GURU KASHI UNIVERSITY

Master of Technology in Structural Engineering

Session: 2024-25

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**
MSE101	Advanced Structural Analysis	Core course	3	1	0	4
MSE102	Advanced Solid Mechanics	Core course	3	1	0	4
MSE112	Design of Advanced Concrete Structures	Core course	3	1	0	4
MSE113	Composite Materials	Program Elective Course - I	3	1	0	4
XXX	Program Elective - II	Program Elective Course - II	3	0	0	3
MSE104	Structural Design Lab	Core Lab	0	0	2	1
MSE105	Advanced Concrete Lab	Core Lab	0	0	2	1
MSE114	Business ownership	Entrepreneurship	2	0	0	2
Total			**17**	**4**	**4**	**23**

Program Elective-II (Any one of the following)						
MSE106	Theory of Thin Plates & Shells	Program Elective-II	3	0	0	3
MSE107	Theory & Applications of Cement Composites					
MSE108	Theory of Structural Stability					

Semester: II						
Course Code	**Course Name**	**Type of Course**	**(Hours Per Week)**			**No. of Credits**
			L	**T**	**P**	
MSE201	FEM in Structural Engineering	Core course	3	1	0	4
MSE202	Structural Dynamics	Core course	3	1	0	4
XXX	Program Elective - III	Program Elective Course	3	1	0	4
XXX	Program Elective - IV	Program Elective Course	3	1	0	4
MSE204	Model Testing Lab	Core Lab	0	0	2	1
MSE205	Numerical Analysis Lab	Core Lab	0	0	4	2
MSE206	Mini Project*	Project	0	0	4	2
XXX	Audit Course	Audit	2	0	0	NC
Total			**14**	**4**	**10**	**21**

Program Elective-III (Any one of the following)						
MSE215	Soil Structure Interaction	Program Elective Course	3	1	0	4
MSE208	Design of Formwork					
Program Elective-IV (Any one of the following)						
MSE207	Advanced Steel Design	Program Elective Course	3	1	0	4
MSE209	Design of High-Rise Structures					
MSE210	Design of Masonry Structures					
Audit Course (Any one of the following)						
MCS220	English for Research Paper Writing	Audit Course	2	0	0	NC
MSE216	Constitution of India					

Semester: III						
Course Code	**Course Name**	**Type of Course**	**(Hours Per Week)**			**No. of Credits**
			L	**T**	**P**	
MSE301	Design of Prestressed Concrete Structures	Core course	3	1	0	4
MSE308	Research Methodology and IPR	Core course	3	0	0	3
MSE307	Dissertation Phase-I*	Dissertation	0	0	20	10
XXX	Open Elective	Open Elective	3	0	0	3
Total			**9**	**1**	**20**	**20**

Open Elective (For other Departments)						
Course Code	**Course Name**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
OEC064	Disaster Preparedness & planning	Open Elective	3	0	0	3

Semester: IV						
Course Code	**Course Name**	**Type of Subject T/P**	**(Hours Per Week)**			**No. of Credits**
			L	**T**	**P**	
MSE401	Dissertation Phase-II*	Dissertation	0	0	32	16
Total			**0**	**0**	**32**	**16**
Grand Total (For all Semesters)			**40**	**9**	**66**	**80**

Evaluation Criteria for Theory Courses

A. Continuous Assessment: [25 Marks]
   i. Surprise Test (Two best out of three) - (10 Marks)
   ii. Term paper (10 Marks)
   iii. Assignment(s) (5 Marks)
B. Attendance (5 marks)
C. MST: [30 Marks]
D. End-Term Exam: [40 Marks]

Evaluation Criteria for Practical Courses

Performance of Each Practical (10 Marks)
Report (5 Marks)
Practical Viva (5 Marks)
Total (20 Marks) (Each Practical)

SEMESTER: I

COURSE TITLE: Advanced Structural Analysis
COURSE CODE: MSE101

L	T	P	Credits
3	1	0	4

Total: 60 Hours

Course outcomes:

At the end of the course, students will be able to

1. Analyze the skeleton structures using stiffness analysis code.
2. Use direct stiffness method understanding its limitations.

Course Content

UNIT-I **15 hours**

Influence Coefficients: Physical Significance, Effects of Settlements, Temperature Change and Lack of Fit, Member Approach and Structure Approach.

Stiffness Method applied to Large Frames: Local Coordinates and Global Coordinates.

UNIT-II **15 hours**

Stiffness Matrix Assembly of Structures: Stiffness Matrix in Global Coordinates, Boundary Conditions, Solution of Stiffness Matrix Equations, Calculation of Reactions and Member Forces.

Applications to Simple Problems: Beams, Plane Trusses, Plane Rigid Jointed Frames and Grids by Structure Approach and Member Approach.

UNIT-III **15 hours**

Boundary Value Problems (BVP): Approximate Solution of Boundary Value Problems, Modified Galerkin Method for One-Dimensional BVP, Matrix Formulation of the Modified Galerkin Method.

