GURU KASHI UNIVERSITY

Master of Technology in Transportation Engineering

Session: 2024-25

Department of Civil Engineering

Graduate Outcomes of the Program

The programme emphasizes to civil engineering principles, including structural analysis, geotechnical engineering, transportation engineering, and environmental engineering. Depending on their chosen specialization, graduates often become experts in areas such as structural engineering, geotechnical engineering, water resources engineering, or transportation engineering.

PROGRAMME LEARNING OUTCOMES

After completing the programme, the Learner will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, review research literature, and analysis complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
6. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
7. 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.
8. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Programme Structure

Semester –I						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credit**
MTE101	Numerical Methods & Applied Statistics	Core course	3	1	0	4
MTE102	Highway Traffic Analysis & Design	Core course	3	1	0	4
MTE103	Pavement Analysis & Design	Core course	3	1	0	4
MTE108	Pavement Materials	Program Elective Course - I	3	1	0	4
XXX	Program Elective-II	Program Elective	3	0	0	3
MTE105	Traffic & Pavement Engineering Lab	Core Lab	0	0	2	1
MTE109	Pavement Materials & Evaluation Lab	Core Lab	0	0	2	1
MTE110	Business Ownership	VAC	2	0	0	2
Total			**17**	**4**	**4**	**23**

Program Elective-II (Any one of the following)						
MTE106	Intelligent Transportation Systems	Program Elective-II	3	0	0	3
MTE107	Advanced Engineering Geology					

Semester –II						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credit**
MTE201	Road Transport Management & Economics	Core Course	3	1	0	4
MTE202	Transportation Planning	Core Course	3	1	0	4
MTE210	Airport Infrastructure Planning & Design	Core Course	3	1	0	4
MTE209	Railway Infrastructure. Planning & Design	Core Course	3	0	0	3
XXX	Program Elective-III	Program Elective	3	0	0	3
MTE211	Transportation Simulation Lab	Core Lab	0	0	4	2
MTE212	Mini Project*	Project	0	0	4	2
XXX	Audit Course	Audit	2	0	0	NC
Total			**17**	**3**	**8**	**22**

Program Elective-III (Any one of the following)						
MTE205	Geographical Information Systems & Remote Sensing	Program Elective	3	0	0	3
MTE206	Environmental Impact Assessment					
Audit Course (Any one of the following)						
MCS220	English for Research Paper Writing	Audit Course	2	0	0	NC
MTE214	Constitution of India					
**Mini Project: In a mini project, students will solve a real-world problem using software, analytical, or computational tools.*						

Semester: III						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
XXX	Program Elective-IV	Program Elective	3	0	0	3
MTE307	Dissertation Phase-I*	Dissertation	0	0	20	10
MTE308	Research Methodology and IPR	Core course	3	0	0	3
XXX	Open Elective	Open Elective	3	0	0	3
Total			**9**	**0**	**20**	**19**

***Dissertation Phase – I: -The work begins in the third semester and should focus on a problem with research potential. It should involve scientific investigation, data collection, analysis, solution development, and ideally showcase the student's individual contribution. The seminar will cover the area related to the dissertation, following the general guidelines for all M.Tech branches. For the examination, the student must prepare a report outlining the problem statement, objectives, literature review, and any preliminary findings, if available. This work is presented to a panel of examiners assigned by the Head and PG Coordinator. The student is expected to stay in regular contact with their Supervisor, and the dissertation topic should be chosen together by the Supervisor and the student.**

Program Elective-IV (Any one of the following)						
Course Code	**Course Name**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
MTE309	Transportation System	**Program Elective**	3	0	0	3
MTE302	Bridge Engineering					

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

Semester: IV						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
MTE402	Dissertation Phase-II*	Dissertation	0	0	32	16
Total			**0**	**0**	**32**	**16**
Grand Total			**43**	**7**	**64**	**80**

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

Evaluation Criteria for Theory Courses

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

Evaluation Criteria for Practical Courses

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

SEMESTER: I

COURSE TITLE: Numerical Method & Applied Statistics
COURSE CODE: MTE101

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Analyze the different samples of data at different level of significance using various hypothesis testing.
2. Develop a framework for estimating and predicting the different sample of data for handling the uncertainties.
3. Learn how to obtain numerical solution of nonlinear equations using Bisection, Newton – Raphson and fixed-point iteration methods.
4. Solve system of linear equations numerically using direct and iterative methods.

Course Contents

UNIT I **15 hours**

Linear system – Gaussian elimination and Gauss – Jordan methods – matrix inversion – Gauss seidel method – Nonlinear equations – Regulafalsi and Newton- Raphson methods – interpolation – Newton's and Lagrange's interpolation.

UNIT II **15 hours**

Linear Programming – Graphical and Simplex methods – Measures of central tendency, dispersion, skewness and Kurtosis – Probability – conditional probability – Bayes' theorem

Random variable – Two dimensional random variables – standard probability distributions – Binomial Poisson and normal distributions - moment generating function

UNIT III **15 hours**

Sampling distributions – confidence interval estimation of population parameters – testing of hypotheses – Large sample tests for mean and proportion – t-test, F-test and Chi-square test – curve fitting-method of least squares.

