DESH BHAGAT UNIVERSITY, MANDI GOBINDGARH

Faculty of Engineering and Applied Sciences

Department of Civil Engineering

Program: M.Tech Structural Engineering

Program Outcomes:

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, Simulation tools, modern techniques and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Independently carry out research /investigation and development work to solve practical problems related to Structural Engineering.

PO3: Design & Development of solutions: To design and develop a system to meet desired needs within social areas such as economics, environmental, and ethics.

PO4: Conduct investigations of complex problems: To work upon unfamiliar problems through investigative studies and research and contribute to the development of technological knowledge and intellectual property.

PO5: Modern tool Usage: Apply appropriate methodology and modern engineering/IT tools to meet the international standards in the area of Structural Engineering.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Acquire integrity and ethics of research to execute projects efficiently.

PO9: Individual and Team Work: Recognize the need for lifelong learning & research independently, with a high level of enthusiasm, commitment and accuracy to improve knowledge and competence continuously

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Observe and examine critically the outcomes of one's actions and make corrective measures subsequently, and learn from mistakes without depending on external feedback.

PO12: Life-long learning: Design one system for Civil Engineering efficient system and make project report for its concept to implementation based on Structural Engineering.

Semester 1

Course Code: MTSE-101
Title of Course: Theory and Analysis of Plates

L	T	P	C
2	1	0	3

Course Outcomes: After completion of the course, students should be able to:

CO1: Aanalysis of 2D flat and curved surfaces
CO2: Mathematical techniques for solutions of these problems
CO3: Knowledge about numerical method for the analysis of 2D problems
CO4: Able to understand the behavior of such elements in practice
CO5: Knowledge about the behavior of thick plates

CO/PO Mapping

(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak												
Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	M	S	M	W	M	W	S	S
CO2	S	S	S	S	M	S	M	W	M	W	S	S
CO3	S	S	S	S	M	S	M	W	M	W	S	S
CO4	S	S	S	S	M	S	M	W	M	W	S	S
CO5	S	S	S	S	M	S	M	W	M	W	S	S

Course Content:

UNIUT I

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

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

UNIT II

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

UNIT III

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

UNIT IV

ORTHOTROPIC PLATES:

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

Recommended Books

1. Timoshenko, 'Theory of Plates &Shells'. (1995)
2. Timoshenko, 'Theory of Elasticity'. (1998)
3. Sadhu Singh, 'Theory of Elasticity and Plasticity'. (2000)
4. N. Rajagopalan, 'Bridge Superstructure', Narosa Publishers. (2005)

E-book

https://www.pdfdrive.com/theory-and-analysis-of-elastic-plates-and-shells-second-edition-e33503303.html
https://www.pdfdrive.com/search?q=theory+and+analysis+of+plates&pagecount=&pubyear=&searchin

online Source
www.Swayam.gov.in
https://nptel.ac.in/courses/112/103/112103251/

Course Code: MTSE -102
Title of Course: Bridge Engineering

L	T	P	C
2	1	0	3

Course Outcomes: After completion of the course, students should be able to:
CO1: Sub-surface investigations required for bridge construction
CO2: Ddesigning of various slab type reinforced concrete bridges
CO3: To perform designing of bridges sub-structures, bearings and joints
CO4: knowledge about of quality control and maintenance aspects of bridges

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	M	M	W	M	W	S	M	S	S
CO2	S	S	S	M	S	W	M	W	S	M	S	S
CO3	S	S	S	M	S	W	M	W	S	M	S	S
CO4	S	S	S	M	S	W	M	W	S	M	S	S

Course Content :

UNIT 1

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

UNIT II

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

UNIT III

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

UNIT IV

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

Recommended Books

1. Pama &Gusens, 'Bridge Deck Analysis'. (2001)
2. Edward V. Hambly, 'Bridge Deck Behavior'. (2002)
3. D. Johnson Vector, 'Essentials of Bridge Engineering'. (2004)

E-book:

bridge-engineering-handbook-second-edition-e18940566.html
https://www.pdfdrive.com/engineering-for-structural-stability-in-bridge-construction-e26543062.html

Online Learning

https://nptel.ac.in/courses/105105165/
www.Swayam.gov.in

Course Code: MTSE -103
Title of Course: Plastic analysis and design of steel structure

L	T	P	C
2	1	0	3

Course Outcomes: After completion of the course, students should be able
CO1: Analysis of frame Structure
CO2 : Analysis of columns Title of Coursed with different loading conditions
CO3: Knowledge about the concepts of shake down analysis

CO/PO Mapping (S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak												
Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	S	M	S	W	S	W	S	S
CO2	S	S	S	S	S	M	S	W	S	W	S	S
CO3	S	S	S	S	S	M	S	W	S	W	S	S

Course Content:

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

Recommended Books

1. M.J. & Z.P.B., Inelastic Analysis of Structures, John Wiley & Sons, Ltd.(2002)

2. M. Bill Wong, 'Plastic Analysis and Design of Steel Structures' (1999)

E-Book

https://www.pdfdrive.com/plastic-analysis-and-design-of-steel-structures-e185437876.html
https://www.pdfdrive.com/plastic-design-of-frames-1-fundamentals-v-1-e184329517.html
https://www.pdfdrive.com/plastic-analysis-and-design-of-steel-framed-structures-e52617566.html
https://freevideolectures.com/course/2679/design-of-steel-structures