UNIT-IV **15 hours**

Linear Element: Shape Functions, Solution for Poisson's Equation, General One-Dimensional Equilibrium Problem.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

References Books:

- *Matrix Analysis of Framed Structures, Weaver andGere.*
- *The Finite Element Method, Lewis P. E. and Ward J. P., Addison-Wesley Publication Co.*
- *Computer Methods in Structural Analysis, Meek J. L., E and FN, Span Publication.*

COURSE TITLE: Advanced Solid Mechanics
COURSE CODE: MSE102

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Solve simple problems of elasticity and plasticity understanding the basic concepts.
2. Apply numerical methods to solve continuum problems.

Course Content

Unit-I **15 hours**

Introduction to Elasticity: Displacement, Strain and Stress Fields, Constitutive Relations, Cartesian Tensors and Equations of Elasticity.

Strain and Stress Field: Elementary Concept of Strain, Stain at a Point, Principal Strains and Principal Axes, Compatibility Conditions, Stress at a Point, Stress Components on an Arbitrary Plane, Differential Equations of Equilibrium, Hydrostatic and Deviatoric Components.

Unit-II **15 hours**

Equations of Elasticity: Equations of Equilibrium, Stress- Strain relations, Strain Displacement and Compatibility Relations, Boundary Value Problems, Co-axiality of the Principal Directions.

Two-Dimensional Problems of Elasticity: Plane Stress and Plane Strain Problems, Airy's stress Function, Two-Dimensional Problems in Polar Coordinates.

Unit-III **15 hours**

Torsion of Prismatic Bars: Saint Venant's Method, Prandtl's Membrane Analogy, Torsion of Rectangular Bar, Torsion of Thin Tubes.

Unit-IV **15 hours**

Plastic Deformation: Strain Hardening, Idealized Stress- Strain curve, Yield Criteria, von Mises Yield Criterion, Tresca Yield Criterion, Plastic Stress-Strain Relations, Principle of Normality and Plastic Potential, Isotropic Hardening.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

References Books:

- *Theory of Elasticity, Timoshenko S. and GoodierJ. N., McGraw Hill,1961.*
- *Elasticity, SaddM.H., Elsevier,2005.*
- *Engineering Solid Mechanics, RagabA.R., BayoumiS.E., CRCPress,1999.*
- *Computational Elasticity, AmeenM.,Narosa,2005.*
- *Solid Mechanics, KazimiS. M. A., Tata McGrawHill, 1994*

COURSE TITLE: Design of Advanced Concrete Structures
COURSE CODE: MSE112

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Analyse the special structures by understanding their behaviour.
2. Design and prepare detail structural drawings for execution citing relevant IS codes.

Course Content

Unit-I **20 Hours**

Design philosophy, Modelling of Loads, Material Characteristics.

Unit-II **20 Hours**

Reinforced Concrete - P-M, M-phi Relationships, Strut-and- Tie Method, Design of Deep Beam and Corbel, Design of Shear Walls, Compression Field Theory for Shear Design, Design against Torsion; IS, ACI and Euro code.

Unit-III **20 Hours**

Steel Structures -- Stability Design, Torsional Buckling - Pure, Flexural and Lateral, Design of Beam-Columns, Fatigue Resistant Design, IS code, AISC Standards and Euro code.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

References Books:

1. *Reinforced Concrete Design, Pillai S. U. and Menon D., Tata McGraw-Hill, 3rd Ed,1999.*
2. *Design of Steel Structures, Subramaniam N., Oxford University Press,2008.*
3. *Reinforced Concrete Structures, Park R.and Paulay T. , John Wiley & Sons,1995.*
4. *Advanced Reinforced Concrete Design, Varghese P. C., Prentice Hall of India, New Delhi.*
5. *Unified Theory of Concrete Structures, Hsu T. T. C. and Mo Y. L., John Wiley & Sons,2010.*
6. *Steel Structures Design and Behavior Emphasizing Load and Resistance Factor Design, Salmon*
7. *C. G., Johnson J. E. and Malhas F. A., Pearson Education, 5th Ed, 2009.*
8. *Design of Steel Structures - Vol. II, Ramchandra. Standard Book House, Delhi.*
9. Plastic Methods of Structural Analysis, Neal B.G., Chapman and HallLondon.

COURSE TITLE: Composite Materials
COURSE CODE: MSE113

L	T	P	Credits
3	1	0	4

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.

Unit-IV **15 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

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

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 Ramezanianpour*

COURSE TITLE: Structural Design Lab
COURSE CODE: MSE104

L	T	P	Credits
0	0	2	1

Total: 30 Hours

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

1. Design and Detail all the Structural Components of Frame Buildings.
2. Design and Detail Complete Multi-Story Frame Buildings.

Course Content

Design and detailed drawing of complete G+ 3 structures by individual student using latest relevant IS codes.

COURSE TITLE: Advanced Concrete lab
COURSE CODE: MSE105

L	T	P	Credits
0	0	2	1

Total: 30 Hours

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

1. Design high grade concrete and study the parameters affecting its performance.
2. Conduct Non-Destructive Tests on existing concrete structures.
3. Apply engineering principles to understand behaviour of structural/elements.

