

# Lingaya's Vidyapeeth

Deemed-to-be-University u/s 3 of UGC Act 1956, Government of India  
**NAAC ACCREDITED**  
Approved by MHRD / AICTE / PCI / BCI / COA / NCTE  
Nachauli, Jasana Road, Faridabad- 121002 | Ph: 0129-2598200-05  
Website: [www.lingayasvidyapeeth.edu.in](http://www.lingayasvidyapeeth.edu.in)

## 1.1.3 Courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year

Color Index	
Employability	Yellow
Entrepreneurship	Green
Skill Development	Pink

# LINGAYA'S VIDYAPEETH

## SCHEME OF STUDIES

### SESSION: 2021-22

<b>School: Engineering and Technology</b>								<b>Batch:2021-2023</b>					
<b>Department: Civil Engineering</b>								<b>Year: 1<sup>st</sup></b>					
<b>Course: M.Tech</b>								<b>Semester: 1<sup>st</sup></b>					
SN	Cate- gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	PCC	AM-501	Advanced Engineering Mathematics	3	1	0	4	15	25	60	-	-	100
2	PCC	RM-501	Research Process Methodology	3	1	0	4	15	25	60	-	-	100
3	PCC	CE-501	Project Planning & Control	3	0	0	3	15	25	60	-	-	100
4	PCC	CE-503	Quality Control & Safety in Construction	3	1	0	4	15	25	60	-	-	100
5	PCC	CE-505	Civil Engineering Materials	3	0	0	3	15	25	60	-	-	100
6	PCC	CE-557	Construction Material Lab	0	0	2	2	-	-	-	60	40	100
<b>Total----&gt;</b>							<b>20</b>						

#### **Abbreviations:**

PCC: Programme Core Courses	ABQ: Assignment Based Quiz
PEC: Programme Elective Courses	MSE: Mid Semester Examination
PROJ: Project	ESE: End Semester Examination
PDP: Personality Development Programme	IP: Internal Practical
L: Lecture	EXP: External Practical
T: Tutorial	
P: Practical	

# LINGAYA'S VIDYAPEETH

## SCHEME OF STUDIES

### SESSION: 2021-22

School: Engineering and Technology								Batch:2021-2023					
Department: Civil Engineering								Year: 1 <sup>st</sup>					
Course: M.Tech								Semester: 2 <sup>nd</sup>					
SN	Cate- gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	PCC	CE-502	Advance Soil Mechanics	3	1	0	4	15	25	60	-	-	100
2	PCC	CE-504	Construction & Maintenance Management	3	1	0	4	15	25	60	-	-	100
3	PEC	CE-506(A/B/C/D)	Departmental Elective – I	3	1	0	3	15	25	60	-	-	100
4	PEC	CE-508(A/B/C/D)	Departmental Elective – II	3	0	0	4	15	25	60	-	-	100
5	PEC	CE-510(A/B/C/D)	Departmental Elective – III	3	0	0	3	15	25	60	-	-	100
6	PEC	CE-552	Advanced Soil Mechanics Lab	0	0	2	2	-	-	-	60	40	100
7	PEC	AC-502 (A/B)	Audit Course -I	2	0	0	0	-	-	-	-	-	-
<b>Total----&gt;</b>							<b>20</b>						

#### **Abbreviations:**

PCC: Programme Core Courses  
 PEC: Programme Elective Courses  
 PROJ: Project  
 PDP: Personality Development Programme  
 L: Lecture  
 T: Tutorial  
 P: Practical

ABQ: Assignment Based Quiz  
 MSE: Mid Semester Examination  
 ESE: End Semester Examination  
 IP: Internal Practical  
 EXP: External Practical

# LINGAYA'S VIDYAPEETH

## SCHEME OF STUDIES

### SESSION: 2022-23

<b>School: Engineering and Technology</b>								<b>Batch:2021-2023</b>					
<b>Department: Civil Engineering</b>								<b>Year: 2<sup>nd</sup></b>					
<b>Course: M.Tech</b>								<b>Semester: 3<sup>rd</sup></b>					
SN	Cate- gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	PCC	CE-601(A/B/C/D)	Departmental Elective – IV	3	1	0	4	15	25	60	-	-	100
2	PEC	CE-603(A/B/C/D)	Open Elective	3	0	0	3	15	25	60	-	-	100
3	PCC	CE-651	FEM Software base Lab study	0	0	4	2	-	-	-	60	40	100
4	PCC	CE-661	Dissertation-I	0	0	20	10	-	-	-	60	40	100
5	PEC	AC-601(A/B)	Audit Course -II	2	0	0	0	-	-	-	-	-	-
<b>Total----&gt;</b>							<b>19</b>						

#### Abbreviations:

PCC: Programme Core Courses  
 PEC: Programme Elective Courses  
 PROJ: Project  
 PDP: Personality Development Programme  
 L: Lecture  
 T: Tutorial  
 P: Practical

ABQ: Assignment Based Quiz  
 MSE: Mid Semester Examination  
 ESE: End Semester Examination  
 IP: Internal Practical  
 EXP: External Practical



# LINGAYA'S VIDYAPEETH

## SCHEME OF STUDIES

### SESSION: 2022-23

<b>School: Engineering and Technology</b>								<b>Batch:2021-2023</b>					
<b>Department: Civil Engineering</b>								<b>Year: 2<sup>nd</sup></b>					
<b>Course: M.Tech</b>								<b>Semester: 4<sup>th</sup></b>					
SN	Cate- gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
				L	T	P		Theory			Practical		
								ABQ	MSE	ESE	IP	EXP	
1	PCC	CE-602	Seminar	0	0	2	1	-	-	-	60	40	100
2	PCC	CE-662	Dissertation-II	0	0	36	18	-	-	-	60	40	100
<b>Total----&gt;</b>							<b>19</b>						

#### Abbreviations:

PCC: Programme Core Courses  
 PEC: Programme Elective Courses  
 PROJ: Project  
 PDP: Personality Development Programme  
 L: Lecture  
 T: Tutorial  
 P: Practical

ABQ: Assignment Based Quiz  
 MSE: Mid Semester Examination  
 ESE: End Semester Examination  
 IP: Internal Practical  
 EXP: External Practical

## List of Departmental Electives

### Departmental Elective – I

1	CE-506A	Air Pollution Control
2	CE-506B	Advance structure engineering
3	CE-506C	Construction Project Management
4	CE-506D	Advance Railway Engineering

### Departmental Elective – II

1	CE-508A	Advance Water Supply & Wastewater Management
2	CE-508B	Advance Design of steel structures
3	CE-508C	Rehabilitation of Structures
4	CE-508D	Analysis & Structural Design of Pavement

### Departmental Elective – III

1	CE-510A	Integrated Solid Waste Management
2	CE-510B	Bridge engineering
3	CE-510C	Construction Practice & Equipment
4	CE-510D	Highway Planning and Geometric Design

### Departmental Elective – IV

1	CE-601A	Solid and Biomedical Waste Management
2	CE-601B	Advance Structure Analysis
3	CE-601C	Rock Mechanics
4	CE601D	Urban Transportation Planning

### Open Elective

1	CE-603A	Remote Sensing & GIS Technology
2	CE-603B	Optimization Methods in Civil Engineering
3	CE-603C	Environmental Impact Assessment
4	CE-603D	Industrial Safety

### Audit Course 1 & 2

1	AC-502A	English for Research Paper Writing
2	AC-502B	Disaster Management
3	AC-601A	Pedagogy Studies
4	AC-602B	Personality Development through Life Enlightenment Skills

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 1<sup>st</sup> Sem**

L- T -P

**CE 501:-Project Planning and Control**

**3- 0 -0**

**Unit-I**

Project Planning: Introduction to Project Planning Process. Types of Project Plans-Project feasibility plan, Project preliminary plan, Project Construction plan. Introduction to network techniques – CPM, PERT and Precedence network

**Unit-II**

Statistical concepts, Material management purchases management and inventory control, Man-Material-Machinery-Money optimization, scheduling, monitoring, updating.

**Unit-III**

Cost functions, time-cost trade off, resource planning-levelling and allocation. Line of balancing techniques, application of digital computers ABC analysis.

