



**DEPARTMENT OF CIVIL ENGINEERING**  
**M.Tech - Construction Engineering and Management (Full Time)**  
**Curriculum & Syllabus**  
**2018 Regulation**

<b>I SEMESTER</b>						
<b>S.No</b>	<b>Sub. Code</b>	<b>Subject Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1.	MMA180015	Applied Mathematics for Construction Engineers	3	1	0	4
2.	MCE18C001	Construction Equipments	3	1	0	4
3.	MCE18C002	Modern Construction Materials	3	1	0	4
4.	MCE18C003	Project Formulation and Appraisal	3	1	0	4
5.	MCE18C004	Advanced Concrete Technology	3	1	0	4
6.	MCE18C005	Construction Project Management	3	1	0	4
7.	MCE18CL01	Computer Application Lab	0	0	3	1
		<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>3</b>	<b>25</b>

<b>II SEMESTER</b>						
<b>S.No</b>	<b>Sub. Code</b>	<b>Subject Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1.	MCE18C006	Advanced Construction Techniques	3	1	0	4
2.	MCE18C007	Computer Applications in Construction Engineering and Planning	3	1	0	4
3.	MBA18CE01	Economics and Finance Management in Construction	3	1	0	4
4.	MCE18C008	Contract Laws and Regulations	3	1	0	4
5.	MCE18CEXX	Elective I	3	1	0	4
6.	MCE18CEXX	Elective II	3	0	0	3
		<b>TOTAL</b>	<b>18</b>	<b>5</b>	<b>0</b>	<b>23</b>



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III SEMESTER						
S.No	Sub. Code	Subject Name	L	T	P	C
1.	MCE18C009	Construction Planning, Scheduling and Control	3	1	0	4
2.	MCE18CEXX	Elective III	3	1	0	4
3.	MCE18CEXX	Elective IV	3	0	0	3
4.	MCE18CL02	Advanced Construction Engineering Laboratory	0	0	3	1
5.	MCE18CL03	Project Work (Phase I)	0	0	6	3
		<b>TOTAL</b>	<b>09</b>	<b>2</b>	<b>9</b>	<b>15</b>

IV SEMESTER						
S.No	Sub. Code	Subject Name	L	T	P	C
1.	MCE18CL04	Project Work ( Phase II)	0	0	24	12
		<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>12</b>

**TOTAL CREDITS = 25+ 23 + 15 + 12 = 75**



**DEPARTMENT OF CIVIL ENGINEERING**

**LIST OF ELECTIVES (COMMON TO BOTH FT & PT)**

<b>ELECTIVE I</b>						
<b>S.No</b>	<b>Sub. Code</b>	<b>Subject Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1.	MCE18CE01	System Integration in Construction	3	1	0	4
2.	MCE18CE02	Management Principles and Risk Analysis	3	1	0	4
3.	MCE18CE03	Construction Personnel Management	3	1	0	4
4.	MCE18CE04	Shoring, Scaffolding and Formwork	3	1	0	4

<b>ELECTIVE II</b>						
1.	MCE18CE05	Resource Management and Control in Construction	3	0	0	3
2.	MCE18CE06	Quantitative techniques in management	3	0	0	3
3.	MCE18CE07	Project Safety Management	3	0	0	3
4.	MCE18CE08	Energy Conservation Techniques in Building Construction	3	0	0	3

<b>ELECTIVE III</b>						
1.	MCE18CE09	Construction of Bituminous Pavements	3	1	0	4
2.	MCE18CE10	Disaster Management	3	1	0	4
3.	MCE18CE11	Condition Assessment and Evaluation Engineering	3	1	0	4
4.	MCE18CE12	Deterioration Process in Reinforced Concrete	3	1	0	4

<b>ELECTIVE IV</b>						
1.	MCE18CE13	Maintenance And Rehabilitation Of Structures	3	0	0	3
2.	MCE18CE14	Prefabrication and Construction Techniques	3	0	0	3
3.	MCE18CE15	Management Information System	3	0	0	3
4.	MCE18CE16	Quality Control and Assurance in Construction	3	0	0	3



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## DEPARTMENT OF CIVIL ENGINEERING

**MMA180015                      APPLIED MATHEMATICS FOR CONSTRUCTION ENGINEERS                      3 1 0 4**

### **UNIT:I RANDOM VARIABLES**

**12Hrs**

Random variables – Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Exponential, and normal distributions – Functions of a Random variable.

### **UNIT:II ESTIMATION THEORY**

**12 Hrs**

Unbiased estimators – Method of moments –Maximum likelihood estimation – Curve fitting by Principle of least squares.

### **UNIT:III TESTING OF HYPOTHESIS**

**12Hrs**

Tests of Significance – Large Sample Tests – Mean – Proportions – Small Sample Tests – t, F, Chi-square Tests: Independence of Attributes, Goodness of Fit.

### **UNIT:IV DESIGN OF EXPERIMENTS**

**12Hrs**

Analysis of Variance – One way classification – Two way classification – Design of Experiments – Completely Randomized Block Design – Randomized Block Design – Latin Square Design.

### **UNIT:V QUEUING**

**12Hrs**

Elementary concepts – Pure Birth and Death process – Single server Markovian models with infinite and finite capacity – Multi server Markovian models with infinite and finite capacity.

**Total No. of Hours: 60**

### **REFERENCE**

1. *Richard Johnson A., Miller & Freund's Probability and statistics for Engineers (8<sup>th</sup> ed), Prentice Hall of India, (2009).*
2. *Richard Johnson A., Wichern .D.W, Applied Multivariate Statistical Analysis (6<sup>th</sup> ed), Prentice Hall of India, (2007).*
3. *Gupta S.C., Kapoor V.K., Fundamentals of Mathematical Statistics, S.Chand & Co., (2007).*
4. *Soong T.T., Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, (2004).*
5. *Hamdy A. Taha, Operations Research: An Introduction (9<sup>th</sup> ed.), Pearson, (2010).*
6. *Hillier, Lieberman, Introduction to Operations Research (8<sup>th</sup> ed.) (IAE), Tata McGraw Hill Publishing Co., (2005).*



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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18C001**

**CONSTRUCTION EQUIPMENTS**

**3 1 0 4**

### OBJECTIVE

- To study the various construction equipment in construction field.

