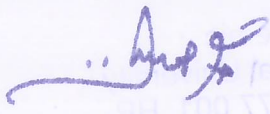


**M. TECH. PROGRAMME**  
in  
**CONSTRUCTION ENGINEERING AND**  
**MANAGEMENT**  
(Regular)



**HIMACHAL PRADESH TECHNICAL  
UNIVERSITY, HAMIRPUR**

  
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**HIMACHAL PRADESH TECHNICAL UNIVERSITY, HAMIRPUR (H.P.)**  
**CURRICULUM FOR M. TECH. IN CONSTRUCTION ENGINEERING AND**  
**MANAGEMENT**

**1. DURATION OF THE PROGRAMME**

A student is ordinarily expected to complete the M. Tech. program in Construction Engineering & Management in four semesters from the date of initial registration. However, a student may complete the program at a slower pace by taking more time, but in any case, not more than 8 semesters (4 years) from the date of initial registration. Further, extension in genuine hardship cases can be allowed by the Vice-Chancellor of H.P. Technical University Hamirpur, (H.P.) and as per the prevailing rule and regulations & ordinance of H.P. Technical University.

**2. STRUCTURE OF THE PROGRAM**

M. Tech. program shall be designed to have a minimum of 74 and a maximum of 80 credits. A candidate has to earn a minimum of 74 credits for successful completion of M. Tech. degree under different categories of courses as follows:

S No	Program Component	Minimum Credit
1	Compulsory Core (including Theory, Laboratory & Seminar)	26
2	Elective courses	16
3	Dissertation	32

**2. ASSESSMENT & EVALUATION**

The assessment of the candidate shall be based on continuous assessment. Each course shall have two components of assessment i.e., Internal Assessment (Component-I) and External Assessment (end semester examination/evaluation - Component-II). The process of assessment/evaluation will be as per the ordinance of M. Tech. prescribed by Himachal Pradesh Technical University.

**3. DISSERTATION**

Every candidate shall be required to submit the Dissertation work on a topic approved by Dissertation Assessment Committee (DAC) to be constituted by the Dean of the School/ Principal/ Director of the affiliated college with Head of the Department as the Chairman and

two senior faculties as members to oversee the proceedings of the dissertation work from allotment to submission.

#### 4. COURSES OF STUDY

In the M. Tech. (Construction Engineering and Management) programme, there will be total of 10 theory subjects, each of 100 marks (including 40 marks for internal assessment and 60 marks for End Semester examination), 04 laboratory courses and seminar /Dissertation work. The Preliminary Dissertation work in 3<sup>rd</sup> semester will have 100 marks as an internal assessment & 100 marks for External assessment. Further, the Main Dissertation work in 4<sup>th</sup> Semester will have 150 marks as an internal Assessment and 150 marks for External assessment. M. Tech. degree will be awarded from 1800 marks.

A candidate will have to study 05 theory courses (03 compulsory & 02 elective) each and 02 laboratory courses each in first 2 semesters. Further in the 3<sup>rd</sup> semester, they have to start Dissertation work and complete it in 4<sup>th</sup> semester.

The courses of study and evaluation scheme for M. Tech. (Construction Engineering and Management) programme will be as below: -

#### 1<sup>st</sup> Semester

**Total: 5 Theory Courses** (03 Core courses & 02 Elective courses) & 02 laboratory courses.

Code	Course	L	T	P	Credit	Internal Assessment	End Semester Exam	Total
<b>CORE COURSES (COMPULSORY)</b>								
MCE-101	Advanced Techniques in Concrete Construction	3	2	-	4	40	60	100
MCE -102	Foundation design and construction	3	2	-	4	40	60	100
MCE -103	Research Methodology	3	2	-	4	40	60	100
MCE -109 (P)	Foundation Engg. Laboratory	-	-	2	1	30	20	50
MCE -110 (P)	Seminar	-	-	3	2	100	-	100

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<b>ELECTIVE COURSES</b>								
<b>(Two Elective courses are to be selected)</b>								
<b>MCE- 104 (E)</b>	Environmental Engg. & Management	3	1	-	3	40	60	100
<b>MCE- 105 (E)</b>	Construction Costing and Financial Management	3	1	-	3	40	60	100
<b>MCE- 106 (E)</b>	Steel Construction Technology	3	1	-	3	40	60	100
<b>MCE- 107 (E)</b>	Design & Construction of Hydraulic Structures	3	1	-	3	40	60	100
<b>MCE- 108 (E)</b>	Transportation Engineering & Planning	3	1	-	3	40	60	100
	<b>TOTAL</b>	<b>15</b>	<b>8</b>	<b>5</b>	<b>(15+6)</b>			<b>650</b>

## 2<sup>nd</sup> Semester

**Total: 5 Theory Courses (03 Core courses & 02 Elective courses) & 02 laboratory courses.**

CodeNo	Subject	L	T	P	Credit	Internal Assessment	End Semester Exam	Total
<b>CORE COURSES (COMPULSORY)</b>								
<b>MCE-201</b>	Construction Management	3	2	-	4	40	60	100
<b>MCE-202</b>	Pavement Design Construction and Maintenance	3	2	-	4	40	60	100
<b>MCE-203</b>	Advanced Construction Technology	3	2	-	4	40	60	100
<b>MCE-209 (P)</b>	Pavement Laboratory	-	-	2	1	30	20	50
<b>MCE-210 (P)</b>	Construction Management Software Laboratory	-	-	3	2	50	50	100
<b>ELECTIVE COURSES</b>								
<b>(Two Elective courses are to be selected)</b>								
<b>MCE-204 (E)</b>	Green Buildings and Services	3	1	-	3	40	60	100

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<b>MCE-205 (E)</b>	Building Maintenance	3	1	-	3	40	60	100
<b>MCE- 206 (E)</b>	Bridge Engineering	3	1	-	3	40	60	100
<b>MCE- 207 (E)</b>	Advanced Structural Design and Detailing	3	1	-	3	40	60	100
<b>MCE- 208 (E)</b>	Technology Management	3	1	-	3	40	60	100
	<b>TOTAL</b>	<b>15</b>	<b>8</b>	<b>5</b>	<b>(15+6)</b>			<b>650</b>

### 3<sup>rd</sup> Semester

#### Dissertation:

Code	Course	L	T	P	Credit	Internal Assessment	End Semester Exam	Total
<b>MCE-301</b>	DISSERTATION (Preliminary)	-	-	28	14	100	100	<b>200</b>

### 4<sup>th</sup> Semester

#### Dissertation:

Code	Course	L	T	P	Credit	Internal Assessment	End Semester Exam	Total
<b>MCE-401</b>	DISSERTATION (Main)	-	-	36	18	150	150*	<b>300</b>

\*Weightage of publication [refer syllabus MCE 411(P)] is 30 marks out of 150.

**Total Credit: 74**

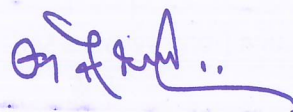
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**COURSE CONTENTS**

**M. Tech. (Construction Engineering and Management)**

**First Semester**



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**MCE -101 ADVANCED TECHNIQUES IN CONCRETE CONSTRUCTION  
(Core Course)**

**CONTENT**

**UNIT-I**

**High Strength Concrete:** Introduction, Ingredients, Applications, Properties (Fresh & Hardened),

**High Strength Concrete Mix Design:** Principles, Review on BIS and ACI standard/guidelines, mix design procedures by IS code method using pozzolanic materials or/and fibres. (8)

**UNIT-II**

**Advanced Concreting Operations:** batching, mixing, transporting, shuttering and staging, placing, compacting, finishing and jointing, curing (Note: only advanced methods/practices/equipment's to be covered).