**Unit-IV**

Project Quality Management - Quality planning, Quality assurance, and Quality control; Project Risk Management - Risk identification, Risk quantification, Risk response development and control

**Unit-V**

Resource Planning: Planning construction Manpower, Scheduling Construction site workers. Planning Construction Materials, Materials quantity estimation. Constrained and unconstrained resource scheduling. Resource usage profile, Resource smoothing, Resource leveling

**Text Books:**

1) Chitkara.K.K. Construction Project Management: Planning Scheduling and Control Tata McGraw Hill Publishing Company, New Delhi-2018

**Reference Books:**

- 1) Jha, K N., Construction Project Management, First Edition, Pearson Publishers, 2011.
- 2) Calin M. Popescu, Chotchal Charoemgam, Project Planning, Scheduling and Control in Construction: An Encyclopaedia of terms and Applications, Wiley, New York,
- 3) Chits Hendrickson and Tung Au, Project Management for Construction - Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall Pittsburgh, 2000

E-Resources: <https://nptel.ac.in/courses/105/106/105106149/>

Latest Journals: <https://ijirt.org/Article?manuscript=146359>

Latest Things: <https://onlinecourses.nptel.ac.in/noc19ce30/preview>

### **Unit-I**

**Introduction to quality**, Planning and control of quality during design of structures. Quantitative techniques in quality control. Quality assurance during construction

### **Unit-II**

Inspection of materials and machinery. In process inspection and test. Preparation of quality manuals, check-list and inspection report. Establishing quality assurance system. Factors affecting safety: Physiological, Psychological and Technological.

### **Unit-III**

Quality standards/codes in design and construction. Concept and philosophy of total quality management (TQM). Training in quality and quality management systems (ISO-9000). Concept of safety.

### **Unit-IV**

Planning for safety provisions. Structural safety. Safety consideration during construction, demolition and during use of equipment. Management of accidents/injuries and provision of first aid.

### **Unit-V**

Provisional aspect of safety. Site management with regard to safety recommendations. Training for safety awareness and implementation. Formulation of safety manuals. Safety legislation, standards/codes with regard to construction, Quality vs. Safety, Case Studies,

### **Text Books:**

1. Richard J. Coble, Theo C. Haupt, Jimmie Hinze, "The Management of Construction Safety and Health", Taylor & Francis, 2000, 905809328X, 9789058093288

### **Reference Books:**

1) Abdul Razzak Rumane, "Quality Management in Construction Projects", Taylor & Francis, 2010, ISBN 1439838712, 9781439838716

2). Tim Howarth, Paul Watson, "Construction Safety Management", John Wiley & Sons, 2008, ISBN 1405186607, 9781405186605

E-Resources: <https://eis.hu.edu.jo/deanshipfiles/pub1193100974.pdf>

Latest Journals: <https://www.scopus.com/journal&https://link.springer.com/book> Ethical Things:

[https://www.google.com/search?q=Quality+Control+and+Safety+in+Construction&r1z=1ClAOHY\\_enlN736IN736&oq=Quality+Control+and+Safety\\*in+Construction&aqs=chrome..69i57j69i59l2j0l2.2318j0j7&sourceid=chrome&ie=UTF-8](https://www.google.com/search?q=Quality+Control+and+Safety+in+Construction&r1z=1ClAOHY_enlN736IN736&oq=Quality+Control+and+Safety*in+Construction&aqs=chrome..69i57j69i59l2j0l2.2318j0j7&sourceid=chrome&ie=UTF-8)

Latest Things: <https://www.clockshark.com/Blog/10-steps-to-ensure-quality-on-your-construction-project>



# CE-505: Civil Engineering Materials

L -T-P

3-0-0

## Unit-I

Cement: Hydration of cement, Chemical reaction, and setting. Lime and supplementary cementations Structure of cement paste, Consistency materials. Aggregates: Classification of aggregates according to size and shape. Fineness modulus of aggregates, grading of aggregates, properties of aggregates,

## Unit-II

Properties of Concrete: Properties of Concrete in plastic stage - Workability, test on workability, factor affecting workability, segregation and bleeding. Properties of Hardened Concrete - Strength, toughness, hardness, durability, impermeability and dimensional changes.

## Unit-III

Batching, mixing and transportation of concrete: Batching of cement. batching of aggregate by volume by using proper gauge box selection of proper gauge box. Batching by weight: spring balance and by batching machines. Measurement of water. Mixing: hand mixing and machine mixing, types of mixer, capacity of mixers, choosing appropriate size mixer operation of mixer. Transportation with and situation of use of the following - pan, wheel borrows, truck mixer, chutes, belt conveyors, pump tower crane and hoist etc.

## Unit-IV

Special Purpose Concrete: introduction to ready mix concrete, high strength concrete, light weight concrete, fiber reinforced concrete, fiber cement and its uses. Admixture - acceleration, air entraining agent, water reducing and set controlling agents.

## Unit-V

Test on Hardened Concrete: Effect of end condition of specimen, capping, H/D ratio, rate of loading, moisture condition. Compression, tension and flexure tests. Test on composition of hardened concrete - cement content, original w/c ratio

### Text Books:

1) Shetty .M.S., "Concrete Technology, Theory and Practice", Revised Edition, S. Chand & company Ltd., New Delhi, 2006

### Reference Books:

- 1) Metha P K and Monteiro.P.J.M, "CONCRETE", Microstructure, Properties and Materials, Third Edition, Tata McGraw- Hill Publishing company Limited, New Delhi, 2006
- 3) Neville. A.M., "Properties of Concrete", 4th Edition Longman, 1995
- 4) Mindass and Young, "Concrete", Prentice Hall. 1998

E-Resources: <https://civilengineering4u/nptel.ac.in/courses>

Latest Journals: <https://www.scopus.com/journal> & <https://link.springer.com/book>

Ethical Things: <http://civilengineeringpdf.com/civil-engineering-materials-pdf/>

Latest Things: <https://www.pdfdrive.com/civil-engineering-materials-books.html>

**Unit-I**

Integration in series, ordinary and singular points, power series, Frobenius method to find the general solution of higher order linear ordinary differential equation with constant variable coefficients, Legendre and Bessel's equation, Legendre polynomials, Bessel functions, Boundary value, Sturm-Liouville problem, Orthogonal eigen function expansions.

**Unit-II**

Laplace Transform, Laplace Inverse Transform, Application of Laplace Transform and Inverse Laplace Transform in the particular solution of integral equation and integro-differential equations, Infinite Fourier sine and cosine transforms and its applications, Fourier-Legendre series, Fourier-Bessel series.

**Unit-III**

Interpolation, Extrapolation, Lagrange's method, Missing-terms problems, Hermite interpolation, Spline interpolation, Cubic spline, Fitting of a curve in given sub-interval using cubic spline interpolation, Representation of a tabulated function in power of  $(x-a)$  using Newton's divided difference formula.

Numerical integration using Romberg method, Gauss-Legendre and Lobatto methods, Gaussian integration and numerical; double integration, Numerical solution of a system of non-linear equations using Newton Raphson method, Solution of system of linear equations in four variables using Gauss-Jordan and Crout's methods.

**Unit-V**

Partial Differential Equations, Modeling, Vibrating String, Wave Equations. Product solutions of 1-D Laplace equations, heat conduction equations, wave equations, Poisson's equations by the method of separation of variables and its applications in boundary value problems, Conversion of a differential equation into integral equation and vice versa, Solutions of Fredholm and Volterra integral equations of first and second kind

**Text Books:**

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers

**Reference Books:**

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern-India.
2. Numerical Methods for Scientific and Engineering Computation, M. K. Jain, S.R.K. Iyengar and R.K. Jain, New Age International (P) Ltd.

E-Resources: <https://n tel ac in/co rses/111/105/111105035/>

Latest Journals: <https://www.springer.com/journal/10665>

Ethical Things:

<https://soaneemrana.org/onewebmedia/ADVANCED%20ENGINEERING%20MATHEMATICS%20BY%20ERWIN%20ERESZIG1.pdf>

<https://www.wolfram.com/books/profile.cgi?1d=8784>

Latest Things: <https://www.wolfram.com/books/profile.cgi?1d=8784>

**Unit-I**

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-U**

Effective literature studies approaches, analysis Plagiarism, Research ethics,

**Unit-III**

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

**Unit-IV**

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-V**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

**Unit-VI**

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.

