Total Contact Hours = 26 **Total Marks = 600** **Total Credits = 22**

SEMESTER 1st		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCIE8-101	Theory and Analysis of Plates	3	1	-	40	60	100	4
MCIE8-102	Bridge Engineering	3	1	-	40	60	100	4
MCIE8-103	Plastic Analysis and Design of Steel Structures	3	1	-	40	60	100	4
MCIE8-104	Non Destructive Testing Lab.	-	-	6	60	40	100	2
Departmental Elective – I (Select any one)		3	1	0	40	60	100	4
MCIE8-156	Advanced Solid Mechanics							
MCIE8-157	Advanced Foundation Engineering							
Departmental Elective – II (Select any one)		3	1	0	40	60	100	4
MCIE8-158	Pre Stressed Concrete Structures							
MCIE8-159	Advanced Structure Design and Detailing							
Total		**15**	**5**	**6**	**260**	**340**	**600**	**22**

Total Contact Hours = 26 **Total Marks = 600** **Total Credits = 22**

SEMESTER 2nd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCIE8-205	Matrix Methods in Civil Engineering	3	1	-	40	60	100	4
MCIE8-206	Structural Dynamics	3	1	-	40	60	100	4
MCIE8-207	CAD Lab	-	-	6	60	40	100	2
Departmental Elective – III (Select any one)		3	1	0	40	60	100	4
MCIE8-260	Industrial Structures							
MCIE8-261	Computer Aided Design Methods							
Departmental Elective – IV (Select any one)		3	1	0	40	60	100	4
MCIE8-262	Finite Element Analysis							
MCIE8-263	Composite Materials							
Open Elective – I (Select any one)		3	1	0	40	60	100	4
Total		**15**	**5**	**6**	**260**	**340**	**600**	**22**

Total Contact Hours = 24 **Total Marks = 500** **Total Credits = 26**

SEMESTER 3rd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MREM0-101	Research Methodology	4	0	0	40	60	100	4
MCIE8-308	Seminar	0	0	2	60	40	100	4
MCIE8-309	Project	0	0	10	60	40	100	10
Departmental Elective – V (Select any one)		3	1	0	40	60	100	4
MCIE8-364	Fluid Dynamics							
MCIE8-365	Direct Stiffness Methods							
Open Elective – II (Select any one)		3	1	0	40	60	100	4
Total		**10**	**2**	**12**	**240**	**260**	**500**	**26**

Total Credits = 20

SEMESTER 4th		Contact Hrs.			Evaluation Criteria	Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Satisfactory/ Unsatisfactory**	
MCIE8- 410	Thesis	0	0	0		20

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Overall

Semester	Marks	Credits
1st	600	22
2nd	600	22
3rd	500	26
4th	--	20
Total	**1700**	**90**

THEORY AND ANALYSIS OF PLATES

Subject Code: MCIE8-101 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (12 Hrs.)

INTRODUCTION TO THEORY OF ELASTICITY: Introduction to the elasticity theory, Stress at a point: stress tensor, Strains and displacements, Constitutive equations (without derivation), Equilibrium equations (without derivation), Compatibility equations (without derivation)

RECTANGULAR PLATES: Introduction, the governing equation for deflection of plates, bending of a long, uniformly loaded rectangular plate (simply supported and clamped edges), Rectangular plates subjected to a concentrated load, bending of plates with small initial curvature, Problems (exact analysis using charts/tables and approximate analysis)

UNIT-II (10 Hrs.)

PURE BENDING OF PLATES: Slope and curvature, Pure bending in two perpendicular directions, Moment curvature relation, Anticlastic and synclastic surfaces, Thermal stresses in plates, Effect of transverse shear deformation on bending of elastic plates, Triangular plates.

UNIT-III (12 Hrs.)

CIRCULAR PLATES: Introduction, Plate differential equation, bending of a circular plate subjected to a lateral pressure per unit area and a centrally placed concentrated load (simply supported and clamped edges), Bending of a circular plate concentrically loaded (simply supported and clamped edges), Deflection of a symmetrically loaded circular plate with a circular hole at the center, Problems.

UNIT-IV (11 Hrs.)

ORTHOTROPIC PLATES:
Introduction, Analysis by Orthotropic plate theory for both longitudinal as well as transverse structural actions using the design charts produced by Morice, Little and Rowe for evaluating bending moment and shear forces, Problems.

