawadekar
- 2) Total Project Management by PK Joy
- 3) Construction Management and Planning by R. Sengupta

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Semester-III

MTCTM -311 INFRASTRUCTURE PROJECT MANAGEMENT (Elective-III)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section-I

Nature & Type of Infrastructure Projects, Characteristics, Scope and Status of Infrastructure Projects in India.

Section-II

Issues of Developing, Funding, Financing and Managing Infrastructure Projects, Various Construction Procurement Options.

Section-III

Uncertainties & Risks in Large Scale Construction Projects. Study of various factors affecting the Cash flow of project and minimizing the risk.

Section-IV

Role of I.T. in Infrastructure Development, Sustainable Infrastructure Development for Competitiveness. Safety Measures in Infrastructure Projects. Safety guidelines for Large scale project, Safety management, Training for safety measures

Text Books

- 1) Ministry of Road Transport and Highways, "Road Development Plan for India"- 2001-2021, Indian Roads Congress, New Delhi, 2002.
- 2) "Road User Cost Study in India"- Final Report, Central Road Research Institute
- 3) Prasanna Chandra "Financial Management

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Semester-III

MTCTM -312 **FINANCIAL MANAGEMENT FOR CIVIL ENGINEERING PROJECTS** (Elective-III)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section I

Meaning and scope of finance management, basic concept of time value of money and cost of capital project cash flow. Assessment of risk, evaluating real estate projects. Long term financial institutions and their appraisal. Working capital management: Working capital policy.

Section II

Cash budgeting, receivables management and control inventory management. Order quantity and order points. Monitoring and control.

Section III

Sources, bank financing, security assessment methods. Finance planning, forecasting, budgeting EVA approach, budgetary control systems, procedure for master budget, key factors, cash flow forecasts. Tax planning & procedure: divisional performance, responsibility accounting, profit centre approach.

Section IV

Corporate governance concept, regulations in India Current development in construction finance management. Revival of firms in financial distress. Monitoring and control of funds and cash flows – MIS Role of computers. Case studies on housing projects, commercial complexes , service apartments.

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Text Books

- 1) Building planning designing and scheduling – Gurcharan Singh
- 2) Mueller, F.W. Integrated cost and schedule control for construction projects.
- 3) Gobourne: Cost control in the construction industry.
- 4) Schedule of rates, specification manuals etc from PWD.
- 5) Chris hendrickson and Tung Au: project Management for construction.
- 6) Datta: material Management procedures, Text and Cases, 2e. Prentice Hall
- 7) Gopalakrishanan, P, Sundaresan, M Material Management- an Integrated Approach, Prentice
- 8) Dobbler and Bart: Purchasing and supplies Management, Text and Cases, 6e.
- 9) Chitkara, K.K. Construction Project Mangement, Tata-McGraw Hill.

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MTCTM -313

HUMAN RESOURCE MANAGEMENT

(Elective-III)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section I

Understanding Human Beings and Their Psychological Conception: Needs, drives, perceptions, values, attitudes, attitude change. Motivation Concepts and applications. Work and Careers. Group behavior and group decision making conflict and negotiation and power and politics in organizations. Organizations. Organization systems and behavior processes therein. Theology of organizations. Group dynamics. Span of control.

Section II

Human resources and their importance. HRD systems-goals-mechanism. HR systems and strategies. HRM differentiated from personnel management.

Section III

HR Management : Team building. Career planning. Succession planning/Communication. Motivation. Change management HR audit. HRM surveys and study methods. Role of HRD in improving quality of products and services, efficiency and effectiveness of individuals, technology, productivity and incomes. Training and development. Job enrichment and enlargement. Job rotation.

Section IV

Leadership: Theories and practices. Types and styles of leadership. Influence and power. Criteria for effective leadership.

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Text Books:

- 1) Human Resource & Personnel Management by K. Aswathappa
- 2) Personnel Management by CB Mamoria
- 3) Organisational Behaviour by Dr. LM Prasad

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MTCTM -314 ENVIRONMENTAL IMPACT ASSESSMENT

(Elective-III)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

SECTION I

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

SECTION – II

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of activities.

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

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SECTION – III

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

SECTION-IV

Post Audit activities, The Environmental pollution Act, The water Act, Water Cess Act, The Air (Prevention & Control of pollution Act.), Mota Act, Wild life Act.

Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

- 1 Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
- 3.Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katania & Sons Publication., New Delhi.
4. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

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Semester-III

MTCTM -315 EMBANKMENT CONSTRUCTION & MANAGEMENT

(Elective-III)

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section I

Lateral Supports in Open Cuts, Stability of Hill sides and Slopes in Open Cuts- Causes and General Characteristics of Slope Failure, Engineering Problems Involving the Stability of Slopes, Standard Slopes, Stability of Slopes and Cuts in Sand, Loess, Clay Containing Layers or Pockets of Water Bearing Sand, Quick Clay Flows, Slides in Soft, stiff clay

Section II

Design and Stability of Embankments, Modern Practice for Railway and Highway Fills, Levees OR Dikes, Types of Base Failures, Methods of Investigating Stability, Fills on Very Soft Organic Silt or Clay, Fills on Homogeneous Clay, Varieties of Failure by Spreading

Section III

Methods for Increasing Stability of Fills above Thin Strata of Soft Clay

Landslide phenomenon: Types and causes of slope failures, Practical applications ; Stability analysis of infinite slopes with or without water pressures ; Stability analysis of finite and Infinite slopes: concept of factor of safety, pore pressure coefficients, Mass analysis, Wedge methods, friction circle method ; Method of slices, Bishop's method, Janbu's method ; Effect of seepage, submerged and sudden draw down conditions ; Design of slopes in cutting, Embankments and Earth dams ; Site Investigation: Reconnaissance, Preliminary and detailed investigation, Investigation for foundations ; Advances in stability analysis of slopes,

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Section IV

Slope Stabilization Techniques: Reinforced Soil, Geosynthetics, Soil Nailing, Influence of Compaction on Rigid Vertical Walls, Earth Pressure against Non-yielding Retaining Walls,

Large Scale Model Tests and Field Observations.

Text Books:

1. Slope Stability and Stabilization Methods, Willey Interscience publications
2. Soil Mechanics & foundation engineering Gopal raja
3. Geotechnical Engineering, C.Venkata Ramaiah
4. Soil Mechanics, B.C.Punmia

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Semester-III

MTCTM -316 PLANNING & DESIGNING OF AN INTEGRATED LARGE TOWNSHIP

ELECTIVE-III

L-T-P
4-0-0

Sessional Marks: 50
External Marks: 100
Total Marks: 150
Exam duration: 3 hrs

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

Section –I

Basic Principles of Planning

Introduction to Planning, Necessity and Need of integrated townships, Methods and principle of planning, Various Planning Techniques and Modern Survey methods.

Planning and Legal Aspects: An over view of legal tools connected with town Planning and Development, Town Planning Act, Master Plans and Town Planning Schemes. Various Acts related to urban governance, planning and development organizations, land resources, environment protection, and public participation in statutory planning process;

Section-II

Infrastructure Planning: Water Supply and Sanitation: Quantity and quality, source of supply, transmission and distribution, treatment methods, design guidelines. Sanitation – concepts, disposal systems, low cost sanitation options; engineering aspects of sewage disposal; Wastewater – generation, disposal system Storm water drainage – systems, Solid Waste Disposal and Management: Basic principles, generation, characteristics, collection, disposal, management., Fire and Electrification, and Social Infrastructure: Planning for fire protection, services and space standards, location criteria; Planning for

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Education, health, civic, cultural infrastructure, Traffic and Transportation: Planning for infrastructure and facilities for transport

Section-III

Earth Quake resistant structures: Basic Concepts, Design Considerations, BIS recommended Planning, analysis and design. Green Buildings: Basic Concepts, Eco friendly planning and designing of integrated townships.

Section IV

Structural design: Basic Concepts in Structural design and Analysis, Structural designing of various infrastructures (Steel & Concrete) using STAAD PRO and AUTO CAD Work Station.

Text Books

1. Principles and practice of town planning, Lewis B. Keeble, Estates Gazette
2. Managing Urban Water Supply Gathe Donald E.; Billings, R. Bruce; Buras, Nathan, 2003 Dordrecht, Kulwer Academic Press.
3. Water of India 2000 Ghosh, G.K. A.P.H. Publishing Corporation 3 Yadav, Satish Water Problems and its Management, 2004 Hope India Publications
4. Urban Water Supply Handbook 2002 W'Mays Larry McGraw Hill Handbook 5 Butter, David Urban Drainage 2004 David Butter & John W. Davis Spon Press (Iind Edition) London & New york, 2004.