**References:**

Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students" Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction" • Ranjit Kumar, 2<sup>nd</sup> Edition, "Research Methodology: A Step by Step Guide for beginners" • Hilbert, "Resisting Intellectual Property", Taylor & Francis Ltd, 2007. Mayall, "Industrial Design", McGraw Hill, 1992. • Niebel, "Product Design", McGraw Hill, 1974. •

**Text Books:**

1. "Research Methodology: An Introduction" • Ranjit Kumar, 2<sup>nd</sup> Edition,
2. "Research Methodology: A Step by Step Guide for beginners & engineering students" Wayne Goddard and Stuart Melville.

**Reference Books:**

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science.
2. "Resisting Intellectual Property", Taylor & Francis Ltd.

**E-Rcsources:**

<https://nptel.ac.in/courses/121/106/121106007/> Latest Journals:

<https://ijrm.humanjournals.com/>

Ethical Things: <https://bmcmedresmethodol.biomedcentral.com/articles/10.1186/1471-2288-14-127>

**Latest Things:**

<https://www.researchgate.net/publication/334519601> Modern Trends in Research Methodology

## **CE-557: Construction Materials Lab. List of Experiments:**

1. Mix Design of Concrete
2. Tests on fresh concrete
3. Tests on hardened concrete
4. In-situ Strength determination by Rebound Hammer.
5. Measurement of Moisture content in aggregates, soil and hardened concrete surface using NDT techniques.
6. Pull-Out Tests on concrete
7. Effect of Chemical admixtures on fresh and hardened properties of concrete
8. Effect of mineral admixtures on fresh and hardened properties of concrete
9. Tests on Bitumen materials
10. Tests on Course aggregates for road construction

### **Reference Books:**

1. Metha P.K and Monteiro. P. J. M. " CONCRETE", Microstructure, Properties and Materials, Third Edition, Tata McGraw- Hill Publishing Company Limited, New Delhi, 2006
2. Shetty.M.S., "Concrete Technology, Theory and Practice", Revised Edition, S.Chand & company Ltd., New Delhi, 2006
3. Neville.A.M., "Properties of Concrete", 4th Edition Longman, 1995

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**

Course Code	Subject Name	L-T-P	Cr.
CE-502	Advance Soil Mechanics	3-1-0	4

**Unit 1**

Effective stress, pore pressure, hydraulic conductivity and its directional variation, electro osmosis

Seepage behavior of soil-flownet constructions by various technique, seepage in layered soils, filter design, seepage through dam body

**Unit 2**

Consolidation: one-dimensional and generalized consolidation theories, primary and secondary consolidation, determination of  $C_v$  by various methods, visco- elastic models, sand drains, effect of smear, numerical solutions, consolidation settlements.

**Unit 3**

Shear behavior of soils, pore pressure parameters, UU, CU & CD tests, stress path method for settlement analysis. Total & effective stress- path, water content contours, stress history, anisotropy of strength, thixotropy, creep, determination of in situ undrained shear strength, stress-strain characteristics of soils, determination of modulus values

**Unit 4**

**Earth Pressure:** Rankine and Coulomb theories, active, passive and pressure at rest; concentrated surcharge above the back fill, earth pressure due to uniform surcharge, earth pressure of stratified backfills, saturated and partially saturated backfill.

**Unit 5**

**Retaining walls:** Proportioning of retaining walls, stability of retaining walls, mechanically stabilized retaining walls/reinforced earth retaining walls

**Sheet Pile wall:** free earth system, fixed earth system

**Bulkheads:** bulkheads with free and fixed earth supports, equivalent beam method, Anchorage of bulkheads and resistance of anchor walls, spacing between bulkheads and anchor walls, resistance of anchor plates

**Books**

- Harr, M.E. Foundation of Theoretical soil Mechanics.
- Lambe & Whitman " Soil Mechanics"
- Scott, R.F. Principles of Soil Mechanics.

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-504</b>	<b>Construction and Maintenance Management</b>	<b>3-1-0</b>	<b>4</b>

1. ENGINEERING ECONOMY: Principle of Engineering Economy, Minimum cost point analysis, Breakeven point analysis, Depreciation and depletion.

2. SAFETY IN CONSTRUCTION: Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: (a) For storage and handling of building materials. (b) Construction of elements of a building (c) In demolition of buildings Safety lacuna in Indian scenario.

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

4. GENERAL MANAGEMENT: Introduction and characteristics of management, Principle and function of management, Scientific management.

5. Materials Management: Scope, Objective and functions of material management, Procurement and store management, Materials handling management, Inventory control and management. Disposal of Surplus Materials

6. Earth Moving Equipment Crawler and wheel tractors their functions, types and specifications; Gradability Bull dozers and their use; tractor pulled scrapers, their sizes and output; effect of grade and rolling resistance on the output of tractor pulled scrapers Earth loaders; Placing and compacting earth fills. Power shovels-functions, selection, sizes, shovel dimension and clearances, output, Draglines functions, types sizes, output clamshells; Safe lifting capacities and working ranges cranes; Hoes, Trenching machine types and production rate calculation of producing rates of equipment ; examples. Hauling Equipment : Trucks; Bottom dump wagons; capacities of trucks and wagons Balancing the capacities of hauling units with the size excavator; effect of grade, rolling resistance and altitude on the cost/performance of hauling equipment; balancing excavating hauling equipment examples. 8. Drilling, Blasting and Tunneling Equipment : Definition of terms, bits, Jackhammers, Drifters, wagon drills, che drills, piston drills, blast hole drills, shot drills, diamond drills, tunneling equipment, selecting the drilling method equipment; selecting drilling pattern; Rates for drilling rock, compressors. Pile Driving Equipment : Pile hammers, selecting a pile hammer, loss of energy due to impact, Energy losses due to causes other than impact.

#### Books

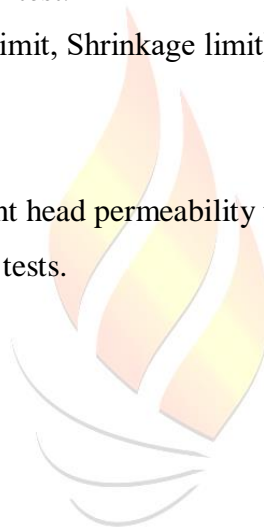
1. Construction equipment and its planning and application Dr. Mahesh Verma.
2. Construction Planning equipment and Methods by RL Peuripo Tata McGraw Hill.
3. Heavy construction planning equipment and methods -Jagman Singh Oxford and

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-522</b>	<b>Advance Soil Mechanics Lab</b>	<b>0-0-2</b>	<b>2</b>

**List of Practicals:**

1. Standard and modified proctor compaction test.
2. Atterberg's Limits (Liquid Limit, Plastic limit, Shrinkage limit)
3. Unconfined compression test.
4. Direct shear test.
5. Falling head permeability test and Constant head permeability test.
6. Tri-axial compression test – UU, CU, CD tests.
7. Consolidation test.



**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -I**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-506A</b>	<b>Air Pollution and Control</b>	<b>3-1-0</b>	<b>4</b>

**Unit I**

Introduction: Role and scope of air pollution control engineering, Principles of fluid flow, Boundary layer theory, Energy transfer in fluid flow, Fluid flow measurement, Dynamics of particles in fluid, Properties of particles, Collection efficiencies of particles, Source reduction (Fuel substitution, Fuel pretreatment, Process modifications), Emission standards.

**Unit II**

Design of Industrial Ventilation Systems: Component of Ventilation systems, Air pollution control systems, Hood specifications and design, Duct specifications and design, Blowers, stacks.

**Unit III**

Particulate Emission Control: Stoke's law, Basic principles, Design and operation of settling chambers (Both laminar and turbulent flow), Cyclone and multiclones, Scrubbers, Bag houses and Electrostatic precipitators, Collection efficiency and Pressure drop calculations across air pollution control devices.

**Unit IV**

Gaseous Emissions Control: Basic principles, Design and operation of scrubbers for gaseous pollutant removal, Adsorption columns and condensation devices.