Recommended Books

1. Timoshenko, 'Theory of Plates & Shells'.
2. Timoshenko, 'Theory of Elasticity'.
3. Sadhu Singh, 'Theory of Elasticity and Plasticity'.
4. N. Rajagopalan, 'Bridge Superstructure', Narosa Publishers.

BRIDGE ENGINEERING

Subject Code: MCIE8-102 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (10 Hrs.)

Introduction-definition and components of bridges. Layout and planning of bridges classification, investigations for bridges, preliminary data collection, choice of type of the bridges, hydraulic design of bridges, traffic design of bridges**.**

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UNIT-II (12 Hrs.)

Analysis and design of superstructure of straight and curved bridge decks-loadings details, specification-reinforced concrete and steel decks. Decks of various types like slab, hollow and voided slab, beam and slam, box girder etc.

UNIT-III (11 Hrs.)

Design of substructure-piers and abutments of different types. Analysis and design of foundations- shallow foundations (open Foundations), deep foundations- well foundations and caisson. Design and constructional aspects of foundations.

UNIT-IV (12 Hrs.)

Modern methods of construction of concrete and steel bridges- their impact on the analysis and the design. Introduction to analysis and design of long span bridges like suspension and cable stayed bridges. Special aspects in analysis and design, based on construction methodology. Inspection and maintenance and rehabilitation of bridges**.**

Recommended Books

1. Pama & Gusens, 'Bridge Deck Analysis'.
2. Edward V. Hambly, 'Bridge Deck Behavior'.
3. D. Johnson Vector, 'Essentials of Bridge Engineering'.

PLASTIC ANALYSIS & DESIGN OF STEEL STRUCTURES

Subject Code: MCIE8-103 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

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UNIT-I (10 Hrs.)

Ductility of Metals: Concept of plastic design, over loaded factors, ultimate load as design criteria. Hinge formation in indeterminate structures, Redistribution of moments, Assumption made for structures subjected to bending only.

UNIT-II (12 Hrs.)

Minimum Weight Design: concept, assumptions, Design of frame with prismatic measures, Elements of linear programming and its application to minimum weight design problems.

UNIT-III (12 Hrs.)

Deflections: Assumption, calculation of deflection at ultimate loads, permissible rotations. Secondary design considerations: Influence of direct load, shear, local buckling, lateral buckling, repeated loading and brittle fracture on moment capacity design of eccentrically loaded columns.

UNIT-IV (11 Hrs.)

Problem of Incremental: collapse, shake down analysis. Special consideration for design of structures using light gauge metals.

Recommended Books

1. M.J. & Z.P.B., Inelastic Analysis of Structures, John Wiley & Sons, Ltd.
2. M. Bill Wong, 'Plastic Analysis and Design of Steel Structures'.

NON DESTRUCTIVE TESTING LAB.

Subject Code: MCIE8-104 **L T P C**
0 0 6 2

EXPERIMENTS

1. Mix Design of concrete without admixtures as per IS Recommended Guidelines
2. Mix Design of concrete with admixtures as per IS Recommended Guidelines
3. Rebound Hammer Test
4. Ultrasonic Pulse Velocity Test
5. Bar Locator test
6. Split Tensile strength of Concrete.
7. Core Test

Recommended Books

1. M.L. Gambhir, Concrete Manual, Dhanpat Rai & Co.
2. P.S. Gahlot, Sanjay Sharma, 'Building Repair and Maintenance Management', CBS Publishers.
3. M.S. Shetty, 'Concrete Technology'.

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ADVANCED SOLID MECHANICS

Subject Code: MCIE8-156 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (11 Hrs.)

Theory of stress, state of stress in a body, Differential equations of equilibrium. Analysis of state of stress at a given point in a body.

UNIT-II (10 Hrs.)

Geometrical theory of strains, displacement components and strain components and relation between them, generalized hooks law, strains expressed in terms of stresses.

UNIT-III (12 Hrs.)

Stresses expressed in terms of strains, torsion of prismatic bars and bending, Saint-Venant method.

UNIT-IV (12 Hrs.)

Three dimensional stress systems, tensors, unsymmetrical bending.

Recommended Books

1. S. Timoshenko, 'Theory of Elasticity'.
2. M. Filonenko, 'Theory of Elasticity'.
3. S.H. Crandall, 'Solid Mechanics'.

ADVANCED FOUNDATION ENGINEERING

Subject Code: MCIE8-157 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (10 Hrs.)