Course Code: MTSE -104

Title of Course: Non Destructive Testing Laboratory

L	T	P	C
0	0	4	2

Course Outcomes: After completion of the course, students should be able

CO1: Knowledge about the concepts of mix design of concrete

CO2 : Analyze of various field test

CO3: awareness regarding theoretical as well as practical aspects

CO/PO Mapping (S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak												
Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	S	M	S	W	S	W	S	S
CO2	S	S	S	S	S	M	S	W	S	W	S	S
CO3	S	S	S	S	S	M	S	W	S	W	S	S

List of Experiments

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

Recommended Books

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

Course Code: MTSE -105
Title of Course: Advanced Solid Mechanics

L	T	P	C
3	1	0	4

Course Outcomes: After completion of the course, students should be able to

CO1: Learn about the elastic and plastic behavior of material and evaluate stress invariants, principal stresses and their directions

CO2: Determine strain invariants, principal strains and their directions

CO3: Develop constitutive relationships between stress and strain for linearly elastic solid

CO4: Analyze theories of failure and design components for safe operation

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
CO1	S	S	S	S	M	S	M	W	S	W	S	S
CO2	S	S	S	S	M	S	M	W	S	W	S	S
CO3	S	S	S	S	M	S	M	W	S	W	S	S
CO4	S	S	S	S	M	S	M	W	S	W	S	S

Course Content:

UNIT I

Theory of stress, state of stress in a body, Differential equations of equilibrium.

Analysis of state of stress at a given point in a body.

UNIT II

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

UNIT III

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

UNIT IV

Three dimensional stress systems, tensors, unsymmetrical bending.

Recommended Books

1. S. Timoshenko, ‘Theory of Elasticity’. (2001)
2. M. Filonenko, ‘Theory of Elasticity’. (2005)
3. S.H. Crandall, ‘Solid Mechanics’. (1998)

E-book

https://www.pdfdrive.com/mechanics-of-solids-e25053013.html

https://www.pdfdrive.com/mechanics-of-solids-e37279868.html

https://www.pdfdrive.com/mechanics-of-materials-2-third-edition-the-mechanics-of-elastic-and-plastic-deformation-of-solids-and-structural-materials-e184470889.html

Online Learning

https://nptel.ac.in/courses/112102284/

www.swayam.gov.in

Course Code: MTSE -106

Title of Course: Advanced foundation Engineering

L	T	P	C
3	1	0	4

Course Outcomes: After completion of the course, students should be able to

CO1: Theories of failure of soil with respect to foundation engineering.
CO2: Methods for design of shallow foundation.
CO3: Different methods for design of combined footing and raft foundation.
CO4: Perform analysis and design of drilled piers and well foundation.

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	M	S	M	W	S	W	S	S
CO2	S	S	S	S	M	S	M	W	S	W	S	S
CO3	S	S	S	S	M	S	M	W	S	W	S	S
CO4	S	S	S	S	M	S	M	W	S	W	S	S

Course Content:

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

Recommended Books

1. J.E. Bowles, 'Foundation Analysis and Design'. (1998)
2. Pech, Hansen and Thornburn, 'Foundation Engg.'. (2001)

E-books:

https://www.pdfdrive.com/geotechnical-engineering-principles-and-practices-of-soil-mechanics-and-foundation-engineering-civil-and-environmental-engineering-e156733753.html
https://www.pdfdrive.com/foundation-engineering-analysis-and-design-e158426318.html
https://www.pdfdrive.com/advances-in-deep-foundations-international-workshop-on-recent-advances-of-deep-foundations-iwdpf07-1-2-february-2007-port-and-airport-research-institute-yokosuka-japan-e162163660.html

Online Learning:

https://nptel.ac.in/courses/105105039/
www.swayam.gov.in

Course Code: MTSE -107

Title of Course: Pre Stressed Concrete Structure

L	T	P	C
3	0	0	3

Course Outcomes: After completion of the course, students should be able to

CO1: Analyze and design of prestressed concrete flexural members

CO2: Determine the shrinkage effect

CO3: Designing of pre-stressed structures

CO/PO Mapping

(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	M	S	M	W	S	W	S	S
CO2	S	S	S	S	M	S	M	W	S	W	S	S
CO3	S	S	S	S	M	S	M	W	S	W	S	S

Course Content:

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

Recommended Books

1. Lundy, 'Pre-stressed Concrete Structures'. (2001)
2. T.Y. Lin, 'Pre-stressed Concrete'. (2004)
3. N. Krishna Raju, 'Pre-stressed Concrete'. (2006)

E-Books

https://www.pdfdrive.com/design-of-concrete-structures-nilson-14th-edition-e37032482.html

https://www.pdfdrive.com/structuralm-concrete-civil-engineering-e11607407.html

https://www.pdfdrive.com/design-of-prestressed-concrete-to-eurocode-2-e158356563.html

Course Code: MTSE -108
Title of Course: Advanced Structure Design and Detailing

L	T	P	C
3	0	0	3

Course Outcomes:
CO1: Idealize structural systems and design the components as per IS code provisions
CO2: Determine the loads and design frames and tall structures
CO3: Design lateral loading systems

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	M	S	M	W	S	W	S	S
CO2	S	S	S	S	M	S	M	W	S	W	S	S
CO3	S	S	S	S	M	S	M	W	S	W	S	S

Course Content:

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

Design and Ductile Detailing of R.C.C. Structures as per I.S. 13920-1993, Repair and Seismic Strengthening of Buildings as per I.S. 13935-1993.

