

GURU KASHI UNIVERSITY



Master of Technology in Civil Engineering (MCE)

Session: 2022-23

Department of Civil Engineering

PROGRAMME LEARNING OUTCOMES

- The programme emphasizes to enable to develop Professional competencies and reflect on policies and practices of higher education.
- It also targets to develop the skills to apply technology in education and for their professional development and to carry out research on the issues of global community.

Programme Structure

Semester -I						
Course Code	Course Title	Type of Course				
			L	T	P	Credit
MCE101	Construction Management & Equipment	Core course	4	0	0	4
MCE102	Concrete Construction Technology	Core course	4	0	0	4
MCE103	Computation Techniques	Ability Enhancement	4	0	0	4
MCE104	Building Planning & Design	Core course	4	0	0	4
Discipline Elective-I (Any one of the following)						
MCE105	Environment Engineering & Management	Discipline Elective-I	3	0	0	3
MCE106	Bridge Engineering					
Audit Course-I (Any one of the following)						
MCE107	English for Research Paper Writing	Audit Course	3	0	0	3
MCE108	Value Education					
MCE109	Constitution of India					
Total			22	0	0	22

Semester –II						
Course Code	Course Title	Type of Course				
			L	T	P	Credit
MCE201	Foundation Design & Construction	Core	4	0	0	4
MCE202	Maintenance of Building Structure	Core	4	0	0	4
MCE203	Computer Aided Design	Ability Enhancement	4	0	0	4
MCE204	Building Cost and Quality	Core	4	0	0	4
Discipline Elective-I (Any one of the following)						
MCE205	Pavement Design, Construction and Maintenance	Discipline Elective-II	4	0	0	4
MCE206	Rural Construction Technology					
Audit Course-II (Any one of the following)						
MCE207	Pedagogy Studies	Audit Course-II	3	0	0	3
MCE208	Stress Management by Yoga					
MCE209	Personality Development through Life Enlightenment Skills					
MCE210	Disaster Management					
Total			23	0	0	23

Semester -III						
Course Code	Course Title	Type of Course	L	T	P	Credit
			MCE301	Dissertation Phase-I* (Major Project)	Research Skills	0
MCE302	Advanced Structural Design and Detailing	Discipline Elective-III	4	0	0	4
MCE303	Composite Materials					
Discipline Elective-IV(Any one of the following)						
MCE304	Disaster Reduction and Management	Discipline Elective	4	0	0	4
MCE305	Construction Costing and Financial Management					
Open Elective Course						
		Open Elective	3	0	0	3
		Total	11	0	20	21

Open Elective For other departments also						
MCE306	Business Analytics	Open Elective	3	0	0	3
MCE307	Industrial Safety					
MCE308	Cost Management of Engineering Projects					
MCE309	Composite Materials					
MCE310	Waste to Energy					

Semester -IV						
Course Code	Course Title	Type of Course				
			L	T	P	Credit
MCE401	Dissertation Phase-II*	Research Skills	0	0	40	20
MCE402	Eco-awareness and Conservation	Value Added Course	2	0	0	2
		Total	0	0	40	22

SEMESTER: I

COURSE TITLE: Construction Management & Equipment
COURSE CODE: MCE101

L	T	P	Credits
4	0	0	4

Total: 60 Hours

Course Outcomes

1. Understand the construction equipment practices and techniques to be used in the field.
2. Apply theoretical and practical aspects of project management techniques to achieve project goals
3. Become familiar with construction equipment and their capabilities
4. Learn to utilize construction equipment on site work and heavy civil projects.
5. Properly select heavy equipment based on applications, utilization, productivity, and other factors

Course Content**UNIT I****15 Hours**

Engineering Economy: Principle of Engineering Economy, Minimum cost point analysis, breakeven point analysis, Depreciation and depletion.

Safety in Construction: Causes, classification, cost and measurement of an accident, safety Programme for construction, protective equipment, accident report, safety measure:

- (a) For storage and handling of building materials.
- (b) Construction of elements of a building
- (c) In demolition of buildings
- (d) Safety lacuna in Indian scenario.

UNIT II**15 Hours**

Construction Planning: Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control.

Introduction and characteristics of management, Principle and function of management, Scientific management.

**Unit-III
Hours****15**

Scope, Objective and functions of material management, Procurement and store management, Materials handling management, Inventory control and management. Disposal of Surplus Materials Earth Moving Equipment: Crawler and wheel tractors their functions, types and specifications; Gradability Bull dozers and their use; tractor pulled scrapers, their sizes and output; effect of grade and rolling resistance on the output of tractor pulled scrapers Earth loaders; Placing and compacting earth fills. Power shovels-functions, selection, sizes, shovel dimension and clearances, output. Draglines-functions, types sizes, output

clamshells; Safe lifting capacities and working ranges cranes; Hoes, Trenching machine types and production rate calculation of producing rates of equipment; examples.

UNIT IV

15 Hours

Hauling Equipment: Truck's; Bottom, dump wagons; capacities of trucks and wagons Balancing the capacities of hauling units with the size excavator; effect of grade, rolling resistance and altitude on the cost/performance of hauling equipment; balancing excavating hauling equipment examples.

Drilling, Blasting and Tunneling Equipment: Definition of terms, bits, Jackhammers, Drifters, wagon drills, che drills, piston drills, blast hole drills, shot drills, diamond drills, tunneling equipment, selecting the drilling method equipment; selecting drilling pattern; Rates for drilling rock, compressors.

Pile Driving Equipment: Pile hammers, selecting a pile hammer, loss of energy due to impact, Energy losses due to causes other than impact.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Verma, Mahesh. (1964), Construction equipment and its planning and application. Metropolitan Book Company.
2. Peuripo, RL. (2010). Construction Planning equipment and Methods. Tata McGraw Hill.
3. Singh, Jagman. 1993. Heavy construction planning equipment and methods. Oxford and IBH.
4. Franklin, John (2004). A. Dusseault, Maurice B. Rock Engineering. Tata McGraw Hill.
5. John, Christan.(1981). Management Machines and Methods in Civil Engineering. John Wiley and Sons

SEMESTER: I

COURSE TITLE: CONCRETE CONSTRUCTION TECHNOLOGY
COURSE CODE: MCE102

L	T	P	Credits
4	0	0	4

Total: 60 Hours

Course Outcomes:

1. Learn about the special ingredients of Concrete.
2. Know different property ingredients of concrete.
3. Understand the use of various admixtures to be used in Preparation of Mixes.
4. Estimate the properties of fresh and harden concrete.
5. Prepare the design concrete mixes.

Course Contents**UNIT I****15 Hours**

Introduction of Concrete materials, Admixtures, Fly Ash, Polymers, Early Age Properties, Strength, Permeability & Durability.

Principles of Concrete mix design, Concrete Mix Design procedure by: IS/ACI/British Standards.

UNIT II**15 Hours**

Concreting Operations-Practices and Equipment, Batching; Mixing; Transporting; Placing and Compacting; curing.

Properties and technique of construction for concrete, Fiber reinforced concrete, light weight concrete, heavy weight concrete, Foam concrete, high performance Concrete.

UNIT III**15 Hours**

Special concrete operations, shot Crete, grouting, grunting, under water concreting, hot and cold weather concrete, pump able concrete.

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

UNIT IV**15 Hours**

Prestressed concrete construction- Principle, methods, materials, Tools and equipment for the construction of a prestressed bridge.

Inspection and Quality Control of Concrete Construction- Stages, Principles, Checklist, Statistical Controls, procedures.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Gambhir, M.L. (2007). Concrete Technology. Tata McGraw-Hill Education.
2. Mehta, P.K. (2009). Concrete Microstructure, Properties and Materials. PJM Monteiro Publications.