### UNIT I: CONSTRUCTION EQUIPMENT MANAGEMENT

**12 Hrs**

Identification – Planning - Equipment Management in Projects - Maintenance Management – Replacement – Unit Operating Cost - Cost Control of Equipment - Depreciation Analysis – Safety Management

### UNIT II: EQUIPMENT FOR EARTHWORK

**12 Hrs**

Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Waders, Earth Movers

### UNIT III: OTHER CONSTRUCTION EQUIPMENT

**12 Hrs**

Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting - Equipment for Compaction - Erection Equipment - Types of pumps used in Construction - Equipment for Dewatering and Grouting – Foundation and Pile Driving Equipment

### UNIT IV: MATERIALS HANDLING EQUIPMENT

**12 Hrs**

Forklifts and related equipment - Portable Material Bins – Conveyors - Hauling Equipment

### UNIT V: EQUIPMENT FOR PRODUCTION OF AGGREGATE AND CONCRETING

**12 Hrs**

Crushers – Feeders - Screening Equipment - Handling Equipment - Batching and Mixing Equipment - Hauling, Pouring and Pumping Equipment – Transporters

**Total No. of Hours: 60**

### REFERENCES

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., *Construction Planning, Equipment and Methods*, 5<sup>th</sup> Edition, McGraw-Hill, Singapore, 1995
2. Sharma S.C. *Construction Equipment and Management*, Khanna Publishers, New Delhi, 1988.
3. Deodhar, S.V. *Construction Equipment and Job Planning*, Khanna Publishers, New Delhi, 1988.
4. Dr.Mahesh Varma, *Construction Equipment and its planning and Application*, Metropolitan Book Company, New Delhi. 1983.







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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18C004**

**ADVANCED CONCRETE TECHNOLOGY**

**3 1 0 4**

### OBJECTIVE

- To study the properties of materials, tests and mix design for concrete.

### UNIT I: CONCRETE INGREDIENTS

**15Hrs**

Composition of OPC – Manufacture – Modified Portland Cements – Hydration Process of Portland Cements – Structure of Hydrated Cement Pastes Mineral Admixtures – Slags – Pozzolanas and Fillers – Chemical Admixtures – Solutes – Retarders – Air Entraining Agents – Water Proofing Compounds – Plasticizers and Super Plasticizers Shape and Mechanical Properties – Absorption and Physical Durability – Chemical Stability – Packing Characteristics

### UNIT II: FRESH CONCRETE

**15Hrs**

Workability – Mix Proportioning – Mixes incorporating Fly-ash, Silica fume, GGBS – Mixes for High Performance Concrete – Mix Design methods – variations in concrete strength.

### UNIT III: HARDENED CONCRETE

**10Hrs**

Interfacial Transition Zone – Fracture Strength – Mechanical Properties – High Strength Concrete – Shrinkage – Creep – Other Properties

### UNIT IV: DURABILITY OF CONCRETE

**10Hrs**

Basic Consideration – Stability of Constituents – Chemical Attack – Corrosion of Reinforcing Steel

### UNIT V : SPECIAL TOPICS

**10Hrs**

Manipulation of Strength of Concrete – Fibre Reinforced Concrete – Self Compacting Concrete – Polymer Concrete – Super Plasticized Concrete.

**Total No. of Hours: 60**

**\*Note: (Use of approved data books permitted)**

### REFERENCES

1. *Nevile, A.M., Properties of Concrete, 4th edition, Longman, 1995.*
2. *Metha P.K. and Montreio P.J.M., Concrete Structure Properties and Materials, 2nd edition, Prentice Hall, 1998.*
3. *Mindass and Young, Concrete, Prentice Hall, 1998*







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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CL01**

**COMPUTER APPLICATION LAB**

**0 0 3 1**

### OBJECTIVE

- This course gives an exposure to students in utilizing the sophisticated Spread sheets programs, Estimation Software and other package programs.
1. Introduction about –software & Hardware.
  2. Use of management software
  3. Construction scheduling with software
  4. Building Information Modeling (BIM)

**Total No. of Hours: 30**

### REFERENCES

1. *Feigenbaum ., L., “ Construction scheduling with primavera project planner” Prentice Hall Inc., 1999.*
2. *Paulson, B.R, “Computer Applications in construction,”Mc Graw-hill, 1995.*



## **DEPARTMENT OF CIVIL ENGINEERING**

**MCE18C006**

**ADVANCED CONSTRUCTION TECHNIQUES**

**3 1 0 4**

### **OBJECTIVE**

- To study and understand the latest construction techniques applied to engineering Construction.

### **UNIT I: SUB STRUCTURE CONSTRUCTION**

**15Hrs**

Box jacking - pipe jacking - Under water construction of diaphragm walls and basement - Tunneling techniques - piling techniques - driving well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - laying operations for built up offshore system - shoring for deep cutting - large reservoir construction with membranes and earth system - well points - dewatering and stand by plant equipment for underground open excavation.

### **UNIT II: SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS**

**10Hrs**

Vacuum dewatering of concrete flooring – concrete paving technology – techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – launching techniques – suspended form work – erection techniques of tall structures, large span structures – launching techniques for heavy decks – insitu prestressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures –

### **UNIT III: CONSTRUCTION OF SPECIAL STRUCTURES**

**15Hrs**

Erection of lattice towers and rigging of transmission line structures – construction sequence in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges – launching and pushing of box decks – Advanced construction techniques in offshore construction practice – construction sequence and methods in domes and prestress domes – support structure for heavy equipment and conveyor and machinery in heavy industries – erection of articulated structures, braced domes and space decks.

### **UNIT IV: REHABILITATION TECHNIQUES**

**10Hrs**

Mud jacking grout through slab foundation - micropiling for strengthening floor and shallow profile - pipeline laying - protecting sheet piles, screw anchors - sub grade water proofing under pining

### **UNIT V: DEMOLITION**

**10Hrs**

Advanced techniques and sequence in demolition and dismantling. Demolition Techniques, Demolition by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, Safety precaution in Demolition and Dismantling.