Recommended Books

1. P. Dayaratnam, ‘Reinforced Concrete Structure’. (2002)
2. A.K. Jain, ‘Reinforced Concrete, Limit State Method ofDesign’. (2010)
3. B.C. Punmia, ‘Reinforced Concrete Structures’, VolII. (1999)
4. Jain and Jaikrishna, ‘Plain and Reinforced Concrete’, VolII. (2005)
5. P. Dayaratnam, ‘Design of Steel Structures’. (2003)
6. S.K. Duggal, ‘Design of Steel Structures’. (2002)
7. B.I.S. Codes 1893, 4326, 13827, 13828, 13920, 13935.

E-books

https://www.pdfdrive.com/ce5510-advanced-structural-concrete-design-design-detailing-e13506597.html
https://www.pdfdrive.com/manual-for-design-and-detailing-of-reinforced-concrete-to-the-code-e7078397.html

Online Learning:
www.nptel.ac.in
www.swayam.gov.in

Course Code: DBSS-101

Title of the Course: Soft Skills-I

L	T	P	Credits
1	0	2	2

Course Outcomes:

CO1: To groom students to be Resilient and to be better equipped to cope with the unfamiliar circumstances, to manage disappointments and deal with conflicts.
CO2: To enable the students to connect and work with others to achieve a set task.
CO3: The course will train the students to gain Leadership skills and be a Leader who can assess and identify the strengths within the team and utilize the diverse skills of the group to achieve the set objectives
CO4. To cause a basic awareness about the significance of soft skills in professional and interpersonal communications and facilitate an all-round development of personality

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (PO's)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	W	S	M	M	W	M	S	S	M	S
CO2	M	M	M	S	S	M	W	S	S	S	S	S
CO3	M	M	M	M	S	S	M	M	S	S	S	S
CO4	S	M	M	W	S	W	M	M	S	S	S	S

Unit	Course Outlines	Hour(s)
Unit-I	**Introduction to Communication Skills in English** A) The Importance of Communication and the Process of communication-Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context. B) Everyday Conversations. C) Barriers to Communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional Barriers.	8
Unit-II	**Team Work & Leadership Skills** A) Broader Meaning of a Leader, Traits of a Leader. A Leader's Commitment to Mission and Vision of an Organisation. Managers versus Leaders. B) Developing Leadership Skills. Addressing Ethics in Leadership Skills.	8
Unit-III	**Written English Communication** A) Progression of thoughts and ideas. B) Structure of Paragraph and Essay.	8

	C) Formal and Informal Letter Writing D) Corporate Communication	
Unit-IV	**Etiquettes & Manners – Social & Business** A) Communication Etiquettes B) Principles of Trust C) Disability Etiquettes D) Gadget Etiquettes	8

Reference Books:

1. Klaus, Peggy (2009).The Hard Truth about Soft Skills. Harper Collins Publishers.
2. Fleming, Kerrie (2016).The Leader's Guide to Emotional Agility. Pearson Education Limited.
3. Riggio&Sherylle J, Tan (2014). Leader Interpersonal and Influence Skills. Routledge.
4. Rutherford, J. Andrea (2000). Basic Communication Skills for Technology. Pearson Education.
5. Kumar, Sanjay (2011). Communication Skills. Oxford University Press.
6. Robbins, Stephen.P (2013).Organizational Behaviour. Pearson.
7. Gill, Hasson (2011). Brilliant Communication Skills.Pearson.
8. Ramesh, GopalaSwamy (2013).The Ace of Soft Skills: Attitude, Communication and Etiquette for Success. Pearson.

Course Code: MTSE-201

Title of Course: Matrix Method in Civil Engineering

L	T	P	C
2	1	0	3

Course Outcomes: After completion of the course, students should be able to:

CO1: Understand the basic concept of determinate and indeterminate structure
CO2 : Analysis of matrices
CO3: Analysis of structure using different methods

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	M	S	M	W	M	W	S	S
CO2	S	S	S	S	M	S	M	W	M	W	S	S
CO3	S	S	S	S	M	S	M	W	M	W	S	S

Course Content:

UNIT I

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

UNIT II

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

UNIT III

FLEXIBILITY METHOD: Introduction, Equilibrium and Compatibility, Equations of Equilibrium, Compatibility Conditions, Analysis of Continuous Beams including Support Settlements, Pin-jointed Plane Frames and Rigid-jointed plane Frames using Physical and

Element Approach, Support Reactions, Shear Force and Bending Moment Diagrams.

UNIT IV

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

Recommended Books

1. Weaver & Gere, 'Matrix Analysis of Framed Structures', CBS Publishers. (2001)
2. C.S. Reddy, 'Basic Structural Analysis', McGraw Hill Publishers. (2005)
3. G.S. Pandit & S.P. Gupta, 'Matrix Methods in Structural Analysis'. (2003)
4. A.K. Jain, 'Advanced Structural Analysis'. (1998)
5. Menon, 'Advanced Structural Analysis'. (1995)

E-Book

https://www.pdfdrive.com/structural-analysis-a-unified-classical-and-matrix-approach-seventh-edition-e187832751.html

https://www.pdfdrive.com/page-1-i-sixth-edition-structural-analysis-a-unifed-classical-and-matrix-e33640303.html

https://www.pdfdrive.com/structural-analysis-iii-colincapranicom-e6522160.html

Course Code: MTSE-202
Title of Course : Structural Dynamics

L	T	P	C
2	1	0	3

Course Outcomes: After completion of the course, students should be able to

CO1: Understand the behavior of structure under dynamic loading
CO2 : Modeling of structural damping
CO3: Establishing dynamic equilibrium, the equation of motion
CO4: Designing of earthquake resistant structure