SEMESTER: I

COURSE TITLE: Computation Techniques
COURSE CODE: MCE103

L	T	P	Credits
4	0	0	4

Total: 60 Hours

Course Outcomes:

1. Articulate the tradeoffs between easy computation and accuracy.
2. Demonstrate proficiency in the use of input/output commands including: command line, file, and graphical.
3. Create changes in program flow using control structures.
4. Modularize program construction and increase code re-uses using functions.
5. Execute basic commands and scripts in a mathematical programming language.

Course Contents**UNIT I****15 Hours**

Equations: Roots of Algebraic, Transcendental equations, Solution of linear simultaneous Equations by different methods using - Elimination, Inversion, Gauss - Jordan methods. Homogeneous Problems and Eigen Value Problems. Nonlinear Equations, Interpolation.

Finite Difference Technique: Initial and Boundary Value Problems of Ordinary and Partial differential equations, Solution of Various types of Plates.

UNIT II**15 Hours**

New Marks Method: Solution of determinate and indeterminate Structures by using New Mark's Procedure.

Statistical Methods: Method of Correlation and Regression Analysis.

UNIT III**15 Hours**

Initial Value Problems: Galerkin's Method of Least Square, Initial Value problem by Collocation points, Runga Kutta Method.

UNIT IV**15 Hours**

Newmark's Implicit and Explicit Solutions for Non-Linear Problems and Convergence Criteria.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Jain, M.K. & Jain, R.K. (2014). Numerical Method Problems and Solutions. Jain, M.K. & Jain, R.K publishers.
2. Tenkolsky, A. Vellerling, W.T. (2009). Numerical Recipes in Fortran, S. W.H. Press
3. Syal & Gupta. (2005). Computer Programming & Numerical Analysis. Khanna Publishers.

SEMESTER: I

COURSE TITLE: Building Planning & Design
COURSE CODE: MCE104

L	T	P	Credits
4	0	0	4

Total: 60 Hours

Course Outcomes:

1. Understand basic principles of building design and planning.
2. Explore building drawing as a way of discovering and developing ideas for designing residential, commercial and public buildings.
3. Develops basic drawing skills; create multilayer architectural and working drawing drawings.
4. Implement planning strategies and policies.
5. Apply fundamentals of management to utilize functions of management in construction. Like Demonstrate leadership qualities by implementing construction project processes with control.

Course Contents**UNIT I – Architecture****15 hours**

Land Acquisition Act 1894 (short titles, extent & definitions only)
Municipality act 1911 (short titles, extent & definitions only, Power of committee for making bylaws, for punishment, to sanction).Architectural Planning and Layout: Principles of planning a building, Factors affecting selection of site for building, Sun & the building

UNIT II – Soil**15 Hours**

Soil formation, particle size analysis, Indian Standard Soil Classification, time-settlement curve, Proctor test, compaction of sand, factors affecting compaction, field compaction methods, calculation of Bearing Capacity of soil by Standard Penetration Test, soil investigation report, types of shear failures, effect of water table on B.C., Settlement cases, calculation of B.C. by Plate Load Test.

Note: IS: 6403 is allowed in Exam

UNIT III – Structure

15 Hours

Earthquake; Hazardous effects on structures & Ground, General guidelines for earthquake resistance buildings. Liquid faction, factors affecting liquefaction & prevention.

UNIT IV

15 Hours

Various Loading Conditions and Analysis of Multistoried Complex (Kani's Method for vertical loads and Portal Method for Lateral loads)

Structural Design of Beams, Columns, Slabs, Foundations and Stairs.

Structural Drawings.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books

1. Arora, K R. (2011). Soil Mechanics and Foundation Engg. Standard Publishers.
2. Verma, Mahesh. (2005). Construction equipment and its planning and application. S.chand Publishers.
3. Peurify RL. (1995). Construction Planning equipment and Methods. Tata McGraw Hill.
4. IS- 1888 (1978): Plate Load Test. BIS. New Delhi.
5. IS – 6403 (1981): Bearing capacity of shallow Foundation. BIS. New Delhi.

SEMESTER: I**COURSE TITLE: Environment Engineering & Management****COURSE CODE: MCE105**

L	T	P	Credits
3	0	0	3

Total: 60 Hours**Course Outcomes:**

1. Understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water.
2. Learn about industrial waste water quantity and quality for achieving better sanitation in society.
3. Use population forecasting methods.
4. Design various water treatment units and plan their operations on the basis of raw water quality and water demand.
5. Apply knowledge of advanced water treatment processes for individual water purification.

Course Contents**UNIT I****15 Hours**

Environment & Ecology: Definition and understanding of concepts. Ecosystem, Energy flow in ecosystem, water, carbon and nitrogen cycle community's inter-relationships in and ecosystem.

Type of Pollutants and Protection of Environment:

Environmental Protection Importance of clean Environment, Control of Environment pollution w.r.t. air, land and water.

UNIT II**15 Hours****Water pollution:**

Sources, causes and measurement of water pollution surface water and underground water, water Quality criteria for various uses of fresh water, river basis studies for surface water pollution control biochemical oxygen demand, effect of oxygen demanding wastes on rivers.

Air and Noise pollution:

Definition Principle materials causing pollution types of air contaminants. Their sources and effects on living and nonliving materials permissible limits. Air pollution control-Basis principles, natural self-cleansing, pollution control methods and various engineering devices to control particulate and gaseous pollutants, controlling and pollution from automobiles.

UNIT III

15 Hours

Current issues in Environmental Engineering:

Global warming, Ozone depletion, Acid Rain, Oil pollution, Radiation Hazard and Control, Role of non-convention sources of energy in environment.

Acts/Legislation Provisions:

Need for laws various acts, Rules and notifications. Salient features of various acts: The water (Prevention and Control of pollution) Act 1974. The water (prevention and Control of pollution) Cass Act, 1977. Air (Prevention and control of Pollution) Act 1981. The Environment (Protection) Act 1986, The Public liability insurance Act, 1991. The forest Act 1927, the wild life (Protection) Act 1927, The Forest (Conservation) Act, 11980, various other Rules and notification for control of pollution.

UNIT IV

15 Hours

Environmental Impact Assessment: Definition and its importance for Environment Management, Constituents of Environment. Impact Assessment Report, Steps involved in preparing EIA, EIA methodologies Projects under EIA, Environment Impact Statement, Constraint in implementation of EIA. Impact prediction water, Resources Projects and other relevant case studies. Application of Biotechnology for Environmental Management: Basic concepts and techniques, Application for industrial effluent: Solid waste management, Bio-fertilizers and Bio-pesticides; Plant tissue culture in forestry. Bio safety aspects, Bio-remedial.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books

1. Peavy, Rowe, Techobanoglous,(2009) Environmental Engg. McGraw-Hill.
2. L Davis, Mackenzie. Environmental (1990). Engg. Tata McGraw-Hill.
3. H.Msters, Glibert.(1997). Environmental Engineering. Sc Prentice Hall of India Pvt. Ltd.
4. Panday, GN. Carney, GC.(2006). Environmental Engineering. McGraw-Hill.
5. Sharma, P.D. (2004). Ecology and Environment. Rastogi Publication.
- 6.

SEMESTER: I

COURSE TITLE: Bridge Engineering
COURSE CODE: MCE106

L	T	P	Credits
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. Discuss the IRC standard live loads and design the deck slab type bridges.
2. Analyze the box culverts for the given loading and detail the box culverts.
3. Design and detail of T-Beam bridges.
4. Understand the design and check the stability of piers and abutments.
5. Discuss the bridge foundations and prepare the bar bending schedule.

Course Contents**UNIT I****15 Hours**

Introduction: Definition and components of a bridge, Classification of bridges, Choice of a bridge type.