**Total No. of Hours: 60**

### **REFERENCES**

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*
- Jerry Irvine, Advanced Construction Techniques, CA Rocketr, 1984*





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## DEPARTMENT OF CIVIL ENGINEERING

**MBA 18CE01      ECONOMICS AND FINANCE MANAGEMENT IN CONSTRUCTION      3 1 0 4**

### OBJECTIVE:

- To study the concepts of Construction Economic and Finance such as comparing alternatives proposals, evaluating alternative investments, management of funds, and management of accounting.

### UNIT I BASIC PRINCIPLES

**12Hrs**

Time Value of Money – Cash Flow diagram – Nominal and effective interest- continuous interest . Single Payment Compound Amount Factor (P/F,F/P) – Uniform series of Payments (F/A,A/F,F/P,A/P)– Problem time zero (PTZ)- equation time zero (ETZ). Constant increment to periodic payments – Arithmetic Gradient(G), Geometric Gradient (C).

### UNIT II COMPARING ALTERNATIVES PROPOSALS

**12Hrs**

Comparing alternatives- Present Worth Analysis, Annual Worth Analysis, Future Worth Analysis, Rate of Return Analysis (ROR) and Incremental Rate of Return (IROR)Analysis, Benefit/Cost Analysis, Break Even Analysis.

### UNIT III EVALUATING ALTERNATIVE INVESTMENTS

**12 Hrs**

Real Estate - Investment Property, Equipment Replace Analysis, Depreciation – Tax before and after depreciation – Value Added Tax (VAT) – Inflation.

### UNIT IV FUNDS MANAGEMENT:

**12 Hrs**

Balance sheet - Project Finance – Sources of finance - Long-term and short -term finance, Working Capital Management, Inventory valuation, Mortgage Financing - International financial management- foreign currency management.

### UNIT V FUNDAMENTALS OF MANAGEMENT ACCOUNTING:

**12 Hrs**

Management accounting, Financial accounting principles- basic concepts, Financial statements – accounting ratios - funds flow statement – cash flow statement.

**Total No. of Hours: 60**

### REFERENCES:

1. Blank, L.T., and Tarquin,a.J *Engineering Economy*,4th Edn. Mc-Graw Hill Book Co., 1988
2. Collier C and GlaGola C *Engineering Economics & Cost Analysis*, 3rd Edn. Addison Wesley Education Publishers.,1998.
3. Patel, B M *Project management- strategic Financial Planning, Evaluation and Control*, Vikas Publishing House Pvt. Ltd. New Delhi, 2000
4. Shrivastava,U.K., *Construction Planning and Management*,2nd Edn. Galgotia Publications Pvt. Ltd. New Delhi., 2001.
5. Steiner, H.M. *Engineering Economic principles*, 2nd Edn. Mc-Graw Hill Book, 1996



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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18C008**

**CONTRACT LAWS AND REGULATIONS**

**3 1 0 4**

### OBJECTIVE

- To study the various types of construction contracts and their legal aspects and provisions

### UNIT I: CONSTRUCTION CONTRACTS

**10 Hrs**

Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts

### UNIT II: TENDERS

**10 Hrs**

Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamilnadu Transparency in Tenders Act.

### UNIT III: ARBITRATION

**10 Hrs**

Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Arbitration Act - Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs

### UNIT IV: LEGAL REQUIREMENTS

**15 Hrs**

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations

### UNIT V: LABOUR REGULATIONS

**15 Hrs**

Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamilnadu Factory Act – Child Labour Act - Other Labour Laws

**Total No. of Hours: 60**

### REFERENCES

1. *Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, M.M.Tripathi Private Ltd., Bombay, 1982*
2. *Tamilnadu PWD Code, 1986*
3. *Jimmie Hinze, Construction Contracts, 2<sup>nd</sup> Edition, McGraw-Hill, 2001*
4. *Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, 6<sup>th</sup> Edition, McGraw-Hill, 2000*





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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18C009 CONSTRUCTION PLANNING, SCHEDULING AND CONTROL 3 1 0 4**

### OBJECTIVE

- To study and understand the concept of scheduling and the techniques necessary for construction project.

### UNIT I: CONSTRUCTION PLANNING

**12 Hrs**

Basic Concepts in the Development of Construction Plans - Choice of Technology and Construction Method - Defining Work Tasks - Defining Precedence Relationships Among Activities - Estimating Activity Durations - Estimating Resource Requirements for Work Activities - Coding Systems

### UNIT II: SCHEDULING PROCEDURES AND TECHNIQUES

**12 Hrs**

Relevance of Construction Schedules - The Critical Path Method - Calculations for Critical Path Scheduling - Activity Float and Schedules - Presenting Project Schedules - Critical Path Scheduling for Activity-on-Arrow and with Leads, Lags, and Windows - Calculations for Scheduling with Leads, Lags and Windows - Resource Oriented Scheduling - Scheduling with Resource Constraints and Precedences - Use of Advanced Scheduling Techniques - Scheduling with Uncertain Durations – Delay analysis - Calculations for Monte Carlo Schedule Simulation - Crashing and Time/Cost Tradeoffs - Scheduling in Poorly Structured Problems - Improving the Scheduling Process.

### UNIT III: COST CONTROL, MONITORING AND ACCOUNTING

**12 Hrs**

The Cost Control Problem - The Project Budget - Forecasting for Activity Cost Control - Financial Accounting Systems and Cost Accounts - Control of Project Cash Flows - Schedule Control - Schedule and Budget Updates - Relating Cost and Schedule Information.

### UNIT IV: QUALITY CONTROL AND SAFETY DURING CONSTRUCTION

**12 Hrs**

Quality and Safety Concerns in Construction - Organizing for Quality and Safety - Work and Material Specifications - Total Quality Control - Quality Control by Statistical Methods - Statistical Quality Control with Sampling by Attributes - Statistical Quality Control with Sampling by Variables - Safety

### UNIT V: ORGANIZATION AND USE OF PROJECT INFORMATION

**12 Hrs**

Types of Project Information - Accuracy and Use of Information - Computerized Organization and Use of Information - Organizing Information in Databases - Relational Model of Databases - Other Conceptual Models of Databases - Centralized Database Management Systems - Databases and Applications Programs - Information Transfer and Flow.