**Special Concretes (Introduction, Principles, Procedure of preparation and applications):** Shotcrete, Ready mixed concrete (RMC), Self-curing concrete, Self-healing concrete, Translucent concrete, Pervious Concrete, 3D Printed concrete. (7)

**UNIT-III**

**Construction Techniques for RCC elements:** Materials, principles and procedures for construction of R.C.C. beams, slabs, columns, foundations, walls and tanks. Design and fabrication of formwork for R.C.C elements, details of special shuttering required for lining of tunnel, procedures and precautions. (7)

**UNIT-IV**

**Pre-stressed Concrete:** Principles of construction, methods, materials, tools and equipment for the construction of pre-stressed concrete structures.

**Inspection, Quality Control and Safety in Concrete Construction:** Stages, principles, checklist, statistical controls, procedures, use of Drones for inspection and quality control. (8)

**Exercise:**

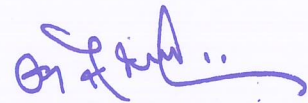
1. Designing of any one grade of high strength concrete and validating result/strength in lab.
2. Inspection of a concrete construction site and preparation of report showing correct and

  
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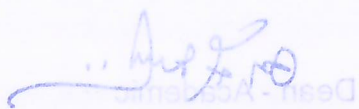
incorrect practices.

**Reference Books:**

1. Gambhir, M.L. Concrete Technology, Tata McGraw Hill, New Delhi
2. Orchard, Concrete Technology, Applied Science Publishers Ltd. London
3. Neville, Brooks, Concrete Technology, Addison – Wesley, England
4. Neville A.M., Properties of Concrete, The English Language Book Society and India, Publishing, London
5. Shetty, M.S. Concrete Technology, M/S S. Chand & Co. Ltd. New Delhi
6. Raina V.K., Concrete for Construction, Tata-McGraw Hill Publishing Co. Ltd. New Delhi.
7. Swamy R.N, New Concrete Materials, Surrly University Press, London
8. Mehta P. Kumar & Monteiro, Paulo J.M., Concrete Microstructure, Properties and Materials, M/S Indian Concrete Institute, Chennai.
9. Malier, Yves, High Performance Concrete, E&FN SPON, London
10. Ramachandran, Concrete Admixture Handbook, Standard Publishers, and Distributors, Delhi.



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**MCE-102 FOUNDATION DESIGN AND CONSTRUCTION**  
(Core Course)

**CONTENT**  
**UNIT - I**

**Shallow Foundations:** Introduction, essential requirements, types and depth of footings like strip footing, isolated footing, combined footing, strap footing and raft footing.

Design features and construction details related to size and depth of footings, codal provisions, problem of frost heave, its causes and prevention, effect of groundwater and environmental considerations. (9)

**UNIT - II**

**Pile Foundations:** Purpose/uses of pile foundations, classification of piles based on different criteria, brief details of timber, concrete, steel piles, their advantages and disadvantages, selection of pile type, pile action, load carrying capacity of piles, behaviour of pile and pile groups under load, negative skin friction, carrying capacity of pile groups in cohesive soils and cohesion-less soils, efficiency of pile group, settlement of pile group in clay, under-reamed piles and their properties. (10)

**UNIT - III**

**Well Foundations:** Introduction to cassions, different shapes of wells and their preference, components of a well and their properties, depth and bearing capacity of well foundations, forces acting on well foundations and well-sinking process.

**Machine Foundation:** Introduction and design principles. (8)

**UNIT - IV**

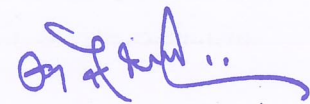
**Improvement of Foundation Soils:** Grouting and injection: Introduction, functions of grouting, types of grouting materials such as soil bentonite, cement mix, cement mix, emulsions etc., grout injection methods and its applications in foundation soil improvement. Use of chemical stabilizers (such as lime, calcium and sodium chlorides, natural and synthetic polymers) in soil improvement/stabilization.

**Geo-synthetics:** Classification of Geo-synthetics, applications of geo-synthetics textiles in the improvement of foundation soils, usage in India and a case study. (9)

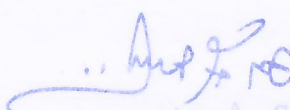
  
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**Reference Books:**

1. Tomlinson MJ, Foundation Design and Construction, ELBS-Longman
2. Bowles Joseph E, Foundation Analysis and Design, McGraw Hill.
3. Som, NN & Das S.C., Theory and Practice of Foundation Design, Prentice Hall of India, 2003
4. Braja M. Das, Principles of Foundation Engineering, 6e, Thomson,
5. Koerner, Robert M, Construction and Geotechnical Methods in Foundation Engineering, McGraw Hill,



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**MCE- 103 RESEARCH METHODOLOGY  
(Core Course)**

**CONTENT**

**UNIT -I**

**Introduction to Research:** Concept, types – basic, applied and action, Need for research in Engineering & Technical Education, objectives, types, different Approaches, Research process, Criteria of good research.

**Identifying and defining research problem & Research Design:** Defining research problem, Necessity, Techniques, Need for research design, Features, Concepts & basic principles. (10)

**UNIT-II**

**Methods of Research:** Descriptive Research: Survey, Case Study and Content Analysis – Concept, types, procedure for conducting descriptive research. Correlation Research: Concept, types, procedures for conducting correlational research.

**Ex-post Facto Research:** Concept and procedure for conducting research Experimental Research: Concept, design of experimental research, internal and external validity of experimental research. (8)

**UNIT-III**

**Sampling Techniques:** Concept of population and sample, sampling techniques - simple random sampling, stratified random sampling, systematic sampling and cluster sampling, snow ball sampling, purposive sampling, quota sampling techniques. Determining size of sample.

**Data collection, Analysis and Processing:** Types of data, methods and techniques of data collection, primary and secondary data. Use of statistics for data analysis, measures of central tendency, dispersion, skewness and relationship. Sampling distributions, sampling theory, determination of sample size, chi-square tests, analysis of variance, multiple regression analysis. (9)

**UNIT-IV**

**Statistical Methods of Analysis:** Descriptive statistics; Meaning, graphical representations, mean, range and standard deviation, characteristics and normal probability curve: concept & characteristics Inferential statistics: t-test, correlation (rank difference and product moment), ANOVA (one way) including numerical problems on above Statistical Methods Selecting Appropriate Statistical Methods of analysis.