Investigation for Bridges: Need for investigation, Selection of bridge site, Determination of design discharge for River Bridge, Linear waterway, Economical span, Vertical clearance, scour depth, Afflux, Traffic projection.

UNIT II**15 Hours**

Standard Specifications for Road Bridges: Indian Road Congress Bridge Code, Width of carriageway, Clearances, Loads to be considered; Dead load, I.R.C. standard live loads, Impact effect, Application of Live load on decks, Wind load, Longitudinal forces, Centrifugal forces, Horizontal forces due to water current, Buoyancy effect, Earth pressure, Deformation stresses, Erection stresses, Temperature effects, and Seismic force.

Reinforced Concrete Bridges: General, Types of bridges; balanced cantilever bridges, Continuous girder bridges, rigid frame bridges, Portal Frame and Arch bridges. Detailed design of solid slab and T-beam bridges,

UNIT III**15 Hours**

Steel Bridges: General, Type of Steel bridges; Plate girder bridges, Box girder bridges, Truss bridges, Cantilever bridges, Cable stayed bridges, and Suspension bridges.

Sub-structure and Foundation: Design of piers and abutments (Masonry & R.C.C.). Types of foundations; Shallow, Pile, and Well foundations including their construction details.

UNIT IV

15 Hours

Bearings & Appurtenances: Different types of bearings, joints and handrails. Construction and Maintenance of Bridges: Methods of construction of concrete bridges. Causes of Bridge failures, Inspection and maintenance.

Instructions to the Examiner: Total eight questions are to be set, covering the complete syllabus, out of which, the students are required to attempt any five questions.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Reddy, C.S. (2011). Basic structural Analysis. Mittal Publications. New Delhi.
2. Vazirani & Ratwani, (2002). Bridge Engineering Vol- I and Vol.-II Khanna Publishers. New Delhi.
3. Ramamurtham, S. (2011). Bridge Engineering. Dhanpat Rai Publishing Co. (P) Limited.
4. Concrete Bridge Design SP-23 (ACI Publication)

SEMESTER: I**COURSE TITLE: English for Research Paper Writing****COURSE CODE: MCE107**

L	T	P	Credits
3	0	0	3

Total: 60 Hours**Course Outcomes:** At the end of the course, students will be able to

1. Understand that how to improve your writing skills and level of readability.
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

Course Content**Unit-I
Hours****15**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing,

Unit-II**15 Hours**

Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check.

Unit-III**15 Hours**

key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.

Unit-IV**15 Hours**

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on GoogleBooks)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

SEMESTER: I**COURSE TITLE: Value Education****COURSE CODE: MCE108**

L	T	P	Credits
3	0	0	3

Total: 60 Hours**Course Outcomes:** At the end of the course, Students will be able to

1. Understand value of education and self- development.
2. Imbibe good values in students.
3. Let the should know about the importance of character.

Course Content**Unit-I****15 Hours**

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements.

Unit-II**15 Hours**

Importance of cultivation of values, Sense of duty. Devotion, Self-reliance. Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline.

Unit-III**15 Hours**

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship, Happiness Vs suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature.

Unit-IV**15 Hours**

Character and Competence –Holy books vs Blind faith, Self-management and good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of Women, All religions and same message, Mind your Mind, Self-control, Honesty, Studying effectively

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, NewDelhi

SEMESTER: I

COURSE TITLE: Constitution of India
COURSE CODE: MCE109

L	T	P	Credits
3	0	0	3

Total: 60 Hours

Course Outcomes: At the end of the course, Students will be able to

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

Course Content**Unit-I** **15 Hours**

History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)

Philosophy of the Indian Constitution: Preamble Salient Features

Unit-II **15 Hours**

Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

Unit-III **15 Hours**

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions.

Unit-IV **15 Hours**

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj:

Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

SEMESTER: II

COURSE TITLE: FOUNDATION DESIGN & CONSTRUCTION
COURSE CODE: MCE201

L	T	P	Credits
4	0	0	4

Total: 60 Hours

Course Outcomes: At the end of the course, Students will be able to

1. Know the importance of soil investigation and determine various soil properties.
2. Understand the significance and determine the load bearing capacity for shallow and deep foundations.
3. Learn the settlement behavior of different type of soil under different foundation.
4. Understand the concept of earth pressure behind earth retaining structures for different conditions.
5. Understand the concepts behind various ground improvement techniques.

Course Content

UNIT I

15 Hours

General principle of foundation Design.

Functions of foundations, Essential requirements of a good foundation, Types of foundations,

Principal modes of failure, Estimation of allowable bearing pressures, calculation of ultimate bearing capacity by theoretical and empirical methods: Terzaghi's Method, Skempton's analysis for clays, Meyerhof's analysis BIS Method (IS: 6403) settlement of foundations, Factors to be considered in foundation design; Environmental considerations.

Shallow Foundations:

Introduction, Essential requirements Type and depth of footings, contact Pressure below footing strip footing, Isolated footing or Pad footing, eccentrically loaded footings, Grillage foundations; Design features and construction details of combined footing, Strap footing or Cantilever footing Problem of frost heave, its causes and prevention effect of ground water Raft footing.

UNIT II

15 Hours

Pile Foundations:

Purpose/Uses of pile foundations, Classification of piles based on different criteria, Details of

Timber, Concrete, Steel Piles their advantages and disadvantages selection of Pile Type, Pile action behavior of pile and pile groups under load. Definition of failure load.

Estimation of carrying capacity: Single driven pile in cohesion less soils-methods based of on SPT and CPT, ultimate load on Driven and cast-in-place piles and Bored and cast-in place piles in cohesion less soils. Factors affecting pile capacity. Ultimate capacity of single pile driven in cohesive soils. Modification for driven and cast-in-place piles and Bored and Cast-in-place piles. Carrying capacity of piles on rocks. Piles in fills-negative skin friction. Carrying capacity of Pile groups in cohesive soil and cohesion less soils, efficiency of pile group. piles subjected to horizontal or inclined loads.

UNIT III

15 Hours

Soil Stability.

Retaining walls-Types Elements for design, construction of cantilever and counter fort retaining walls. Unbraced excavations, braced excavations. Sheet Piles and Bulkheads-Types and design of cantilever and Anchored sheet piles; Anchors and Tie backs. Shorting and Underpinning- Necessity and methods.

Improvement of Foundation Soils.

Purpose: Improvement of Granular Soils: Terms used to describe degree of compactness-Relative Density, Density Ratio and Degree of Compaction;

Methods - Vibration at ground surface, factors influencing, roller compaction; Deep Dynamic Compaction, Vibro compaction, Impact at depth.

Improvement of Cohesive soils: Preloading or Dewatering, Methods of installing sand drains, drain wicks, Electrical and Thermal methods.

Grouting: Purpose, Functions Types of grouts; Soil Bentonite-cement mix, cement mix, emulsions, solutions: Grout Injection methods.

d) Geosynthetics: Types, Functions, Manufacturing of geotextiles, Classification of geotextiles.

Specific Applications: Bearing capacity improvement, Reinforcement, Retaining walls, Embankment etc. Testing of Geosynthetics usage in India and a case study.

UNIT IV

15 Hours

Special Considerations in Foundation Design and construction: Elementary Principles of design and construction of foundations subjected to earthquake or dynamic loads Special measures for foundations constructed under water.

Design of shallow foundations.