**Total No. of Hours: 60**

### REFERENCES

1. Chitkara, K.K. *Construction Project Management: Planning, Scheduling and Control*, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2. Calin M. Popescu, Chotchai 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.



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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CL02      ADVANCED CONSTRUCTION ENGINEERING LABORATORY 0 0 3 1**

### OBJECTIVE:

- This course provides a thorough knowledge of material selection through the material testing based on specification.

### LIST OF EXPERIMENTS

1. Mix design of concrete as per IS, ACI & BS methods for high performance concrete.
2. Flow Characteristics of Self Compacting concrete.
3. Effect of minerals and chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength and durability.
4. Permeability of Concrete.
  - a. Rapid chloride Penetration Test,
  - b. Freeze and Thaw test,
  - c. Acid test ,
  - d. Alkali aggregate reaction test
  - e. VCC testing for fire resistance
  - g. Autoclaving
5. Non Destructive Testing Of Concrete.
  - a. Ultra Sonic Pulse velocity Test,
  - b. Rebound Hammer test
  - c. Cover Meter
  - d. Concrete Analyzer

**Total No. of Hours: 30**

### REFERENCES

1. *Purushothaman, P, Reinforced Concrete Structure Structural Elements : Behaviour Analysis and Design , Tata Mc Graw Hill, New Delhi 1986.*
2. *Varghese, P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India New Delhi, 1995.*
3. *Krishna Raju, N.Advanced Reinforced Concrete Design, CBS Publishers and New Delhi Distributors, 1986.*
4. *Neville, A.M., Properties of Concrete , Pitman Publishing Limited, London.*
5. *Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi.*





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## **DEPARTMENT OF CIVIL ENGINEERING**

**MCE18CL03**

**PROJECT PHASE I**

**0063**

### **OBJECTIVE**

- The student shall be capable of identifying a problem related to the program of study and carry out wholesome research on it leading to findings which will facilitate development of a new/improved product, process for the benefit of the society.

M.Tech projects should be socially relevant and research oriented ones. Each student is expected to do an individual project. The project work is carried out in two phases – Phase I in III semester and Phase II in IV semester. Phase II of the project work shall be in continuation of Phase I only. At the completion of a project the student will submit a project report, which will be evaluated (end semester assessment) by duly appointed examiner(s). This evaluation will be based on the project report and a viva voce examination on the project. Student will be allowed to appear in the final viva voce examination only if he / she has submitted his / her project work in the form of paper for presentation / publication in a conference / journal and produced the proof of acknowledgement of receipt of paper from the organizers / publishers.



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## **DEPARTMENT OF CIVIL ENGINEERING**

**MCE18CL04**

**PROJECT PHASE II**

**0 0 24 12**

### **OBJECTIVE**

- The student shall be capable of identifying a problem related to the program of study and carry out wholesome research on it leading to findings which will facilitate development of a new/improved product, process for the benefit of the society.

M.Tech projects should be socially relevant and research oriented ones. Each student is expected to do an individual project. The project work is carried out in two phases – Phase I in III semester and Phase II in IV semester. Phase II of the project work shall be in continuation of Phase I only. At the completion of a project the student will submit a project report, which will be evaluated (end semester assessment) by duly appointed examiner(s). This evaluation will be based on the project report and a viva voce examination on the project. Student will be allowed to appear in the final viva voce examination only if he / she has submitted his / her project work in the form of paper for presentation / publication in a conference / journal and produced the proof of acknowledgement of receipt of paper from the organizers / publishers.



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**DEPARTMENT OF CIVIL ENGINEERING**

# **ELECTIVE SYLLABUS**



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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE01                      SYSTEM INTEGRATION IN CONSTRUCTION                      3 1 0 4**

### OBJECTIVE

- To study and understand the construction system integration.

### UNIT I: STRUCTURAL

**12Hrs**

Structural System, Systems for enclosing Buildings, Functional aesthetic system, Materials Selection and Specification.

### UNIT II: ENVIRONMENTAL

**12Hrs**

Qualities of enclosure necessary to maintain a specified level of interior environmental quality – weather resistance – Thermal infiltration – Acoustic Control – Transmission reduction – Air quality – Illumination – Relevant systems integration with structural systems.

### UNIT III: SERVICES

**12Hrs**

Plumbing – Electricity – Vertical circulation and their interaction.

### UNIT IV: MAINTENANCE

**12Hrs**

Component longevity in terms of operation performance and resistance to deleterious forces - Planning systems for least maintenance materials and construction – access for maintenance – Feasibility for replacement of damaged components – equal life elemental design – maintenance free exposed and finished surfaces.

### UNIT V: SAFETY

**12 Hrs**

Ability of systems to protect fire – preventive systems – fire escape system design – planning for pollution free construction environmental – Hazard free Construction execution.

**Total No. of Hours: 60**

### REFERENCES

1. *E.C. Butcher and A.C. Parnell, Designing for Fire Safety, John Wiley and Sons, 1993.*
2. *William T. Mayer, Energy Economics and Build Design, McGraw-Hill Book Company, 1983.*
3. *Peter R. Smith and Warren G. Julian, Building Services, Applied Science Publishers Ltd., London.*
4. *A.J.Elder and Martiz Vinden Barg, Handbook of Building Enclosure, McGraw-Hill Book Company, 1983.*
5. *Jane Taylor and Gordin Cooke, The Fire Precautions Act in Practices, 1987.*





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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE03      CONSTRUCTION PERSONNEL MANAGEMENT      3 1 0 4**

### OBJECTIVE

To study the various aspects of manpower management in construction.

### UNIT I: MANPOWER PLANNING

**15 Hrs**

Manpower Planning, Organizing, Staffing, directing, and controlling – Personnel Principles

### UNIT II: ORGANISATION

**15 Hrs**

Organization – Span of Control – Organization Charts – Staffing Plan - Development and Operation of human resources - Managerial Staffing – Recruitment – Selection - Placement, Training and Development.