**Interpretation and report writing:** Techniques of interpretation, precautions in interpretation, significance of report writing, different steps in report writing, layout of research report, mechanics of writing research report. (8)

**Reference books:**

1. C.R Kothari, Research Methodology, Wishwa Prakashan
2. P. G Triphati, Research Methodology, Sultan Chand & Sons, N.Delhi
3. Fisher, Design of Experiments, Hafner
4. Stoufferetal, Measurement and Prediction, Wiley, N.York
5. J. W Bames, Statistical Analysis for Engineers and Scientists, McGraw Hill, N.York
6. Borg, W and Gall, M (2003) Educational Research: An Introduction, New York: Longman.2003
7. Burke, J & Larry, Christensen (2008) Educational Research: Quantitative, Qualitative and Mixed Approaches New Delhi: Sage Publications, 2008
8. Cohen, L. (2000) Educational Research in Classrooms and Schools! A Manual of Materials and Methods New York: Harper and Row Publishers.2000
9. CPSC: Developing Skills in Technician Education Research Modules 1 to 11 Singapore, Colombo Plan Staff College for Technician Education
10. Drew, CJ (2008) 'Designing and Conducting Research in Education' New Delhi: Sage Publications, 2008
11. Garrett, HE and Woodworth, RS (2003). Statistics in Psychology and Education, Educational
12. Research, Bombay: Vakils Fetter and Simons Ltd. 2003
13. Gay, LR (2000) Educational Research, Ohio: Charles E. Merril Publishing Company 2000
14. Gupta SL and Gupta Hitesh (2011) Research Methodology (Text and Cases with SPSS): International Book House, New Delhi
15. Levin Richard and Rubin DS (2009) Statistics for Management, Pearson Prentice Hall
16. Oliver, Paul (2010) Understanding the Research Process. New Delhi: Sage Publications, 2010
17. Wiersma William (2000) Research Methods in Education – An Introduction London: Allyn and Bacon, Inc.2000

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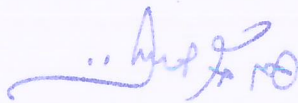
**MCE-109 (P) FOUNDATION ENGINEERING LABORATORY**  
(Core Course)

**PRACTICAL EXERCISES:**

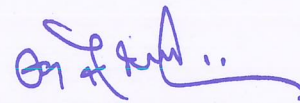
1. To conduct Standard Penetration Test (SPT) and estimation of bearing capacity for shallow foundation case.
2. Determination of shear strength characteristics by field tests like in situ vane shear test, pocket penetrometer etc.
3. Determination of shear strength characteristics by laboratory tests (Direct Shear Test).
4. Determination of unconfined compression strength of cohesive soil.
5. To recommend a field investigation programme to obtain design data.
6. Computation of bearing capacity and settlement for given conditions of soil, depth and type of foundation and loading.
7. Determination of Relative Density of Soil.
8. To conduct Tri-axial test on soil.
9. Visit to a foundation construction site and preparation of report.

**REFERENCES:**

1. Arora K.K. (2014) – Soil Mechanics and Foundation Engineering. Standard Publishers Distributors.
2. BC Punmia (2005) Soil Mechanics & Foundations – Laxmi Publications



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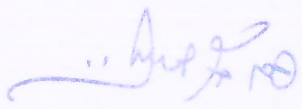
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**MCE-110 (P) SEMINAR  
(Core Course)**

Individual student will study different literatures/articles/research papers (minimum 20 to 25) on broader/advanced areas in Civil Engineering by their choice to get more research ideas for their dissertation work.

A seminar will consist of sections such as introduction, background, analysis, methodology, discussion, conclusion, references etc. The seminar report will be more or less in the form of a research paper. The student will give presentation (power-point presentation) to the Seminar Evaluation Committee (SEC) in the presence of their classmates. It is mandatory for all the students to attend the presentations of their classmates. The concepts must be clearly understood and presented by the student. Minimum 02 presentations are expected during the semester by the student. A hard copy of the seminar report (15 to 20 pages, A4 size, 12 fonts, Times New Roman, 1.5-line spacing with normal margin on all sides, both sides printed as per format) should be submitted before delivering the seminar. A copy of the report in soft form must also be submitted to the faculty supervisor along with other details, if any.

Each student has to submit a seminar report in two hard copies. The report must not be reproduction of any original paper/article. SEC will evaluate the seminar. One of the two copies submitted by the student should be returned to him/her after duly signed by the faculty supervisor and Head of the department. The other copy shall be kept in the departmental library. Internal & External assessment will be evaluated as per the university scheme.



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**MCE- 104 (E) ENVIRONMENTAL ENGINEERING & MANAGEMENT**  
(Elective Course)

**CONTENT**

**UNIT-I**

**Environment & Ecology:** Definition and understanding of concepts, ecosystem, energy flow in ecosystem, water, carbon and nitrogen cycle, community's inter-relationships in an ecosystem, importance of clean environment.

**Current Issues in Environmental Engineering:** Global warming, ozone depletion, acid rain, oil pollution, role of non- conventional sources of energy in environment.

(7)

**UNIT-II**

**Type of Pollutants and Protection of Environment:** Water Pollution, Sources, causes and measurement of water pollutants in surface and ground water, Water quality criteria for various uses of fresh water, biochemical oxygen demand, effect of oxygen demanding wastes on rivers.

**Domestic and industrial Pollution:** Sources, Standards for disposal of waste water and industrial effluents, basic unit operations in control of waste water pollution, C.P.C.B./M.O.E.F. for abatement of Industrial Pollution and Pollution Control/Treatment methods and technologies.

**Air Pollution:** Definition, principal materials causing pollution, types of air contaminants, their sources and ill effects on living and non-living materials, permissible limits. air pollution control - basic principles, pollution control methods and various engineering devices to control particulate and gaseous pollutants.

**Noise Pollution:** Definition, sources of noise and its units, adverse effects of noise pollution, sound pressure level and its measurement, band and its importance; noise pollution control measures.

**Solid Waste Pollution:** Sources, Health Effects and treatment of solid wastes. (9)

**UNIT-III**

**Degradation of Land Resources:** Deforestation and Wetlands: Forest land, deforestation and its effects on land use and environmental quality, wetland and their importance in environment, Soil degradation problems, erosion, salinization, water logging.

**Environmental Management System:** Environmental (Protection) Act, main clauses and basic steps for EMS certification. (8)

#### UNIT-IV

**Environment Impact Assessment:** Definition and its importance for environment management, constituents of environment impact assessment, project data for EIA study, prediction of impacts, EIA methodologies, constraints in implementation of EIA, Case studies (any 2).

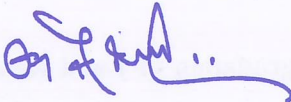
**Cleaner Production Technologies:** Need and benefits, cleaner production techniques and options, zero impact manufacturing initiatives CDM and carbon credits/case studies. (8)


#### Field Tasks:

1. Determination of noise levels for indoor and outdoor noise.
2. Visit to water treatment plant/wastewater treatment plant in nearby areas.

#### Reference Books:

1. Peavy, Rowe, Tchobanoglous, Environmental Engg. Tata McGrawHill.
2. Mackenzie L Davis, Environmental Engg. Tata McGrawHill.
3. Baljeet S. Kapoor; Environmental Engg. An overview, Khanna Publishers.
4. Gilbert H.Masters , Environmental Engineering and Science, Prentice Hall of India Pvt.Ltd.
5. GN Panday, GC Carney Environmental Engineering, Tata McGrawHill.
6. P.D. Sharma, Ecology and Environment Rastogi Publications.
7. Ray P.A Lcances Environmental Impact Assessment Hand Book, National
8. Environmental Protection Council Manila.
9. P Venugopala Rao; Text Book of Environmental engineering, PHI
10. Duggal AK, Sharma S, Water & Waste Water Analysis, Galgotia Publications.