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	M	S	M	W	M	W	S	S
CO2	S	S	S	S	M	S	M	W	M	W	S	S
CO3	S	S	S	S	M	S	M	W	M	W	S	S
CO4	S	S	S	S	M	S	M	W	M	W	S	S

Course Content:

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

Recommended Books

1. Clough and Penzien, 'Dynamics of Structures'. (2003)
2. G.K. Grover, 'Mechanical Vibrations'. (2000)

E-book

https://www.pdfdrive.com/stress-strain-and-structural-dynamics-e19798696.html

https://www.pdfdrive.com/stress-strain-and-structural-dynamics-e19798696.html

Online Learning :

https://nptel.ac.in/courses/105101006/#

Course Code: MTSE -203
Title of Course: CAD Laboratory

L	T	P	C
0	**0**	**2**	**1**

Course Outcomes: After completion of the course, students should be able
CO1: knowledge regarding designing Reinforced concrete elements
CO2: with the help of computer programs simulate problems related to structural analysis & design
CO3: to develop computer aided design program

CO/PO Mapping (S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak												
Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	S	M	S	W	S	W	S	S
CO2	S	S	S	S	S	M	S	W	S	W	S	S
CO3	S	S	S	S	S	M	S	W	S	W	S	S

List of Experiments

1. Computer Aided Analysis & Design of Reinforced Concrete Elements such as Beams, Slabs.
2. Computer Aided Analysis & Design of Steel Elements such as Connections, Tension Members, Compression Members, Beams, Column Base, and Roof Trusses.
3. To develop a complete self-reliance in solving analysis and design problems of engineering with the use of computers. The effort must culminate with a CAD program and a project report.
4. To develop a complete self-reliance of software used for the structural analysis & design.

Course Code: MTSE-204
Title of Course: Industrial Structures

L	T	P	C
3	0	0	3

Course Outcomes: After completion of the course, students should be able to

CO1: Analyse and design industrial buildings and storage structures
CO2: Analyse and design structures using light gauge steel and aluminium
CO3: Understand shop practice in steel construction including fabrication, erection and production.

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	S	S	M	W	M	W	S	S
CO2	S	S	S	S	S	S	M	W	M	W	S	S
CO3	S	S	S	S	S	S	M	W	M	W	S	S

Course Content:

UNIT I

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

UNIT II

Bunkers & Silos in steel.

UNIT III

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

UNIT IV

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

Recommended Books

1. C.W. Dunham, 'Planning of Industrial Structures'.(1992)
2. 'Structural Engineers Handbook'.
3. S.K. Duggal, 'Design of Steel Structures'. (1995)

E-Books:

https://www.pdfdrive.com/design-of-steel-structures-eurocode-3-design-of-steel-structures-part-1-1-general-rules-and-rules-for-buildings-e174571090.html

https://www.pdfdrive.com/design-of-cold-formed-steel-structures-eurocode-3-design-of-steel-structures-part-1-3-design-of-cold-formed-steel-structures-e184556814.html

https://www.pdfdrive.com/fatigue-design-of-steel-and-composite-structures-eurocode-3-design-of-steel-structures-part-1-9-fatigue-eurocode-4-design-of-composite-steel-and-concrete-structures-e158293829.html

Online Learning:

https://nptel.ac.in/courses/105105162/
www.swayam.gov.in

Course Code: MTSE-205
Title of Course : Computer Aided Design Methods

L	T	P	C
3	0	0	3

Course Outcomes: After completion of the course, students should be able to:

CO1: Knowledge about the role of graphic communication in the engineering design processes
CO2 : Able to use CAD software to generate a computer model and technical drawing
CO3 : Understand and demonstrate dimensioning concepts and techniques

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	S	S	M	W	M	W	S	S
CO2	S	S	S	S	S	S	M	W	M	W	S	S
CO3	S	S	S	S	S	S	M	W	M	W	S	S

Course Content:

UNIT I

Introduction to CAD and its scope simple description of computer hardware. - Micro, mini etc. - memory, processor - Peripheral devices-disks, printer. Video terminals. Graphic floater, graphic screen digitizer**.**

UNIT II

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

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

UNIT III

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

Recommended Books

1. William M. Newman & Robert F. Sproul, 'Principles of Interactive Computer Graphics'. (2000)
2. Hunton and Owan, 'Programming in Finite Element'. (2004)
3. Joe Rooney & Philips Steadman, 'Principles of Computer Aided Design' (2006)

E-Books

https://www.pdfdrive.com/computer-aided-design-for-rapid-tooling-methods-for-mold-design-and-design-for-manufacture-e15002772.html

https://www.pdfdrive.com/computer-aided-design-engineering-and-manufacturing-systems-techniques-and-applications-volume-iii-operational-methods-in-computer-aided-design-e157102933.html

Course Code: MTSE-206
Title of Course: Finite Element Analysis

L	T	P	C
3	0	0	3

Course Outcomes: After completion of the course, students should be able to

CO1: Know the different methods in finite element analysis
CO2: Understand the different elements in finite element analysis and its application
CO3: Able to formulate 2D and 3D isoparametric elements

CO/PO Mapping (S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak												
Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	S	S	M	W	M	W	S	S
CO2	S	S	S	S	S	S	S	W	M	W	S	S
CO3	S	S	S	S	S	S	M	W	M	W	S	S

Course Content:

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

Recommended Books

1. C.S. Krishanmurthy, 'Finite Element Analysis – Theory andProgramming'.
2. K.J. Bathe & E.L. Wilson, 'Numerical Method in Finite ElementAnalysis'.

