Shri Jagdishprasad Jhabarmal Tibrewala University

(Civil Engineering Department)

Detailed Syllabus of M.Tech.

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
श्री जगदीशप्रसाद झाबरमल टीबडेवाला विश्वविद्यालय

INSTITUTE OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
Teaching & Scheme of Examination for M.Tech (Construction Technology and Management)
EFFECTIVE FROM ACADEMICSESSION 2013-2017

Year: I **Semester: I**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	MCTM-101	Project Planning & Control	2		-	3	30/12	70/28	100/40
2	MCTM-102	Civil Engineering Materials	2		-	3	30/12	70/28	100/40
3	MCTM-103	Quantitative Methods in Construction Management	2		-	3	30/12	70/28	100/40
4	MCTM-104	Construction Engineering Practices	2		-	3	30/12	70/28	100/40
Practical's									
5	MCTM-105	Computational Laboratory for Construction Management	-	-	3	3	40/16	60/24	100/40
		Total	**8**		**3**				**500**
		Total Teaching Load	**11**						

M.Tech Civil (Construction Technology and Management), First Semester

Note: Eight (08) questions are to be set covering the entire syllabus. Students will be required to attempt any five (05) questions attempting one (1) question from each Unit.

MCTM- 101 Project Planning & Control

Unit 1: Work-study, work breakdown structure, Time estimates, Applications of CPM/PERT, statical concepts.

Unit 2: Man-Material-Machinery-Money optimization, scheduling, monitoring, updating. Cost functions, time-cost trade off,

Unit 3: resource planning-leveling and allocation. Resources - based networks, crashing, master networks, interface activities and dependencies, line of balancing techniques,

Unit 4: line of balancing techniques, application of digital computers, Material management, purchases management and inventory control, ABC analysis, Human Resource Management.

Reference Books:

1) Chitkara. K.K. Construction Project Management: Planning Scheduling and Control Tata McGraw Hill Publishing Company, New Delhi, 1998
2) Calin M. Popescu, Chotchal Charoenngam, Project Planning, Scheduling and Control in Construction : An Encyclopedia of terms and Applications, Wiley, New York, 1995
3) Chris Hendrickson and Tung Au, Project Management for Construction - Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall Pittsburgh, 2000
4) Moder, J., C. Phillips and E. Davis, Project Management with CPM, PERT and Precedence Diagramming, Van Nostrand Reinhold Company, Third Edition, 1983
5) Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 1986
6) Halpin, D. W. Financial and Cost Concepts for Construction Management, John Wiley & Sons. New York, 1985

MCTM-102 Civil Engineering Materials

Unit 1: Cement selection for civil works. Concrete making materials. Fresh concrete and its rheological properties.

Unit 2: Mechanical, deformational behavior and microstructure of hardened concrete. Creep and shrinkage.

Unit 3: Laboratory testing of concrete. Durability of plain and reinforced concrete.

Unit 4: Structural steels including alloyed and cold-worked steels.

Reference Books:

1) Metha P.K and Monteiro.P.J.M, " CONCRETE", Microstructure, Properties and Materials, Third Edition, Tata McGraw- Hill Publishing company Limited, New Delhi, 2006
2) Shetty .M.S., " Concrete Technology, Theory and Practice", Revised Edition, S. Chand & company Ltd., New Delhi,2006
3) Neville. A.M. , " Properties of Concrete", 4th Edition Longman,1995
4) Mindass and Young, " Concrete", Prentice Hall.1998

MCTM-103 Quantitative Methods in Construction Management

Unit 1: Introduction and concepts of probability and statistics, Linear programming.

Unit 2: Transportation and assignment problems.

Unit 3: Dynamic programming, Queuing theory, Decision theory, Games theory simulations applied to construction.

Unit 4: Modifications and improvement on CPM/PERT techniques.

Reference Books:

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

MCTM-104 Construction Engineering Practices

Unit 1: Concrete Construction methods, form work design and scaffolding, slip form and other moving forms.