### UNIT III: HUMAN BEHAVIOUR

**10Hrs**

Introduction to the field of people management - basic individual psychology; motivation - Job design and performance management - Managing groups at work - self-managing work teams - intergroup behaviour and conflict in organisations – Leadership - Behavioural aspects of decision-making; and communication for people management

### UNIT IV: WELFARE MEASURES

**10 Hrs**

Compensation – Safety and health – GPF – EPF – Group Insurance – Housing - Pension – Laws related to welfare measures.

### UNIT V: MANAGEMENT AND DEVELOPMENT METHODS

**10 Hrs**

Compensation - Wages and Salary, Employee Benefits, employee appraisal and assessment - Employee services - Safety and Health – Discipline and discharge - Special Human resource problems, Performance appraisal. - Employee hand book and personnel manual - Job descriptions and organization structure and human relations – Productivity of Human resources.

**Total No. of Hours: 60**

### REFERENCES

1. Carleton Counter II and Jill Justice Coutler, *The Complete Standard Handbook of Construction Personnel Management*, Prentice-Hall, Inc., New Jersey, 1989.
2. Memoria, C.B., *Personnel Management*, Himalaya Publishing Co., 1992.
3. Josy. J. Familiaro, *Handbook of Human Resources Administration*, McGraw-Hill International Edition, 1987.
4. Pringle Charles, *Management Longenecker Emerricle Publishing Company*, 1981.
5. R.S. Dwivedi, *Human Relations and Organisational Behaviour*, BH – 1987.



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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE04 SHORING, SCAFFOLDING AND FORMWORK**

**3 1 0 4**

### OBJECTIVE

- To study and understand the various types of scaffolding, formworks, shoring methods and techniques.

### UNIT I : PLANNING, SITE EQUIPMENT AND PLANT FOR FORM WORK 12Hrs

Planning – Standard units – Schedule for column formwork – Formwork elements – Planning at Tender stage – Development of basic system – Planning for maximum reuse – Economical form construction – Planning examples – Crane size, effective scheduling estimate – Recheck plan details – Detailing the forms. Crane arrangement – Site layout plan – Transporting plant – Formwork beams – Formwork ties – Wales – Scaffold frames - Form accessories – Vertical transport table form work.

### UNIT II : FORM MATERIALS AND PRESSURES ON FORMWORK 12Hrs

Lumber – Types – Finish – Sheathing boards - Working stresses – Repetitive member stress – Plywood – Types and grades – Textured surfaces and strength – Reconstituted wood – Steel – Aluminum Form lining materials – Hardware and fasteners – Nails in Plywood – Bolts lag screw and connectors – Bolt loads. Pressures on Formwork - Concrete density – Height of discharge – Temperature – Rates of Placing – Consistency of concrete – Live loads and wind pressure – Vibration Hydrostatic Adjustment for non standard condition.

### UNIT III : SHORES AND FORM DESIGN 12Hrs

Simple wood stresses – Slenderness ratio – Allowable loads – Tubular steel shores - Patented shores – Site Preparation - Size and spacing – Steel Tower Frames – Safety practices – Horizontal shores shoring for multistories – More concentrated shore loads - T-heads – Two tier wood shores – Ellis shores – Dayton sure grip and Baker Roos shores – Safway Symons shores – Beaver Advance shores - Dead shores – Raking and Flying shores Basic simplification – Beam formulas – Allowable stresses – Deflection bending lateral stability – Shear, Bearing – Examples in wall forms – Slab forms – Beam form – Ties, Anchors and Hangers – Column forms – DOKA forms - Examples in each.

### UNIT IV: FORMWORK FOR BUILDINGS AND FAILURES 12Hrs

Location of job mill – Storage – Equipment – Footings – Wall footing – Column footings Sloped footings – Slab on grade and paving work – Highway and airport paving – Curb and Gutter forms – Wall forms – External vibration – Prefabricated panel systems – Giant forms curved wall forms – wall openings joints – Tolerance for walls – Erection practices – Column heads – Beam or girder forms – Beam pockets – Suspended forms – Suggested Tolerances – Flying system forms – CECO Meyer flange and long forms. Causes of failures – Inadequate shoring - Inadequate bracing of members – Improper vibration – Premature stripping – Errors in design – Failure to follow codes – How formwork affects concretes quality – ACI – Case studies – Planning for safety - Achieving economy – Finish of exposed concrete surface - Design deficiencies - Safety factors – Reshore installation – Prevention of rotation – Stripping sequence – Advantage of reshoring.

### UNIT V: DOME FORMS, TUNNEL FORMS, SLIPFORMS AND SAFETY PRACTICES FOR SCAFFOLDS 12Hrs

Shells of translation and revolution - Hemispherical – Parabolic - Barrel vaults - Hyperbolic



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## **DEPARTMENT OF CIVIL ENGINEERING**

Paraboloid Shells – Conoidal Shells - Folded plates – Shell form design – Building the form – Placing concrete – Strength requirements – Tunnel forming components – Curb and Invert forms – Arch and Wall forms - Telescopic forms– Concrete placement methods – Cut and Cover construction – Continuous Advancing slope method - Bulk head method – General design considerations influence of placing equipment – Tolerances – Form construction for Shafts. Slipforms – Principles – Types – Advantage – Functions of various components – Planning of Slipform operations – Desirable characteristics of concrete – Common problems faced – Safety in slip forms - Special structures built with Slipform Technique – Codal provisions – Types of scaffolds – Putlog and Independent scaffold – Single pole scaffolds – Fixing ties – Spacing of ties - Plan Bracing – Knots – Safety nets – General safety requirements – Precautions against particular hazards – Truss, Suspended – Gantry and system scaffolds.

**Total No. of Hours: 60**

### **REFERENCES**

1. Robert L. Peurifoy and Garold D. Oberlender, “Formwork for Concrete Structures”, Third Edition McGraw-Hill, 1996.
2. Hurd, M.K., “Formwork for Concrete”, Special Publication No. 4 Sixth Edition, American Concrete Institute, Detroit, 1995.
3. Michael P. Hurst, “Formwork”, Construction Press, London and New York, 1997.
4. Austin, C.K., “Formwork for Concrete”, Cleaver – Hume Press Ltd., London 1996.
5. Tudor Dinescu and Constantin Radulescu, “Slipform Techniques”, Abacus Press, Turn Bridge Wells, Kent, 1992.
6. “Guide for Concrete Formwork”, American Concrete Institute Detroit, Michigan, 1996.