  
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**MCE- 105 (E) CONSTRUCTION COSTING AND FINANCIAL MANAGEMENT**  
(Elective Course)

**CONTENT**

**UNIT-I**

**Construction Costing:** Costing of construction Works; different methods of costing, cost elements in a project; analysis of rates; non-scheduled items of work; cost estimation for a small construction job; purpose, methods and stages of cost control; cost monitoring; cost forecasting methods; variations in individual items of work and their effect on total contract price; valuation of variations.

**Methods of measurement:** Earthwork, RCC, Brickwork, Woodwork joinery, steel (BBS) and iron work, plastering/painting, white/colour washing (Numerical problems). (9)

**UNIT-II**

**Cash Flow:** Determining the funds required for a construction job; preparing cash flow statements; cash inflow and outflow during contract period. Project expectations. (6)

**UNIT-III**

**Civil Works Tenders:** Common types of tenders, preparation of a tender document, e-tendering process.

**Different types of payment:** first, running, advance and final payments, study of different charts and forms used in various Government Departments. (8)

**UNIT-IV**

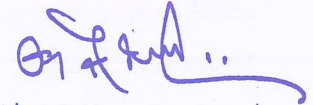
**Material Management:** Objectives and scope of material management classification, codification, ABC analysis, standardization and substitution;

**Introduction to inventory control:** stores management; organization and layout; receipt, inspection and issue; care and safety; store records and store accounting (PWD and CPWD Performa). (8)

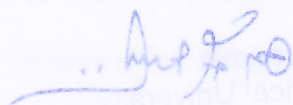
**Reference Books:**

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, Prentice Hall
6. Gopalakrishnan, P, Sundaresan, M: Material Management - an Integrated Approach, Prentice Hall.
7. Approach, Prentice Hall.
8. Dobbler and Bart: Purchasing and Supplies Management, Text and Cases,
9. Chitkara, K.K.: Construction Project Management; Tata-McGraw Hill



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**MCE- 106 (E) STEEL CONSTRUCTION TECHNOLOGY**  
(Elective Course)

**CONTENT**

**UNIT I**

**Concept of Plastic Design:** Introduction, Theory of plastic bending, Assumptions, Bending of rectangular section, Plastic hinge, Redistribution of moments, Computation of plastic moment, Shape factor, Overload factor,

**Method of plastic analysis:** Statical Method, Mechanism method, Upper bound, Lower bound and uniqueness theorem, Partial, Complete and over complete failure of indeterminate structures.

(6)

**UNIT II**

**Industrial Structures:** Introduction, Roof and side coverings, Design loads, purlins, end bearings, general framing of industrial buildings, bracings.

**Gantry Girder:** Introduction, loading consideration, maximum load effect, selection of gantry girder, design of gantry girder.

(8)

**UNIT III**

**Plate Girder:** Introduction, general consideration, distribution of stresses, web panel subjected to combined bending and shear, design of plate girder using IS:800-2007, behaviour of longitudinally stiffened plate, welding of girder components.

**Fabrication and Erection of Steel Structures:** Methods, tools, equipment and practices, Transportation of fabricated components, Erection equipment, erection tools, methods of erection, section sequence field connections, detailing to facilitate erection. Storage and handling.

(10)

**UNIT-IV**

**Estimating:** Specifications, Estimating and costing of steel work.

**Repair:** Fire protection, Maintenance and repair of steel construction

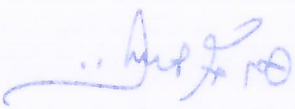
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**Reference Books:**

1. Ramachandra (2011). Design of steel structures. New Delhi. Standard Book House,
2. Subramanian, N (2008) Design of Steel Structures, Oxford University Press.

3. Singh, Gurcharan; Singh, Jagdish (2013) Estimating, Costing and Valuation, Delhi, Lomousoffset Press
4. Guidebook for Fabrication and Erection of Steel Structures (2005) Kolkata INSDAG
5. Syal, I.C.; Singh, Satinder (2013). Design of Steel Structures. Delhi. Standard Publishers Distributors.

  
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**MCE-107 (E) DESIGN AND CONSTRUCTION OF HYDRAULIC STRUCTURES**  
(Elective Course)

**CONTENT**

**UNIT - I**

**Elements of Dam Engineering.:** Embankment, dam types and characteristics, concrete dam types and characteristics, Spillway and its types (Straight Drop, Ogee, Shaft, Chute, Side Channel, Siphon, Labyrinth)

**Coffer Dams:** Definition, Uses, Selection, Types, Design features, Leakage Prevention Economic Height, suitability criteria and construction of different types of coffer dams (9)

**UNIT - II**

**Concrete Dams:** Gravity dams, loading and forces on gravity dams, Considerations and design aspects of basic profile of gravity dam, stability criteria, Galleries in dams, instrumentation in dams, temperature control, control of cracking,

**Earthen Dams:** Factors influencing design, criteria for safety, design aspects of earthen dams, seepage control, rip rap and concrete lining of slopes. (8)

**UNIT - III**

**Introduction to Miscellaneous Structures:** Weir, types, barrage. River training works (Classification, Site Selection & Interaction with Other Structure, Design Consideration), Methods of River Training, Guide Banks or Bell Bunds, Spurs or Groynes, Classification of Groynes, Bed Pitching, Bank Revetment and Dredging of River. (7)

**UNIT IV**

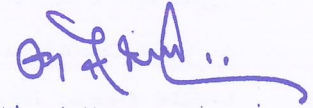
**Energy Dissipaters:** Types of Energy dissipaters, stilling basins and bucket Energy dissipaters, hydraulic jump and importance, Energy dissipation arrangement by studying graph of discharge vs Tail Water Curve, Types and Selection, Design of Hydraulic Jump Type, Stilling Basins and Roller Buckets, USBR Stilling Basins.

**Water logging:** Introduction, causes, prevention and Remedial measures, Reclamation of water logged area. (9)

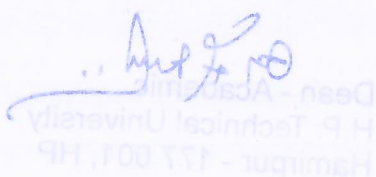
**Reference Books:**

1. Barrows H. K., Water Power Engg. Tata McGraw Hill.

2. Punmia B.C., Irrigation and water Power Engg. Standard Publishing distributors.
3. P. Novak, A.I. B Maffat & C.Nalluri, Hydraulic Structures, Unwin Hyman.
4. Campbellell Lehr, Water Well Technology, Tata McGraw Hill.
5. Davis Handbook of Applied Hydraulics, Tata McGraw Hill.
6. Bharat Singh, Engineering for Embankment Dams Oxford & IBH.



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**MCE- 108 (E) TRANSPORTATION ENGINEERING AND PLANNING**  
(Elective Course)

**CONTENT**

**UNIT - I**

**Traffic Flow Characteristics:** Nature of Traffic Flow, Various Parameters e.g. speed, rate of flow, density, spacing and headway, lane occupancy, clearance etc. Categories of traffic flow, uninterrupted and interrupted flow, Analysis of speed, flow and density relationship.

**Traffic signal:** Fixed-time Signals, vehicle actuated signals, semi actuated signals, Advantages, Disadvantages, Traffic signal Design Procedure, Trial cycle method and its design, Approximate method and its design, Webster method and its design. (9)

**UNIT II**

**Introduction to Intelligent Transportation Systems (ITS):** Definition, objectives and benefits of ITS, Historical Background, ITS Data collection techniques – Detectors.