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

UNIT-II (12 Hrs.)

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

UNIT-III (12 Hrs.)

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

UNIT-IV (11 Hrs.)

Equipment foundation subjected to dynamic loads. Underground structures, strategies for instrumentation and monitoring of foundation performance.

Recommended Books

1. J.E. Bowles, 'Foundation Analysis and Design'.
2. Pech, Hansen and Thornburn, 'Foundation Engg.'.

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PRE STRESSED CONCRETE STRUCTURES

Subject Code: MCIE8-158 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (10 Hrs.)

Limit state design of statically determinate pre-stressed beams- limit state of collapse by flexure, shear, torsion limit state of serviceability. Anchorage zone stresses for posttensioned members**.**

UNIT-II (12 Hrs.)

Statically indeterminate structures- analysis and design- continuous beams and frames. Choice of profile, linear transformation, concordancy, omically viable profile. Composite beam with precast pre-stressed beams and cast in situ RC slab analysis and design.

UNIT-III (12 Hrs.)

Time dependent effects such as creep, shrinkage etc. on composite construction inclusive of creep relaxation and relaxation creep- partial pre-stressing principles, analysis and design of simple beams, crack and crack width calculations**.**

Unit-IV (11 Hrs.)

Analysis and design of pre-stressed pipes, tanks and spatial structures slabs, grids, folded plates and shells.

Recommended Books

1. Lundy, 'Pre-stressed Concrete Structures'.
2. T.Y. Lin, 'Pre-stressed Concrete'.
3. N. Krishna Raju, 'Pre-stressed Concrete'.

ADVANCED STRUCTURE DESIGN & DETAILING

Subject Code: MCIE8-159 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (12 Hrs.)

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 Hrs.)

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

UNIT-III (11 Hrs.)

Design and Detailing of Earthen Buildings as per 13827-1993, Design and Detailing of Masonry Structures as per I.S. 13828-1993.

UNIT-IV (12 Hrs.)

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.

Recommended Books

1. P. Dayaratnam, 'Reinforced Concrete Structure'.
2. A.K. Jain, 'Reinforced Concrete, Limit State Method of Design'.
3. B.C. Punmia, 'Reinforced Concrete Structures', Vol II.
4. Jain and Jaikrishna, 'Plain and Reinforced Concrete', Vol II.
5. P. Dayaratnam, 'Design of Steel Structures'.
6. S.K. Duggal, 'Design of Steel Structures'.
7. B.I.S. Codes 1893, 4326, 13827, 13828, 13920, 13935.

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MATRIX METHODS IN CIVIL ENGINEERING

Subject Code: MCIE8-205 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (10 Hrs.)

BASIC CONCEPTS: Introduction, Static and Kinematic Indeterminacies, Axes and Coordinates, Types of structures, Actions and displacements, Action and displacement equations, Generalized system of coordinates**.**

UNIT-II (10 Hrs.)

DEVELOPMENT OF MATRICES: Flexibility and Stiffness Influence Coefficients, Flexibility Matrix, Stiffness Matrix, Physical and Element Approach, Relation between Flexibility and Stiffness Matrices, Systems Approach of Flexibility and Stiffness Methods, Comparison of methods.

UNIT-III (12 Hrs.)

FLEXIBILITY METHOD: Introduction, Equilibrium and Compatibility, Equations of Equilibrium, Compatibility Conditions, Analysis of Continuous Beams including Support Settlements, Pin-jointed Plane Frames and Rigid-jointed plane Frames using Physical and Element Approach, Support Reactions, Shear Force and Bending Moment Diagrams.

UNIT-IV (13 Hrs.)

STIFFNESS METHOD: Introduction, Joint Loads, Member Loads, Combined Loads, Equivalent Joint Loads, Analysis of Continuous Beams including Support Settlements, Pin-jointed Plane Frames and Rigid-jointed Plane frames using Physical and Element Approach, Support Reactions, Shear Force and Bending Moment Diagrams**.**

Recommended Books

1. Weaver & Gere, 'Matrix Analysis of Framed Structures', CBS Publishers.
2. C.S. Reddy, 'Basic Structural Analysis', McGraw Hill Publishers.
3. G.S. Pandit & S.P. Gupta, 'Matrix Methods in Structural Analysis'.
4. A.K. Jain, 'Advanced Structural Analysis'.
5. Menon, 'Advanced Structural Analysis'.