**Unit V**

Control of Mobile Sources: Control of crank case emissions, Evaporative emissions control, Air fuel ratio, Alternative fuels, Automobile emission control, Catalytic convertors, Gasoline and diesel powered vehicles. Air Pollution Mitigation Measures: Green belt design, Management strategies for air pollution abatement

**Recommended Books**

1. Flagan RC and Seinfeld JH, Fundamentals of Air Pollution Engineering, Prentice Hall (1988).
2. Boubel RW, Fox DL, Turner B and Stern AC, Fundamental of Air Pollution, Academic Press (1994). 3rd ed.
3. Perkins HC, Air Pollution, McGraw Hill (2004).
4. Rao CS, Environmental Pollution Control Engineering, New Age International (2006).



**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -I**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-506B</b>	<b>Advanced Structural Engineering</b>	<b>3-1-0</b>	<b>4</b>

Matrix Algebra – methods for matrix inversion and solution of simultaneous equations – band and sparse matrix techniques stiffness and flexibility matrices of structural elements – various co-ordinate system and their transformation and synthesis matrix formulation of force and displacement methods – member approach. Finite element concept in Engineering Analysis – Displacement model shape functions and element properties. Analysis of plane stress/strain – axi-symmetric stress analysis. Weighted residual methods and variational formulation of Finite Element Analysis. Isoparametric element — Numerical integration – assemblage of elements. Solution techniques – Finite element programming – use of package programmes.

**REFERENCE BOOK:**

- 1) Numerical Methods for Engineers by Chopra
- 2) Finite element procedure-- K.J. Bathe
- 3) matrix analysis of frame structure-- weaver/gere
- 4) Structural analysis – A matrix approach by G.S. Pandit and Gupta
- 5) Numerical Methods for Engineers by Steven C. Chapra, Raymond P. Canale

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -I**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-506C</b>	<b>Construction Project Management</b>	<b>3-1-0</b>	<b>4</b>

**Unit I**

Project Management: Basic forms of organization with emphasis on Project; Project life cycle, planning for achieving time, cost, quality, project feasibility reports based on socio-techno-economic-environmental impact analysis, project clearance procedures and necessary documentation for major works like dams, multi-storeyed structures, ports, tunnels, Qualities, role and responsibilities of project Manager, Role of Project Management Consultants, Web based project management.

**Unit II**

Project Scheduling: Construction Scheduling, Work break down structure, activity cost and time estimation in CPM, PERT, techniques, Precedence Network Analysis.

**Unit III**

Project Controlling: Monitoring and Control, Crashing, Resource Levelling, Updating. Work Study: Definition, Objectives, and basic procedure, and method study and work measurement.

**Unit IV**

Work-study applications in Civil Engineering. Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams.

**Unit V**

Work measurement – Time and motion studies, Concept of standard time and various allowances, time study, equipment performance rating.

**Suggested Readings;**

- 1 Construction Planning & management By P S Gahlot & B M Dhir, New Age International Limited Publishers
2. Construction Project planning & Scheduling By Charles Patrick, Pearson, 2012
- 3 Construction Project Management Theory & practice --- Kumar Neeraj Jha, Pearson, 2012
4. Construction management Fundamentals by Knutson, Schexnayder, Fiori, Mayo, Tata McGraw Hill, 2nd Edition.

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -I**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-506D</b>	<b>Advanced Railway Engineering</b>	<b>3-1-0</b>	<b>4</b>

**Unit I.** Railway Transportation and its development, Long-term operative plans for Indian Railways. Classification of Railway lines and their track standards, Railway terminology, Traction and tractive

**Unit II.** Resistance, Hauling capacity and tractive effort of locomotives, different Types of Tractions.

**Unit III.** Permanent Way: Alignment Surveys, Requirement, gauges, track section, Coning of wheels, Stresses in railway track, high-speed track. Geometric design of railway track, Gauge, Gradient, speed, super elevation, cant deficiency, Negative super elevation, curves, length of transition curves, grade compensations.

**Unit IV.** Railway track components: Important features, Railway curves, Super elevation, Gradients and grade compensation, Points and crossing and their design approaches. ; Construction and maintenance of railway track, Control of train movements; Signals and interlocking,

**Unit V.** Modernisation of railways and future trends; Track standards and track rehabilitation.

**Suggested Readings:**

1. J.S. Mundrey, Railway Track Engineering, Tata McGraw Hill Co. Ltd., 3rd Edition, 2000.

2. M.M. Agarwal, Railway Track Engineering, Standard Publishers, 1st Ed. 2005.

Supplementary Reading: 1. S. Chandra and Aqarwal, Railway Engineering, Oxford University Press, 1st Ed. Feb 2008. 2. A.D. Kerr, Fundamentals of Railway Track Engineering, Simmons Boardman Pub Co (December 30, 2003).

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -II**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-508A</b>	<b>Advance Water Supply and Waste Water Management</b>	<b>3-0-0</b>	<b>3</b>

**1. Wastewater Characteristics and Effluent Standards:** Physical, chemical and biological parameters of water pollution; Solids (volatile and non-volatile solids; suspended, dissolved and colloidal solids); Biodegradable and non-biodegradable organic matter (DO, COD, BOD and BOD kinetics); Nutrients (TKN, total nitrogen, and total and ortho-phosphorus); Sulfides, phenols, cyanides, heavy metals and recalcitrant/toxic organic compounds; Effluent standards.

**2. Overview of Wastewater Treatment Technologies:** Preliminary, primary, secondary and tertiary treatment technologies; Overview of biological treatment technologies; Biological treatment technologies for the tertiary treatment.

**3. Preliminary Treatment:** Screens; Grit removal facilities – grit channels, vortex degriters and cyclonic degriters, aerated grit chambers; Effluent sumps and pumps; Equalization tanks – flow and strength equalization, and online and offline equalization tanks.

**4. Primary Treatment:** Neutralization and precipitation; Primary and secondary sedimentation tanks; Membrane filtration processes; Roughing filters.

**5. Biological Treatment:** Activated sludge process and its modifications including SBR; Trickling filters and RBC units; SAF, FAB and MBBR technologies; UASB reactors and its modifications including anaerobic baffled reactor and anaerobic moving bed reactor; Waste stabilization pond systems and its modifications including vegetated ponds and constructed wetlands. **Other Treatment Technologies:** Advanced oxidation processes; Biological nutrient removal; Filtration and chlorination; Membrane processes for TDS reduction; Wet oxidation process.

***Recommended Books***

1. Metcalf, Eddy, Tchobanoglous, G., Burton, F.L., Stensel, H.D., Wastewater. Engineering – Treatment, Disposal and Reuse, Tata McGraw Hill (2002) 4th ed.
2. Eckenfelder WW Jr., Industrial Water Pollution Control, McGraw Hill (2003) 3rd ed.
3. Biological Wastewater Treatment, Edited Volume Series, IWA (2008).

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -II**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-508B</b>	<b>Advance Design of Steel Structure</b>	<b>3-0-0</b>	<b>3</b>

**Unit I** Properties of Steel: Mechanical Properties, Hysteresis, Ductility. Compactness and noncompactness, slenderness, residual stresses. 07

**Unit II** Plastic Behavior of Structural Steel: Introduction, Plastic theory, Plastic hinge concept, Plastic collapse load, conditions of plastic analysis, Theorem of Plastic collapse, Methods of Plastic analysis 10

**Unit III** Design of Industrial Buildings: 15 Introduction, selection of bay width, structural framing, purlins, girts and eave strut, plane trusses, Design of Gantry girders.

**Unit IV** Design of cold formed sections: Advantages, stiffened and un stiffened elements, local buckling and post buckling strength, shear lag and flange curling, unusually wide flange section, short span sections, members subjected to axial tension, compression and bending.