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## DEPARTMENT OF CIVIL ENGINEERING

### MCE18CE05 RESOURCE MANAGEMENT AND CONTROL IN CONSTRUCTION 3 0 0 3

#### OBJECTIVE

- To study the management of various resources involved in construction.

#### UNIT I: RESOURCE PLANNING

9 Hrs

Resource Planning, Procurement, Identification, Personnel, Planning for material, Labour, time schedule and cost control, Types of resources, manpower, Equipment, Material, Money, Time.

#### UNIT II: ABOUT

9 Hrs

Systems approach in resource management, Characteristics of resources, Resources, Utilization, measurement of actual resources required, Tools for measurement of resources, Labour, Classes of Labour, Cost of Labour, Labour schedule, optimum use Labour.

#### UNIT III: MATERIALS AND EQUIPMENT

9 Hrs

Material : Time of purchase, quantity of material, sources, Transportation, Delivery and Distribution. Equipment: Planning and selecting by optimistic choice with respect to cost, Time, Source and handling.

#### UNIT IV: TIME

9 Hrs

Personnel time, Management and planning, Managing time on the project, forecasting the future, Critical path measuring the changes and their effects. Cost control: Cash flow and cost control, objectives of cost, Time and quality.

#### UNIT V: RESOURCE ALLOCATION AND LEVELLING

9 Hrs

Time-cost trade of, Computer application in resource leveling examples, resource list, resource allocation graph, Resource loading, Cumulative cost ETC - Value Management.

**Total No. of Hours: 45**

#### REFERENCES

1. Andrew,D., Szilagg, *Hand Book of Engineering Management*, 1982.
2. Glenn, A., Sea's and Reichard.H Clough, *Construction Project Management*, John Wiley and Sons,Inc. 1979.
3. Harvey, A., Levine, *Project Management using Micro Computers*, Osborne-McGraw-Hill C.A. Publishing Co., Inc. 1988.
4. James.A., Adrain ,*Quantitative Methods in Construction Management*, American Elsevier Publishing Co., Inc., 1973.



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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE06      QUANTITATIVE TECHNIQUES IN MANAGEMENT      3 0 0 3**

### OBJECTIVE:

- To study the various quantitative methods applied to the elements of management.
- To study the effect of production management, finance management, decision theory and managerial economics

**UNIT I OPERATIONS RESEARCH      9 Hrs**

Introduction to Operations Research - Linear Programming – Graphical and Simplex Methods, Duality and Post – Optimality Analysis – Transportation and Assignment Problems.

**UNIT II PRODUCTION MANAGEMENT      9 Hrs**

Inventory Control - EOQ - Quantity Discounts - Safety Stock – Replacement Theory – PERT and CPM – Simulation Models – Quality Control.

**UNIT III FINANCIAL MANAGEMENT      9 Hrs**

Working Capital Management – Compound Interest and Present Value methods – Discounted Cash Flow Techniques – Capital Budgeting.

**UNIT IV. DECISION THEORY      9 Hrs**

Decision Theory – Decision Rules – Decision making under conditions of certainty, risk and uncertainty – Decision trees – Utility Theory.

**UNIT V. MANAGERIAL ECONOMICS      9 Hrs**

Cost Concepts – Break-even analysis – Pricing Techniques – Game theory Applications.

**Total No. of Hours: 45**

### REFERENCES:

1. Frank Harrison, E., *The Managerial Decision Making Process*, Houghton Mifflin Co., Boston, 1999.
2. Hamdy A.Taha, *Operations Research: An Introduction*, Prentice Hall, 2010.
3. Levin, R.I, Rubin,D.S., and Stinson J., *Quantitative Approaches to Management*, McGraw Hill College, 1993.
4. Tang S.L., Irtishad U.Ahmad, Syed M.Ahmed, Ming Lu, *Quantitative Technique for Decision making in Construction*, Hongkong University Press, HKU, 2004.
5. Schroeder, R.G, *Operations Management*, McGraw Hill, 2009.
6. Vohra, Nd., *Quantitative Techniques in Management, Third Edition*, Tata McGraw-Hill Company Ltd, 2007.



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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE07**

**PROJECT SAFETY MANAGEMENT**

**3 0 0 3**

### OBJECTIVE

- To study and understand the various safety concepts, requirements applied to construction projects.

### UNIT I : CONSTRUCTION ACCIDENTS

**9 Hrs**

Accidents and their Causes – Human Factors in Construction Safety - Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications

### UNIT II : SAFETY PROGRAMMES

**9 Hrs**

Problem Areas in Construction Safety – Elements of an Effective Safety Programme – Job-Site Safety Assessment – Safety Meetings – Safety Incentives

### UNIT III : CONTRACTUAL OBLIGATIONS

**9 Hrs**

Safety in Construction Contracts – Substance Abuse – Safety Record Keeping

### UNIT IV: DESIGNING FOR SAFETY

**9 Hrs**

Safety Culture – Safe Workers – Safety and First Line Supervisors – Safety and Middle Managers – Top Management Practices, Company Activities and Safety – Safety Personnel – Subcontractual Obligation – Project Coordination and Safety Procedures – Workers Compensation

### UNIT V : OWNERS' AND DESIGNERS' OUTLOOK

**9 Hrs**

Owner's responsibility for safety – Owner preparedness – Role of designer in ensuring safety – Safety clause in design document.

**Total No. of Hours: 45**

### REFERENCES

1. *Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997*
2. *Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001*
3. *Tamilnadu Factory Act*



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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE08                      ENERGY CONSERVATION TECHNIQUES IN                      3 0 03**  
**BUILDING CONSTRUCTION**

### OBJECTIVE

- To study the various energy saving and management techniques applied to building and construction with relevance to environment.