Unit 2: Pumping of concrete and grouting mass concreting (roller compacted concrete), ready mixed concrete.

Unit 3: Various methods of placing and handling concrete, Accelerated curing.

Unit 4: Hot and cold weather concreting, under water concreting, Pre-stressing.

Reference Books:

1) Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications, 1995
2) Patrick Powers .J, Construction Dewatering: New Methods and Applications John Wiley & Sons, 1992
3) Jerry Irvine, Advanced Construction Techniques CA Rockers, 1984
4) Peurifoy, R.L., Ledbetter, W.B. and Schexnayder. C, Construction Planning Equipment and Methods, McGraw Hill. Singapore 1995
5) Sharma S.C. Construction Equipment and Management, Khanna Publishers, Delhi, 1988
6) Deodhar, S.V. Construction Equipment and Job Planning Khanna Publishers Delhi, 1988
7) Dr. Mahesh Varma, Construction Equipment and its planning and application, Metropolitan Book.

MCTM-105 Computational Laboratory for Construction Management

List of Experiments:

PRIMAVERA

1. Planning and Scheduling of Multi storied building
2. Planning and scheduling of Road Project
3. Prepare the resource sheet, assign and level the resource
4. Preparing different reports available in Primavera
5. Plot the variance graphs for the given Project

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Year: I **Semester: II**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	MCTM-201	Construction Methods & Equipment	2		-	3	30/12	70/28	100/40
2	MCTM-202	Management of Quality & Safety in Construction	2		-	3	30/12	70/28	100/40
3	MCTM-203	Building Services & Maintenance Management	2		-	3	30/12	70/28	100/40
4	MCTM-204	Construction & Contract Management	2		-	3	30/12	70/28	100/40
Practical's									
5	MCTM-205	Quality Control in Construction	-	-	3	3	40/16	60/24	100/40
		Total	**8**		**3**				**500**
		Total Teaching Load	**11**						

M.Tech Civil (Construction Technology and Management), Second Semester

Note: Eight (08) questions are to be set covering the entire syllabus. Students will be required to attempt any five (05) questions attempting one (1) question from each Unit.

MCTM- 201 Construction Methods & Equipment

Unit 1: Factors affecting selection of equipment - technical and economic, construction engineering fundamentals,

Unit 2: Analysis of production outputs and costs, Characteristics and performances of equipment for Earth moving,

Unit 3: Erection, Material transport, Pile driving, Dewatering,

Unit 4: Concrete construction (including batching, mixing, transport, and placement) and Tunneling.

Reference Books:

1. Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications, 1995
2. Patrick Powers .J, Construction Dewatering: New Methods and Applications John Wiley & Sons, 1992
3. Jerry Irvine, Advanced Construction Techniques CA Rockers, 1984
4. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder.C, Construction Planning Equipment and Methods, McGraw Hill. Singapore 1995
5. Sharma S.C. Construction Equipment and Management, Khanna Publishers, Delhi, 1988
6. Deodhar, S.V. Construction Equipment and Job Planning Khanna Publishers Delhi, 1988
7. Dr. Mahesh Varma, Construction Equipment and its planning and application, Metropolitan Book Company, New Delhi 1983

MCTM-202 Management of Quality & Safety in Construction

Unit 1: Introduction to quality. Planning and control of quality during design of structures. Quantitative techniques in quality control. Quality assurance during construction. Inspection of materials and machinery. In process inspection and test.

Unit 2: Preparation of quality manuals, check-list and inspection report. Establishing quality assurance system. Quality standards/codes in design and construction. Concept and philosophy of total quality management (TQM).Training in quality and quality management systems (ISO-9000).

Unit 3: Concept of safety. Factors affecting safety: Physiological, Psychological and Technological. Planning for safety provisions. Structural safety. Safety consideration during construction, demolition and during use of equipment. Management of accidents/injuries and provision of first aid. Provisional aspect of safety. Site management with regard to safety recommendations.