List of Experiments/Assignments:

1. Study of stress-strain curve of high strength concrete, Correlation between cube strength, cylinder strength, split tensile strength and modulus of rupture.
2. Effect of cyclic loading on steel.
3. Non-Destructive testing of existing concrete members.
4. Behaviour of Beams under flexure, Shear and Torsion.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Reference Books:

1. *Properties of Concrete, Neville A. M., 5th Edition, Prentice Hall,2012.*
2. *Concrete Technology, Shetty M. S., S. Chand and Co.,2006.*

Course Title: Business ownership
Course Code: MSE114

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Assess the commercial viability of new technologies, business opportunities and existing companies
2. Plan, organize, and execute a project or new venture with the goal of bringing new products and service to the market
3. Carry out scientific research in the field of entrepreneurship
4. Improved your interpersonal and collaborative skills

Course Content

UNIT I **10 Hours**

Introduction to Generic Skills: Importance of Generic Skill Development (GSD), Global and Local Scenario of GSD, Life Long Learning (LLL) and associated importance of GSD.

Managing Self: Knowing Self for Self-Development- Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc., Managing Self – Physical- Personal grooming, Health, Hygiene, Time Management, Managing Self – Intellectual development -Information Search: Sources of information, Reading: Purpose of reading, different styles of reading, techniques of systematic reading, Note Taking: Importance of note taking, techniques of note taking, Writing: Writing a rough draft, review and final draft. Managing Self – Psychological, Stress, Emotions, Anxiety-concepts and significance, Techniques to manage the above.

UNIT II **5 Hours**

Managing in Team: Team - definition, hierarchy, team dynamics, Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background, Communication in group - conversation and listening skills.

UNIT III **5 Hours**

Task Management: Task Initiation, Task Planning, Task execution, Task close out, Exercises/case studies on task planning towards development of skills for task management

Problem Solving: Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving, Different approaches for problem solving. Steps followed in problem solving. Exercises/case studies on problem solving.

UNIT IV **10 Hours**

Entrepreneurship: Introduction, Concept/Meaning and its need, Competencies/qualities of an entrepreneur, Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level. Market Survey and Opportunity Identification (Business Planning)- How to start a small-scale industry, Procedures for registration of small-scale industry, List of items reserved for exclusive manufacture in small-scale industry, Assessment of demand and supply in potential areas of growth, understanding business opportunity, Considerations in product selection, Data collection for setting up small ventures.

Project Report Preparation- Preliminary Project Report, Techno-Economic Feasibility Report, Exercises regarding "Project Report Writing" for small projects.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings

1. *Khanka, S. S. (2006). Entrepreneurial development. S. Chand Publishing.*
2. *Desai, V. (2009). Dynamics of entrepreneurial development and management (pp. 119-134). Himalaya Publishing House.*
3. *Kennedy, A. (2015). Business development for dummies. John Wiley & Sons*

COURSE TITLE: Theory of Thin Plates & Shells
COURSE CODE: MSE106

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Use analytical methods for the solution of thin plates andshells.
2. Use analytical methods for the solution ofshells.
3. Apply the numerical techniques and tools for the complex problems in thinplates.
4. Apply the numerical techniques and tools for the complex problems inshells.

Course Contents

UNIT-I **15 Hours**

Introduction: Space Curves, Surfaces, Shell Co-ordinates, Strain Displacement Relations, Assumptions in Shell Theory, Displacement Field Approximations, Stress Resultants, Equation of Equilibrium using Principle of Virtual Work, Boundary Conditions.

UNIT-II **10 Hours**

Static Analysis of Plates: Governing Equation for a Rectangular Plate, Navier Solution for Simply- Supported Rectangular Plate under Various Loadings, Levy solution for Rectangular Plate with other Boundary Conditions.

UNIT-III **10 Hours**

Circular Plates: Analysis under Axi- Symmetric Loading, Governing Differential Equation in Polar Co-ordinates. Approximate Methods of Analysis- Rayleigh-Ritz approach for Simple Cases in Rectangular Plates.

UNIT-IV **10 Hours**

Static Analysis of Shells: Membrane Theory of Shells - Cylindrical, Conical and Spherical Shells,

Shells of Revolution: with Bending R**esistance** - Cylindrical and Conical Shells, Application to Pipes and Pressure Vessels. Thermal Stresses in Plate/Shell.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

References Books:

- *Theory of Plates and Shells, Timoshenko S. and KriegerW., McGrawHill.*
- *Stresses in Plates and Shells, UguralAnsel C., McGrawHill.*
- *Thin Elastic Shells, KrausH., John Wiley andSons.*
- *Theory of Plates, ChandrashekharaK., UniversitiesPress.*

COURSE TITLE: Theory & Applications of Cement Composites
COURSE CODE: MSE107

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Formulate constitutive behavior of composite materials – Ferrocement, SIFCON and Fiber Reinforced Concrete - by understanding their strain-stress behavior.

2. Classify the materials as per orthotropic and anisotropic behavior.

3. Estimate strain constants using theories applicable to composite materials.

4. Analyze and design structural elements made of cement composites.

Course Content:

UNIT-I **15 Hours**

Introduction: Classification and Characteristics of Composite Materials- Basic Terminology, Advantages. Stress-Strain Relations- Orthotropic and Anisotropic Materials, Engineering Constants for Orthotropic Materials, Restrictions on Elastic Constants, Plane Stress Problem, Biaxial Strength, Theories for an Orthotropic Lamina.

UNIT-II **10 Hours**

Mechanical Behavior: Mechanics of Materials Approach to Stiffness- Determination of Relations between Elastic Constants, Elasticity Approach to Stiffness- Bounding Techniques of Elasticity, Exact Solutions - Elasticity Solutions with Continuity, Halpin, Tsai Equations, Comparison of approaches to Stiffness.