E-Books:

https://www.pdfdrive.com/fundamentals-of-finite-element-analysis-linear-finite-element-analysis-e158466302.html

https://www.pdfdrive.com/fundamentals-of-finite-element-analysis-e33613547.html

https://www.pdfdrive.com/fundamentals-of-finite-element-analysis-e12165060.html

Online Learning:

https://nptel.ac.in/courses/112104115/

Course Code: MTSE-207
Title of Course: Composite Materials

L	T	P	C
3	0	0	3

Course Outcomes: After completion of the course, students should be able to

CO1: Understand the latest development in trend in concrete composites
CO2 : Advanced applications of composite materials.
CO3: Manufacturing and properties of concrete composites such as fibre reinforced concrete, ferro-cement, silica fume concrete and polymer concrete

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	S	M	M	W	S	W	M	S
CO2	S	S	S	S	S	M	M	W	S	W	M	S
CO3	S	S	S	S	S	M	M	W	S	W	S	S

Course Content:

UNIT I

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

UNIT II

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

FERRO CEMENT: Constituent materials and their properties, Mechanical properties of ferro cement, Construction techniques and application of ferro cement.
LIGHT WEIGHT CONCRETE: Properties of light weight concretes, Pumice concrete, Aerated cement mortars, No fines concrete, Design and applications of light weight concrete.

UNIT III

POLYMER CONCRETE: Terminology used in polymer concrete, Properties of constituent materials, Polymer impregnated concrete, Polymer modified concrete, Properties and

applications of polymer concrete and polymer impregnated concrete.

HIGH PERFORMANCE CONCRETE: Materials for high performance concrete, Supplementary cementing materials, Properties and durability of high performance concrete, Introduction to silica fume concrete, Properties and applications of silica fume concrete.

UNIT IV

SULPHUR CONCRETE AND SULPHUR INFILTRATED CONCRETE: Process technology, Mechanical properties, Durability and applications of sulphur concrete, Sulphur infiltrated concrete, Infiltration techniques, Mechanical properties, Durability and applications of sulphur infiltrated concrete.

Recommended Books

1. A.M. Nevillie, 'Concrete Technology'. (2008)
2. M.L. Gambhir, 'Concrete Technology'. (2001)
3. M.S. Shetty, 'Concrete Technology'. (2006)

E-Books:

https://www.pdfdrive.com/composite-materials-engineering-volume-1-fundamentals-of-composite-materials-e182437865.html

https://www.pdfdrive.com/composite-materials-e29586293.html

https://www.pdfdrive.com/composite-materials-handbook-volume-3-polymer-matrix-composites-materials-usage-design-and-analysis-e158300486.html

Online Learning:

www.nptel.ac.in

Course Code: MTSE-208
Title of Course: Human Resource Management

L	T	P	C
3	0	0	3

Course Outcomes: After completion of the course, students should be able to

CO1: Develop, implement, and evaluate employee orientation, training, and development program
CO2: Research and support the development and communication of the organization's total compensation
CO3: Develop, implement, and evaluate organizational development strategies aimed at promoting organizational effectiveness

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	S	S	M	S	W	S	W	S	S
CO2	M	M	M	S	S	M	S	W	S	W	S	S
CO3	M	M	M	S	S	M	S	W	S	W	S	S

Course Content

UNIT I

HumanResourcesManagement: Meaning,Scope,Objective,Functions,RolesandImportance. interaction with other functional areas. HRM & HRD a comparative analysis. Human Resource Planning: Meaning, Process & Methods of Human Resources Planning, Importance of HRIS. Job Analysis, Job Description, Job Specification. Concept of Job Evaluation

UNIT II

Recruitment & Selection: Concept, Process & Methods. Concept of Induction & Placement. Training & Development: Concept & Methods, Difference Between Training & Development, Internal Mobility: Promotion, Transfer, Demotion, Separation.

UNIT III

Performance Appraisal: Concept, methods & Process. Compensation Management- Wage &SalaryAdministration,Elements&MethodsofWage&Salary,IncentivePlans&FringeBenefits, Quality of work life (QWL): Meaning, Development and Various Approaches of QWL, Techniques for improving QWL.

UNIT IV

Industrial Relations: Meaning and importance. Collective Bargaining, Participative Management, Employee Grievances and their Resolution, Quality Circles, HR Audit, Contemporary Issues in HRM, Trade Union in India, Safety Provisions under Factories Act1948, Social Security, ESI Act1948.

Recommended Books

1. Edwin B. Flippo, 'Personal Management', Tata McGraw Hill. (2002)
2. Bohlander, Snell &Vohra, 'Human Resource Management', Cengage COURSE. (2004)
3. Gary Dessler, 'Human Resource Management',McMillan. (2008)
4. V.S.P. Rao, 'Human Resource Management', Excel Books. (2001)
5. C.B. Mamoria, 'Personal Management', Himalaya Publications. (2000)
6. T.N. Chabbra, 'Human Resource Management', Dhanpat Rai & Sons. (2004)
7. C.B. Gupta, 'Human Resource Management', Sultan Chand and Sons. (2006)
8. R.S. Dwivedi, 'HRD in India Companies', Himalaya Publications. (2008)

E-Books:

https://www.pdfdrive.com/human-resources-management-set-concepts-methodologies-tools-and-applications-human-resources-management-concepts-methodologies-tools-and-applications-e175226969.html

https://www.pdfdrive.com/strategic-human-resource-management-e15459785.html

https://www.pdfdrive.com/a-handbook-of-human-resource-management-practice-e24209359.html

Course Code: MTSE-209

Title of Course: Environment Management

L	T	P	C
3	0	0	3

Course Outcomes: After completion of the course, students should be able to

CO1: Concepts of global environment issues
CO2: Understand the concepts of environment impact assessment
CO3: Knowledge about Cleaner Production Technologies

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	S	S	M	S	W	S	W	S	S
CO2	M	M	M	S	S	M	S	W	S	W	S	S
CO3	M	M	M	S	S	M	S	W	S	W	S	S
CO4												

Course Content:

UNIT I

Global Environmental Problems: Global warming, green-house effect, ozone depletion, acid rain,oilpollution,radiationhazardandcontrol,globalclimatechange.Mainclausesandbasicstepsfor Environmental Management System certification. Environmental Laws/Acts.

