GURU KASHI UNIVERSITY

Master of Technology in Structural Engineering

Session: 2023-24

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.

Course Structure of the Programme

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
MSE103	Research Methodology and IPR	Research skill course	3	1	0	4
MSE104	Structural Design Lab	Technical skill course	0	0	4	2
MSE105	Advanced Concrete Lab	Technical skill course	0	0	4	2
Discipline Elective-I (Any one of the following)						
MSE106	Theory of Thin Plates & Shells	**Discipline Elective-I**	3	0	0	3
MSE107	Theory & Applications of Cement Composites					
MSE108	Theory of Structural Stability					
Discipline Elective-II (Any one of the following)						
MSE109	Analytical and Numerical Methods for Structural Engineering	**Discipline Elective-II**	3	0	0	3
MSE110	Structural Health Monitoring					
MSE111	Structural Optimization					
Total			**15**	**3**	**8**	**22**

Semester: 2nd							
Sr. No.	**New Course Code**	**Course Name**	**Type of Course**	**(Hours Per Week)**			**No. of Credits**
				L	**T**	**P**	
1	MSE201	FEM in Structural Engineering	Core course	3	1	0	4
2	MSE202	Structural Dynamics	Core course	3	1	0	4
3	MSE203	Design of Advanced Concrete Structures	Core course	3	1	0	4
4	MSE207	Advanced Steel Design	Core course	3	1	0	4
5	MSE204	Model Testing Lab	Skill Based	0	0	4	2
6	MSE205	Numerical Analysis Lab	Skill Based	0	0	4	2
7	MSE206	Mini Project*	Skill Based	0	0	4	2
8	MCS220	English for Research Paper Writing	Value Added Course	2	0	0	2
Discipline Elective-III(Any one of the following)							
9	MSE208	Design of Formwork	Discipline Elective	3	0	0	3
10	MSE209	Design of High-Rise Structures					
11	MSE210	Design of Masonry Structures					
***Mini Project: - In case of mini project, they will solve a live problem using software/analytical/computational tools. Students will learn to write technical reports and will develop skills to present and defend their work in front of technically qualified audit**							
Total				**17**	**4**	**12**	**27**

Semester: 3rd							
Sr. No.	**New Course Code**	**Course Name**	**Type of Course**	**(Hours Per Week)**			**No. of Credits**
				L	**T**	**P**	
1	MSE301	Design of Prestressed Concrete Structures	Core course	3	1	0	4
2	MSE305	Composite Materials	Core course	3	1	0	4
3	MSE307	Dissertation Phase-I*	Research skills	0	0	24	12
Total				6	2	24	20

***Dissertation Phase – I: -The work will start in semester III and should preferably be a problem with research potential and should involve scientific research, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution. Seminar should be based on the area in which the candidate has undertaken the dissertation work as per the common instructions for all branches of M. Tech. The examination shall consist of the preparation of report consisting of a detailed problem formulation with objectives and a literature review. The preliminary results (if available) of the problem may also be discussed in the report. The work has to be presented in front of the examiners panel set by Head and PG coordinator. The candidate has to be in regular contact with his guide and the topic of dissertation must be mutually decided by the guide and student.**

Semester: 4th							
Sr.	**New Course Code**	**Course Name**	**Type of Subject T/P**	**(Hours Per Week)**			**No. of Credits**
				L	**T**	**P**	
1	MSE401	Dissertation Phase-II*	Research skills	0	0	48	24
			Total				24

*Dissertation Phase – II:-It is a continuation of research work started in semester III. He has to submit the report in prescribed format and also present a seminar. The dissertation should be presented in standard format as provided by the department. The candidate has to prepare a detailed research report consisting of introduction of the problem, problem statement, literature review, objectives of the work, methodology (experimental set up or numerical details as the case may be) of solution and results and discussion. The report must bring out the conclusions of the work and future scope for the study. . The work has to be presented in front of the examiners panel consisting of an approved external examiner, an internal examiner and a guide, co-guide etc. as decided by the Head and PG coordinator. The candidate has to be in regular contact with his guide.

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

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

Open Talk

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.

SEMESTER: I

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 basicconcepts.
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,

IsotropicHardening.

Transactional Mode

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

Open Talk

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.