UNIT-III **10 Hours**

Cement Composites: Types of Cement Composites, Terminology, Constituent Materials and their Properties, Construction Techniques for Fiber Reinforced Concrete - Ferrocement, SIFCON, Polymer Concretes, Preparation of Reinforcement, Casting and Curing.

UNIT-IV **10 Hours**

Mechanical Properties of Cement Composites: Behavior of Ferrocement, Fiber Reinforced Concrete in Tension, Compression, Flexure, Shear, Fatigue and Impact, Durability and Corrosion.

Application of Cement Composites: FRC and Ferrocement- Housing, Water Storage, Boats and Miscellaneous Structures. Composite Materials- Orthotropic and Anisotropic behavior, Constitutive relationship, Elastic Constants.

Analysis and Design of Cement Composite Structural Elements - Ferrocement, SIFCON and Fiber Reinforced Concrete.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Reference Books:

- *Mechanics of Composite Materials, Jones R. M,, 2nd Ed., Taylor and Francis,BSP Books,1998.*
- *Ferrocement – Theory and Applications, Pama R. P., IFIC,1980.*
- *New Concrete Materials, Swamy R.N., 1st Ed., Blackie, Academic and Professional, Chapman & Hall,1983.*

COURSE TITLE: Theory of Structural Stability
COURSE CODE: MSE108

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Determine stability of columns and frames
2. Determine stability of beams and plates
3. Use stability criteria and concepts for analysing discrete and continuous systems,

Course Contents

UNIT-I **15 Hours**

Criteria for Design of Structures: Stability, Strength, and Stiffness, Classical Concept of Stability of Discrete and Continuous Systems, Linear and nonlinear behaviour.

UNIT-II **15 Hours**

Stability of Columns: Axial and Flexural Buckling, Lateral Bracing of Columns, Combined Axial, Flexural and Torsion Buckling.

UNIT-III **15 Hours**

Stability of Frames: Member Buckling versus Global Buckling, Slenderness Ratio of Frame Members.

UNIT-IV **15 Hours**

Stability of Beams: lateral torsion buckling.

Stability of Plates: axial flexural buckling, shear flexural buckling, buckling under combined loads. Introduction to Inelastic Buckling and Dynamic Stability.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Reference Books:

1. Theory of elastic stability, Timoshenko and Gere, Tata Mc GrawHill,1981
2. Principles of Structural Stability Theory, Alexander Chajes, Prentice Hall, New Jersey.
3. Structural Stability of columns and plates, Iyengar, N. G. R., Eastern west press Pvt. Ltd.
4. Strength of Metal Structures, Bleich F. Bucking, Tata McGraw Hill, New York.

SEMESTER: II

COURSE TITLE: FEM in Structural Engineering
COURSE CODE: MSE201

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Use Finite Element Method for structural analysis.
2. Execute the Finite Element Program/Software.
3. Solve continuum problems using finite element analysis.

Course Content

Unit-I **15 Hours**

Introduction: History and Applications. Spring and Bar Elements, Minimum Potential Energy Principle, Direct Stiffness Method, Nodal Equilibrium equations, Assembly of Global Stiffness Matrix, Element Strain and Stress. Beam Elements**:** Flexure Element, Element Stiffness Matrix, Element Load Vector.

Unit-II **15 Hours**

Method of Weighted Residuals: Galerkin Finite Element Method, Application to Structural Elements, Interpolation Functions, Compatibility and Completeness Requirements, Polynomial Forms, Applications.

Unit-III **15 Hours**

Types: Triangular Elements, Rectangular Elements, Three-Dimensional Elements, Isoparametric Formulation, Axi-Symmetric Elements, Numerical Integration, Gaussian Quadrature. Application to Solid Mechanics: Plane Stress, CST Element, Plane Strain Rectangular Element, Isoparametric Formulation of the Plane Quadrilateral Element, Axi- Symmetric Stress Analysis, Strain and Stress Computations.

Unit-IV **15 Hours**

Computer Implementation of FEM procedure, Pre-Processing, Solution, Post-Processing, Use of Commercial FEA Software.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Reference Books.

- Finite Element Analysis, Seshu P., Prentice-Hall ofIndia,2005.
- Concepts and Applications of Finite Element Analysis, Cook R. D., Wiley J., New York,1995.
- Fundamentals of Finite Element Analysis, Hutton David, Mc-Graw Hill,2004.
- Finite Element Analysis, Buchanan G.R., McGraw Hill Publications,

New York,1995.
- Finite Element Method, Zienkiewicz O.C. & Taylor R.L. Vol. I, II & III, Elsevier,2000.
- Finite Element Methods in Engineering, Belegundu A.D., Chandrupatla, T.R., Prentice Hall India,1991.

COURSE TITLE: Structural Dynamics
COURSE CODE: MSE202

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Analyze and study dynamics response of single degree freedom system using fundamental theory and equation ofmotion.
2. Analyze and study dynamics response of Multi degree freedom system using fundamental theory and equation ofmotion.
3. Use the available software for dynamic analysis.