UNIT II

Cleaner Production Technologies Need and benefits, cleaner production techniques and options, zero impact manufacturing initiatives CDM and carbon credits/case studies.

UNIT III

Environment Impact Assessment: Definition and its importance for environment management, constituents of environment impact assessment, project data for EIA study, prediction of impacts, EIA methodologies, constraints in implementation of EIA, impact prediction on water resources projects and other relevant case studies. Environment pollution.

UNIT IV

Degradation of Land Resources: Deforestation: Forest land, deforestation and its effects on land seandEnvironmentalquality,wetlandandtheirimportanceinenvironment,causesandextentof wasteland, Soil degradation problems, erosion, salinization, water logging, land use management & planning.

Recommended Books

1. Peavy, Rowe, 'Techobanoglous, Environmental Engg.', Tata McGraw-Hill. (2001)
2. Mackenzie L. Davis, 'Environmental Engg.', Tata McGraw-Hill. (2003)
3. Baljeet S. Kapoor, 'Environmental Engg. An overview', Khanna Publishers. (1998)
4. Glbert H. Masters, 'Environmental Engineering and Science', Prentice Hall of India Pvt. Ltd. (1995)
5. G.N. Panday, G.C. Carney, 'Environmental Engineering', Tata McGraw-Hill. (1996)
6. P.D. Sharma, 'Ecology and Environment', Rastogi Publications. (2002)
7. P.A. Ray, 'Lcances Environmental Impact Assessment', Hand National Environmental Protection Council, Manile.

E-Books:

https://www.pdfdrive.com/environmental-economics-and-natural-resource-management-e34386385.html
https://www.pdfdrive.com/environmental-economics-and-natural-resource-management-e34386385.html
https://www.pdfdrive.com/climate-and-land-degradation-environmental-science-and-engineering-environmental-science-environmental-science-and-engineering-environmental-science-e157218251.html

Online Learning

www.nptel.ac.in , www.swayam.gov.in

Course Code: DBES-100

Title of the Course: Environmental Studies

L	T	P	Credits
1	0	2	2

Course Outcomes:

CO1: Articulate the interdisciplinary context of environmental issues.
CO2: Identify and justify key stakeholders in humanities and social sciences that need to be a part of sustainable solutions.
CO3: Formulate an action plan for sustainable alternatives that integrate science, humanist, and social perspectives.
CO4: Students will be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.

CO/PO mapping

(S/M/W indicates strength of correlation)
S- Strong , M-Medium , W- Weak

CO'S	Program Outcome (PO's)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	W	S	S	W	W	S	M	S	M
CO2	S	S	M	M	S	M	M	W	W	S	M	S
CO3	S	M	S	M	S	W	S	M	S	W	S	S
CO4	S	S	M	W	S	S	W	W	S	M	S	M

Unit	Course Outlines	Hour(s)
1	**The Multidisciplinary Nature of Environmental Studies** Definition, scope and importance Need for public awareness. **Natural Resources** Renewable and Non-renewable Resources: • Natural resources and associated problems. (a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people. (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.	8

	(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, Case studies. (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of an individual in conservation of natural resources. • Equitable use of resources for sustainable lifestyles.	
2	**Ecosystems** • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow in the ecosystem. • Ecological succession. • Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **Unit Biodiversity and Its Conservation** • Introduction, definition: genetic, species and ecosystem diversity. • Biogeographical classification of India. • Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. • Biodiversity at global, National and local levels. • India as a mega-diversity nation. • Hot-spots of biodiversity. • Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. • Endangered and endemic species of India. • Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity	10

3	**Environmental Pollution** • Definition • Causes, effects and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards • Solid waste management: Causes, effects and control measures of urban and industrial wastes. • Role of an individual in prevention of pollution. • Pollution case studies. • Disaster management: Foods, earthquake, cyclone and landslides. **Social Issues and the Environment** • From unsustainable to sustainable development. • Urban problems related to energy. • Water conservation, rain water harvesting, watershed management. • Resettlement and rahabilitation of people; its problems and concerns. Case studies. • Environmental ethics: Issues and possible solutions. • Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. • Wasteland reclamation. • Consumerism and waste products. • Environment Protection Act. • Air (Prevention and Control of Pollution) Act. • Water (Prevention and Control of Pollution) Act. • Wildlife Protection Act. • Forest Conservation Act. • Issues involved in enforcement of environmental legislation. • Public awareness. Common UGC Syllabus for Environmental Studies xiii	12
4	**Human Population and the Environment** • Population growth, variation among nations. • Population explosion—Family Welfare Programme. • Environment and human health. • Human rights. • Value education. • HIV/AIDS. • Women and Child Welfare. • Role of Information Technology in environment and human health. • Case Studies. **Field Work** • Visit to a local area to document environmental assets—river/forest/grassland/hill/mountain. • Visit to a local polluted site—Urban/Rural/Industrial/Agricultural.	15