SEMESTER: I

COURSE TITLE: Research Methodology and IPR
COURSE CODE: MSE103

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Understand research problemformulation.
2. Analyze research relatedinformation
3. Follow researchethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, andcreativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering inparticular.
6. UnderstandthatIPRprotectionprovidesanincentivetoinventorsforfurtherresea rch work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and socialbenefits.

Course Contents

Unit 1: **15 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, PaperDeveloping a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit III: 15 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: 15 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 in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

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Open Talk

References Books

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineeringstudents’”
2. Wayne Goddard and Stuart Melville, “Research Methodology: AnIntroduction”
3. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”
4. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd,2007.
5. Mayall , “Industrial Design”, McGraw Hill,1992.

SEMESTER: I

COURSE TITLE: Structural Design Lab
COURSE CODE: MSE104

L	T	P	Credits
0	0	4	2

Total: 15 Hours

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

1. Design and Detail all the Structural Components of FrameBuildings.
2. Design and Detail complete Multi-Storey FrameBuildings.

Course Content

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

SEMESTER: I

COURSE TITLE: Advanced Concrete lab
COURSE CODE: MSE105

L	T	P	Credits
0	0	4	2

Total: 15 Hours

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

1. Design high grade concrete and study the parameters affecting itsperformance.
2. Conduct Non Destructive Tests on existing concretestructures.
3. Apply engineering principles to understand behavior 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 ofrupture.
2. Effect of cyclic loading onsteel.
3. Non-Destructive testing of existing concretemembers.
4. Behavior of Beams under flexure, Shear andTorsion.

Transactional Mode

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

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.

SEMESTER: I

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

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. 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 ofEquilibrium using Principle ofVirtual Work, BoundaryConditions.

UNIT-II **15 Hours**

Static Analysis of Plates: Governing Equation for a Rectangular Plate, NavierSolution for Simply- Supported Rectangular Plate under Various Loadings, Levy solution for Rectangular Plate with other BoundaryConditions.

UNIT-III **15 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 RectangularPlates.

UNIT-IV **15 Hours**

Static Analysis of Shells: Membrane Theory ofShells - Cylindrical, Conical andSpherical Shells,

Shells ofRevolution: with BendingR**esistance** - Cylindrical andConical Shells, Application to Pipes and PressureVessels. Thermal Stresses in Plate/Shell.

Transactional Mode

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

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.

SEMESTER: I

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

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. Formulate constitutive behaviour of composite materials – Ferrocement, SIFCON and Fiber Reinforced Concrete - by understanding their strain-stressbehaviour.
2. Classify the materials as per orthotropic and anisotropic behaviour.
3. Estimate strain constants using theories applicable to compositematerials.
4. Analyze and design structural elements made of cementcomposites.

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 OrthotropicLamina.

UNIT-II **15 Hours**

Mechanical Behaviour: 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 toStiffness.

UNIT-III **15 Hours**

Cement Composites: Types of Cement Composites, Terminology, Constituent Materials andtheir Properties, Construction Techniques for Fibre Reinforced Concrete - Ferrocement, SIFCON, Polymer Concretes, Preparation of Reinforcement, Casting andCuring.

UNIT-IV **15 Hours**

Mechanical Properties of Cement Composites:BehaviorofFerrocement, Fiber Reinforced ConcreteinTension,Compression,Flexure,Shear,FatigueandImpact,Durabilityand Corrosion.

Application of Cement Composites: FRC andFerrocement- Housing, Water Storage, Boats and Miscellaneous Structures. Composite Materials- Orthotropic and Anisotropic behaviour, Constitutive relationship, ElasticConstants.

Analysis and Design of Cement Composite Structural Elements - Ferrocement, SIFCON andFibre ReinforcedConcrete.

Transactional Mode

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

Reference Books:

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

SEMESTER: I

COURSE TITLE:Theory of Structural Stability
COURSE CODE: MSE108

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. Determine stability of columns andframes
2. Determine stability of beams andplates
3. Use stability criteria and concepts for analyzing 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 nonlinearbehaviour.

UNIT-II15 Hours

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

UNIT-III **15 Hours**

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

UNIT-IV15 Hours

Stability of Beams: lateraltorsion buckling.

Stability of Plates: axialflexural buckling, shearflexural buckling, buckling under combined loads. Introduction to Inelastic Bucklingand DynamicStability.