Course Content

Unit-I **15 Hours**

Introduction: Objectives, Importance of Vibration Analysis, Nature of Exciting Forces, Mathematical Modeling of Dynamic Systems. Single Degree of Freedom System**:** Free and Forced Vibration with and without Damping, Response to Harmonic Loading, Response to General Dynamic Loading using Duhamel's Integral, Fourier Analysis for Periodic Loading, State Space Solution for Response.

Unit-II **15 Hours**

Numerical Solution to Response using New mark Method and Wilson Method, Numerical Solution for State Space Response using Direct Integration.

Multiple Degree of Freedom System (Lumped parameter): Two Degree of Freedom System, Multiple Degree of Freedom System, Inverse Iteration Method for Determination of Natural Frequencies and Mode Shapes, Dynamic Response by Modal Superposition Method, Direct Integration of Equation of Motion.

Unit-III **15 Hours**

Multiple Degree of Freedom System (Distributed Mass and Load): Single Span Beams, Free and Forced Vibration, Generalized Single Degree of Freedom System.

Unit-IV **15 Hours**

Special Topics in Structural Dynamics (Concepts only): Dynamic Effects of Wind Loading, Moving Loads, Vibrations caused by Traffic, Blasting and Pile Driving, Foundations for Industrial Machinery, Base Isolation.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Reference Books:

- *Dynamics of Structures, Clough R. W. and Penzien J., Mc GrawHill.*
- *Structural Dynamics and Introductionto Earthquake Engineering, Chopra A.K.*
- *Vibration ofStructures - Application in Civil Engineering Design, Smith J. W., Chapman and Hall.*
- *Dynamics of Structures, Humar J. L., PrenticeHall.*
- *Structural Dynamics - Theory andComputation, Paz Mario, CBSPublication.*
- *Dynamics ofStructures, Hart andWong.*

COURSE TITLE: Model Testing Lab
COURSE CODE: MSE204

L	T	P	Credits
0	0	2	1

Total: 30 Hours

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

1. Understand the response of structures.
2. Prepare the models.
3. Conduct model testing for static loading
4. Conduct model testing for free and forced vibrations

Course Content

Students will perform Experiments on the following:

1. Response of structures and its elements against extreme loading events.
2. Model Testing: Static - testing of plates, shells, and frames models.
3. Model Testing: Free and forced vibrations, Evaluation of dynamic modulus.
4. Beam vibrations, Vibration isolation, Shear wall building model, Time and frequency-domain study, Vibration Characteristics of RC Beams using Piezoelectric Sensors etc.

COURSE TITLE: Numerical Analysis Lab
COURSE CODE: MSE205

L	T	P	Credits
0	0	4	2

Total: 30 Hours

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

1. Find Roots of non-linear equations by Bisection method and Newton's method.
2. Do curve fitting by least square approximations
3. Solve the system of Linear Equations using Gauss - Elimination/ Gauss - Seidal Iteration/ Gauss - Jorden Method
4. To Integrate Numerically Using Trapezoidal and Simpson's Rules
5. To Find Numerical Solution of Ordinary Differential Equations by Euler's Method, Runge- Kutta Method.

Course Content

Students will perform Experiments on the following:

1. Find the Roots of Non-Linear Equation Using Bisection Method.
2. Find the Roots of Non-Linear Equation Using Newton's Method.
3. Curve Fitting by Least Square Approximations.
4. Solve the System of Linear Equations Using Gauss - Elimination Method.
5. Solve the System of Linear Equations Using Gauss - Seidal Iteration Method.
6. Solve the System of Linear Equations Using Gauss - Jorden Method.
7. Integrate numerically using Trapezoidal Rule.
8. Integrate numerically using Simpson's Rules.
9. Numerical Solution of Ordinary Differential Equations By Euler's Method.
10. Numerical Solution of Ordinary Differential Equations By Runge-Kutta Method.

COURSE TITLE: Soil Structure Interaction
COURSE CODE: MSE215

L	T	P	Credits
3	1	0	4

Total: 60 Hours

Course Outcomes: At the end of the course, students will be able to
1. Understand soil structure interaction concept and complexities involved.
2. Evaluate soil structure interaction for different types of structure under various conditions of loading and subsoil characteristics.
3. Prepare comprehensive design-oriented computer programs for interaction problems based on theory of sub grade reaction such as beams, footings, rafts etc.
4. Analyze different types of frame structure founded on stratified natural deposits with linear and non-linear stress-strain characteristics.
5. Evaluate action of group of piles considering stress-strain characteristics of real soils.

Course Content

Unit 1 **15 Hours**

Critical Study of Conventional Methods of Foundation Design, Nature and Complexities of Soil Structure Interaction.
Application of Advanced Techniques of Analysis such as FEM and Finite Difference Method.

Unit 2: **15 Hours**

Relaxation and Interaction for the Evaluation of Soil Structure Interaction for Different Types of Structure under various Conditions of Loading and Subsoil Characteristics.
Preparation of Comprehensive Design Oriented Computer Programs for Specific Problems, Interaction Problems based on Theory of Sub Grade Reaction Such as Beams, Footings, Rafts Etc.

Unit 3: **15 Hours**

Analysis of Different Types of Frame Structures Founded on Stratified Natural Deposits with Linear and Non-Linear Stress-Strain Characteristics.