Recommend suitable dimensions. Depth and spacing of pile/pile group for given loading conditions.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference books:

1. Tomlinson, Mj. (1996). Foundation Design and Construction. ELBS Longman.
2. Joseph E, Bowles. (2000). Foundation Analysis and Design. McGraw Hill.
3. Brahma, SP. (1985). Foundation Engineering. Tata McGraw Hill.
4. Robert M, Koerner. (1985). Construction and Geotechnical Methods in Foundation Engineering. McGraw Hill.
5. Mohan, Dinesh. (1998). Pile foundations. oxford & IBH,.
6. Kurian, N.P. (1982). Modern Foundations. Tata McGraw Hill,

SEMESTER: II**COURSE TITLE: Maintenance of Building Structure****COURSE CODE: MCE202**

L	T	P	Credits
4	0	0	4

Total: 60 Hours**Course Outcomes:** At the end of the course, Students will be able to

1. Assess the health condition of structures.
2. Inspect and evaluate damage structures.
3. Test the assess the condition of properties of existing concrete structures.
4. Implement the techniques for repairing of concrete structures.
5. Dismantle and demolish structures which cannot be repaired in an environment friendly, with maximum saving of materials and in a safe way.

Course Content**UNIT-I****12 Hours**

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.

UNIT II**12 Hours**

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.

UNIT III

12 Hours

Investigation and diagnosis for Repair of structures: Basic Approach to investigations, Physical inspection, Material Tests, Nondestructive 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.

Building Defects and Remedial Measures:

Nature, types of problems, their causes, remedial measures and special treatment for building elements. Foundation, Basements D.P.C. Walls Wall finishes Chimney, stacks and shafts Columns and beams Roof and roof terraces Floor and floor finishes Joinery work Decorative/decorative finishes Services Materials Dampness

Unit -IV

12 Hours

Acoustics: Basic problems criteria and terminology, Transmission of sources in rooms, speech privacy

Between offices, co-efficient of source absorption, noise reduction co-efficient, classification selection of acoustical materials, design and installation of acoustical Treatment for of auditorium, schools religion buildings.

Air Conditioning Heating and Ventilation: Different types of heating equipment viz radiation converters, electric radiant panel heaters,

Requirements comfort conditions, temperature control, humidity control Mechanical ventilation plenum system, exhaust system fans, air filters of different types, air conditioning plants layout of ducts for cinema auditoriums and offices etc.

UNIT V

12 Hours

Fire Fighting: Fire regulations and requirements, cause of fire, fire resistance of materials, fire tests, fire-reissuance of elements, layout escape means for Multi storied buildings, Fire Training equipment different methods of fire fighting fire protection.

Electrical Services:

General distribution of electric power: Sub-stations for small schemes and industrial units, meter-rooms, electrical installations in buildings, Fuses and Circuit breakers, various types of conduits, earthing, switches and outlet, lamp holder electrical wiring -different materials employed specifications, electrical appliances and electrical service bye-laws pertaining to electrical installations. Different types of artificial lighting systems, lighting systems for residential buildings, public buildings, hotels, cinemas, hospitable exhibition, halls, libraries, schools, college, scientific laboratories etc.

Lifts and Escalators:

Classification types of lifts, lift codes and rules. Traffic analysis and selection of lifts, Quantity of service, Quality service, Car speed. Provision form fire safety Angle Arrangements of lifts, Details of information to be given to manufacturers, Escalators, Types and their installation.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Seeley, IVOR H. (1990). Building Technology. Mac Millian.
2. Shetty, M.S. (2008). Concrete Technology – Theory and Practice. S.Chand and Company.
3. DovKominetzky, M.S. (2001). Design and Construction Failures. Golgotha Publications Pvt. Ltd.
4. Ravishankar. K. & Krishnamoorthy, T.S. (2004). Structural Health Monitoring Repair and Rehabilitation of Concrete Structures. Allied Publishers,
5. Gambhir, M.L. CPWD and Indian Buildings Congress. (2008). Hand book on Seismic Retrofit of Buildings. Narosa Publishers.
6. Chudley, Building Finishes, fittings and domestic sercie longman, Scientific and Technical.

SEMESTER: II

COURSE TITLE: Computer Aided Design
COURSE CODE: MCE203

L	T	P	Credits
4	0	0	4

Total: 40 Hours

Course Outcomes: At the end of the course, Students will be able to

1. Create fully constrained solid models that can be quickly modified using standard software tools.
2. Use, identify and explain standard features in solid modeling including protrusions, revolutions, cutouts, and patterns.
3. Ability to use standard software tools to create engineering drawings, or other documents, to fully describe the geometries and dimensions of parts, as well as to document assemblies according to standard practice.
4. Ability to use standard software tools to create part assemblies and check for clearances.
5. Ability to create the drawings of farm implements and their analysis.

Course Contents**UNIT I****20 Hours**

Introduction to CAD and its scope simple description of computer hardware. Micro, mini etc. memory, processor. Peripheral devices-disks, printer. Video terminals. Graphic floater, graphic screen digitizer. Computer Graphics: introduction, point plotting techniques, line drawing displays, two-three-dimensional transformation, clipping and windowing, segmentation geometric modeling. Three-dimensional graphics, curves and surfaces, hidden surface elimination, shading. Graphic input devices. Graphic input technique, input functions. Raster graphic fundamentals, interactive raster graphics, and raster graphic systems.

UNIT II**20 Hours**

Computer aided linkage displays and synthesis, interactive acceleration analysis. Appreciation of graphic packages. Matrix methods of structural analysis and associated computer Programme assembly of matrices. Solution of equilibrium equations. Flow charts. Typical listing as illustrations. Introduction to interactive computer Programme for the design detailing of simple structural elements: RCC slab, beams, columns, isolated footings etc. Steel typical members and connections. Data base management, storing and retrieving of data.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Newman, William M. & Sproul, Robert F. Principles of interactive computer graphics.
2. Hunton & owan (2000). Programming in Finite Element. Golgotha Publications Pvt. Ltd.
3. Sinha, P.K. (2003). Computer Fundamentals. BPB Publications.
4. Rooney, Joe & Steadman, Philips. (2007). Principles of Computer Aided design. Golgotha Publications Pvt. Ltd.

SEMESTER: II

COURSE TITLE: Building Cost and Quality Management

COURSE CODE: MCE204

L	T	P	Credits
4	0	0	4

Total: 60 Hours

Course Outcomes: At the end of the course, Students will be able to

1. Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems.
2. Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.
3. Critically appraise the organizational, communication and teamwork requirements for effective quality management.
4. Critically analyses the strategic issues in quality management, including current issues and developments, and to devise and evaluate quality implementation plans.
5. Understand the fundamentals of quality management for a project-based industry.

Course Contents**UNIT I****15 Hours**

Estimation of quantities for R.C.C. multistoried complex viz. earthwork, concrete in foundation, D.P.C., R.C.C. work, flooring and roofing, plastering and pointing etc., wood work, white washing.

Unit-II**15 Hours**

Analysis of rates for multistoried building works – Brick work in foundations and Superstructure, cement concrete, R.C. C., Plastering, Flooring, Timber work etc.

UNIT III

15 Hours

Checking of construction quality – various tests of bricks, cement, concrete, aggregates, and steel as per IS codes. Preparation of bills for payment, measurement book, mode of payment, running account bill. Ledger and Cash book details, Arbitration.

UNIT IV

15 Hours

Estimation of building services viz. water supply works, electrification, sanitary fitting etc, and their cost analysis. Completion report of the project; Checking of Plan, Details of various works, and issue of completion report of the project.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Rangwala, S.C. (1982). Estimating and Costing. Anand. Charotar Book Stall
2. Chakraborti, M. (1992). Estimating Costing and Specification in Civil Engineering. Calcutta Publishers.
3. Dutta, B.N. (2002). Estimating and Costing. Khanna Publisher.
4. Mahajan, Sanjay. (2000). Estimating and Costing. Satya Parkashan. Delhi
5. Singh, Gurbakshish. (1998). Quality surveying. Eagle Prakashan. Jalandher

SEMESTER: II

COURSE TITLE: Pavement Design, Construction and Maintenance
COURSE CODE: MCE205

L	T	P	Credits
4	0	0	4

Total: 60 Hours

Course Outcomes: At the end of the course, Students will be able to

1. Study the behavior of pavements under various loads.
2. Design the flexible and rigid pavements using different Empirical, semi-empirical and theoretical approaches.
3. Understand the concept of Pavement Management System, pavement failures and its evaluation.
4. Learn about various methods of flexible pavement design.
5. Estimate the various methods of rigid pavement design.