**Reference Book:**

1. N. Subramanian Design of Steel Structures: Theory and Practice, Oxford University.
2. V. L. Shah and Veena Gore, Limit State Design of Steel Structures IS : 800-2007, Structures.
3. S. S. Bhavikatti, Design of Steel Structures by Limit State Methods as Per IS 800-2007, I & K. International.
4. M. R. Shiyekar, Limit State Design in Structural Steel, PHI Learning.
5. S. K. Duggal, Limit State Design of Steel Structures, Tata McGraw Hill. Reference Book:

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -II**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-508C</b>	<b>Rehabilitation of Structures</b>	<b>3-0-0</b>	<b>3</b>

**UNIT-I** Introduction Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures. Cracks in R.C. buildings Various cracks in R.C. buildings, causes and effects Maintenance Maintenance importance of maintenance, routine and preventive maintenance. Damages to masonry structures Various damages to masonry structures and causes

**UNIT-II** Repair materials Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials Special mortars and concretes Polymer Concrete and Mortar, Quick setting compounds Grouting materials Gas forming grouts, Salfoalumate grouts, Polymer grouts, Acrylate and Urethane grouts. Bonding agents Latex emulsions, Epoxy bonding agents. Protective coatings Protective coatings for Concrete and Steel FRP sheets

**UNIT-III** Damage diagnosis and assessment Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test, Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement Substrate preparation Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning

**UNIT-IV** Crack repair Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks. Corrosion of embedded steel in concrete Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns) Jacketing Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing. Strengthening Strengthening, Beam shear strengthening, Flexural strengthening.

**TEXT BOOKS**

1. Repair and protection of concrete structures by Noel P.Mailvaganam, CRC Press,1991.
2. Concrete repair and maintenance Illustrated by Peter.H.Emmons, Galgotia publications Pvt. Ltd., 2001.
3. "Earthquake resistant design of structures" by Pankajagarwal, Manish shrikande, PHI, 2006.

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -II**

Course Code	Subject Name	L-T-P	Cr.
CE-508D	Analysis & Structural Design of Pavement	3-0-0	3

**Unit I:** General Consideration: Components of road pavement such as subgrade, Sub base, Base course and wearing course and their functions. Comparison of flexible and rigid pavements highway and airport pavements

**Unit II.** Pavements Materials: Stabilizing base viz., Mechanical, Stabilized with admixture like cements, Bitumen lime and other chemicals. Factor Affecting the Pavements Design: Traffic factor, Moisture and climate factors, and Soil factor, Stress distribution factor Design of Flexible pavements:

**Unit III.** General classification of various methods and their approach, Empirical methods using soil classification. Theoretical and semi theoretical methods. General observation and limitation of various methods.

**Unit IV.** Design Method of Rigid Pavements: Analysis of stresses in concrete pavements due to various wheel loads. Cyclic changes in temperature. Changes in moisture and volumetric change in subgrade and base course. Comparison of analysis of stress due to wheel loads on liquid and solids subgrade theorem. Thickness design methods such as P.C. A. design method F.A.A. methods etc. Design of distributed steel reinforcement, design of dowels, Design of spacing of joints.

**Unit V. Pavement Evaluation and Strengthening:** Method of pavement evaluation including LCN method for airport, Design of various types of overlays for flexible and rigid pavements, Mechanics of pumping and blowing, Factor affecting pumping, preventive measures. Pavements Performance: Pavements performance, Road Mechanic and their applications, The AASHO road test. Evaluation of performance of the flexible and rigid pavements. Analysis of results from flexible and rigid pavements.

**Suggested Readings:**

1. S.K.Khurana, Principles, Practice and Design of Highway Engineering,
2. E.J.Yodar and M.W.Witczac, Principles of Pavement Design, 2nd Edition, John Wiley and Sons, New York.
3. C.A. O'Flaherty, Highways, Butterworth Heinemann.
4. Khanna and Justo, Highway Engineering, Nem Chand & Bros. Roorkee.

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -III**

Course Code	Subject Name	L-T-P	Cr.
CE-510A	Integrated Solid Waste Management	3-0-0	3

**Unit - I Introduction to Environment Ecosystem** –meaning- Types -Components- Structure – Functions, Levels of organization in nature- Food chain and Trophic structure, Biogeochemical Cycles, Energy flow.

**Unit - II Municipal solid waste Definition - Sources and types of solid waste- composition and its determinants of Solid waste-factors influencing generation-quantity assessment of solid wastes-methods of sampling and characterization.**

**Unit - III Collection and Transfer Collection:** Collection of Solid waste – collection services – collection system, equipments – time and frequency of collection – labour requirement – factors affecting collection – analysis of collection system – collection routes – preparation of master schedules. **Transfer and Transport:** Need for transfer operation – transfer stations – types – transport means and methods – location of transport stations - Manpower requirement – collection routes: Transfer stations – selection of location, types & design requirements, operation & maintenance.

**Unit - IV Processing Techniques and Recovery of Energy Processing techniques – purposes mechanical volume reduction – necessary equipments – chemical volume reduction – incinerators – mechanical size reduction selection of equipments – components separation – methods – drying and dewatering.**

**Unit - V Disposal of Solid Wastes Refuse disposal – various methods – incinerations – principle features of an incinerator – site selection and plant layout of an incinerator - sanitary landfill- methods of operation – advantages and disadvantages of sanitary land fill - site selection – reactions accruing in completed landfills – gas and leachate movement and control – equipments necessary.**

### References

- 1) George Tchobanoglous et al, "Integrated Solid Waste Management" McGraw - Hill, 1993.
- 2) Tchobanoglous Thiesen Ellasen; Solid Waste Engineering Principles and Management, McGraw - Hill 1997.
- 3) R.E. Landrefh and P.A. Rebers, "Municipal Solid Wastes-Problems & Solutions" , Lewis, 1997.
- 4) Manual on Municipal 1 Solid waste Management, CPHEEO, Ministry of Urban Development, Govt. Of. India, New Delhi, 2000.



**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -III**

Course Code	Subject Name	L-T-P	Cr.
CE-510B	Bridge Engineering	3-0-0	3

**UNIT - I**

**Types of Bridges:** Consideration of loads and stresses in bridges, bridge loading as per IRC and IRS specifications, traffic lanes, footway, kerbs, railing and parapet loading, impact, wind load, longitudinal forces, temp effects, secondary stresses, erection stresses, earth pressure, effect of live load on back fill and on the abutment.

**UNIT – II**

**Design of RC Bridges:** Slab culvert, box culvert, pipe culvert, T-beam bridge, super structure, design examples, brief introduction to rigid frame, arch and bow string girder bridges. Design of pre-stressed concrete bridges, pre-tensioned and post tensioned concrete bridges, analysis and design of multi-lane prestressed concrete T-beam bridge super structure.

**UNIT – III**

**Steel Bridges:** Types, economical span, loads, permissible stresses, fluctuation of stresses, secondary stresses, plate girder bridges, general arrangement, bridge floors, plate girder railway bridges, deck type plate girder bridges, design example. Truss bridges, types, wind force on lattice Girder Bridge, bracings, truss bridge for railway – through type truss bridge. Pier, abutment and wing walls, types of piers, forces on piers, stability, abutments, bridge code provisions for abutments, wing walls, design examples.

**UNIT – IV**

**Bearings:** Functions, bearings for steel and concrete bridges, bearings for continuous span bridges, IRC provisions for bearings, fixed bearings, expansion bearings, materials and specifications, permissible stresses, design considerations for rocker and roller cum rocker bearings, sliding bearings.

**UNIT- V**

Foundations, types, general design criterion, design of well and pile foundations for piers and Abutments.

**Suggested Readings:**

- (i) Victor DJ, Essentials of Bridge Engineering, Oxford & IBH Pubb Co.
- (ii) Rowe RE, Concrete ridge Design

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -III**

Course Code	Subject Name	L-T-P	Cr.
CE-510C	Construction Practice and Equipment	3-0-0	3

### Unit I

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering sheet piles – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick – weather and water proof – roof finishes – air conditioning – acoustic and fire protection.

### Unit II

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques- driving well and caisson - sinking cofferdam - cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting- Large reservoir construction with membranes and Earth system- well points -Dewatering and stand by Plant equipment for underground open excavation.

### Unit III

Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, aerial transporting handling - erecting light weight components on tall structures -erection of transmission towers - Construction sequences in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges -Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks.

### Unit IV

Study on causes of building damage and deterioration – Assessment of materials and methods of repair and restoration.

### Unit V

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end loaders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling, drilling, blasting — dewatering and pumping equipment – Transporters.

### REFERENCES

- 1.Jha J and Sinha S.K., Construction and Foundation Engineering, Khanna Publishers, 1993.
2. Sharma S.C. “Construction Equipment and Management”, Khanna Publishers New Delhi,

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -III**

Course Code	Subject Name	L-T-P	Cr.
CE-510D	Highway Planning & Geometric Design	3-0-0	3

**UNIT –I**

Planning: Description of urban and regional transportation systems, Definition of a system; System analysis: scope and limitations, Transportation planning based upon system Analysis, Survey and analysis of existing conditions.