Unit 4: **15 Hours**

Determination of Pile Capacities and Negative Skin Friction, Action of Group of Piles Considering Stress-Strain Characteristics of Real Soils, Anchor Piles and Determination of Pull-out Resistance.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

References:

• *Analytical and Computer Methods in Foundation, Bowels J.E.,McGraw Hill Book Co., New York, 1974.*

- *Numerical Methods in Geotechnical Engineering, Desai C.S. and Christian J.T., McGraw HillBook Co., New York.*
- *Soil Structure Interaction - The real behaviour of structures, Institution of Structural Engineers.*
- *Elastic Analysis of Soil Foundation Interaction, Developments in Geotechnical Engg. Vol-17,Elsevier Scientific Publishing Company.*
- *Elastic Analysis of Soil-Foundation Interaction, Selvadurai A.P.S., Elsevier Scientific*
- *Analysis & Design of substructures, Swami Saran, Oxford & IBH Publishing Co. Pvt. Ltd.*
- *Design of Foundation System- Principles & Practices, Kurian N. P., Narosa Publishing*

COURSE TITLE: Design of Formwork
COURSE CODE: MSE208

L	T	P	Credits
3	1	0	4

Total Hours - 60

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

1. Select proper formwork, accessories and material.
2. Design the form work for Beams, Slabs, columns, Walls and Foundations.
3. Design the form work for Special Structures.
4. Understand the working of flying formwork.
5. Judge the formwork failures through case studies.

Course Content

Unit-I **15 Hours**

Introduction: Requirements and Selection of Formwork.
Formwork Materials- Timber, Plywood, Steel, Aluminium, Plastic, and Accessories. Horizontal and Vertical Formwork Supports.

Unit-II **10 Hours**

Formwork Design: Concepts, Formwork Systems and Design for Foundations, Walls, Columns, Slab and Beams.
Formwork Design for Special Structures: Shells, Domes, Folded Plates, Overhead Water Tanks, Natural Draft Cooling Tower, Bridges.

Unit-III **10 Hours**

Flying Formwork: Table Form, Tunnel Form, Slip Form, Formwork for Precast Concrete, Formwork Management Issues –Pre-and Post-Award.

Unit-IV **10 Hours**

Formwork Failures: Causes and Case studies in Formwork Failure, Formwork Issues in Multi- Story Building Construction.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Reference Books:

1. Formwork for Concrete Structures, Peurify, Mc Graw Hill India,2015.
2. Formwork for Concrete Structures, Kumar NeerajJha, Tata McGraw Hill Education,2012.
3. IS 14687: 1999, False work for Concrete Structures - Guidelines, BIS.

COURSE TITLE: Advanced Steel Design
COURSE CODE: MSE207

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Design steel structures/ components by different design processes.
2. Analyse and design beams and columns for stability and strength, and drift.
3. Design welded and bolted connections.

Course Content

Unit-I **15 Hours**

Properties of Steel: Mechanical Properties, Hysteresis, Ductility.
Hot Rolled Sections: compactness and non-compactness, slenderness, residual stresses.

Unit-II **15 Hours**

Design of Steel Structures: Inelastic Bending Curvature, Plastic Moments, Design Criteria Stability, Strength, and Drift.
Stability of Beams: Local Buckling of Compression Flange &Web, Lateral Torsional Buckling.

Unit-III **15 Hours**

Stability of Columns: Slenderness Ratio, Local Buckling of Flanges and Web, Bracing of Column about Weak Axis.
Method of Designs: Allowable Stress Design, Plastic Design, Load and Resistance Factor Design

Unit-IV **15 Hours**

Strength Criteria: Beams - Flexure, Shear, Torsion, Columns - Moment Magnification Factor, Effective Length, PM Interaction, Biaxial Bending, Joint Panel Zones.
Drift Criteria: P Effect, Deformation Based Design;
Connections: Welded, Bolted, Location Beam Column, Column Foundation, Splices.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Reference Books:

1. Design of Steel Structures - Vol. II, Ramchandra. Standard Book House, Delhi.
2. Design of Steel Structures - Arya A. S., Ajmani J. L., Nemchand and Bros., Roorkee.
3. The Steel Skeleton- Vol. II, Plastic Behaviour and Design - Baker J. F., Horne M. R., Heyman J.,ELBS.

4. Plastic Methods of Structural Analysis, Neal B. G., Chapman and Hall London.
5. IS 800: 2007 – General Construction in Steel - Code of Practice, BIS,2007.
6. SP – 6 - Handbook of Structural Steel Detailing, BIS,1987

COURSE TITLE: Design of High-Rise Structures
COURSE CODE: MSE209

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Analyze, design and detail Transmission/ TV tower, Mast and Trestles with different loading conditions.
2. Analyze, design and detail the RC and Steel Chimney.
3. Analyze. Design and detail the tall buildings subjected to different loading conditions using relevant codes.

Course Content

Unit I **15 Hours**

Design of transmission/ TV tower, Mast and trestles: Configuration, bracing system, analysis and design for vertical transverse and longitudinal loads.

Unit II **15 Hours**

Analysis and Design of RC and Steel Chimney, Foundation design for varied soil strata.

Unit III **15 Hours**

Tall Buildings: Structural Concept, Configurations, various systems, Wind and Seismic loads, Dynamic approach, structural design considerations and IS code provisions. Firefighting design provisions.