Course Contents**UNIT I****15 Hours**

Introduction: Types of pavement structure. Functions of pavement components, Factors affecting pavement design. Design wheel load, Strength characteristics of pavement materials.

Design of Flexible Pavements: General design considerations, Methods for design of flexible pavements; Group Index method, California Bearing Ratio (CBR) method, California Resistance Value method, Triaxial Test method, Burmister method, McLeod's method.

UNIT II**15 Hours**

Design of Rigid Pavements: General design considerations, Methods for design of rigid pavements; Westergard's method, F.A.A. method, IRC recommendations for design of concrete pavements, method, Types of joints and their design in cement concrete pavements. Thickness design for Airport pavement, LCN system of pavement design, design of airport pavement overlays.

UNIT III**15 Hours**

Highway Construction: Types of highway construction and their selection, materials for construction, construction procedure of different highways: Earth roads, Gravel roads, WBM roads, bituminous pavements, Cement concrete pavements, Low cost roads, Introduction to various equipment used for highway construction.

UNIT IV

15 Hours

Highway Maintenance: Need for highway maintenance, Pavement failures their causes and remedial measures. Typical flexible and rigid pavement failures, Types of highway maintenance: Routine, periodic and special type, materials used for maintenance of different pavements, Strengthening of existing pavements, Maintenance management system.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Roess, RP. McShane, WR. & Prassas, ES.(1998), Traffic Engineering. Prentice Hall.
2. May, A. D. (1990). Fundamentals of Traffic Flow. Prentice Hall.
3. Papacostas, C.S. (1987). Fundamentals of Transportation Engineering. Prentice Hall.
4. Kadiyali, L.R. (1987). Traffic Engineering and Transportation Planning. Khanna Publications.
5. Highway Capacity Manual (2000). Transportation Research Board, USA.
6. Khanna, S.K. & Justo, C.E. G. (1991). Highway Engineering. Khanna Publications.
7. Pingnataro, G. J. (1970). Principles of Traffic Engineering. McGraw - Hill

SEMESTER: II

COURSE TITLE: Rural Construction Technology
COURSE CODE: MCE206

L	T	P	Credits
4	0	0	4

Total: 60 Hours

Course Outcomes: At the end of the course, Students will be able to

1. Understand rural construction techniques.
2. Learn design principles of treatment-Low-Cost water treatment technologies.
3. Understand Low cost pavement materials-testing.
4. Estimate the design & Construction of Tube well, Drip & Sprinkle irrigation systems.
5. Understand Drawing and Design of rural development plans.

Course Contents**UNIT I****15 Hours**

Rural Development Planning and Concept of Appropriate Technology. Scope, Development Plans; Various approaches to rural development planning Concept of Appropriate technology; Role of Civil Engineering in Rural Development; Organizational structures & management rural development programmers/projects.

Rural Housing : Low cost construction materials for housing low cost housing designs-architectural considerations for individual and group housing ; composite material-Ferro cement & flay ash, Autoclaved Calcium silicate bricks and soil-stabilized unburnt brick; Plinth protection of Mud Walls; Design Consideration and Construction of: Non-erodible Mud Plaster, water-proof and fire-retardant roof treatment for thatch roofs, Precast stone Masonry Block walling scheme; rat-trap bond for walls; Prefab Brick Panels for roof, Ferro cement flooring /roofing units, Thin R.C.Ribbed slab fon floors & roofs, Precast R.C. Channel Unit for flooring/roofing scheme, Precast R.C. cored unit for flooring/roofing scheme, Precast R.C. Plank flooring/roofing scheme, L-Pan roofing scheme; Glued Plywood Web Beams and Roof Panels; manual & Power Scaffold hoist, lifting device for prefab components; solar passive building design; Building economics and management.

UNIT II**15 Hours**

Water Supply and Rural Sanitation: Epidemiology sources of water, BIS & WHO water standards. Quality, Storage and distribution for rural water supply works; Basic Design principles of treatment-Low Cost water treatment technologies; Hand pumps-types, installation operation, and maintenance of Mark-II hand pump; Conservation of water; Rainwater, Harvesting; Drainage in rural areas, Design of low cost waste disposal

systems; Design and constructions of low cost latrines: 2 pit pour flush water seal VIP latrines, septic tank etc; Biogas technology: Low cost community & individual Garbage disposal systems, Recycling of organic/agricultural wastes: Development of village ponds; Ferro cement water storage tanks & latrines. Cattle shed management; Sewage farming-standards for disposal and use for irrigation.

UNIT-III

15 Hours

Low-Cost Roads and Transport: Low-cost pavement materials-testing suitability criteria processing materials; factors affecting pavement thickness & composition of various layers; CRRI Design for rural roads-Traffic Index, strength Index, CBR curve Intermediate Technology & Technology options for specifies areas. Labor in tensile techniques of road construction Mechanical stabilization; lime stabilization; water bond Macadam Construction; utilization of waste in rural construction one/two coat surface dressing; bitumen premix carpet; low cost improved transport system rural areas.

UNIT IV

15 Hours

Low-Cost irrigation: Design & Construction of Tube well, Drip & Sprinkle irrigation systems; Water logging Reclamation land watershed and catchment area development-problem and features of watershed Management Plans watershed structures and their basic design catchment treatment and Rehabilitation Plans; Types of M Hydrel Plants, site selection, Advantages of Mini & Mi Hydrel projects, and structures required for plants.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Madhov Rao, A.G. & Ramachandra Murthy, D.S.(2000). Apprority Technologies for low cost. Housing oxford and IBH Publishing Co. Pvt. Ltd.
2. CBRI, Roorkee Advances in building Materials Construction.
3. Satyanarayan Murthy, C.(1998). Design of Minor Irrigation and Canal Structures. Wiley Eastern Ltd.
4. Document on Rural Road Development in India. (2009). Volume Central Road Research Institute, New Delhi.

SEMESTER: II

COURSE TITLE: Pedagogy Studies
COURSE CODE: MCE207

L	T	P	Credits
3	0	0	3

Total: 60 Hours

Course Outcomes: At the end of the course, students will be able to

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Course Content**Unit-I****15 Hours****Introduction and Methodology**

Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

Unit-II**15 Hours**

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Unit-III**15 Hours**

Evidence on the effectiveness of pedagogical practices, Methodology for the in-depth stage: quality assessment of included studies, how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy, Theory of change, Strength and nature of the body of evidence for effective pedagogical practices, Pedagogic theory and pedagogical approaches, Teachers' attitudes and beliefs and Pedagogic strategies.

Unit-IV**15 Hours**

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes.