Transactional Mode

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

Reference Books:

1. Theory of elastic stability, Timoshenko and Gere, Tata Mc GrawHill,1981
2. Principles of Structural Stability Theory, Alexander Chajes, Prentice Hall, NewJersey.
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: I

COURSE TITLE:Analytical and Numerical Methods for Structural Engineering
COURSE CODE: MSE109

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. Solveordinaryandpartialdifferentialequationsinstructuralmechanicsusingnumericalmethods.
2. Write a program to solve a mathematicalproblem.

Course Content

UNIT-I **15 Hours**

Fundamentals of Numerical Methods: Error Analysis, Polynomial Approximations and Interpolations, Curve Fitting**;** Interpolation andextrapolation.

UNIT-II **15 Hours**

Solution of Nonlinear Algebraic and TranscendentalEquations

Elements of Matrix Algebra: Solution of Systems of Linear Equations, Eigen ValueProblems.

UNIT-III **15 Hours**

Numerical Differentiation & Integration: Solution of Ordinary and Partial Differential Equations.

UNIT-IV **15 Hours**

Finite Difference scheme: Implicit & Explicitscheme.

Computer Algorithms: Numerical Solutions for Different Structural Problems, Fuzzy Logic and NeuralNetwork.

Transactional Mode

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

Reference Books:

1. An Introduction to Numerical Analysis, AtkinsonK.E., J. Wiley and Sons, 1989.
2. Theory and Problems of Numerical Analysis, Scheid F, McGraw Hill Book Company, (Shaum Series),1988.
3. Introductory Methods of Numerical Analysis, Sastry S. S, Prentice Hall of India,1998.

SEMESTER: I

COURSE TITLE:Structural Health Monitoring
COURSE CODE: MSE110

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. Diagnosis the distress in the structure understanding the causes andfactors.
2. Assess the health of structure using static fieldmethods.
3. Assess the health of structure using dynamic fieldtests.
4. Suggest repairs and rehabilitation measures of thestructure

Course Content

UNIT-I **15 Hours**

StructuralHealth: FactorsaffectingHealthofStructures,CausesofDistress,RegularMaintenance. Structural Health Monitoring**:** Concepts, Various Measures, Structural Safety inAlteration.

UNIT-II **15 Hours**

Structural Audit: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHMProcedures. Static Field Testing**:** Types of Static Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static ResponseMeasurement.

UNIT-III **15 Hours**

Dynamic Field Testing: Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods,HardwareforRemoteDataAcquisitionSystems,RemoteStructuralHealthMonitoring.

UNIT-IV **15 Hours**

Introduction to Repairs and Rehabilitations of Structures: Case Studies (Site Visits), piezo– electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMItechnique.

Transactional Mode

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

Reference Books:

1. Structural Health Monitoring, Daniel Balageas, Claus Peter Fritzen, Alfredo Güemes, John Wiley and Sons,2006.
2. Health Monitoring of Structural Materials and Components Methods with Applications, Douglas E Adams, John Wiley and Sons,2007.
3. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan, Taylor and Francis Group, London, UK,2006.
4. Structural Health Monitoring with Wafer Active Sensors, Victor Giurglutiu, Academic Press Inc, 2007.

SEMESTER: I

COURSE TITLE:Structural Optimization
COURSE CODE: MSE111

L	T	P	Credits
3	0	0	3

60 Hours

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

1. Use Variational principle foroptimization
2. Apply optimization techniques to structural steel and concretemembers.
3. Design using frequencyconstraint.

Course Content

UNIT-I 15 Hours

Introduction: Simultaneous Failure Mode and Design, Classical External Problems.
Calculus of Variation: Variation Principles with Constraints.

UNIT-II 15 Hours

Linear Programming, Integer Programming, Nonlinear Programming, Dynamic Programming,

UNIT-III15 Hours

GeometricProgramming andStochastic Programming**.** Applications**:** Structural Steel and Concrete Members, Trusses and Frames.

UNIT-IV15 Hours

Design: Frequency Constraint, Design of Layouts.

Transactional Mode

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

Reference Books:

1. Elements of Structural Optimization, Haftka, Raphael T., Gürdal, Zafer,Springer.
2. Variational methods for Structural optimization, Cherkaev Andrej,Springer

SEMESTER: I

COURSE TITLE:English for Research PaperWriting
COURSE CODE: MSE112

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-I15 Hours

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-II15 Hours

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

Unit-III15 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-IV15 Hours

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

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 UniversityPress
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

SEMESTER: I

COURSE TITLE:Value Education
COURSE CODE: MSE113

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 ofhumanism.Moral and non- moral valuation. Standards andprinciples. Valuejudgements.