**Automatic Vehicle:** Location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS). (9)

**UNIT III**

**Trip generation modelling:** Trip classification - productions and attractions, variables influencing trip generation, Regression Analysis and Category Analysis.

**Trip distribution Modelling:** factors governing trip distribution, Growth factor methods, Uniform growth factor, Advantages and limitations of growth factor model, Gravity model. (8)

**UNIT IV**

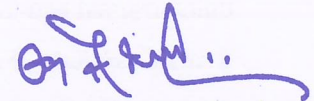
**Traffic assignment:** Assignment methods, All-or-nothing assignment - Route-choice behaviour - Network analysis, Modal split models - Behavioural models - Probabilistic models - Utility functions – logistic models - Two stage model.

**Hill Roads Construction:** Stability of Slopes, Landslides – Causes and Control measures, Construction of Bituminous and Cement Concrete roads at high altitudes, Hill Road drainage, Construction and maintenance problems and remedial measures. (9)

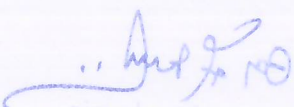
**Reference Books:**

1. Khanna & Justo Highway Engineering; Nem Chand & Brothers, Roorkee

2. John W.Dickey Metropolitan Transportation Planning, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
3. L.R.Kadiyali Traffic Engineering and Transport Planning, Khanna Publishers, Delhi.
4. S.K. Sharma Principles, Practice and Design of Highway Engineering S.Chand & Company Ltd., New Delhi.
5. Khisty, CJ and Lall B Kent, Transportation Engineering -An Introduction.



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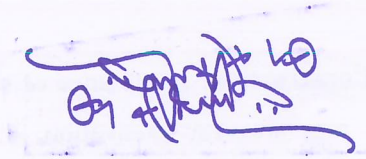
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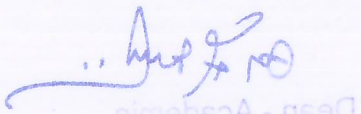
**COURSE CONTENTS**

**M. Tech. (Construction Engineering and Management)**

**Second Semester**



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**MCE- 201 CONSTRUCTION MANAGEMENT  
(Core Course)**

**CONTENT**

**UNIT-I**

**Introduction:** Definition, functions and scope of construction management; scientific methods of Management; construction team.

**Construction Contracts:** Types of construction contracts; contract documents; specifications; general and special conditions; contract management; arbitration and settlement. (7)

**UNIT-II**

**Construction Planning and Network Techniques:** Pre-tender planning; contract planning; planning and scheduling construction jobs by bar charts and critical path network techniques; allocation of resources; techniques of development and analysis of PERT/CPM networks for construction projects; updating of network; examples and case studies.

**Time-cost Optimization:** Direct cost, indirect cost, total cost; purpose, stages and methods of cost control techniques of time cost optimization; examples and case studies. (9)

**UNIT-III**

**Site Layout:** Principles governing site lay out; factors effecting site lay out; preparation of site lay out by using DGPS and total station

**Site Supervision:** Supervisor's responsibilities; keeping records; control of field activities, handling disputes and work stoppages. (8)

**UNIT-IV**

**Safety in Construction:** Importance of safety, accident-prone situations at construction site i.e., safety measures for excavation, drilling/blasting, scaffolding/formwork, hoisting & erection demolition and hot bituminous work. Fire Safety, Safety record of construction industry, safety campaign

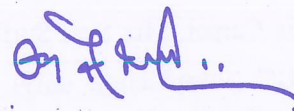
**Project Management:** Feasibility study; project reports; monitoring and controlling project activities. (7)

**Exercises:**


1. To do detailed scheduling of a Construction Project.
2. To study and prepare contract document of a highway project/Large Building/Bridge (any one).

**Reference Books:**

1. Challahan, M.T., Construction Project Scheduling.
2. Srinath, L.S. PERT and CPM-Concepts and Applications.
3. Austen: Managing Construction Projects, A guide to Processes & Procedures
4. International Labour office, Geneva
5. Douglas and Manager: Construction Management, Prentice Hall
6. Roberts, J.M. Construction Management - An effective Approach.
7. O'Brien: CPM in Construction Management, McGraw Hill
8. Roy Pilcher: Principles of Construction Management, McGraw Hill
9. Gehlot and Dhir: Construction Planning and Management, New Age International (P) Ltd.
10. Dharwadkar: Management in Construction Industry, Oxford and IB H
11. Raina: Construction Management Practice
12. BC Punmia & KK Khandelwal: Project Planning & Management with PERT & CPM, Laxmi Publications.
13. S. Choudhury; Project Management, Tata McGraw Hill
14. Chitkara, Construction Project Management, Tata McGraw Hill.



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**MCE- 202 PAVEMENT DESIGN, CONSTRUCTION AND MAINTENANCE**  
(Core Course)

**CONTENT**

**UNIT - I**

**Introduction:** Types of pavement structure, Functions of pavement components. Factors affecting pavement design.

**Design of Highway Pavements:** Introduction to various methods of design of flexible pavements: Group Index Method, Triaxial test method, Burmister method, McLeod's method. Design guidelines of CBR method as per IRC-37 (latest). Design considerations in Rigid Pavements, Methods for design of rigid pavements: Westergaard's method, F.A.A. method, types of joints and their design in cement concrete pavements. (9)

**UNIT -II**

**Airport Pavements:** Difference between design approach between Highway & Airport Pavements. Thickness design, FAA method for Flexible and Rigid pavements, Soil Classification for FAA, ESWL Concept – design data of various aircrafts, CBR method (USACE), LCN system of pavement design, problem solving on all these methods. Introduction to CAN, PCN method. (8)

**UNIT -III**

**Construction of Highways:** Types of Highway Construction and their selection, materials for construction, Types of binders and their grades e.g., Emulsion, Bitumen, CRMB, Cut-back PMB, NRMB etc. Brief Specifications and Construction procedure of different Granular layers: G.S.B., WBM and W.M.M., Introduction to various Equipment used for highway construction. Hot mix plant, Paver, Rollers. Brief Specifications and Constructional features for Pre-Mix Carpet, Mix Seal Surfacing, B.M., SDBC. Other higher quality pavement layers – DBM, BC (introduction only). Prime coat and Tack coat- their application and brief specifications, Seal coat Cement concrete pavements, Joints in cement concrete pavements, (10)

**UNIT -IV**

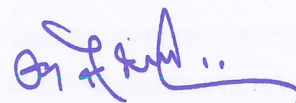
**Maintenance of Highways:** Types of highway maintenance: routine, periodic and special type. Need for Inspection and schedule of maintenance. Pavement failures, their causes and

  
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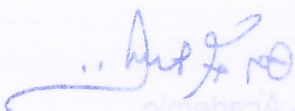
remedial measures typical flexible and rigid pavement failures Defects/ Failures in Flexible Pavement- their types and causes: Design and Construction lapses. Surface defects, Cracks, Deformation, disintegration, Surface Defects: Fatty Surface, Polishing, Hungry Surface Deformation: Rutting, shallow Depression, settlement & upheaval. Disintegration: Loss of Aggregate, Stripping, pot-hole. Remedial Measures Slurry Seal, Liquid Seal, Fog Seal, Patching, Ready mix patch Rigid Pavement: Various stresses, types of defects, cracking, spalling, slab rocking and settlement, joint sealant failure. Methods of Repair Rectification: Repair of Spalled Joints, Full Depth Reconstruction, Replacement of Dowel Bar. (9)