Unit IV **15 Hours**

Application of software in analysis and design.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Reference Books:

1. Structural Design of Multi-storeyed Buildings, Varyani U. H., 2nd Ed., South Asian Publishers, New Delhi,2002.
2. Structural Analysis and Design of Tall Buildings, Taranath B. S., Mc Graw Hill,1988.
3. Illustrated Design of Reinforced Concrete Buildings(GF+3storeyed), Shah V. L. & Karve S. R., Structures Publications, Pune,2013.
4. Design of Multi Storeyed Buildings, Vol. 1 & 2, CPWD Publications,1976.
5. Tall Building Structures, Smith Byran S. and Coull Alex, Wiley India.1991.
6. High Rise Building Structures, Wolfgang Schueller, Wiley.,1971.
7.

COURSE TITLE: Design of Masonry Structures
COURSE CODE: MSE210

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Understand Structural design of walls, columns and beams
2. Explain the static behaviour of masonry structures
3. Selection of measures for moisture protection, heat insulation, sound insulation and fire insulation of masonry structures
4. Design of movement joints

Course Content

Unit I **15 Hours**

Masonry Units, Materials, types and masonry construction: Bricks, Stone and Block masonry units-strength, modulus of elasticity and water absorption of masonry materials-classification and properties of mortars. Defects and Errors in masonry construction-cracks in masonry, types, reason for cracking, methods of avoiding cracks. Strength and Stability: Strength and stability of axially loaded masonry walls, effect of unit strength, mortar strength, joint thickness, rate of absorption, effect of curing, effect of ageing, workmanship. Compressive strength formulae based on elastic theory and empirical formulae.

Unit II **15 Hours**

Permissible stresses: Types of walls, permissible compressive stress, stress reduction and shape modification factors, increase in permissible stresses for eccentric vertical and lateral load, permissible tensile stress and shear stresses. Design Considerations: Effective height of wall sand columns, openings in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action in lintels. Problems on design considerations for solid walls, cavity walls, wall with pillars.

Unit III **15 Hours**

Design of walls subjected to concentrated axial loads: Solid walls, cavity walls, solid wall supported at the ends by cross wall, walls with piers, design of wall with openings. Design of walls subjected to eccentric loads: Design criteria-stress distribution under eccentric loads -Problems on eccentrically loaded solid walls, cavity walls, walls with piers.

Unit IV **15 Hours**

Design of Laterally and transversely loaded walls: Design criteria, design of solid wall under wind loading, design of shear wall-design of compound walls. Introduction to reinforced brick masonry, lintels and slabs. In-filled frames: Types-modes of failures-design criteria of masonry retaining walls.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learningss

Reference Books:

DESIGN OF MASONRY STRUCTURES Third edition of Load Bearing Brickwork Design A.W.Hendry, and S.R.Davies.

Course Title: English for Research Paper Writing
Course Code: MCS220

L	T	P	Credits
2	0	0	NC

Total hours: 30

Learning Outcomes: After completion of this course, the learner 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

Course Content

Unit-I **8 Hours**

Planning and Preparation, Word Order, breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Unit-II **8 Hours**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

Unit-III **7 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

Unit-IV **7 Hours**

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

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

Transactional Mode:

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings:

1. *Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books) Model Curriculum of Engineering & Technology PG Courses [Volume-I] [41]*
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'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

Course Title: Constitution of India
Course Code: MSE216

L	T	P	Credits
2	0	0	NC

Total hours: 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.

2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.

3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Content

Unit-I **8 Hours**

History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)
Philosophy of the Indian Constitution: Preamble Salient Features

Unit-II **8 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 **7 Hours**

Organs of Governance:

- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers

- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

Unit-IV **7 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: ZilaPachayat.
- Elected officials and their roles, CEO ZilaPachayat: 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:

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings:

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.

COURSE TITLE: Design of Prestressed Concrete Structures
COURSE CODE: MSE301

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Find out losses in the prestressed concrete. Understand the basic aspects of prestressed concrete fundamentals, including pre and post-tensioning processes.
2. Analyze prestressed concrete deck slab and beam/girders.
3. Design prestressed concrete deck slab and beam/girders.
4. Design of end blocks for prestressed members.

Course Content

Unit-I **15 Hours**

Introduction to prestressed concrete: types of prestressing, systems and devices, materials, losses in prestress. Analysis of PSC flexural members: basic concepts, stresses at transfer and service loads, ultimate strength in flexure, code provisions.

Unit-II **15 Hours**

Statically determinate PSC beams: design for ultimate and serviceability limit states for flexure, analysis and design for shear and torsion, code provisions.

Transmission of prestress in pretensioned members; Anchorage zone stresses for post tensioned members.

Unit-III **15 Hours**

Statically indeterminate structures - Analysis and design - continuous beams and frames, choice of cable profile, linear transformation and concordancy.

Composite construction with precast PSC beams and cast in-situ RC slab - Analysis and design, creep and shrinkage effects. Partial prestressing - principles, analysis and design concepts, crack- width calculations

Unit-IV **15 Hours**

Analysis and design of prestressed concrete pipes, columns with moments.