### UNIT I: INTRODUCTION

**9 Hrs**

Fundamentals of energy- Energy Production Systems-Heating, Ventilating and Airconditioning – Solar Energy and Conservation – Energy Economic Analysis – Energy conservation and audits – Domestic energy consumption – savings - challenges –primary energy use in buildings - Residential – Commercial – Institutional and public buildings – Legal requirements for conservation of fuel and power in buildings.

### UNIT II: ENVIRONMENTAL

**9 Hrs**

Energy and resource conservation – Design of green buildings – Evaluation tools for building energy – Embodied and operating energy – Peak demand – Comfort and Indoor Air quality – Visual and acoustical quality – Land, water and materials – Airborne emissions and waste management.

### UNIT III: DESIGN

**9 Hrs**

Natural building design consideration – Energy efficient design strategies – Contextual factors – Longevity and process Assessment – Renewable Energy Sources and design – Advanced building Technologies – Smart buildings – Economies and cost analysis.

### UNIT IV: SERVICES

**9 Hrs**

Energy in building design – Energy efficient and environment friendly building – Thermal phenomena – thermal comfort – Indoor Air quality – Climate, sun and Solar radiation, - Psychometrics – passive heating and cooling systems - Energy Analysis – Active HVAC systems - Preliminary Investigation – Goals and policies – Energy audit – Types of Energy audit – Analysis of results – Energy flow diagram – Energy consumption / Unit Production – Identification of wastage- Priority of conservative measures – Maintenance of energy management programme.

### UNIT V: ENERGY MANAGEMENT

**9 Hrs**

Energy management of electrical equipment - Improvement of power factor – Management of maximum demand – Energy savings in pumps – Fans – Compressed air systems – Energy savings in Lighting systems – Air conditioning systems – Applications – Facility operation and maintenance – Facility modifications – Energy recovery dehumidifier – Waster heat recovery – Steam plants and distribution systems – Improvement of boiler efficiency – Frequency of blow down – Steam leakage – steam Flash and condense return.

**Total No. of Hours: 45**

### REFERENCES

1. Moore F., *Environmental Control system* Mc Graw Hill, Inc. 1994.
2. Brown, GZ, *Sun, Wind and light: Architectural design strategies*, John Wiley & Sons, 1985.
3. Cook, J, Award – *Winning passive Solar Design*, Mc Graw Hill, 1984.
4. J.R. Waters, *Energy conservation in Buildings: A Guide to part L of the Building Regulations*, Blackwell Publishing, 2003.





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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE10**

**DISASTER MANAGEMENT**

**3 1 0 4**

### OBJECTIVE

- To study about Disaster Risk Management & development.

### UNIT I : INTRODUCTION TO DISASTERS

**12 Hrs**

Concepts, and definitions-Disaster, Hazard, Vulnerability, Resilience, Risks Disasters: Classification, Causes, Impacts -including social, economic, political, environmental, health, psychosocial, etc.

### UNIT II: RISK MANAGEMENT

**12 Hrs**

Goals and objectives of ISDR Programme- Risk identification – Risk sharing – Disaster and development: Development plans and disaster management –Alternative to dominant approach – disaster-development linkages -Principle of risk partnership.

### UNIT III: RISK REDUCTION

**12Hrs**

Trigger mechanism – constitution of trigger mechanism– risk reduction by education – disaster information network – risk reduction by public awareness Application of various technologies: Data bases– RDBMS– Management Information systems– Decision supportsystem and othersystems–Geographic information systems Remote sensing-an insight – contribution of remote sensing and GIS - Case study.

### UNIT IV : INTER-RELATIONSHIPS BETWEEN DISASTERS AND DEVELOPMENT12 Hrs

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources financial arrangements – areas of improvement –disaster preparedness — emergency response.

### UNIT V: DISASTER RISK MANAGEMENT IN INDIA

**12 Hrs**

Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)

**Total No. of Hours: 60**

### REFERENCE

1. Pardeep sahani, Alka Dhameja and Uma medury, “Disaster mitigation: Experiences and reflections”, PHI
2. Pardeep Sahn, Madhavi malalgoda and ariyabandu, “Disaster risk reduction in south asia”, PHI
3. Amita sinvhal, “Understanding earthquake disasters” TMH, 2010.







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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE12          DETERIORATION PROCESS IN REINFORCED CONCRETE          3 1 0 4**

### OBJECTIVE

- To study and understand the defects and damage in concrete.

### UNIT-I PHYSICAL DAMAGE:

**10 Hrs**

Plastic Settlement –Drying Shrinkage- Thermal Effects – Freeze and Thaw-Abrasion –Creep-Erosion and Cavitation – Fire.

### UNIT –II REBAR CORROSION:

**15 Hrs**

Types of Corrosion – Corrosion of reinforcement exposed to atmosphere – Corrosion of reinforcement embedded in concrete –Mechanisms of Corrosion – Factors influencing Corrosion - Protective Coating for concrete surfaces – Protective Coatings for Reinforcement bar – Cathodic Protection.

### UNIT- III CHEMICAL ATTACK ON CONCRETE:

**10 Hrs**

Sulphate attack –Seawater damage –Salt weathering-Carbonation –Acid attack –attack of soft water. Alkali –Silica reaction –Alkali –Carbonate reaction –unsound Cement –Biological attack.

### UNIT – IV CONSTRUCTION AND DESIGN DEFECTS

**15 Hrs**

Settlement of Sub-grade –Internal Settlement of Concrete Suspension –Movement of Formwork- Premature removal of forms/shores – Vibrations – Re-entrant Corners – Improper Placement of reinforcing steel bars – Poor Detailing joints – Inadequate – Drainage –Design errors –Deflection – Settlement of foundation.

### UNIT – V BLEMISHES AND DEFECTS IN CONCRETE:

**10 Hrs**

Honey Combing –Pop outs –Crazing – Efflorescence –Scaling and Spalling –Cold Joints – Discoloration -Bleeding -Curling.