**Reference Books:**

1. Khanna and Justo; Highway Engineering, Nemchand & Bros. Roorkee
2. Clarkson H.Oglesby and Gary Hicks; Highway Engineering. John Wiley & Sons, London,
3. Rao; Airport Engineering, Tata McGraw Hill Publishing Co. New Delhi
4. Khanna and Arora. Airport Planning and Design
5. Wright and Paquette; Highway Engg , John Wiley and Sons, New York
6. Vaswani, Highway Engg Roorkee Publishing House, Roorkee
7. Sharma and Sharma. Principles and Practices of Highway Engg., Asia Publishing House, New Delhi
8. Ken Atkinson, Highway Maintenance, Thomas Telford Ltd. London
9. Baker, Handbook of Highway Engineering, Van Nostrand Reinhold Co. London
10. Duggal AK & Puri VP, Laboratory Manual in Highway Engineering, New Age Publishers



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**MCE- 203 ADVANCED CONSTRUCTION TECHNOLOGY**  
(Core Course)

**CONTENT**

**UNIT-I**

**Composite Structures (Buildings):** Introduction to steel - concrete composite construction, theory of composite structures, Comparison of composite and non-composite, Introduction to steel - concrete - steel sandwich construction. Materials in composite construction, Composite columns: Types, Earthquake resistant design of masonry structures.

**New Technologies (Road and Bridges):** Recycling of Pavements – purpose, usage of old material, reclaiming bitumen, usage of granular material. Cold Mix Technologies, Warm Mixes. (9)

**UNIT-II**

**Special Foundations:** Necessity, Problems in expansive Soils, Loose sand deposits and organic soils, Black cotton soils - soil potential to expand and related soil properties, measures to counteract the problems in expansive soils; Frost action and measures; Foundations for chimney, cooling towers, Telecommunication/transmission towers, foundations for underground structures, coastal and off shore structures in different soil conditions, foundations in expansive soils. Dewatering and its various methods.

**High Rise Construction:** High rise buildings; architectural & structural aspects; special features of construction; tall chimneys, components, design aspects; slip form method, lift slab method; special problems of high-rise construction. (10)

**UNIT-III**

**Prefabricated Construction:** Advantages of pre-fabricated construction; selection of structural elements; design aspects; assembly of precast elements; jointing, modular co-ordination and tolerances; structural systems for buildings; single and multi- storey building systems; methods and equipment's. For handling and placement. (7)

**UNIT-IV**

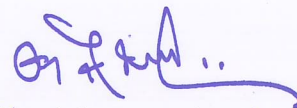
**Advanced Construction Materials:** Geo-synthetics: Various, types (geo-textiles, geo-grids, geo-membranes, geo- composites) epoxy resins, polymers, grouts and anchors, special flooring materials, sealants and adhesives, protective coatings. (6)

**Exercises:**

1. Enumerate major design parameters and data requirements of any one type of special foundations.
2. Visit the construction site of multi storied building and to prepare report on techniques employed and to suggest the further scope of improvement.

**Reference Books:**

1. Naiman P Kurian, Modern Foundations - Introduction to Advanced Techniques Tata McGraw Hill
2. CBRI Roorkee-Application Potential of Geosynthetics in Civil engineering, Proceedings of workshop January 4-6, Tata McGraw Hill.
3. Engineering with Geosynthetics-Proceedings of Workshop, Chandigarh Edited by Verma and Dr.G V Rao. organised by-CBIP and committee for international geosynthetics society. New Delhi.
4. Bungale S Taranath; Structural Analysis and Design of Tall Buildings, Tata McGraw Hill
5. Monohar SN; Tall Chimneys-Design and Construction Tata McGraw Hill.
6. Cast in place concrete in tall Building Design and construction Council on Tall Buildings and Urban Habitate Committee 21 D Tata McGraw Hill.
7. CBRI Roorkee, Advances in Building Materials and Construction Techniques.
8. Bohdan Lewicki Building with large Prefabricates, Elsevier Publishing Company
9. ASG Bruggeling GF Hugghe Prefabrication with Concrete, AA Balkema/Rotterdam/Brookfield
10. Braja M. Das, Principles of Foundation Engineering, Thomson.
11. Sarkar & Sarswati. (2012) Construction Technology, Oxford University Publishers.
12. Johnson R. P, (2004, 3rd addition) Composite Structures of Steel and Concrete, UK.Blackwell Scientific Publications.



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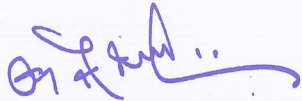
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**MCE- 209 (P) PAVEMENT LABORATORY**  
**(Core Course)**

**CONTENT**

**PRACTICAL EXERCISES:**

1. Determination of CBR value of sub-grade soils.
2. Determination of stripping value of road aggregate.
3. Determination of Marshall Stability value.
4. Evaluation of pavement strength by using Benkelman's Beam.
5. Determination of strength of existing pavement by Dynamic Cone Penetration Test.
6. Roughness measurement of road surface.
7. Determination of Hardness Number of Mastic Asphalt.
8. Visit to site for demonstration of Sensor- paver and other construction machinery, Batching and mixing plant for construction of roads (Hot mix plant/WMM plant).

  
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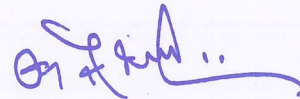


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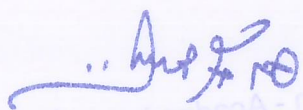
**MCE- 210 (P) CONSTRUCTION MANAGEMENT SOFTWARE LAB  
(Core Course)**

**CONTENT**

1. Planning and Scheduling of a Multi-storeyed building using any relevant software.
  - a) Break up of activities for construction of a Residential Building
  - b) Planning and scheduling of Road Project
  - c) Time Estimate for activities and Expected Time calculation.
2. Prepare drawing and estimate of quantities using any drafting tool and MS Excel:
  - a) Residential Building with Load Bearing walls (with foundation)
  - b) Apartment with Framed Structure.
3. Analysis of geo-spatial data using GIS software.
4. Creating user interface tool for design of Framed structure /road on MS excel.
5. Performing and simulating finite element analysis of reinforced concrete structures using non-linear analysis software.



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**MCE -204 (E) GREEN BUILDINGS AND SERVICES**  
**(Elective Course)**

**CONTENT**

**UNIT-I**

**Introduction to Green Buildings:** Definition, Benefits, Components/features– Site selection, Energy Efficiency, Water Efficiency, Material Efficiency, Indoor Air Quality.

**Design Features for Green Building Construction:** Site selection strategies, landscaping, building form, orientation, building envelope and fenestration – material and construction techniques, roofs, walls, fenestration and shaded finishes, advanced passive heating and cooling techniques, Waste reduction during construction. (9)

**UNIT-II**

**Water and Waste Water Management:** Compliance, fixtures, rainwater harvesting and techniques, water and waste water management, solid waste management.

**Energy Management:** Appliances, compliance energy performance, solar water heating system, use of renewable energy options. High performance glass, other energy saving options, provisions of ECBC, insulator materials. (8)

**UNIT-III**

**Eco-friendly Materials:** Various types of eco-friendly materials, use of recycled materials like: fly ash bricks recycled ceramic tiles, recycled glass tiles, porcelain tiles, natural terracotta tile, wood, steel, aluminum and renewable materials, agrifibre, linoleum, salvaged material – properties and applications.