Unit 4: Training for safety awareness and implementation. Formulation of safety manuals. Safety legislation, standards/codes with regard to construction. Quality vs. Safety. Case Studies.

Reference Books:

1. Richard J. Coble, Theo C. Haupt, Jimmie Hinze, “The Management of Construction Safety and Health”, Taylor & Francis, 2000, 905809328X, 9789058093288
2. Abdul Razzak Rumane, “Quality Management in Construction Projects”, Taylor & Francis, 2010, ISBN 1439838712, 9781439838716
3. Tim Howarth, Paul Watson, “Construction Safety Management”, John Wiley & Sons, 2008, ISBN 1405186607, 9781405186605
4. Phil Hughes, Ed Ferrett, “Introduction to Health and Safety in Construction: The Handbook for Construction Professionals and Students on Nebosh and Other Construction Courses”, Edition 3, Publisher Routledge, 2008, ISBN 1856175219, 9781856175210

MCTM-203 Building Services & Maintenance Management

Unit 1: Components of urban forms and their planning. Concepts of neighborhood unit. Street system and layout in a neighborhood.

Unit 2: Functional planning of buildings, optimization of space: Spatial Synthesis graphical techniques,

heuristic procedures, formulation of linear and non-linear optimization problem. Space requirements and relationships for typical buildings, like residential offices, hospitals, etc.
Standard fire, fire list, fire resistance, classification of buildings, means of escape, alarms, etc.

Unit 3: Engineering services in a building as a systems. Lifts, escalators, cold and hot water systems, waster water systems, and electrical systems.

Unit 4: Building Maintenance: Scheduled and contingency maintenance planning. M.I.S. for building maintenance. Maintenance standards. Economic maintenance decisions.

Reference Books:

1) G. M. Fair, J. C. Geyer and D. Okun, Water and waste Engineering, Vol.II, John Wiley & sons, Inc., New York. 1968
2) R. G. Hopkinson and J. D. Kay , The Lighting of buildings ,Faber and Faber, London, 1969
3) Hand book for Building Engineers in Metric systems, NBC, New Delhi, 1968
4) Philips Lighting in Architecture Designs, McGraw Hill, New York, 1964
5) Time saver Standards for Architecture Design Data , Callendar JH ,McGraw Hill, 1974
6) William H. Severns and Julian R. Fellows, Air conditioning and refrigeration ,John Wily and sons,

MCTM-204 Construction & Contract Management

Unit 1: Project cost estimation, rate analysis, overhead charges, bidding models and bidding strategies. Qualification of bidders. Tendering and contractual procedures, Indian Contract Act1872,

Unit 2: Definition of Contract and its applicability. Types of contracts, International contracts, Conditions and specifications of contract. Contract administration,

Unit 3: Claims, compensation and disputes, Dispute resolution techniques, Arbitration and Conciliation Act 1996, Arbitration case studies,

Unit 4: Professional ethics, Duties and responsibilities of parties. Management Information systems, Risk analysis, Value engineering.

Reference Books:

1) Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, M. M. Tripathi Private Ltd., Bombay, 1982 Tamilnadu PWD Code, 1986
2) Jimmie Hinze, Construction Contracts, McGraw Hill, 2001
3) Joseph T. Bockrath, Contracts, the Legal Environment for Engineers and Architects, McGraw Hiii, 2000
4) Oxley Rand Posicit, Management Techniques applied to the Construction Industry, Granda Publishing Ltd.,1980

MCTM-205 Quality Control in Construction

List of Experiments:

1. Mix Design of Concrete
2. Tests on fresh concrete
3. Tests on hardened concrete
4. In-situ Strength determination by Rebound Hammer.
5. Measurement of Moisture content in aggregates, soil and hardened concrete surface using NDT techniques.
6. Pull-Out Tests on concrete
7. Effect of Chemical admixtures on fresh and harden properties of concrete
8. Effect of mineral admixtures on fresh and harden properties of concrete
9. Tests on Bitumen materials
10. Tests on Course aggregates for road construction

Reference Books:

1) Metha P.K and Monteiro. P. J. M. " CONCRETE", Microstructure, Properties and Materials, Third Edition, Tata McGraw- Hill Publishing company Limited, New Delhi, 2006
2) Shetty .M.S., " Concrete Technology, Theory and Practice", Revised Edition, S. Chand & company Ltd., New Delhi,2006
3) Neville. A.M. , " Properties of Concrete", 4th Edition Longman,1995
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Year: II **Semester: III**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Theory									
1	MCTM-301	Construction Economics & Finance	2		-	3	30/12	70/28	100/40
2	MCTM-302	GIS in Construction Engineering and Management Reliability	2		-	3	30/12	70/28	100/40
Practical's									
5	MCTM-303	Synopsis	-	-	3	3	40/16	60/24	100/40
Total			**4**		**3**				**300**
Total Teaching Load			**7**						

MCTM- 301 Construction Economics & Finance

Unit 1: Construction accounting, Income statement. Depreciation and amortization. Engineering economics, Time value of money, discounted cash flow, NPV, ROR, PI, Bases of comparison, Incremental rate of return,

Unit 2: Benefit-cost analysis, Replacement analysis, Break even analysis. Risks and uncertainties and management decision in capital budgeting. Taxation and inflation. Work pricing, cost elements of contract, bidding and award,

Unit 3: Revision due to unforeseen causes, escalation. Turnkey activities, Project appraisal and project yield. Working capital management,

Unit 4: financial plan and multiple source of finance. International finance, Budgeting and budgetary control, Performance
budgeting. appraisal through financial statements, Practical problems and case studies.

Reference Books:

1) Eugene F. Brigham, Michael C. Ehrhardt, "Financial Management Theory and Practice", Cengage Learning, 2010
2) Simon A. Burtonshaw-Gunn, "Risk and Financial Management in Construction", Gower Publishing, Ltd., 2009
3) Warneer Z, Hirsch, Urban Economics, Macmillan, New York, 1993

MCM-403 GIS in Construction Engineering and Management Reliability

Unit 1:GIS Basic Concepts Definition - Components of GIS -Maps - Definition - Types of Maps - Characteristics of Maps - Map Projections -- Hardware, Software and Organizational Context - GIS software.

Unit 2: Data Types - Spatial and Non-Spatial - Spatial Data - Points, Lines and areas- Non-spatial data - Nominal, Ordinal, Interval and Ratio - Digitizer - Scanner - Editing and Cleaning - Geo reference data.

Unit 3: Raster and Vector Data Structure - Raster data storage - Run length, Chain and Block Coding - Vector Data Storage - Topology – Topological Models - Arc Node Structure - Surface Data - DEM - Grid DEM and TIN structure- Applications of DEM.

Unit 4: Reclassification - Measurement - Buffering - Overlaying - SQL for Queries - Neighborhood and zonal operations - Data Quality - Components of data quality - Sources of errors in GIS - Meta data. Output - Maps, Graphs, Charts, Plots, Reports - Printers – Plotters. Fields of application - Natural Resource Management, construction management-Parcel based, AM/FM applications examples - Case study

Reference Books:

1. Burrough P.A., Principles of GIS for Land Resources Assessment, Oxford Publication, 1998
2. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press,1996
3. Anji Reddy, Remote Sensing and Geographical Information Systems , BS Publications 2001
4. Srinivas M.G. (Edited by), Remote Sensing Applications, Narosa Publishing House, 2001
5. Rhind, D., Understanding of GIS, The ARC / INFO Method, ESRI Press. 1990

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Year: II **Semester: IV**

S. No.	Subject Code	Subject Name	Hrs./Week			Exam Hrs.	Maximum & Minimum Marks		
			L	T	P		Internal/ Min. Pass Marks	External/ Min. Pass Marks	Total/Min. Pass Marks
Practical's									
1	MCTM-401	Dissertation			3	3	60/24	140/56	200/80
Total					**3**				**200**
Total Teaching Load			**3**						