STRUCTURAL DYNAMICS

Subject Code: MCIE8-206 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (10 Hrs.)

Introduction, Systems with single degree of freedom (SDOF) Equation of motion – Analysis of free vibration-response to harmonic, impulsive, periodic and general dynamic loadings.

UNIT-II (10 Hrs.)

Forced and free vibration response of MDOF damp and undamped discrete systems-equation of motion- evaluation of natural frequencies and modes – approximate methods.

UNIT-III (12 Hrs.)

Overview of dynamics of continuous elastic systems-flexural beams-shear beams-columns, base excited system-formulation of equations for SDOF & MDOF systems-concepts of spectral quantities and response spectrum-fundamental of Earthquake Engg**.**

UNIT-IV (13 Hrs.)

Computational and numerical methods-solution of Eigen value problems mode superposition method and modal truncation errors-modal acceleration method, direct integration method-explicit and implicit methods.

Recommended Books

1. Clough and Penzien, 'Dynamics of Structures'.
2. G.K. Grover, 'Mechanical Vibrations'.
3. Walter C. Hurty & Moshe F. Rubinsten, 'Dynamics of Structures'.

CAD LAB.

Subject Code: MCIE8-207 **L T P C**
0 0 6 2

EXPERIMENTS

1. Computer Aided Analysis & Design of Reinforced Concrete Elements such as Beams, Slabs.
2. Computer Aided Analysis & Design of Steel Elements such as Connections, Tension Members, Compression Members, Beams, Column Base, and Roof Trusses.

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3. To develop a complete self-reliance in solving analysis and design problems of engineering with the use of computers. The effort must culminate with a CAD program and a project report.
4. To develop a complete self-reliance of software used for the structural analysis & design.

INDUSTRIAL STRUCTURES

Subject Code: MCIE8-260 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (10 Hrs.)

Planning of Industrial Structures: Design of single and multibay industrial structures in steel.

UNIT-II (10 Hrs.)

Bunkers & Silos in steel.

UNIT-III (12 Hrs.)

Liquid retaining structures in steel, Pressure vessels & chimneys in concrete.

UNIT-IV (13 Hrs.)

Cooling tower in concrete, Structural aspects /design of machine, foundation in concrete.

Recommended Books

1. C.W. Dunham, 'Planning of Industrial Structures'.
2. 'Structural Engineers Handbook'.
3. S.K. Duggal, 'Design of Steel Structures'.

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COMPUTER AIDED DESIGN METHODS

Subject Code: MCIE8-261 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (10 Hrs.)

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**.**

UNIT-II (11 Hrs.)

Computer Graphics: introduction, point plotting techniques, line drawing displays, two three dimensional transformations, clipping and windowing, segmentation geometric modeling. Three dimensional graphics, curves and surfaces, hidden surface elimination, shading. Graphic input devices. Graphic input technique, input functions.

UNIT-III (10 Hrs.)

Raster graphic fundamentals, interactive raster graphics, raster graphic systems. Computer aided linkage displays and synthesis, interactive acceleration analysis. Appreciation of graphic packages.

UNIT-IV (14 Hrs.)

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**.**

Recommended Books

1. William M. Newman & Robert F. Sproul, 'Principles of Interactive Computer Graphics'.
2. Hunton and Owan, 'Programming in Finite Element'.
3. Joe Rooney & Philips Steadman, 'Principles of Computer Aided Design'.

FINITE ELEMENT ANALYSIS

Subject Code: MCIE8-262 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (10 Hrs.)

Basic equations of solid mechanics-review of equilibrium conditions, strain – displacement relations, stress – strain relations, principles of virtual work and stationary potential energy and various formulations.

UNIT-II (10 Hrs.)

Approximate methods Rayleigh, Ritz weighted residual (Galerkin) and finite difference methods. Finite element method: displacement model-shape functions Lagrange and Serendipity elements. Element properties-isoperimetric elements-numerical integration technique assemblage of elements and solution technique for static analysis.

UNIT-III (12 Hrs.)

Analysis of framed structures-2D & 3D truss and beam element and applications. Analysis of plan stress/strain and ax symmetric solids-triangular, quadrilateral and isoperimetric elements, incompatible modes. Three dimensional stress analysis isoperimetric 8 and 20 nodded elements.