Unit-II **15 Hours**

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

Unit-III **15 Hours**

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity anddiscipline, Punctuality, Love andKindness, Avoid faultThinking, Free from anger, Dignity oflabour, Universal brotherhood and religioustolerance, Truefriendship, Happiness Vs suffering, love fortruth, Aware of self-destructivehabits, Association andCooperation, Doing best for savingnature.

Unit-IV **15 Hours**

Character and Competence –Holy books vs Blind faith, Self-management and Goodhealth, Science of reincarnation, Equality, Nonviolence ,Humility, Role ofWomen, All religions and samemessage, Mind your Mind,Self-control, Honesty, Studyingeffectively.

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: MSE114

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 Indianpolitics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution inIndia.
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 IndianConstitution.
4. Discuss the passage of the Hindu Code Bill of1956.

Course Content

Unit-I 15 Hours
History of Making of the Indian Constitution: HistoryDrafting Committee, (Composition & Working)

Unit-II 15 Hours
Philosophy of the IndianConstitution: Preamble Salient Features

Contours of Constitutional Rights &Duties: FundamentalRights**,** Right toEquality**,** Right toFreedom**,** Right againstExploitation**,** Right to Freedom ofReligion**,** Cultural and EducationalRights**,** Right to ConstitutionalRemedies**,** Directive Principles of StatePolicy**,** FundamentalDuties.

Unit-III15 Hours
Organs ofGovernance: Parliament**,** Composition**,** Qualifications andDisqualifications**,** Powers andFunctions**,** Executive**,** President**,** Governor**,** Council ofMinisters**,** Judiciary, Appointment and Transfer of Judges,Qualification, Powers andFunctions.

Unit-IV **15 Hours**

LocalAdministration: District's Administration head: Role andImportance, **Municipalities**: Introduction, Mayor and role of Elected Representative, CEO o MunicipalCorporation, Pachayati raj: Introduction, PRI:Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position androle, Block level: Organizational Hierarchy (Differentdepartments),Village level: Role of Elected and Appointedofficials,Importance of grass rootdemocracy

ElectionCommission: Election Commission: Role andFunctioning, Chief Election Commissioner and ElectionCommissioners, State Election Commission: Role andFunctioning, Institute and Bodies for the welfare of SC/ST/OBC andwomen.

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: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 structuralanalysis.
2. Execute the Finite Element Program/Software.
3. Solve continuum problems using finite elementanalysis.

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 Strainand Stress. Beam Elements**:** Flexure Element, Element Stiffness Matrix, Element LoadVector.

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, GaussianQuadrature. 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 StressComputations.

Unit-IV **15 Hours**

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

Transactional Mode

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

Reference Books:

1. Finite Element Analysis, Seshu P., Prentice-Hall ofIndia,2005.
2. Concepts and Applications of Finite Element Analysis, Cook R. D., Wiley J., New York,1995.
3. Fundamentals of Finite Element Analysis, Hutton David, Mc-Graw Hill,2004.
4. Finite Element Analysis, Buchanan G.R., McGraw Hill Publications, New York,1995.
5. Finite Element Method, Zienkiewicz O.C. & Taylor R.L. Vol. I, II & III, Elsevier,2000.
6. Finite Element Methods in Engineering, Belegundu A.D., Chandrupatla, T.R., Prentice Hall India,1991.

SEMESTER: II

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 dynamicanalysis.

Course Content

Unit-I **15 Hours**

Introduction: Objectives, Importance of Vibration Analysis, Nature of Exciting Forces, Mathematical Modeling of DynamicSystems. 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 forResponse.

Unit-II **15 Hours**

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

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 Equationof 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 FreedomSystem.

Unit-IV **15 Hours**

Special Topics in Structural Dynamics(Concepts only): Dynamic Effects ofWind Loading, Moving Loads, Vibrations caused by Traffic, Blasting andPile Driving, Foundations for Industrial Machinery, BaseIsolation.

Transactional Mode

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

Reference Books:

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

SEMESTER: II

COURSE TITLE:Design of Advanced Concrete Structures
COURSE CODE: MSE203

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 special structures by understanding theirbehaviour.
2. Design and prepare detail structural drawings for execution citing relevant IScodes.