Highway Alignment: Requirements. Factors controlling alignment. Obligatory points. Engineering Surveys for highway location. Route selection. Steps in new project. Highway classifications.

**UNIT –II**

Cross Sectional Element: Pavement surface characteristics. Factors affecting skid resistance.

Pavement unevenness. Camber. Providing camber in the field. Width of carriageway. Design Vehicle, Medians, kerbs, road margins, right of way and typical cross-sections of roads.

**UNIT -III**

Sight Distances: Introduction. Stopping sight distance. Reaction time. Analysis of stopping distance. Overtaking sight distance. Analysis of overtaking sight distance. Effect of grade on sight distances. Overtaking zone. Intermediate sight distance. Sight distance at intersections.

Super elevation: Requirement of super elevation. Limits and attainment of super elevation in the field.

**UNIT –IV**

Highway Alignment: General. Design speed. Horizontal curves. Super elevation. Analysis of super elevation. Super elevation design. Attainment of super elevation. Widening of pavement on horizontal curves. Methods of introducing extra widening. Horizontal Transition curves. Different types of transition curves. Length of transition curve. Setting out of transition curve. Set-back distance on horizontal curves. Curve resistance.

**UNIT –V**

Vertical Alignment: General. Gradients. Compensation in gradient on horizontal curves. Vertical curves. Summit curve. Length of summit curve. Valley Curve. Length of valley curve and profile. Relevant IRC standards for urban and rural roads.

**Suggested Reading;**

1. L.R. Kadiyalli, Traffic Engineering and Transport Planning, Khanna Publishers, 7th Edition, 2008
2. C. S. Papacostas, P. D. Prevedouros, Transportation Engineering and Planning, PHI Publication, 3rd edition, 2002
3. Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.
4. Highway Engg. by S.K. Khanna & C.E.G. Justo, New Chand Bros., Roorkee.
5. Principles and Practice of Highway Engg. by L.R. Kadiyali, Khanna Publishers, Delhi.
6. Principles of Transportation and Highway Engineering by G.V. Rao, Tata McGraw-Hill Publishing Co. Ltd. N. Delhi.
7. MORTH Specifications for Road and Bridge Works, IRC Publication.

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -IV**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-601A</b>	<b>Solid and Biomedical Waste Management</b>	<b>3-1-0</b>	<b>4</b>

**Unit I Fundamental s of solid waste management**

Definition of solid waste, Meaning of different solid waste -Domestic Waste, commercial waste, industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, Sources of solid waste, Classification of solid waste -hazardous and non- hazardous waste. Physical and chemical characteristics of municipal solid waste Impact of solid waste on environment, Solid waste management techniques – solid waste management hierarchy, waste prevention and waste reduction techniques, Factors affecting the solid waste generation.



**Unit- II Storage, Collection and Transportation of Municipal Solid Waste**

Storage of solid waste, Collection methods of solid waste, Tools and Equipment-Litter Bin, Broom, Shovels, Handcarts, Mechanical road sweepers, Community bin – like movable and stationary bin, Transportation of municipal waste., Transportation vehicles with their capacity Working -Animal carts, Auto .vehicles; Tractors or Trailers, Trucks, Dumpers, Compactor vehicles. Transfer station meaning, necessity, location, Role of rag pickers and their utility for society Organization pattern of solid waste management system, practices according to Population of the town or city.

**Unit- III Biomedical Waste management and Health aspects and public Involvement in Solid Waste Management**

1. Definition of Bio medical Waste.
2. Sources and generation of Biomedical Waste
3. Classification of Biomedical Waste.
4. Management technologies.

Health aspects and public Involvement in solid waste management

1. Health aspects during handling and processing
2. Health problems during time of segregation, recovery, recycling and reuse of solid waste.
3. Public involvement and participation in solid waste management practices.

**Unit -IV Industrial waste management and E-waste waste management**

Industrial waste Management:

1. Variety of industrial waste
2. Collection and disposal of industrial waste,
3. Control measures for industrial waste,
4. Recycling of industrial waste.

E-waste Management

1. Definition of E- waste, Varieties of E- wastes, Dangers of E- waste,
2. Recycling of E- waste.
3. Disposal of E- waste.

- **Reference Books**

1. Solid Waste Management Bhide A. D Indian National Scientific Documentation Centre, New Delhi Edition 1983 ASIN: B0018MZ0C2
2. Solid Waste Techobanoglous George; Kreith, Frank McGraw Hill Publication, New Delhi 2002, ISBN 9780071356237
3. Environmental Studies Manjunath D. L. Pearson Education Publication, New Delhi, 2006 ISBN-13: 978-8131709122
4. Solid Waste Management Sasikumar K. PHI learning, New Delhi, 2009 ISBN 8120338693
5. Environmental Pollution Khopkar S. M. New Age International limited, Delhi, 2007, ISBN 8122415075
6. Environmental Studies Basak Anindita Pearson Publication, Delhi, 2009 ISBN : 8131785688, 9788131785683
7. Environmental Pollution Control Engineering Rao C. S. New Age International, 2006, New Delhi, ISBN-13: 978-8122418354
8. Prospect and Perspectives of Solid Waste Management Hosetti B. B. New Age International Publisher, 2006 New Delhi, ISBN-13: 978-8122417777



**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -IV**

Course Code	Subject Name	L-T-P	Cr.
CE-601B	Advance Structure Analysis	3-1-0	4

#### UNIT-1

##### **Review of basic concepts in structural analysis:**

**structure** (structural elements, joints and supports, stability, rigidity and static indeterminacy, kinematic indeterminacy); **loads** (direct actions, indirect loading); **response** (equilibrium, compatibility, force-displacement relations); levels of analysis; analysis of **statically determinate structures** (trusses, beams, frames); applications of principle of virtual work and displacement-based and force-based energy principles; deriving stiffness and flexibility coefficients.

##### **Review of analysis of indeterminate structures:**

**Force methods:** Statically indeterminate structures (method of consistent deformations; theorem of least work). **Displacement Methods:** Kinematically indeterminate structures (slope-deflection method; moment distribution method).

#### UNIT-2

**Matrix concepts and Matrix analysis of structures:** Matrix; vector; basic matrix operations; rank; solution of linear simultaneous equations; eigenvalues and eigenvectors. **Introduction;** coordinate systems; displacement and force transformation matrices; Contra-gradient principle; element and structure stiffness matrices; Element and structure flexibility matrices; equivalent joint loads; stiffness and flexibility approaches

**Matrix analysis of structures with axial elements:** Introduction: Axial stiffness and flexibility; stiffness matrices for an axial element (two dof), plane truss element (four dof) and space truss element (six dof); **One-dimensional axial structures:** Analysis by conventional stiffness method (two dof per element) and reduced element stiffness method (single dof); Analysis by flexibility method; **Plane trusses:** Analysis by conventional stiffness method (four dof per element) and reduced element stiffness method (single dof); Analysis by flexibility method; **Space trusses:** Analysis by conventional stiffness method (six dof per element) and reduced element stiffness method (single dof).