Research gaps and future directions, Research design, Contexts, Pedagogy,

Teacher education, Curriculum and assessment, Dissemination and research impact.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3):361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London:DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3):272-282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston:Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

SEMESTER: II

COURSE TITLE: Stress Management by Yoga

COURSE CODE: MCE208

L	T	P	Credits
3	0	0	3

Total: 30 Hours

Course Outcomes: At the end of the course, students will be able to

1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency

Unit-I

10 Hours

Definitions of Eight parts of yoga. (Ashtanga)

Unit-II

10 Hours

Yam and Niyam. Do's and Don't's in life, Ahinsa, satya, astheya, bramhacharya and aparigraha

Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Unit-III**10 Hours**

Asan and Pranayam: Various yoga poses and their benefits for mind & body

Regularization of breathing techniques and its effects-Types of pranayam

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. 'Yogic Asanas for Group Training-Part-I' :Janardan Swami Yoga bhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department),Kolkata

SEMESTER: II

COURSE TITLE: Personality Development through Life Enlightenment Skills
COURSE CODE: MCE209

L	T	P	Credits
3	0	0	3

Total: 30 Hours

Course Outcomes: At the end of the course, students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students

Course Content**Unit-I
Hours****10**

Neetishatakam-Holistic development of personality

Verses- 19,20,21,22(wisdom)

Verses- 29,31,32 (pride & heroism)

Verses- 26,28,63,65(virtue)

Verses- 52,53,59(don't's)

Verses- 71,73,75,78(do's)

Unit-II**10 Hours**

Approach to day to day work and duties.

Shrimad Bhagwad Geeta: Chapter 2-Verses 41,47,48,

Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23,35,
Chapter 18-Verses 45, 46,48.

Unit-II**10 Hours**

Statements of basic knowledge.
Shrimad BhagwadGeeta: Chapter2-Verses 56, 62,68
Chapter 12 -Verses 13, 14, 15, 16,17,18
Personality of Role model. Shrimad BhagwadGeeta:
Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
Chapter 4-Verses 18,38,39
Chapter18 – Verses37,38,63

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion,
Demonstration, Open Talk

Suggested reading

1. “Srimad Bhagavad Gita” by Swami SwarupanandaAdvaita Ashram (Publication Department),Kolkata
2. Bhartrihari’s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, NewDelhi.

SEMESTER: II**COURSE TITLE: Disaster Management****COURSE CODE: MCE210**

L	T	P	Credits
3	0	0	3

Total: 40 Hours**Course Outcomes:** At the end of the course, students will be able to

1. Provide basic conceptual understanding of disasters and its relationships with development.
2. Understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.
3. Understand Medical and Psycho-Social Response to Disasters.
4. Prevent and control Public Health consequences of Disasters.
5. Enhance awareness of Disaster Risk Management institutional processes in India.

Course Contents**UNIT I****10 Hours**

Disaster Reduction :Earthquake resistant design of structures, Response spectra and design earthquake parameters, Principles and philosophies, Codal provisions, Factors affecting damage to structures, Enforcement of codal provisions, Strong motion instrumentation and data processing,

Effective rescue operation, General planning and design aspects, Conventional earthquake resistant design, Seismic base isolation method, retrofitting, Training and lecturing at various levels, Preparedness to meet earthquake disaster, Programmers for public awareness, demonstrations and exhibitions, Information management (Safety, emergencies, management and planning, design, response, user experience problems and case studies), Proper land use practices, long term disaster preparedness measures. Precautions after a major earthquake, Preparedness for medical

Unit-II

10 Hours

supply Emergency care (First aid, Home remedies), Disposal of dead bodies (Human and Cattle) , Care for old and orphans.

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

UNIT III

10 Hours

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

Unit-IV

10 Hours

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

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books

1. Iyengar, (1990). *Natural Hazards in the Urban Habitat C.B.R.I.* Tata McGraw Hill Publisher

2. Ingleton, Jon. (2004). *Natural Disaster management*. Tudor Rose Published.

SEMESTER: III

COURSE TITLE: Dissertation Phase-I (Major Project)
COURSE CODE: MCE301

L	T	P	Credits
0	0	20	10

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. The capability to create, analyze and critically evaluate different technical/architectural solutions.
2. A consciousness of the ethical aspects of research and development work.
3. The capability to create, analyze and critically evaluate different technical/architectural solutions.
4. The capability to critically and systematically integrate knowledge.
5. The capability to use a holistic view to critically, independently and creatively identify, formulate and deal with complex issues.

Course Content

The dissertation will normally contain:

- An account of the process of obtaining the data required for the dissertation and the results obtained; relationship to other research, and any methodological or theoretical implications;
- The relationship of the findings to existing professional understanding and, where
- Appropriate, potential implementation difficulties.
- It is not intended to restrict students to a precisely defined format for the dissertation but it
- Should follow the standard practices of dissertation writing. Although a written report should be submitted, it should be accompanied by soft copy on CD.

SEMESTER: III

COURSE TITLE: Advanced Structural Design and Detailing
COURSE CODE: MCE302

L	T	P	Credits
4	0	0	4

Total: 40 Hours

Course Outcomes:

1. Enhance competence in design of advanced reinforced concrete structures.
2. Familiarize the students with the concepts of designing concrete mixes using different methods of proportioning and to understand the effects of various parameters
3. Show competency in design of advanced reinforced concrete structures.
4. Develop competence for selection of suitable structural system for tall buildings.
5. Analyze tall buildings under gravity, wind and earthquake loading.

Course Contents**UNIT I****10 Hours**

Introduction to limit state method of design, provisions in the Indian standard codes for loading wind loads and seismic loads, design and detailing of concrete structures.

BIS Handbook for design, Examples of design using handbook.

UNIT II**10 Hours**

Design of Structures as per I.S. 1893 for Earthquake Resistant Design Construction. Design and Detailing Requirements as per 4326-1993.

UNIT III**10 Hours**

Design and Detailing of Earthen Buildings as per 13827-1993.

Design and Detailing of Masonry Structures as per I.S. 13828-1993

UNIT IV**10 Hours**

Design and Ductile Detailing of R.C.C. Structures as per I.S. 13920-1993

Repair and Seismic Strengthening of Buildings as per I.S. 13935-1993.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books

1. Dayaratnam, P. (2001). *Reinforced Concrete Structure*. S. Chand Publishers.
2. Jain, A.K. (1998). *Reinforced Concrete - Limit State Method of Design*. Khanna Publishers.
3. Punmia, B.C. *Reinforced Concrete Structures, Vol II*. Allied Publishers.
4. Jain & jaikrishna *Plain and Reinforced Concrete Vol II*. JP Publishers

SEMESTER: III

COURSE TITLE: Composite Materials

COURSE CODE: MCE303

L	T	P	Credits
4	0	0	4

Total: 45 Hours

Course Outcomes:

1. Explain the behavior of constituents in the composite materials.
2. Enlighten the students in different types of reinforcement.
3. Develop the student's skills in understanding the different manufacturing methods available for composite material.
4. Illuminate the knowledge and analysis skills in applying basic laws in mechanics to the composite materials.
5. Apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels.

Course Content

UNIT I

15 Hours

Fiber Reinforced Concrete: Properties of Constituent Materials, Mix Proportions, Mixing and Casting Procedures, Properties of Freshly mixed FRC, Mechanics and properties of Fiber reinforced concrete, Composite Material approach, Application of fibre reinforced concrete.

Fly Ash Concrete: Classification of Indian Flyashes, Properties of Fly ash, Reaction Mechanism, Proportioning of Fly ash concretes, Properties of Fly ash concrete in fresh and hardened state, Durability of flyash concrete.

UNIT II

15 Hours

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

Ferro Cement: Constituent materials and their properties, Mechanical properties of Ferro cement, Construction techniques and application of Ferro cement.

UNIT III

7.5 Hours

High Performance Concrete: Materials for high performance concrete, Supplementary cementing materials, Properties and durability of high performance concrete, Introduction to silica fume concrete, Properties and applications of silica fume concrete.

UNIT-IV

7.5 Hours

Sulphur Concrete and Sulphur Infiltrated Concrete: Process technology, Mechanical properties, Durability and applications of sulphur concrete, Sulphur infiltrated concrete, Infiltration techniques, Mechanical properties, Durability and applications of sulphur infiltrated concrete.