Course Content

Unit-I **20 Hours**

Design philosophy, Modeling 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 andEurocode.

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 andEurocode.

Transactional Mode

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

References Books:

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

SEMESTER: II

COURSE TITLE:Model Testing Lab
COURSE CODE: MSE204

L	T	P	Credits
0	0	4	2

Total: 15 Hours

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

1. Understand the response ofstructures.
2. Prepare themodels.
3. Conduct model testing for staticloading
4. Conduct model testing for free and forcedvibrations

Course Content

Students will perform Experiments on the following:

1. Response of structures and its elements against extreme loadingevents.
2. Model Testing: Static - testing of plates, shells, andframes models.
3. Model Testing: Free and forced vibrations, Evaluation of dynamicmodulus.
4. Beam vibrations, Vibration isolation, Shear wall building model, Time and frequency-domain study, Vibration Characteristics of RC Beams using Piezoelectric Sensorsetc.

SEMESTER: II

COURSE TITLE:Numerical Analysis Lab
COURSE CODE: MSE205

L	T	P	Credits
0	0	4	2

Total: 15 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'smethod.
2. Do curve fitting by least squareapproximations.
3. Solve the system of Linear Equations using Gauss - Elimination/ Gauss - Seidal Iteration/ Gauss – JordenMethod
4. To Integrate Numerically Using Trapezoidal and Simpson'sRules
5. To Find Numerical Solution of Ordinary Differential Equations by Euler's Method, Runge-Kutta Method.

Syllabus Contents

Students will perform Experiments on the following:

1. Find the Roots of Non-Linear Equation Using BisectionMethod.
2. Find the Roots of Non-Linear Equation Using Newton'sMethod.
3. Curve Fitting by Least SquareApproximations.
4. Solve the System of Linear Equations Using Gauss – EliminationMethod.
5. Solve the System of Linear Equations Using Gauss - Seidal IterationMethod.
6. Solve the System of Linear Equations Using Gauss – JordenMethod.
7. Integrate numerically using TrapezoidalRule.
8. Integrate numerically using Simpson'sRules.
9. Numerical Solution of Ordinary Differential Equations By Euler'sMethod.
10. Numerical Solution of Ordinary Differential Equations ByRunge-KuttaMethod.

SEMESTER: II

COURSE TITLE:Mini Project
COURSE CODE: MSE206

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;
- Appropriate, potential implementation difficulties.
- It is not intended to restrict students to a precisely defined format for the project Report but it should follow the standard practices of Report writing. Although a written report should be submitted, it should be accompanied by soft copy on CD.

SEMESTER: II

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 designprocesses.
2. Analyze and design beams and columns for stability and strength, anddrift.
3. Design welded and boltedconnections.

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 TorsionalBuckling.

Unit-III **15 Hours**

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

Unit-IV **15 Hours**

Strength Criteria: Beams - Flexure, Shear, Torsion, Columns - Moment Magnification Factor, Effective Length, PM Interaction, Biaxial Bending, Joint PanelZones.
Drift Criteria: P Effect, Deformation Based Design;

Connections: Welded, Bolted, Location Beam Column, Column Foundation, Splices.

Transactional Mode

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

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 HallLondon.
5. IS 800: 2007 – General Construction in Steel - Code of Practice, BIS,2007.
6. SP – 6 - Handbook of Structural Steel Detailing,BIS,1987

SEMESTER: II

COURSE TITLE:Design of Formwork
COURSE CODE: MSE208

L	T	P	Credits
3	1	0	4

60 Hours

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

1. Select proper formwork, accessories andmaterial.
2. Design the form work for Beams, Slabs, columns, Walls andFoundations.
3. Design the form work for SpecialStructures.
4. Understand the working of flyingformwork.
5. Judge the formwork failures through casestudies.

Course Content

Unit-I **15 Hours**

Introduction: Requirements and Selection ofFormwork.
Formwork Materials- Timber, Plywood, Steel, Aluminum, Plastic, and Accessories. Horizontal and Vertical FormworkSupports.

Unit-II **15 Hours**

Formwork Design: Concepts, Formwork Systems and Design for Foundations, Walls, Columns, Slaband Beams.

Formwork Designfor Special Structures: Shells, Domes, FoldedPlates, Overhead WaterTanks, Natural Draft Cooling Tower,Bridges.

Unit-III **15 Hours**

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

Unit-IV **15 Hours**

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

Transactional Mode

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

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 workfor Concrete Structures - Guidelines,BIS.