	• Study of common plants, insects, birds. • Study of simple ecosystems—pond, river, hill slopes, etc. • (Field work equal to 5 lecture hours	

Total -45

Recommended Books

1. " Environmental Science" by Miller T G.
2. " Introduction to Environmental Engineering and Science" by Gilbert M Masters.
3. " The Biodiversity of India" by BharuchaErach.
4. " Essentials of Ecology" by Townsend C and Michael Begon.
5. https://nptel.ac.in/courses/122102006/
6. https://swayam.gov.in/nd2_cec19_bt03/preview
7. https://www.pdfdrive.com/environmental-science-e12033451.html

Course Code:MTSE-301
Title of Course: Research Methodology

L	T	P	Credits
4	0	0	4

Course Outcomes:

CO1: Able to select and define appropriate research problem and Parameters.
CO2: Able to select the data from different methods.
CO3: Able to organize and conduct research in a more appropriate manner.
CO4: Able to understand and apply statistical.

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	S	M	M	M	W	W	M	S	M
CO2	S	S	S	S	M	M	M	W	W	M	S	M
CO3	S	S	M	S	M	M	M	W	W	M	S	M
CO4	S	S	M	S	S	M	M	W	W	M	S	M

Course Content:

UNIT I

Motivation and objectives – Research methods vs. Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis

UNIT II

Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables. Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (Sigma STAT,SPSS for student t-test, ANOVA, etc.), hypothesis testing.

UNIT III

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports, Conclusions.

UNIT IV

Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Engineering, Impact factor of Journals, When and where to publish. Ethical issues related to publishing, Plagiarism and Self-Plagiarism.

Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism

Recommended Books:

1. R.I. Levin and D.S. Rubin, 'Statistics for Management', 7th Edn., Pearson Education New Delhi.
2. N.K. Malhotra, 'Marketing Research–An Applied Orientation', 4th Edn., Pearson Education New Delhi.
3. Donald Cooper, 'Business Research Methods', Tata McGraw Hill, NewDelhi.
4. Sadhu Singh, 'Research Methodology in Social Sciences', HimalayaPublishers.
5. Darren George & Paul Mallery, 'SPSS for Windows Step by Step', Pearson Education NewDelhi.
6. C.R. Kothari, 'Research Methodology Methods & Techniques', 2nd Edn., New Age InternationalPublishers.
7. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition, by John W. Creswell.

E-Books and online learning material

1. https://www.pdfdrive.com/
2. modares.ac.ir/uploads/Agr.Oth.Lib.17.pdf
3. https://www.free-ebooks.net/
4. http://e-library.net/free-ebook.htm

Course Code: MTSE-302

Title of Course: Seminar

L	T	P	Credits
0	**0**	**4**	**2**

Course Outcomes:

CO1: Defines the subject and determines the contents
CO2: carry out academic and scientific research in related fields, using quantitative methods
CO3: develop problem-solving skills

CO/PO Mapping

(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	S	S	S	W	M	W	S	S
CO2	S	S	S	S	S	S	M	W	M	W	S	S
CO3	S	S	S	S	S	S	S	W	M	W	S	S

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

Course Code: MTSE-303

Title of Course: Project

L	T	P	Credits
0	0	12	6

CO1: Use statistical techniques to model and solve real-life problems
CO2: Relates the causes and outcomes of the subject
CO3: Analyse the results of a research

CO/PO Mapping (S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak												
Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	S	S	M	W	M	W	S	S
CO2	S	S	S	S	S	S	S	W	M	W	S	S
CO3	S	S	S	S	S	S	M	W	M	W	S	S
CO4	S	S	S	S	S	S	S	W	M	W	S	S

A student can work on the following types of Projects:

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

Course Code: MTSE-304
Title of Course: Fluid Dynamics

L	T	P	Credits
4	0	0	4

Course Outcomes: After completion of the course, students should be able to

CO1: Student will understand the concepts of types of flow.
CO2: Student will analyse the numerical problem related to the different types of flow.
CO3: Student will analyse the numerical problem related to perturbation theory

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	M	M	S	M	W	M	W	S	S
CO2	S	S	S	S	S	S	S	W	M	W	S	S
CO3	S	S	S	S	S	S	M	W	M	W	S	S

Course Content:

UNIT I

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

UNIT II

2Stability theory, flow of non-Newtonian fluids, stationary and moving shockwaves

UNIT III

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

UNIT IV

Methods of characteristics, small perturbation theory and similarity rules.

Recommended Books

1. F. Charlton, 'A Text Book of Fluid Dynamics'. (2002)
2. G.K. Batchelor, 'A Text Book of Fluid Dynamics'. (2007)

E-Book

https://www.pdfdrive.com/page-2-computational-fluid-dynamics-page-3-john-f-wendt-ed-computational-fluid-dynamics-e39904215.html
https://www.pdfdrive.com/fluid-dynamics-part-1-classical-fluid-dynamics-e158427109.html
https://www.pdfdrive.com/computation-fluid-dynamics-e11248340.html

Course Code: MTSE-305

Title of Course: Direct stiffness Method

L	T	P	Credits
4	0	0	4

Course Outcomes:

CO1: To Understand the basic concept of coordinate system
CO2: Analyse the numerical problem related to Matrices
CO3: Analyse the numerical problem related to grids and trusses

CO/PO Mapping (S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak												
Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	M	M	S	M	W	M	W	S	S
CO2	S	S	S	S	S	S	S	W	M	W	S	S
CO3	S	S	S	S	S	S	M	W	M	W	S	S

Course Content:

UNIT I

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

UNIT II

2. **ELEMENT & GLOBAL STIFFNESS MATRICES:** Stiffness Matrix for Truss Element, Beam Element Stiffness Matrix, Rigid Frame Element Stiffness Matrix, Global Stiffness Matrix, Coordinate Transformation, Rotation Matrix: Displacement Transformation Matrix, Force Transformation Matrix.