#### UNIT-3

**Matrix analysis of beams and grids: Conventional stiffness method for beams:** Beam element stiffness (four dof); generation of stiffness matrix for continuous beam; dealing with internal hinges, hinged and guided-fixed end supports; accounting for shear deformations; **Reduced stiffness method for beams:** Beam element stiffness (two dof); dealing with moment releases, hinged and guided-fixed end supports; **Flexibility method for fixed and continuous beams:** Force transformation matrix; element flexibility matrix; solution procedure (including support movements); **Stiffness method for grids:** Introduction; torsional stiffness of grid element and advantage of torsion release; analysis by conventional stiffness method using grid element with six dof; analysis by reduced stiffness method (three dof per element);

#### UNIT-4

**Matrix analysis of plane and space frames: Conventional stiffness method for plane frames:** Element stiffness (six dof); generation of structure stiffness matrix and solution procedure; dealing with internal hinges

and various end conditions; **Reduced stiffness method for plane frames:** Element stiffness (three dof); ignoring axial deformations; dealing with moment releases, hinged and guided fixed end supports; **Flexibility method for plane frames:** Force transformation matrix; element flexibility matrix; solution procedure (including support movements); Ignoring axial deformations; **Stiffness method for space frames:** Introduction; element stiffness matrix of space frame element with 12 dof and 6 dof; coordinate transformations; analysis by reduced stiffness method (six dof per element);

#### **UNIT-5**

**Analysis of elastic instability and second-order effects: Effects of axial force on flexural stiffness:** Review of buckling of ideal columns; flexural behaviour and stiffness measures for beam-columns - braced and unbraced, under axial compression; **Solution by slope deflection method:** Slope deflection equations for prismatic beam columns using stability functions; modifications for pinned and guided-fixed-end conditions; fixed end moments in beam-columns; **Solution by matrix method:** Stiffness matrix for prismatic beam column element; estimation of critical elastic buckling loads; second-order analysis;

#### • **Reference Books**

1. Devdas Menon, "Advanced Structural Analysis", Narosa Publishing House, 2009.
2. Asslam Kassimali, "Matrix Analysis of Structures", Brooks/Cole Publishing Co., USA, 1999.
3. Amin Ghali, Adam M Neville and Tom G Brown, "Structural Analysis: A Unified Classical and Matrix Approach", Sixth Edition, 2007, Chapman & Hall.
4. Devdas Menon, "Structural Analysis", Narosa Publishing House, 2008.

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -IV**

Course Code	Subject Name	L-T-P	Cr.
CE-601C	Rock Mechanics	3-1-0	4

### Unit-1

**Rock formation, exploration and classification:** Basic terminology, Its genesis, Rock and Rock mass classification, Geological petro graphic, Index properties of rocks, Physical and Mechanical properties, Defects in rock mass, Elastic constants of rock; Insitu stresses in rock, Modes of failures of rocks, Objective of rock exploration, methods of rock exploration; by direct penetration, by geophysical processing, in-situ and laboratory tests.

### Unit-2

**Rock strength and failure Rock strength, Types of failure,**

Theories of failure (Coulomb-Navier, Mohr, Griffith), Hoek and Brown Strength criteria for rocks with discontinuity sets, Absolute stress by bore hole deformation method, Flat jack method, Propagation velocity method, Bearing capacity of foundations on rocks – case studies; Examples Testing of rocks: Laboratory and field test, assessment of in-situ strength

### Unit-3

**Rock Bearing Capacity and Rock Stability**

Rock Foundation: Shallow and Deep investigation for foundation design and construction aspect, Slope Stability analysis, Mode of failures in rock. Design of slopes, Excavation in rock and stabilization concepts, Bearing capacity of foundations on rocks – case studies,

### Unit-4

**Engineering Applications**

Reinforcement of fractured and jointed rocks - Shotcreting, Bolting, Anchoring, Installation methods - Case studies. Rock bolting, Reinforcement of laminated rock

#### • Reference Books

1. K.Szechy “Art of Tunnelling” Publied by – “Atademiaikiado , Budapest 1973”
2. Obert & Duall- “Rock Mechanics & Design of Structures in Rock”
3. Jager & Cook “ Fundamentals of Rock Mechanics”
4. Verma B.P.”Rock Mechanics Engineers”, Khanna Publishers. New Delhi 1985
5. Hudson, A. and Harrison, P., Engineering Rock mechanics – An introduction to the principles, Pergamon publications, 1997.
6. Wittke, W., Rock Mechanics. Theory and Applications with case Histories, Springerverlag, Berlin, 1990.
7. T. Ramamurthy, Editor, Engineering in Rocks for Slopes Foundations and Tunnels, PHI Learning Pvt. Ltd., 2007



**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Departmental Elective -IV**

Course Code	Subject Name	L-T-P	Cr.
CE-601D	Urban Transportation Planning	3-1-0	4

**Unit-1**

**Introduction:**

Transport and Socioeconomic Activities; Historical Development of Transport; Transportation in the Cities; Freight Transportation; Future Developments

**Urban Transportation System Planning –**

Conceptual Aspects: Transport Planning Process, Problem Definition, Solution Generation, Solution Analysis, Evaluation and Choice, Implementation, Sequence of Activities Involved in Transport Analysis.

**Unit-2**

**Trip Generation Analysis:** Trip Production Analysis; Category Analysis; Trip Attraction Modelling.

**Mode Choice Modeling:** Influencing Factors, Earlier Modal Split Models, Trip-End Type Modal Split Model, Trip-Interchange Modal Split Model, Disaggregate Mode-Choice Model, Logit Model of Mode-Choice, Binary Choice Situations, Multinomial Logit Model, Model Calibration, Case Studies.

**Unit-3**

**Trip Distribution Analysis:** Presentation of Trip-Distribution Data, PA Matrix to OD Matrix, Basis of Trip Distribution, Gravity Model of Trip Distribution, Calibration of Gravity Model, Singly and Doubly Constrained, Gravity Models, Case Studies. Growth Factor Methods of Trip Distribution, Uniform Factor Method, Average Factor Method, Fratar Growth-Factor Method, Disadvantage of Growth Factor Methods

**Route Assignment:** Description of Transport Network, Route Choice Behaviour, The Minimum Path, Minimum Path Algorithm, Route Assignment Techniques, All-or-Nothing Assignment, Multipath Traffic Assignment, Capacity-Restrained Traffic Assignment

**Unit-4**

**Transportation Survey:** Definition of Study Area Zoning Types of Movements Types of Surveys, Home-Interview Survey, Commercial Vehicle Survey, Intermediate Public Transport Survey, Cordon-Line Survey, Post-Card Questionnaire Survey, Registration-Number Survey, Tag-on-Vehicle Survey.

**Transport Related Land-use Models:** Development of Land-use Models, The Lowry Model, Application of Lowry Model.

**Unit-5**

**Urban Structure:** Urban Activity Systems, Urban Movement Hierarchies Types of Urban Structure, Centripetal - Type Urban Structure, Grid-Type Urban Structure, Linear Type Urban Structure, Directional Grid Urban Structure

**Urban Goods Movement:** Classification of Urban Goods Movements. Methodology of Approach to Analysis of Goods Movement. Modelling Demand for Urban Goods Transport.

- **Reference Books**

Ortuzar, J.D.D. and Willumsen, L.G. “Modelling Transport”, John Wiley & Sons, 1990.

2. Ben Akiva, M.E. and Lerman, S.R., “Discrete Choice Analysis : Theory and Application to Travel Demand”, The MIT Press, Cambridge, Massachusetts, 1985.

3. Hutchinson, B.G., “Principles of Urban Transport Systems Planning”, McGraw Hill Book Company, 1974.



**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**2<sup>nd</sup> Year/ 3<sup>rd</sup> Sem**  
**Open Electives**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-603A</b>	<b>Remote Sensing &amp; GIS</b>	<b>3-0-0</b>	<b>3</b>

Unit 1

Introduction, Geographical concepts and Terminology, Difference between Image Processing system and GIS, Utility of GIS

Unit 2

Various GIS packages and their salient features, Essentials components of GIS, Data acquisition through scanners and digitizers

Unit 3

Raster and Vector Data: Introduction, Descriptions: Raster and Vector data, Raster Versus Vector, Raster to Vector conversion, Remote Sensing Data in GIS, Topology and Spatial Relationships, Data storage verification and editing

Unit 4

Data preprocessing, Georeferencing, Data compression and reduction techniques, Runlength encoding, Interpolation of data, Database Construction, GIS and the GPS, Data Output Database structure, Hierarchical data, Network systems, Relational database, Database management, Data manipulation and analysis

Unit 5

Spatial and mathematical operations in GIS, Overlay, Query based, Measurement and statistical modelling, Buffers, Spatial Analysis, Statistical Reporting and Graphing, Application of GIS to various natural resources mapping and monitoring and engineering problems

**Books**

Paul Bolstad, 2008. GIS Fundamentals, a First Text on Geographic Information Systems. 3rd Edition. Eider Press, ISBN 978-0-9717647-2-9.