SEMESTER: II

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

L	T	P	Credits
3	1	0	4

Total: 30 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 SteelChimney.
3. Analyze. Design and detail the tall buildings subjected to different loading conditions using relevantcodes.

Course Content

Unit I **8 Hours**

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

Unit II **7 Hours**

2. **Analysis and Design of RC and Steel Chimney**, Foundation design for varied soilstrata.

Unit III **8 Hours**

3. **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 **7 Hours**

4. **Application** of software in analysis anddesign.

Transactional Mode

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

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. Tall Chimneys, Manohar S. N., Tata Mc Graw Hill Publishing Company, New Delhi

SEMESTER: II

COURSE TITLE:Design of Masonary 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 behavior 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 onec centrically 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

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

Reference Books:

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

SEMESTER: II

COURSE TITLE:Pedagogy Studies
COURSE CODE: MSE211

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 developingcountries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population oflearners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effectivepedagogy?

Course Content

Unit-I **15 Hours**

Introduction andMethodology

Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Researchquestions**.** Overview of methodology andSearching.

Unit-II **15 Hours**

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developingcountries. Curriculum, Teachereducation.

Unit-III **15 Hours**

Evidence on the effectiveness of pedagogicalpractices, Methodology for the in depth stage: quality assessment of includedstudies, 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: MSE212

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 healthalso
2. Improve efficiency

Unit-I **10 Hours**

Definitions of Eight partsof yoga. (Ashtanga)

Unit-II **10 Hours**

Yam and Niyam. Do`s and Don't's inlife, Ahinsa, satya, astheya, bramhacharya andaparigraha

Shaucha, santosh, tapa, swadhyay,ishwarpranidhan

Unit-III **10 Hours**

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

Regularization of breathing techniques and its effects-Types ofpranayam

Transactional Mode

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

Reference Books:

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

SEMESTER: II

COURSE TITLE:Personality Development through Life Enlightenment Skills
COURSE CODE: MSE213

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 inlife
2. The person who has studied Geeta will lead the nation and mankind to peace andprosperity
3. Study of Neetishatakam will help in developing versatile personality ofstudents

Course Content

Unit-I **10 Hours**

Neetisatakam-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(dont's)

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

Unit-II **10 Hours**

Approach to day to day work andduties.
Shrimad BhagwadGeeta: 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 basicknowledge.
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: MSE214

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 15 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 15 Hours

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

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

UNIT III 15 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 **15 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:Design of Prestressed Concrete Structures
COURSE CODE: MSE301

L	T	P	Credits
1	1	0	2

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-tensioningprocesses.
2. Analyze prestressed concrete deck slab and beam/girders.
3. Design prestressed concrete deck slab and beam/girders.
4. Design of end blocks for prestressedmembers.

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, codeprovisions.

Unit-II **15 Hours**

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

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 transformationandconcordancy.

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- widthcalculations

Unit-IV **15 Hours**

Analysis and design of prestressed concrete pipes, columns withmoments.

Transactional Mode

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

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 PrestressedConcrete,GuyanY., Applied Science Publishers,1972.
- IS: 1343- Code of Practice for PrestressedConcrete
- IRC:112

SEMESTER: III

COURSE TITLE:Business Analytics
COURSE CODE: MSE302

L	T	P	Credits
1	1	0	2

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, Destination 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

References:

- 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: MSE303

L	T	P	Credits
1	1	0	2

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 departmentsafety 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 Managenent.*All India traveler book seller.
2. Krishnan, N.V. (1996). *Safety in Industry*. Jaico Publisher House.
3. DeReamer, R. (1980). *Modern Safety and health Technology*. R.Wiley

SEMESTER: III

COURSE TITLE:Cost Management of Engineering Projects
COURSE CODE: MSE304

L	T	P	Credits
1	1	0	2

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.

Course Content

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: MSE305

L	T	P	Credits
1	1	0	2

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 I15 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 **20 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

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 Ramezanianpour

SEMESTER: III

COURSE TITLE:Waste to Energy
COURSE CODE: MSE306

L	T	P	Credits
1	1	0	2

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.

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.

UNIT-IV **15 Hours**

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: III

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. 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.
- 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: IV

COURSE TITLE:Dissertation Phase-II
COURSE CODE: MSE401

L	T	P	Credits
0	0	48	24

48 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.
- 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.