UNIT III

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

UNIT IV

4. **ANALYSIS OF STRUCTURES:** Continuous Beams, Pin-jointed Plane Frames and Rigid- jointed Plane Frames including Support Settlements using Direct Stiffness Matrix

Method and formalization of Direct Flexibility Matrix Method.

APPLICATION TO SIMPLE GRIDS & TRUSSES: Element Stiffness Matrix, Torsion Constant, Global and Element Forces.

Recommended Books

1. Weaver & Gere, 'Matrix Analysis of Framed Structures', CBS Publishers.(2001)
2. T.S. Thandavamoorthy, 'Structural Analysis', Oxford Higher Education.(2004)
3. A.K. Jain, 'Advanced Structural Analysis'. (2008)
4. Menon, 'Advanced Structural Analysis'. (2010)

E-Books

https://www.pdfdrive.com/2-the-direct-stiffness-method-e45715645.html
https://www.pdfdrive.com/introduction-to-direct-stiffness-method-e19795825.html

Online Learning

www.nptel.ac.in

www.swayam.gov.in

Course Code: DBSS-102

Title of the Course: Soft Skills-II

L	T	P	Credits
1	0	2	2

Course Outcomes:

CO1: The course will skill the student to learn Effective Communication, writing skills in English and Listening Skills.
CO2: to address various challenges of communication as well as behavioral skills faced by individual at work place and organizations.
CO3: This course will help the student gain Emotional maturity and Emotional health.
CO4: to enhance the employability of the students.

CO/PO Mapping
(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	W	S	M	M	W	M	S	S	M
CO2	M	S	M	M	S	S	M	W	S	S	S	S
CO3	M	M	M	M	M	S	S	M	M	S	S	S
CO4	S	S	M	S	W	S	W	M	M	S	S	S

Unit	Course Outlines	Hour(s)
Unit-I	**Introduction to Non-verbal Communication Skills in English** A) Non- Verbal Communication and Body Language. Basic Elements of Body Language, Kinesics. B) Basic Listening Skills: Becoming an Active Listener C) Basic Writing Skills: Fundamentals of Grammar, Letter Writing & Paragraph Writing	6
Unit-II	**Management Skills** A) Time Management – Program Evaluation Review Technique (PERT), The Pareto Principle, The Law of the Three, The Important Versus the Urgent. B) Anger Management – What is Anger, Effects of Anger, Types of Anger,1-2-3 Turtle Rule, Anger Management. C) Stress Management- Signs & Symptoms, Sources of Stress, Practicing the 4 A's. D)	6
Unit-III	**Social &Organisational Well-Being** A) Emotional Intelligence- Traits, Self-Awareness, Self-Regulation, Motivation, Empathy, EQ vs. IQ, Spiritual Intelligence, Whole Brain Training (IQ+EQ+SQ= 3Q). B) Business Dress and Dining Etiquette – Why a Dress Code, Business and Casual Dress Code, Table Manners. C) Netiquette- What is Netiquette, Why Netiquette, Netiquette	10

	Norms, E-Mail Etiquette.	
Unit-IV	**Interview Skills, Presentation Skills & Group Discussion** A)Curriculum Vitae and Resume Writing, Do's and Don'ts of an Interview B) Planning and Structuring your Presentation. Techniques of Delivering a Presentation like a Pro. C) Group Discussion- Do's & Don'ts of a GD. How to Ace a GD.	10

Total-32

Reference Books:

1. Klaus, Peggy (2009).The Hard Truth about Soft Skills. Harper Collins Publishers.
2. Fleming, Kerrie (2016).The Leader's Guide to Emotional Agility. Pearson Education Limited.
3. Butterfield, Jeff (2010).Problem Solving& Decision Making, Course Technology.Cengage Learning.
4. Pellerin, Charles. J. (2009). How NASA Builds Teams: Mission Critical Soft Skills for Scientists, Engineers, and Project Teams. John Wiley & Sons. Inc.
5. Riggio&Sherylle J, Tan (2014). Leader Interpersonal and Influence Skills. Routledge.
6. Rutherford, J. Andrea (2000). Basic Communication Skills for Technology. Pearson Education.

Course Code: MTSE-401

Title of Course: Dissertation

L	T	P	C
0	**0**	**32**	**16**

Course outcomes:

CO1: plan, and engage in, an independent and sustained critical investigation and evaluation of a research area

CO2: understand and apply ethical standards of conduct in the collection and evaluation of data and other resources

CO3: communicate research concepts and contexts clearly and effectively both in writing and orally

CO/PO Mapping

(S/M/W indicates strength of correlation) S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	M	M	S	M	W	M	W	S	S
CO2	S	S	S	S	S	S	S	W	M	W	S	S
CO3	S	S	S	S	S	S	M	W	M	W	S	S

Dissertation

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

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

Unfair means and Plagiarism

(a) Incaseastudentisfoundliftingofsomeother'swork(s)andinsertingitinhis/herproject, seminar and dissertation etc. without proper acknowledgement, credit and reference or plagiarizing the dissertation /project report etc., such penal action shall be taken by the Institute as may be necessary to up hold the sanctity, integrity and the credibility of the Institute.

All the students are required to follow the PG Ordinances & Regulations of the Institute