**Indoor Air Quality:** Natural air ventilation systems, different types of low VOC materials, day lighting. (8)

**UNIT-IV**

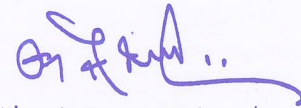
**Rating Systems and Certification for Green Building:** Different types of rating systems and their special features. Criteria, compliance, appraisal for rating systems. Case study on rating of green buildings. (7)

**Reference Books:**

1. Pradeep Kumar and Amit Kumar Tyagi; Managing Energy Efficiently in Hotels and Commercial Buildings, TERI Publications.

  
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2. M K Halpeth, T Senthil Kumar and G Harikumar; Light Right – A Practising Engineer’s Manual on Energy Efficient Lighting, TERI Publications
3. R K Pachauri and Shyamala Abeyratne; From Sunlight to Electricity – Solar Photovoltaic Applications, TERI Publications.
4. Sharma, S.K., Gupta Himmi, Singh Balkar (2014), Proceeding of Training Programme on Energy Efficient & Green Buildings, New Delhi, Excel India Publishers.
5. Sabnis, Gajanan M. (2013) Green Building with Concrete, Sustainable Design & construction, New Delhi, Taylor & Francis Group.
6. Ministry of Power, Govt. of India. (2008). Energy Conservation Building code 2007, New Delhi, Bureau of Energy Efficiency.
7. Indian Green Building Council. (2014). IGBC Green Homes Rating System.



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**MCE- 205 (E) BUILDING MAINTENANCE  
(Elective Course)**

**CONTENT**

**UNIT-I**

**Principles of Maintenance:** Importance of maintenance, deterioration and durability, factors affecting decision to carryout maintenance, maintenance and GNP, agencies causing deterioration, effect of deterioration agencies on materials.

**Design and Economic Consideration in Maintenance:** Factors to reduce maintenance at design stage, consideration of maintenance aspects in preparing tender document and specifications, sources of error in design which enhances maintenance, importance of working drawings and schedules, provision of access for maintenance and its importance at design stage. Economic consideration in maintenance: physical life, functional life, economic life of different types of buildings, discounting technique for assessment of economic life. (10)

**UNIT-II**

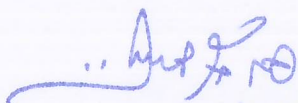
**Maintenance Management:** Definition, organization structure, work force for maintenance, communication needs, building inspections, maintenance budget and estimates, property inspections and reports, specification for maintenance jobs, health and safety in maintenance, quality in maintenance, maintenance manual and their importance.

**Materials for Maintenance:** Compatibility of repair materials, durability and maintenance, types of materials, their specification and application, criteria for selection of material, use of commercially available materials in maintenance. (8)

**UNIT-III**

**Investigation and Diagnosis for Repair of Structures:** Basic approach to investigations, physical inspection, material tests, non-destructive testing for diagnosis, estimation of actual loads and environmental effects, study of design and construction practices used in original construction, retrospective analysis, confirmation and repair steps.

**Maintenance Problems and Root Causes:** Classification of defects, need for diagnosis, type of defects in building elements and building materials defect location, symptoms and causes. (8)

  
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## UNIT-IV

**Remedial Measures for Building Defects:** Preventive maintenance and special precautions - considerations, preventive maintenance for floors, joints, wet areas, water supply and sanitary systems, termite control, common repair techniques, common methods of crack repair. Repair and maintenance of miscellaneous elements.

**Maintenance of Multi-storey Buildings:** Special features for maintenance of multi-storeyed buildings, including fire protection system, elevators booster pumps, generator sets. (7)

### Reference Books:

1. A.C. Panchdari, Maintenance of Buildings New Age International (P) Limited Publishers
2. R.Chudley; Building finishes, fittings and domestic services, Longman Technical Services
3. G.szechy,D.SC ; Foundation Failures, Concrete Publications limited 14 Dartmouth street, London
4. Whitney Clark Huntington Probert E.Mickadeit ; Building Construction materials and types of construction Allan Hancock College
5. H.J.Eidridge, Common Defects in Buildings Her Majesty's Stationery Office, London
6. W.H. Ransom; Building Failures: Diagnosis and Avoidance, New Age Publications (P) Ltd.
7. Housing Defects reference Manual, The Building Research Establishment E. & F.N. SPON
8. Geoffrey K.Cook Dr.A John Hinks Appraising building defects: Properties on stability and hygro-thermal performances, Longman Scientific & Technical
9. Repair of Concrete damaged by reinforcement Corrosion - Report of working party, The Concrete Society
10. R Chudley The maintenance and adaption of buildings Longman Technical Services
11. Common Building Defects - Diagnosis & Remedy, National Building Agency
12. B.D Hutchinson. J.Barton , Nellis. Maintenance and Repair of Buildings And their internal environment, New Age International (P) Ltd.
13. Gahlot, Sharma, Building Repair and Maintenance Management' CBS Publishers,

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**MCE- 206 (E) BRIDGE ENGINEERING**  
(Elective Course)

**CONTENT**  
**UNIT I**

**Introduction:** Definition; components of a bridge; classification; importance of bridges; selection of bridge site; preliminary data to be collected, and choice of bridge type. Indian Roads Congress Bridge Code; width of carriageway; clearances; loads to be considered; dead load; I.R.C. standard live load; seismic, wind loads, Code of practice for Bridges using LSM as per IRC 112.

**RCC Bridges:** General arrangement and suitability of RCC bridges, design of RCC Slab culvert, T-beam bridges. (10)

**UNIT II**

**Bridges:** Introduction, Design consideration for Box girder bridge, balanced cantilever bridge

**Sub Structure:** Types of piers and abutments, design of piers and abutments. (9)

**UNIT III**

**Steel Bridges:** Introduction to suspension bridges, cantilever bridges, cable stayed bridges, design of stringers, cross girders, main trusses, top and bottom lateral bracing, design of truss bridge.

**Bearings, Joints:** Various types of expansion bearing and fixed bearings, elastomeric bearings design of bearings; joints and their types. (8)

**UNIT IV**

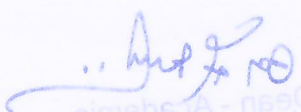
**Foundation:** Types of foundations; Open; Piled and Well foundations; including construction details. Pile Foundations: Suitable Pile types for bridges, Pile Installation, carrying capacity of bored and cast- in-situ pile.

**Construction and Maintenance of Bridges.** Quality Assurance, Construction Method, Traditional method, Incremental Push launching method, Cantilever method, Maintenance, Maintenance of Bearings, Expansion Joints. (9)

**Reference Books:**

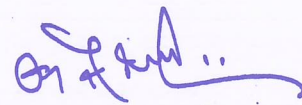
1. Victor Johnson; Essentials of Bridge Engineering, Oxford & IBH Publishing Co, New

Delhi.