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

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books

1. Concrete, its Properties and Microstructure by P.K. Mehta, and P.J.M. Monterio.
2. Ferro cement by B.K. Paul, and R.P. Pama
3. Fiber Reinforced Concrete by Bentur and Mindess
4. Fly ash in Concrete by Malhotra and Ramezianpour

SEMESTER: III

COURSE TITLE: Disaster Reduction and Management
COURSE CODE: MCE304

L	T	P	Credits
4	0	0	4

Total: 40 Hours**Course Outcomes:**

1. Provide basic conceptual understanding of disasters and its relationships with development.
2. Understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.
3. Understand Medical and Psycho-Social Response to Disasters.
4. Prevent and control Public Health consequences of Disasters.
5. Enhance awareness of Disaster Risk Management institutional processes in India.

Course Contents**UNIT I****10 Hours**

Disaster Reduction :Earthquake resistant design of structures, Response spectra and design earthquake parameters, Principles and philosophies, Codal provisions, Factors affecting damage to structures, Enforcement of codal provisions, Strong motion instrumentation and data processing, Effective rescue operation, General planning and design aspects, Conventional earthquake resistant design, Seismic base isolation method, retrofitting, Training and lecturing at various levels, Preparedness to meet earthquake disaster, Programmers for public awareness, demonstrations and exhibitions, Information management (Safety, emergencies, management and planning, design, response, user experience problems and case studies), Proper land use practices, long term disaster preparedness measures. Precautions after a major earthquake, Preparedness for medicalsupply Emergency care (First aid, Home remedies), Disposal of dead bodies (Human and Cattle) , Care for old and orphans.

Unit-II**10 Hours**

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

UNIT III**10 Hours**

Disaster Management- Management cell, Central crisis management core group, damage reconnaissance, Management of relief and rehabilitation (Infrastructure rehabilitation, Housing rehabilitation, Social rehabilitation),

Role of volunteers, Emergency operation centers, Information system, Danger zone restrictions, Cooperation with local authority, Coordination for international relief, Role of government, NGO's, Business and donors, Role of remote sensing in relief operations, Information management and related technologies in engineering and disaster management.

UNIT-IV

10 Hours

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

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books

1. Iyengar, (1990). *Natural Hazards in the Urban Habitat C.B.R.I.* Tata McGraw Hill Publisher
2. Ingleton, Jon. (2004). *Natural Disaster management.* Tudor Rose Published.

SEMESTER: III

COURSE TITLE: Construction Costing and Financial Management
COURSE CODE: MCE305

L	T	P	Credits
4	0	0	4

Total: 40 Hours

Course Outcomes:

1. Understand the various types of estimates that are used in the construction industry.
2. Know how to prepare a quantity takeoff and extend quantities to costs Prepare a bid recap/summary.
3. Locate and compile information vital to the development and maintenance of schedules and budgets.
4. Organize, calculate and present construction project budgets using common spreadsheet applications.
5. Interpret the results of changes in the schedule or budget resulting from periodic progress or changes in the nature or scope of the project in an ethical manner.

Course Content**UNIT I****10 Hours**

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.

Cash flow: Determining the funds required for a construction job, preparing cash flow statements, Cash inflow and outflow during contract period, Project expectations and performance models.

UNIT II**10 Hours**

Cash and payment of works: Precautions in custody of cash, impress account and temporary advance, Maintenance of temporary advance and advance account, different types of payment, first running advance and final payments.

UNIT III**10 Hours**

Material Management: Objectives and scope of material management classification, codification, ABC analysis, standardization and substitution, Introduction to inventory control, Stores management organization and lay out, receipt, inspection and issue, care and safety, store records and store accounting.

UNIT-IV**10 Hours**

Financial Management: Meaning and scope financial statement analysis, funds flow analysis, Capital budgeting, cost benefit analysis.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Rangwala, S.C. (1982). *Estimating and Costing*. Anand. Charotar Book Stall
2. Chakraborti, M. (1992). *Estimating Costing and Specification in Civil Engineering*. Calcutta Publishers.
3. Dutta, B.N. (2002). *Estimating and Costing*. Khanna Publisher.
4. Mahajan, Sanjay. (2000). *Estimating and Costing*. Satya Parkashan. Delhi
5. Singh, Gurbakshish. (1998). *Quality surveying*. Eagle Prakashan. Jalandher

SEMESTER: III**COURSE TITLE: Business Analytics****COURSE CODE: MSE302**

L	T	P	Credits
3	0	0	3

Total: 60 Hours

Course Outcomes: At the end of the course, students will be able to

1. To introduce students to basic principles of marketing.
2. To provide understanding of marketing as a business function.
3. To understand the role of the basic marketing framework.
4. To understand practical implications of marketing principles

Course Content**Unit 1****15 Hours**

Basic concepts: Nature & Scope of Marketing, Concepts - production, product, selling marketing & societal marketing, marketing environment – marketing management and its environment.

Unit 2:**15 Hours**

Consumer buying behaviour: Consumer decision making process (five step model), factors affecting buying behaviour, purchase behaviour, buyer's role. Market Segmentation: Meaning, Definition, Different ways to Segmentation, Essential of effective Market Segmentation, Distinction between differential Marketing & Concentrated Marketing.

Unit 3: **15 Hours**
Planning Marketing Strategy Strategic Planning Process, marketing and competitive strategies, Marketing Mix strategy, Marketing mix and environment, Assembling and managing marketing mix.

Unit 4: **15 Hours**
Product decisions:
Product definition, new product development process, and product life cycle, positioning, branding (Definition of Brand and Brand Equity, Selection of Brand Name,), packaging & labeling decisions Pricing decisions: importance, objectives Concept of Price, Factors Influencing Pricing, Methods of Pricing (Cost based and Competition oriented) & strategies Product promotion: promotion mix and factors affecting. Distribution: channel decisions, types & factors, physical distribution system & its components.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

- Data Analysis and Decision Making by S.Christian Albright and Wayne L. Winston.
- Data Analytics: Become A Master In Data Analytics by Richard Dorsey
- Data Analytics: The Ultimate Beginner's Guide to Data Analytics by Edward Mize

SEMESTER: III

COURSE TITLE: Industrial Safety
COURSE CODE: MCE307

L	T	P	Credits
3	0	0	3

Total: 60 Hours

Course Outcomes: At the end of the course, students will be able to

1. Evaluate workplace to determine the existence of occupational safety and health hazards.
2. Identify relevant regulatory and national consensus standards along with best practices that is applicable.
3. Predict the appropriate control methodologies based on the hierarchy of controls.
4. Analyze injury and illness data for trends.
5. Enhance their skill sets to deal with any situation in industry.

Course Content**Unit-I****15 Hours****Operational Safety:**

Hot metal operation, boiler, pressure vessels – heat treatment shop – gas furnace operation – electroplating – hot bending pipes – safety in welding and cutting, Cold – metal operation – safety in machine shop – cold bending and chamfering of pipes- metal cutting – shot blasting, grinding, painting – power press and other machines. Management of toxic gases and chemicals – industrial fires and prevention – road safety – highway and urban safety – safety of sewage disposal and cleaning – control of environmental pollution – managing emergencies in industries – planning security and risk assessments, on – site and off site. Control of major industrial hazards.

Unit-II**15 Hours****Safety Appraisal And Analysis:**

Human side of safety – personal protective equipment – causes and cost of accidents. Accidents prevention program – specific hazard control strategies – HAZOP training and development of employees – first aid – fire fight devices – accident reporting, investigation. Measurement of safety performance, accident reporting and investigation – plant safety inspection, job safety analysis – safety permit procedures. Product safety – plant safety rules and procedures – safety sampling – safety inventory systems. Determining the cost effectiveness of safety measurement.