Software Packages Required : STAAD PRO V8i, AUTOCAD 3D WORK STATION

Instruments Required: Total Station, Auto Level, GPS unit.

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Semester-III

MTCTM - 303 PROJECT

L- T- P
0-0- 3

Sessional Marks : 50
External Marks : 50
Total marks: 100

Every student will have to carry out Project under the guidance of Supervisor(s). The topic shall be approved by a Committee constituted by the Head of the concerned Deptt. Topic may or may not be related to his/her dissertation and should be practical based. Every student will be required submit the report of his project work and the same has to be presented in front of the Committee constituted by head of the department. The committee constituted will screen the whole project to award the marks.

Semester-III

MTCTM -304 SEMINAR

L- T- P
0- 0- 2

Sessionals Marks : 50
Total Marks : 50

Student has to choose topic of his interest in an emerging area with approval of supervisor and Committee, appointed by Head of the Department for this purpose. He/she has to do an in depth exhaustive study on his topic throughout the semester under the guidance of his supervisor. At the end of the semester, student has to submit report. He will present his work in a seminar. Evaluation will be based on continuous monitoring of his contribution during the semester by his supervisor and the report and seminar evaluation by the Committee appointed by Head of the Department.

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Semester-III

MTCTM-305 DISSERTATION PHASE-I

L- T- P
0- 0- 6

Sessionals Marks :100
Total Marks : 100

Every student will have to carry out Dissertation under the guidance of Supervisor(s). The topic shall be approved by a Committee constituted by the Head of the concerned Deptt. Selection of Topic of Dissertation is based on mutual interest of student and supervisor(s).

The term work under this, submitted by the student shall include –

1. Work diary maintained by the student and counter signed by his guide.
2. The contents of work diary shall reflect the efforts taken by candidate for
 - (a) Searching the suitable project work
 - (b) Visits to different factories or organizations
 - (c) Brief report of journals and various papers referred
 - (d) Brief report of web sites seen for project work
 - (e) The brief of feasibility studies carried to come to final conclusion
 - (f) Rough sketches
 - (g) Design/Analysis carried by the student.

The student has to make a presentation in front of panel of experts in addition to guide as decided by department head.

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Semester-IV

MTCTM -401

DISSERTATION FINAL PHASE

L- T- P
0- 0- 24

Sessional Marks : 200
External Marks : 400
Total Marks : 600
Duration of Exam:3 hrs.

The Dissertation Phase-1 will be continued as dissertation in Semester-IV. The award of sessional marks will be done by an internal Committee constituted by the Head of the Deptt and assessment shall be based on presentation (s), report, etc. before this committee.

At the end of the semester, every student will be required to submit three bound copies of his/her Master's dissertation of the office of the concerned Department. Out of these, one copy will be kept for department record & one copy shall be for the supervisor. A copy of the dissertation will be sent to the external examiner by mail by the concerned department, after his/her appointment and intimation from the university. Dissertation will be evaluated by a committee of examiners consisting of the Head of the Department, dissertation supervisor(s) and one external examiner. The external examiner shall be appointed by the University from a panel of examiners submitted by the respective Head of Deptt., to the Chairman, Board of Studies. In case the external examiner so appointed by the University does not turn up, the Director/ Principal of the concerned college, on the recommendation of the concerned Head of the Deptt. Shall be authorized, on behalf of the University., to appoint an external examiner from some other institution. The student will defend his/her dissertation through presentation before this committee and the committee will award the Marks. In case of any modifications, or suggestions made by External Examiner student shall have to incorporate those corrections or modifications and he/she has to resubmit the dissertation.

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Format of Dissertation Report

The dissertation submitted by the student on topic already approved by university authorities on the basis of initial synopsis submitted by the candidate shall be according to following guidelines:

The dissertation work report shall be typed with 1.5 spacing, printing on both sides on A4 bond paper. The total number of pages shall not be more than 150 and not less than 60. Figures, graphs, annexures etc. be added as per requirement. The report should be written in the following format.

1. Title sheet
2. Certificate
3. Acknowledgement
4. List of figures / photographs / graphs / tables
5. Abbreviations
6. Abstract / final synopsis
7. Contents
8. Text with usual scheme of chapters
9. Discussion of the results and conclusion
10. Bibliography (The source of illustrative matter be acknowledged clearly at appropriate place)