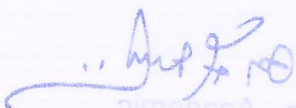
  
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2. Khadilkar; C.H., A text book of Bridge Construction, Allied Publisher, New Delhi
3. Rowe, R.E., Concrete Bridge Design, John Wiley & Sons, Inc. New York
4. Raina, V.K., Concrete Bridges Practice Book, Tata McGraw Hill, New Delhi
5. Jagadeesh, Jayaram: Design of Bridge Structures, Prentice Hall.
6. Raina, V.K. Concrete Bridges Handbook, Galgotia Publications (P) Ltd, 8. New Delhi
7. IRC.78.200, IS 5050, IS 3955



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**MCE- 207 (E) ADVANCED STRUCTURAL DESIGN AND DETAILING  
(Elective Course)**

**CONTENT**

**UNIT I**

**Introduction to limit state method of design:** provisions in the Indian Standard codes for loading, wind loads and seismic loads; Earthquake resistant design provisions in RCC structures; Design of Slender Columns.

**Beams:** Design of curved beams. (8)

**UNIT II**

**Walls:** Design of Shear Walls.

**Slabs:** Design of Circular Slabs, Flat Slabs. (9)

**UNIT III**

**Water Tank:** Design of RCC Underground Tanks and Intze tanks.

**Chimney:** Design of RCC Chimney. (9)

**UNIT IV**

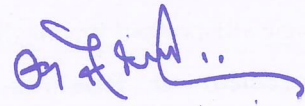
**Silo- Bunker:** Design of silos and bunkers.

**Building:** Design and Analysis of Multi-Storey Building Frames. (8)

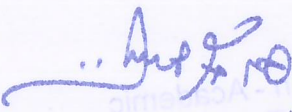
**Reference Books:**

1. Dayaratnam, P: Reinforced Concrete Structures.
2. Subramaniam M., (2014), Design of Reinforced Concrete Structures. New Delhi Oxford University Press.
3. Krishna Raju M. (2016), Advanced Reinforced Concrete Design (IS:450-2000). New Delhi. CBS Publishers & Distributers Pvt. Ltd.
4. Wight, James K. (2016), Reinforced Concrete: Mechanics and Design. England: Pearson Education Limited.

5. Jain, A.K. (2012): Reinforced Concrete, Limit State Design, Roorkee Nem Chand & Bros.
6. Punmia, B.C., Jain, A.K, Jain, Arun Kumar, (2007), R.C.C. Designs (Reinforced Concrete Structures), New Delhi, Laxmi Publications (P) Ltd.



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**MCE- 208 (E) TECHNOLOGY MANAGEMENT  
(Elective Course)**

**CONTENT**

**UNIT-1**

**Introduction to Technology Management:** Introduction to Technology Management  
**Business Strategy for New Technologies:** adding value, gaining competitive advantage, timing and capability development. (7)

**UNIT-II**

**Technology Forecasting:** Techniques of Forecasting, Technology Forecasting- Relevance, Strategic alliance and Practicality, and Technology transfer.  
**Management of Research, Development and Innovation:** Technology mapping, Comparison of types of R& D Projects and development approaches- radical platform and incremental projects, innovation process. (8)

**UNIT-III**

**Management of Intellectual Property Rights:** Patents, Designs, Trademarks and Copyright. Process of Patenting and Development. Strategic value of patents, trade secrets and licensing. (8)

**UNIT-IV**

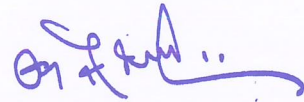
**Managing scientist and Technologists:** Identification, Recruitment, Retention, Team work and Result Orientation. Technology for Managerial Productivity and Effectiveness, Just-in-Time Management Roles and Skills for New Technology, Venture Capital & Technology Development. (8)

**Reference Books:**

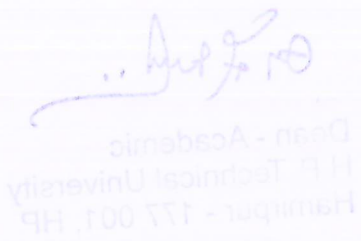
1. Technology and Management, Cassell Educational Ltd., London
2. John Humbleton Elsevier; Management of High Technology Research and Development Charles W.L. Hill/Gareth R. Jones, Strategic Management, Houghton Mifflin Co.
3. A. Bergin R&D Management, Basil Blackwell Inc.
4. Richard M. Burton & Borge Obel Elsevier Innovation and Entrepreneurship in organizations

  
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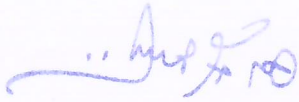
5. Spyros Maksudkis & Steven C Wheelwright, The Handbook of Forecasting- A Management Guide, John Wiley & Sons



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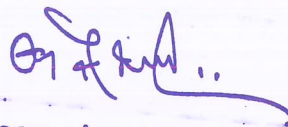


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## **COURSE CONTENTS**

### **M. Tech. (Construction Engineering and Management)**

#### **Third Semester**



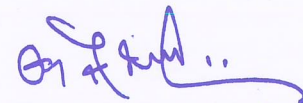
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**MCE- 301 DISSERTATION (PRELIMINARY)**  
**(Core Course)**

Individual student is required to search, collect and review various research articles published in chosen area of research. A student has to select a topic for his dissertation, based on his/her interest and the available facilities at the commencement of dissertation work. A student shall be required to submit a synopsis within a one month of the research work carried out by him/her by deciding the objectives, scope of the study, area of study, methodology/planning of work, facilities required for proposed work, he/she can opt the on campus and off campus (industry/research Centre/reputed institute) based dissertation work by presenting the synopsis in front of Dissertation assessment committee (DAC). DAC will recommend the student for on campus or off campus dissertation work depending upon his/her research synopsis. Student will have to do experimental work and/or software analysis/ simulation with relevant outcomes/comparative study to complete the dissertation work. Students need to present progress of their work in (end semester) viva-voce conducted by the department in presence of DAC.

Each student has to submit a report on Dissertation (Preliminary) in two copies. The report must not be reproduction of any original paper/dissertation/thesis work. One of the two copies submitted by the student should be returned to him/her and 2<sup>nd</sup> Copy will be submitted to faculty guide duly certified by DAC. Internal & External assessment will be evaluated as per the scheme.

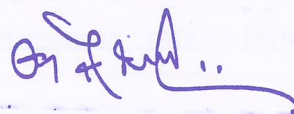


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**COURSE CONTENTS**

**M. Tech. (Construction Engineering and Management)**

**Fourth Semester**



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**MCE- 401 DISSERTATION (MAIN)**  
**(Core Course)**

In the fourth semester, student will have to complete all the objective of their work as decided in 3<sup>rd</sup> semester. He/she has to present his/her work through presentation in front of DAC for the evaluation. Minimum 2 presentations will be given by student for internal assessment.

Each student has to submit a final Dissertation report in three copies. The report must not be reproduction of any original paper/thesis work (Plagiarism report will be attached by the students that should not be greater than 25% in any case). One of the three copies submitted by the student should be returned to him/her, 2<sup>nd</sup> Copy will be submitted to faculty guide and the 3<sup>rd</sup> copy shall be kept in the departmental library. All copies should be duly signed by the DAC and the Head of the department. The soft copy of the report written on CD should also be submitted along with 3<sup>rd</sup> copy. Internal & External assessment will be evaluated as per the scheme. Student whose work is published/accepted in reputed (and unpaid) journal or published/presented in any National/International conference of repute before the submission of their report, weightage (30 marks) will be given as per scheme. Following criterion will be adopted for awarding weightage (out of 30 marks):

- Publication/Acceptance (with minor revision will also suffice) in reputed & unpaid journal = 30
- Publication (Full paper)/Presentation in International Conference of repute = 25
- Publication/ (Full Paper)/Presentation in National Conference of repute = 20



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