**Total No. of Hours: 60**

### REFERENCES:

1. Mark Richardson – *Technology, Fundamentals of Durable Reinforced Concrete-Spon press (UK)*
2. Pietro Pedferri, Rob.B. Polder, *Corrosion of Steel in Concrete Prevention, Diagnosis, Repair, Wiley – VCH*
3. G. Jorv, *Concrete under severe conditions, Spon Press (UK)*
4. R. K. Dhir, Michael, J. Mearthy, *Concrete Durability & Repair Technology, Thomas Telford.*
5. R. K. Dhir, *Challenges of Concrete Construction, Pt.1, V.4, Thomas Telford, London.*
6. SP: 25-1984, *Causes and Prevention of Cracks in Buildings, BIS, New Delhi.*





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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE13 MAINTENANCE AND REHABILITATION OF STRUCTURES 3 0 0 3**

### OBJECTIVE

- To study the damages, repair and rehabilitation of structures.

**UNIT I: GENERAL 9 Hrs**

Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking.

**UNIT II: INFLUENCE ON SERVICEABILITY AND DURABILITY 9 Hrs**

Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.

**UNIT III: MAINTENANCE AND REPAIR STRATEGIES 9 Hrs**

Definitions: Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration - testing techniques.

**UNIT IV : MATERIALS FOR REPAIR 9 Hrs**

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

**UNIT V : TECHNIQUES FOR REPAIR 9 Hrs**

Rust eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete, Guniting and Shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning.

**Total No. of Hours: 45**

### REFERENCES

1. Denison Campbell, Allen and Harold Roper, "Concrete Structures", Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
2. R.T.Allen and S.C.Edwards, "Repair of Concrete Structures", Blakie and Sons, UK, 1987.



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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE14      PREFABRICATION AND CONSTRUCTION TECHNIQUES      3 0 0 3**

### OBJECTIVE

- At the end of this course the student shall be able to appreciate modular construction
- Industrialized construction and shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods using these elements

### **UNIT-I      INTRODUCTION      9 Hrs**

Materials - Modular co-ordination, standardization and tolerances-system for prefabrication. Pre-cast concrete manufacturing techniques, Moulds –construction design, maintenance and repair.

### **UNIT-II      PRE-CASTING TECHNIQUES      9 Hrs**

Pre-casting techniques - Planning, analysis and design considerations - Handling techniques - Transportation Storage and erection of structures.

### **UNIT-III      CURING AND TESTING      9 Hrs**

Joints -Curing techniques including accelerated curing such as steam curing, hot air blowing etc., - Test on precast elements - skeletal and large panel constructions - Industrial structures.

### **UNIT-IV      PRE-CASTE APPLICATION      9 Hrs**

Pre-cast and pre-fabricating technology for low cost and mass housing schemes. Small pre-cast products like door frames, shutters, Ferro-cement in housing - Water tank service core unit - Pre Engineered Building (PEB)

### **UNIT-V      QUALITY CONTROL      9 Hrs**

Quality control - Repairs and economical aspects on prefabrication.

**Total No. of Hours: 45**

### REFERENCES:

1. Levitt. M., *Precast concrete - Materials, Manufacture Properties and Usage*, Applied Science Publs. 1982,
2. Konex.T., *Handbook of Pre-cast Construction*, Vol.1.2&3.
3. Richardson,J.G., *Pre-cast concrete Production*, Cement and Concrete Association, London, 1973.
4. Madhava Rao.A-G., *Modern Trends in Housing in Developing Countries*, Oxford & UBH Publishing co., 1985. -
5. Lewicki.B., *Building with Large Pre-fabrications*, Elsevier Publishers.
6. *Large Panel Prefabricated Constructions*, Proc. of Advance Course conducted by SERC, Madras.
7. Bruggeling.A.S.G., & Huyghe.G.F., *Prefabrication with Concrete*, A.s.A., Balkema Publishers, Netherland, 1991.





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## DEPARTMENT OF CIVIL ENGINEERING

**MCE18CE16      QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION      3 0 0 3**

### OBJECTIVE

- To study the concepts of quality and assurance and control techniques in Construction.

### UNIT I: QUALITY MANAGEMENT

**9 Hrs**

Introduction – Definitions and objectives – Factor influencing construction quality -Responsibilities and authority - Quality plan - Quality Management Guidelines – Quality circles.

### UNIT II: QUALITY SYSTEMS

**9 Hrs**

Introduction - Quality system standard – ISO 9000 family of standards – Requirements – Preparing Quality System Documents – Quality related training – Implementing a Quality system – Third party Certification.

### UNIT III: QUALITY PLANNING

**9 Hrs**

Quality Policy, Objectives and methods in Construction industry – Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance – Taguchi's concept of quality – Codes and Standards – Documents – Contract and construction programming – Inspection procedures - Processes and products – Total QA / QC programme and cost implication.

### UNIT IV: QUALITY ASSURANCE AND CONTROL

**9 Hrs**

Objectives - Regularity agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC - Different aspects of quality - Appraisals, Factors influencing construction quality - Critical, major failure aspects and failure mode analysis, -Stability methods and tools, optimum design - Reliability testing, reliability coefficient and reliability prediction.

### UNIT V: QUALITY IMPROVEMENT TECHNIQUES

**9 Hrs**

Selection of new materials - Influence of drawings, detailing, specification, standardization - Bid preparation - Construction activity, environmental safety, social and environmental factors - Natural causes and speed of construction - Life cycle costing - Value engineering and value analysis.

**Total No. of Hours: 45**

### REFERENCES

1. James, J.O' Brian, *Construction Inspection Handbook – Quality Assurance and Quality Control*, Van Nostrand, New York, 1989.
2. Kwaku, A., Tena, Jose, M. Guevara, *Fundamentals of Construction Management and Organisation*, Reston Publishing Co., Inc., Virginia, 1985
3. Juran Frank, J.M. and Gryna, F.M. *Quality Planning and Analysis*, Tata McGraw Hill, 1993
4. Hutchins.G, *ISO 9000*, Viva Books, New Delhi, 2000
5. Clarkson H. Oglesby, *Productivity Improvement in Construction*, McGraw-Hill, 1989.
6. John L. Ashford, *The Management of Quality in Construction*, E & F.N.Spon, New York, 1989.
7. Steven McCabe, *Quality Improvement Techniques in Construction*, Addison Wesley Longman Ltd, England.