Transactional Mode

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

References:

- *Design of Prestressed Concrete Structures, Lin T.Y., Asia Publishing House,1955.*
- *Prestressed Concrete, Krishnaraju N., Tata McGraw Hill, New Delhi,1981.*
- *Limited State Design of Prestressed Concrete, Guyan Y., Applied Science Publishers,1972.*
- *IS: 1343- Code of Practice for Prestressed Concrete*
- *IRC:112*

Course Title: Research Methodology & IPR
Course Code: MSE308

L	T	P	Credits
3	0	0	3

Total hours: 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Identify and discuss the role and importance of research in the social sciences.
2. Classify the issues and concepts salient to the research process.
3. Select the appropriate research design and develop appropriate research hypothesis for a research project
4. Discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project.

COURSE CONTENT

Unit-I **10 Hours**

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

Unit-II **15 Hours**

Effective literature studies approaches, analysis Plagiarism, Research ethics. Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit-III **10 Hours**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit-IV **10 Hours**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments inIPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Transactional Mode:
Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings:

- *Stuart Melville and Wayne Goddard, "Research methodology: an introduction for • science & engineering students'"*
- *Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction" • Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for • beginners"*
- *Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.*
- *Mayall , "Industrial Design", McGraw Hill, 1992.*
- *Niebel , "Product Design", McGraw Hill, 1974.*
- *Asimov , "Introduction to Design", Prentice Hall, 1962.*
- *Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New • Technological Age", 2016.*
- *T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008*

COURSE TITLE: Dissertation Phase-I*
COURSE CODE: MSE307

L	T	P	Credits
0	0	20	10

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

1. Identify structural engineering problems reviewing available literature.
2. Identify appropriate techniques to analyze complex structural systems.
3. Apply engineering and management principles through efficient handling of project

Course Content

The dissertation will normally contain:

1. Dissertation-I will have mid semester presentation and end semester presentation. Mid semester
2. Presentation will include identification of the problem based on the literature review on the topic referring to latest literature available.
3. End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions and must bring out individuals contribution.
4. Continuous assessment of Dissertation – I and Dissertation – II at Mid Sem and End Sem will be evaluated by the departmental committee.

Course Title: Disaster Preparedness & Planning
Course Code: OEC064

L	T	P	Cr.
3	0	0	3

Total: 45 Hours

Learning Outcomes: After completion of this course, the learner will be able to:

1. Identify various types of disasters, their causes, effects & mitigation measures.
2. Demonstrate the understanding of various phases of disaster management cycle and create vulnerability and risk maps.
3. Apply emergency management system to tackle the problems.
4. Interpret the role of media, various agencies and organizations for effective disaster management and design an early warning system and the utilization of advanced technologies in disaster management.

Course Content

Unit I: 15 Hours

Introduction to Disaster Management: Define and describe disaster, hazard, vulnerability, risk-severity, frequency and details, capacity, impact, prevention, mitigation.

Disasters: Identify and describe the types of natural and manmade disasters, hazard and vulnerability profile of India, mountain and coastal areas, Factors affecting vulnerability such as impact of development projects and environment modifications (including dams, land-use changes, urbanization etc.), Disaster impacts (environmental, physical, social, ecological, economic etc.); health, psycho-social issues; demographic aspects (gender, age, special needs), Lessons and experiences from important disasters with specific reference to civil engineering.

Unit II: 10 Hours

Disaster Mitigation and Preparedness: Disaster Management Cycle-its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; Preparedness for natural disasters in urban areas.

Risk Assessment: Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems; Use of Remote Sensing Systems (RSS) and GIS in disaster Management, early warning systems.

Unit III: 10 Hours

Post Disaster Response: Emergency medical and public health services; Environmental post disaster response (water, sanitation, food safety, waste management, disease control, security, communications);

reconstruction and rehabilitation; Roles and responsibilities of government, community, local institutions, role of agencies like NDMA, SDMA and other international agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines.

Unit IV: 10 Hours

Integration of public policy: Planning and design of infrastructure for disaster management, Community based approach in disaster management, methods for effective dissemination of information, ecological and sustainable development models for disaster management.

Transactional Mode:

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings:

1. *www.http//ndma.gov.in*
2. *http://www.ndmindia.nic.in*
3. *Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill, Publisher*
4. *Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester 92*
5. *Singh B.K., 2008, Handbook of disaster management: Techniques & Guidelines, Rajat Publications.*
6. *Disaster Management, R.B. Singh (Ed), Rawat Publications*
7. *ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction*

SEMESTER-IV

Course Title: Dissertation Phase II*
Course Code: MSE401

L	T	P	Credits
0	0	32	16

Learning Outcomes: After completion of this course, the learner will be able to:

1. Create, analyze and critically evaluate different technical/architectural solutions.
2. Analyze the consciousness critically of the ethical aspects of research and development work.
3. Analyze and evaluate different technical/architectural solutions.
4. Explain the capability of critically and systematically integrate knowledge.

Course Content

The dissertation will normally contain:

Dissertation – II will be extension of the to work on the topic identified in Dissertation – I. Continuous assessment should be done of the work done by adopting the methodology decided involving numerical analysis/ conduct experiments, collection and analysis of data, etc. There will be pre - submission seminar at the end of academic term. After the approval the student has to submit the detail report and external examiner is called for the viva-voce to assess along with guide.