UNIT-IV (13 Hrs.)

Analysis of plate bending-basic equations of thin plate theory Reissinner-Mindlin theory- plate elements and applications. Analysis of shells-degenerated shell elements. Finite element programming and FEA software.

Recommended Books

1. C.S. Krishanmurthy, 'Finite Element Analysis – Theory and Programming'.
2. K.J. Bathe & E.L. Wilson, 'Numerical Method in Finite Element Analysis'.
3. R.D. Cook, 'Concepts and Applications of Finite Element Analysis', Wiley India Pvt. Ltd.

COMPOSITE MATERIALS

Subject Code: MCIE8-263 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

UNIT-I (10 Hrs.)

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

UNIT-II (12 Hrs.)

FLY ASH CONCRETE: Classification of Indian Fly ash, Properties of Fly ash, Reaction Mechanism, Proportioning of Fly ash concretes, Properties of Fly ash concrete in fresh and hardened state, Durability of fly ash concrete.

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

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

UNIT-III (10 Hrs.)

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.

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 (13 Hrs.)

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.

Recommended Books

1. A.M. Nevillie, 'Concrete Technology'.
2. M.L. Gambhir, 'Concrete Technology'.
3. M.S. Shetty, 'Concrete Technology'.

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RESEARCH METHODOLOGY

Subject Code – MREM0-101 **L T P C** **Duration: 45 Hrs.**
4 0 0 4

UNIT–I (11 Hrs.)

Introduction to Research: Meaning, Definition, Objective and Process

Research Design: Meaning, Types - Historical, Descriptive, Exploratory and Experimental

Research Problem: Necessity of Defined Problem, Problem Formulation, Understanding of Problem, Review of Literature

Design of Experiment: Basic Principal of Experimental Design, Randomized Block, Completely Randomized Block, Latin Square, Factorial Design.

Hypothesis: Types, Formulation of Hypothesis, Feasibility, Preparation and Presentation of Research Proposal

UNIT–II (10 Hrs.)

Sources of Data: Primary and Secondary, Validation of Data

Data Collection Methods: Questionnaire Designing, Construction

Sampling Design & Techniques – Probability Sampling and Non Probability Sampling

Scaling Techniques: Meaning & Types

Reliability: Test – Retest Reliability, Alternative Form Reliability, Internal Comparison Reliability and Scorer Reliability

Validity: Content Validity, Criterion Related Validity and Construct Validity

UNIT–III (13 Hrs.)

Data Process Operations: Editing, Sorting, Coding, Classification and Tabulation

Analysis of Data: Statistical Measure and Their Significance, Central Tendency, Dispersion, Correlation: Linear and Partial, Regression: Simple and Multiple Regression, Skewness, Time series Analysis, Index Number

Testing of Hypothesis: T-test, Z- test, Chi Square, F-test, ANOVA

UNIT – IV (11 Hrs.)

Multivariate Analysis: Factor Analysis, Discriminant Analysis, Cluster Analysis, Conjoint Analysis, Multi-Dimensional Scaling

Report Writing: Essentials of Report Writing, Report Format

Statistical Software: Application of Statistical Soft wares like SPSS, MS Excel, Mini Tab or MATLAB Software in Data Analysis

**Each Student has to Prepare Mini Research Project on Topic/ Area of their Choice and Make Presentation. The Report Should Consists of Applications of Tests and Techniques Mentioned in The Above UNITs*

Recommended Books

1. R.I. Levin and D.S. Rubin, 'Statistics for Management', 7th Edn., Pearson Education, New Delhi.
2. N.K. Malhotra, 'Marketing Research–An Applied Orientation', 4th Edn., Pearson Education, New Delhi.
3. Donald Cooper, 'Business Research Methods', Tata McGraw Hill, New Delhi.
4. Sadhu Singh, 'Research Methodology in Social Sciences', Himalaya Publishers.
5. Darren George & Paul Mallery, 'SPSS for Windows Step by Step', Pearson Education, New Delhi.
6. C.R. Kothari, 'Research Methodology Methods & Techniques', 2nd Edn., New Age International Publishers.

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SEMINAR

Subject Code –MCIE8-308 **L T P C**
0 0 2 4

This is an unstructured open-ended course where under the overall supervision of a faculty member of his discipline. Each student must submit a seminar report as a culmination of his Endeavour and investigation. The course will aim to evaluate student's actual ability to use the fundamentals of knowledge and to meet new unknown situations as demonstrated by the students' interaction with the teachers.