Unit-III**15 Hours****Safety And Health Regulations:**

Safety and health standards – industrial hygiene – occupational diseases prevention welfare facilities. The object of factories act 1948 with special reference to safety provisions, model rules 123a, history of legislations related to safety – pressure vessel act – Indian boiler act – the environmental protection act – electricity act – explosive act.

Unit-IV

15 Hours

Safety Management:

Evaluation of modern safety concepts – safety management functions – safety organization, safety department safety committee, safety audit – performance measurements and motivation – employee participation in safety - safety and productivity.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

References Books

1. Grimaldi, J.V. & Simonds, R.H. (1989). Safety Management. All India traveler book seller.
2. Krishnan, N.V. (1996). Safety in Industry. Jaico Publisher House.
3. De Reamer, R. (1980). Modern Safety and health Technology. R.Wiley

SEMESTER: III

COURSE TITLE: Cost Management of Engineering Projects

COURSE CODE: MCE308

L	T	P	Credits
3	0	0	3

Total: 60 Hours

COURSE OUTCOMES: At the end of the course, students will be able to

1. Understand the concept of strategic cost management, strategic cost analysis – target costing, life cycle costing and Kaizen costing and the cost drive concept.
2. Describe the decision-making; relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system.
3. Understand the meaning and different types of project management and project execution, detailed engineering activities.
4. Understand the project contracts, cost behaviour and profit planning types and contents, Bar charts and Network diagram.
5. Analyse by using quantitative techniques for cost management like PERT/CPM.

UNIT-I

15 Hours

Introduction and Overview of the Strategic Cost Management Process. Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision Making.

UNIT-II

15 Hours

Project: meaning, Different types, why to manage, cost overruns centers, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents. Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

UNIT-III

15 Hours

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement, Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

UNIT-IV

15 Hours

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation Problems, Assignment problems, Simulation, Learning Curve Theory.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi.
2. Charles T. Horngren and George Foster, Advanced Management Accounting.
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting.
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher.
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co.Ltd

SEMESTER: III**COURSE TITLE: Composite Materials****COURSE CODE: MCE308**

L	T	P	Credits
3	0	0	3

Total: 60 Hours**Course Outcomes:** At the end of the course, students will be able to

1. Explain the behavior of constituents in the composite materials.
2. Enlighten the students in different types of reinforcement.
3. Develop the student's skills in understanding the different manufacturing methods available for composite material.
4. Illuminate the knowledge and analysis skills in applying basic laws in mechanics to the composite materials.
5. Apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels.

Course Content**UNIT I****15 Hours**

Fiber Reinforced Concrete: Properties of Constituent Materials, Mix Proportions, Mixing and Casting Procedures, Properties of Freshly mixed FRC, Mechanics and properties of Fiber reinforced concrete, Composite Material approach, Application of fibre reinforced concrete.

Fly Ash Concrete: Classification of Indian Flyashes, Properties of Fly ash, Reaction Mechanism, Proportioning of Fly ash concretes, Properties of Fly ash concrete in fresh and hardened state, Durability of flyash concrete.

UNIT II**15 Hours**

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

Ferro Cement: Constituent materials and their properties, Mechanical properties of Ferro cement, Construction techniques and application of Ferro cement.

UNIT III**15 Hours**

High Performance Concrete: Materials for high performance concrete, Supplementary cementing materials, Properties and durability of high performance concrete, Introduction to silica fume concrete, Properties and applications of silica fume concrete.

Sulphur Concrete and Sulphur Infiltrated Concrete: Process technology, Mechanical properties, Durability and applications of sulphur concrete, Sulphur infiltrated concrete, Infiltration techniques, Mechanical properties, Durability and applications of sulphur infiltrated concrete.

UNIT-IV**15 Hours**

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

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration, Open Talk

Reference Books:

1. Concrete, its Properties and Microstructure by P.K. Mehta, and P.J.M. Monterio.
2. Ferro cement by B.K. Paul, and R.P. Pama
3. Fiber Reinforced Concrete by Bentur and Mindess
4. Fly ash in Concrete by Malhotra and Ramezaniapur

SEMESTER: III**COURSE TITLE: Waste to Energy****COURSE CODE: MCE310**

L	T	P	Credits
3	0	0	3

Total: 60 Hours

Course Outcomes: At the end of the course, students will be able to

1. To enable students to understand of the concept of Waste to Energy.
2. To link legal, technical and management principles for production of energy form waste.
3. To learn about the best available technologies for waste to energy.
4. To analyze of case studies for understanding success and failures.
5. To facilitate the students in developing skills in the decision-making process.

Course Content**UNIT-I****15 Hours**

Introduction The Principles of Waste Management and Waste Utilization. Waste Management Hierarchy and 3R Principle of Reduce, Reuse and Recycle. Waste as a Resource and Alternate Energy source.

UNIT-II**15 Hours**

Waste Sources & Characterization Waste production in different sectors such as domestic, industrial, agriculture, postconsumer, waste etc. Classification of waste – agro based, forest residues, domestic waste,

industrial waste (hazardous and non-hazardous). Characterization of waste for energy utilization. Waste Selection criteria.

UNIT-III

15 Hours

Technologies for Waste to Energy Biochemical Conversion – Energy production from organic waste through anaerobic digestion and fermentation. Thermo-chemical Conversion – Combustion, Incineration and heat recovery, Pyrolysis, Gasification; Plasma Arc Technology and other newer technologies.

UNIT-IV

15 Hours

Waste to Energy Options Landfill gas, collection and recovery. Refuse Derived Fuel (RDF) – fluff, briquettes, pellets. Alternate Fuel Resource (AFR) – production and use in Cement plants, Thermal power plants and Industrial boilers. Conversion of wastes to fuel resources for other useful energy applications.

Case Studies – Success/failures of waste to energy Global Best Practices in Waste to energy production distribution and use. Indian Scenario on Waste to Energy production distribution and use in India. Success and Failures of Indian Waste to Energy plants. Role of the Government in promoting ‘Waste to Energy.

Transactional Mode

Video Based Teaching, Cooperative teaching, Group Discussion, Demonstration,

Open Talk

Reference Books:

1. Industrial and Urban Waste Management in India, TERI Press.
2. Wealth from Waste: Trends and Technologies by Banwari Lal and Patwardhan, TERI Press. Fundamentals of waste and Environmental Engineering, S.N Mukhopadhyay, TERIPress.
3. Gazette Notification on Waste Management Rules 2016.
4. CPCB Guidelines for Co-processing in Cement/Power/Steel Industry
5. Waste-to-Energy in Austria – White Book – Figures, Data Facts, 2nd edition , May 2010.
6. Report of the task Force on Waste to Energy, Niti Ayog (Formerly Planning Commission) 2014.
7. Municipal Solid Waste Management Manual, CPHEEO, 2016.

SEMESTER: IV

COURSE TITLE: Dissertation Phase-II
COURSE CODE: MCE401

L	T	P	Credits
0	0	40	20

Total: 60 Hours

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. The capability to create, analyze and critically evaluate different technical/architectural solutions.
2. A consciousness of the ethical aspects of research and development work.
3. The capability to create, analyze and critically evaluate different technical/architectural solutions.
4. The capability to critically and systematically integrate knowledge.
5. The capability to use a holistic view to critically, independently and creatively identify, formulate and deal with complex issues.

Course Content

The dissertation will normally contain:

- An account of the process of obtaining the data required for the dissertation and the results obtained; relationship to other research, and any methodological or theoretical implications;
- The relationship of the findings to existing professional understanding and, where
- Appropriate, potential implementation difficulties.
- It is not intended to restrict students to a precisely defined format for the dissertation but it
- Should follow the standard practices of dissertation writing. Although a written report should be submitted, it should be accompanied by soft copy on CD.