Ormsby, T., E. Napoleon, R. Burke, C. Groessl, and L. Bowden 2010, Getting to Know ArcGIS Desktop: for ArcGIS 10, 2nd Edition, ESRI Press, Redlands, CA, ISBN: 978-1-58948-260-9

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**2<sup>nd</sup> Year/ 3<sup>rd</sup> Sem**  
**Open Electives**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-603B</b>	<b>Optimization Methods in Civil Engineering</b>	<b>3-0-0</b>	<b>3</b>

### **Unit I**

Introduction to Optimization: Engineering application of Optimization – Statement of an Optimization problem – Optimal Problem formulation – Classification of Optimization problem. Optimum design concepts: Definition of Global and Local optima – Optimality criteria – Review of basic calculus concepts – Global optimality

### **Unit II**

Linear programming methods for optimum design: Review of Linear programming methods for optimum design – Post optimality analysis – Application of LPP models in design and manufacturing.

### **Unit III**

Optimization algorithms for solving unconstrained optimization problems – Gradient based method: Cauchy's steepest descent method, Newton's method, Conjugate gradient method.

### **Unit IV**

Optimization algorithms for solving constrained optimization problems – direct methods – penalty function methods – steepest descent method – Engineering applications of constrained and unconstrained algorithms.

### **Unit V**

Modern methods of Optimization: Genetic Algorithms – Simulated Annealing – Ant colony optimization – Tabu search – Neural-Network based Optimization – Fuzzy optimization techniques – Applications. Use of Matlab to solve optimization problems.

### **Books**

- Rao S. S. – 'Engineering Optimization, Theory and Practice' – New Age International Publishers – 2012 – 4th Edition
- Deb K. – 'Optimization for Engineering Design Algorithms and Examples' – PHI – 2000
- Arora J. – 'Introduction to Optimization Design' – Elsevier Academic Press, New Delhi – 2004
- Saravanan R. – 'Manufacturing Optimization through Intelligent Techniques' – Taylor & Francis (CRC Press) – 2006

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**2<sup>nd</sup> Year/ 3<sup>rd</sup> Sem**  
**Open Electives**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-603C</b>	<b>Environment Impact Assessment</b>	<b>3-0-0</b>	<b>3</b>

#### **UNIT-1**

**Introduction:** The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, International agreements.

#### **UNIT-II**

**Identifying The Key Issues:** Key Elements of an Initial Project Description and Scoping, Project Location(s), Land Use Impacts, Consideration of Alternatives, Process selection: Construction Phase, Input Requirements, Wastes and Emissions, Air Emissions, Liquid Effluents, Solid Wastes, Risks to Environment and Human, Health, Socio-Economic Impacts, Ecological Impacts, Global Environmental Issues.

#### **UNIT-III**

**EIA Methodologies:** Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods-Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods, Environmental index using factor analysis, Cost/benefit analysis, Predictive or Simulation methods. Rapid assessment of Pollution sources method, predictive models for impact assessment, Applications for RS and GIS.

#### **UNIT-IV**

**Reviewing The EIA Report:** Scope, Baseline Conditions, Site and Process alternatives, Public hearing. Construction Stage Impacts, Project Resource Requirements and Related Impacts, Prediction of Environmental Media Quality,

#### **UNIT-V**

Socio-economic Impacts, Ecological Impacts, Occupational Health Impact, Major Hazard/ Risk Assessment, Impact on Transport System, Integrated Impact

#### **Books**

1. R. Therirvel, E. Wilson, S. Hompson, D. Heaney, D. Pritchard, *Strategic Environmental Assessment*, Earthscan, London, 1992
2. Paul, A Erickson, *A Practical Guide to Environmental Impact Assessment*, Academic Press, 1994

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**2<sup>nd</sup> Year/ 3<sup>rd</sup> Sem**  
**Open Electives**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-603D</b>	<b>Industrial Safety</b>	<b>3-0-0</b>	<b>3</b>

**Unit I**

Laws and Regulation: Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000, Chemical Accidents (Emergency Preparedness, Planning and Response) Rules 1986, Hazardous Waste (Management, Handling and Trans boundary Movement) Rules 2008.

**Unit II**

Hazards and Risks: Understanding of Hazards and Risks – Risk Assessment Techniques – Accident Investigation Reporting and Analysis Techniques – Measurement and Control of Performances.

**Unit III**

Hazard analysis techniques and measurements. Major Accident Hazard Control: Conception of Major Accident Hazard – Evaluation of major hazards – Onsite and Offsite Emergency Planning – Case Studies.

**Unit IV**

Importance of Disaster Management: Concept – Emergency preparedness at local level – Contingency Plans – Emergency planning and preparedness in international standards like ISO 14001, OHSA's 18001 and OSHA's Process Safety Management System.

**Unit V**

Pollution Control Strategies- Water Pollution Control Strategies, Air and Noise Pollution Control Strategies, Noise pollution control strategies, Land and Sea Pollution Control Strategies, Solid waste management, Marine and coastal pollution control strategies

**Books:**

Danuta Koradecka, Hand book of "Occupational Safety and Health", CRC Press, 2010

Hand book of "Occupational Safety and Health", National Safety Council, Chicago, 1982. 3. Barbara

A.Plog, Patricia J.Quinlan, MPH, CIH and Jennifer Villareal "Fundamentals of Industrial Hygiene", 6th edition 2012, National Safety Council, 2012.

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**2<sup>nd</sup> Year/ 3<sup>rd</sup> Sem**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-651</b>	FEM Software base Lab study	<b>0-0-4</b>	<b>2</b>

Case study by using any software available.

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-661</b>	Dissertation I	<b>0-0-20</b>	<b>10</b>

**Dissertation -I**



**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Audit Course 1**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>AC-502A</b>	<b>English for Research Paper Writing</b>	<b>2-0-0</b>	<b>0</b>

**Unit I**

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

**Unit II**

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

**Unit III**

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

**Unit IV**

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

**Unit V**

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

**Books**

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books) Model Curriculum of Engineering & Technology PG Courses [Volume-I]
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook. 4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011



**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**1<sup>st</sup> Year/ 2<sup>nd</sup> Sem**  
**Audit Course 1**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>AC-502A</b>	<b>Disaster Management</b>	<b>2-0-0</b>	<b>0</b>

### **Unit I**

Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

### **Unit II**

Repercussions Of Disasters And Hazards: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

### **Unit III**

Disaster Preparedness And Management Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

### **Unit IV**

Risk Assessment Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

### **Unit V**

Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

#### **Books:**

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royal book Company.
2. Sahni, Pardeep Et. Al. (Eds.), "Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies", Deep&Deep Publication Pvt. Ltd., New Delhi.

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**2<sup>nd</sup> Year/ 3<sup>rd</sup> Sem**  
**Audit Course 2**

Course Code	Subject Name	L-T-P	Cr.
AC-601A	Pedagogy Studies	2-0-0	0

### Unit I

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

### Unit II

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

### Unit III

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

### Unit IV

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

### Unit V

Research gaps and future directions, Research design, Contexts , Pedagogy , Teacher education, Curriculum and assessment, Dissemination and research impact.

### Books

- Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
- Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
- Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
- 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.
- Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
- Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
- [www.pratham.org/images/resource%20working%20paper%202.pdf](http://www.pratham.org/images/resource%20working%20paper%202.pdf).

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**2<sup>nd</sup> Year/ 3<sup>rd</sup> Sem**  
**Audit Course 2**

Course Code	Subject Name	L-T-P	Cr.
AC-601B	Personality Development through Life Enlightenment Skills	2-0-0	0

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 (don't's) • Verses- 71,73,75,78 (do's)  
Approach to day to day work and duties. • ShrimadBhagwadGeeta : 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.

Statements of basic knowledge.

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

**Books**

1. “Srimad Bhagavad Gita” by Swami SwarupanandaAdvaita Ashram (Publication
2. Department), Kolkata
3. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, 4. Rashtriya Sanskrit Sansthanam, New Delhi.

**Department of Civil Engineering**  
**M.Tech Scheme & Syllabus Batch 2021-2023**  
**2<sup>nd</sup> Year/ 4<sup>th</sup> Sem**

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-602</b>	<b>Seminar</b>	<b>0-0-2</b>	<b>1</b>

Seminar

<b>Course Code</b>	<b>Subject Name</b>	<b>L-T-P</b>	<b>Cr.</b>
<b>CE-622</b>	<b>Dissertation II</b>	<b>0-0-36</b>	<b>18</b>

Dissertation II