PROJECT

Subject Code –MCIE8-309 **L T P C**
0 0 10 10

A student can work on the following types of Projects:

1. **Lab Oriented Projects:** These include projects involving Laboratory investigation or Laboratory development in the students' discipline or interdisciplinary areas. It must co-terminate with a project report.
2. **Study Oriented Projects:** These include projects which are oriented towards readings from published literature or books about new frontiers of development or analysis of available data base. It must co-terminate with a project report.
3. **Computer Oriented Projects:** These are intended to impart practical training to students in the areas of computer software and hardware. The projects would be student-oriented, individually supervised by a project guide. It must co-terminate with a project report.
4. **Projects on Organizational Aspects:** These involve projects related to thrust areas where students are expected to get involved with planning, organization, and execution of new ideas and concepts. It must co-terminate with a project report.

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FLUID DYNAMICS

Subject Code –MCIE8-364 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Unit-I (10 Hrs.)

1. Mechanics of turbulent flow, semi-empirical expressions, statistical concepts.

Unit-II (10 Hrs.)

2. Stability theory, flow of non-Newtonian fluids, stationary and moving shock waves.

Unit-III (12 Hrs.)

3. Prandt1-Mayer expressions, two and three dimensional subsonic and supersonic flow.

Unit-IV (13 Hrs.)

4. Methods of characteristics, small perturbation theory and similarity rules.

Recommended Books

1. F. Charlton, 'A Text Book of Fluid Dynamics'.
2. G.K. Batchelor, 'A Text Book of Fluid Dynamics'.

DIRECT STIFFNESS METHOD

Subject Code –MCIE8-365 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Unit-I (10 Hrs.)

1. **BASIC CONCEPTS:** Introduction, Identification of Members and Nodes, Global and Member Coordinates, Comparison with Classical methods.

Unit-II (10 Hrs.)

2. **ELEMENT & GLOBAL STIFFNESS MATRICES:** Stiffness Matrix for Truss Element, Beam Element Stiffness Matrix, Rigid Frame Element Stiffness Matrix, Global Stiffness

Matrix, Coordinate Transformation, Rotation Matrix: Displacement Transformation Matrix, Force Transformation Matrix.

Unit-III (10 Hrs.)

3. **TRANSFORMATION OF STIFFNESS MATRICES:** Construction of Structure or Global Stiffness Matrix, Load and Displacement Vectors, Load Vector of Loads Not Applied at Nodes.

Unit-IV (15 Hrs.)

4. **ANALYSIS OF STRUCTURES:** Continuous Beams, Pin-jointed Plane Frames and Rigid-jointed Plane Frames including Support Settlements using Direct Stiffness Matrix Method and formalization of Direct Flexibility Matrix Method.
   APPLICATION TO SIMPLE GRIDS & TRUSSES: Element Stiffness Matrix, Torsion Constant, Global and Element Forces.

Recommended Books

1. Weaver & Gere, 'Matrix Analysis of Framed Structures', CBS Publishers.
2. T.S. Thandavamoorthy, 'Structural Analysis', Oxford Higher Education.
3. A.K. Jain, 'Advanced Structural Analysis'.
4. Menon, 'Advanced Structural Analysis'.

THESIS

Subject Code –MCIE8-410 **L T P C**
0 0 0 20

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Dissertation / Thesis:

(a) A student enrolled for M.Tech. degree shall have to work on a Dissertation. The Dissertation work involves in-depth study and critical review of the topic and the creation of new knowledge in the area either through development of new techniques, instruments, experimental facility and new experimental findings and/or theoretical and fundamental insight or by reinterpretation of the existing facts to propound new theory.

(b) A PG student shall normally carry out his dissertation in the Institute. However, he may be allowed to carry it out in other organizations provided he/she has completed all courses except dissertation.

Unfair means and Plagiarism

(a) In case a student is found lifting of some other's work(s) and inserting it in his/her project, seminar and dissertation etc. without proper acknowledgement, credit and reference or plagiarizing the dissertation /project report etc., such penal action shall be taken by the Institute as may be necessary to up hold the sanctity, integrity and the credibility of the Institute.

(b) All the students are required to follow the PG Ordinances & Regulations of the Institute.