UNIT IV **15 hours**

Regression and correlation – rank correlation – multiple and partial correlation – analysis of variance-one way and two-way classifications – experimental design – Latin square design – Time series analysis

Transactional Mode:

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

Suggested Readings:

1. *Bowker and Liberman, Engineering Statistics, Prentice-Hall, 1972.*
2. *Venkatraman, M.K., Numerical Methods in Science and Engineering, National Publisher Company.*

COURSE TITLE: Highway Traffic Analysis & Design
COURSE CODE: MTE102

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Apply a compact foundation in the field of traffic engineering, its management in order to achieve the safety to the road users.
2. Apply the basic principles of traffic engineering in the design of traffic facilities based on traffic flow theory.
3. Analyze traffic system management in the urban area.
4. To estimate capacity and level of service for the rural and urban area.

Course Contents

UNIT I **15 hours**

Elements of Traffic Engineering -road user, vehicle and road way. Vehicle characteristics - IRC standards - Design speed, volume. Highway capacity and levels of service - capacity of urban and rural roads - PCU concept and its limitations - Road user facilities - Parking facilities - Cycle tracks and cycle ways - Pedestrian facilities.

UNIT II **15 hours**

Traffic volume studies, origin destination studies, speed studies, travel time and delay studies, Parking studies, Accident studies.

Elements of design - Alignment - Cross sectional elements - Stopping and passing sight distance. Horizontal curves - Vertical curves. Design problems – Hill Roads.

UNIT III **15 hours**

Traffic regulation and control - Signs and markings - Traffic System Management - Design of at-grade intersections – Principles of design – Channelization - Design of rotaries - Traffic signals - pre-timed and traffic actuated. Design of signal setting - phase diagrams, timing diagram – Signal co-ordination.

UNIT IV **15 hours**

Grade separated intersections - Geometric elements for divided and access-controlled highways and expressways – Road furniture - Street lighting. Traffic Safety – Principles and Practices – Road Safety Audit.

Transactional Mode:

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

Suggested Readings:

- *1.ITE Hand Book, Highway Engineering Hand Book, Mc Graw - Hill.*
- *AASHTO A Policy on Geometric Design of Highway and Streets*
- *R. J. Salter and N. B. Hounsel, Highway Traffic Analysis and Design, Macmillan Press Ltd, 1996.*

COURSE TITLE: Pavement Analysis & Design
COURSE CODE: MTE103

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Comprehend the material specifications and design factors of pavements.
2. Analyze stresses in flexible and rigid pavements.
3. Design of flexible and rigid pavements.
4. Interpret the constructional operations and equipment's.

Course Contents

UNIT I **15 hours**

Introduction: Types and component parts of pavements, Factors affecting design and performance of pavements. Highway and airport pavements, functions of pavement components

UNIT II **15 hours**

Pavement Design Factors: Design wheel load, strength characteristics of pavement materials, climatic variations, traffic - load equivalence factors and equivalent wheel loads, aircraft loading, gear configuration and tyre pressure. Drainage – Estimation of flow, surface drainage, sub-surface drainage systems, design of sub-surface drainage structures

UNIT III **15 hours**

Flexible Pavement Design: Empirical, semi-empirical and theoretical approaches, design of highway and airport pavements by IRC, AASHTO Methods, applications of pavement design software.

Rigid Pavement Design: Types of joints and their functions, joint spacing; design of CC pavement for roads, highways and airports as per IRC, AASHTO, design of joints. Design of continuously reinforced concrete pavements. Reliability; Use of software for rigid pavement design.

UNIT IV **15 hours**

Pavement Management: Pavement failures, maintenance of highways, structural and functional condition evaluation of pavements, pavement management system.

Transactional Mode:

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

Suggested Readings:

1. *Yoder and Witczak, Priniciples of Pavement Design, John Wiley and Sons*
2. *Yang. H. Huang, Pavement Analysis and Design, Second Edition, Prentice Hall Inc.*
3. *Rajib B. Mallick and Tahar El-Korchi, Pavement Engineering – Principles and Practice, CRC Press (Taylor and Francis Group)*
4. *W.Ronald Hudson, Ralph Haas and Zeniswki , Modern Pavement Management, Mc Graw Hill and Co*
5. *Relevant IRC Codes*

COURSE TITLE: Pavement Materials
COURSE CODE: MTE108

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Comprehend the material specifications and design factors of pavements
2. Analyze stresses in flexible and rigid pavements
3. Design of flexible and rigid pavements
4. Comprehend the constructional operations and equipment's.

Course Contents

UNIT I **15 hours**

Subgrade soil - Soil composition and structure - Soil classification for engineering purposes- Origin, Classification, requirements, properties and tests on road aggregates.

UNIT II **15 hours**

Origin, preparation, properties and tests, constitution of bituminous road binders, requirements - Bituminous Emulsions and Cutbacks: Preparation, characteristics, uses and tests.

UNIT III **15 hours**

Bituminous Mixes: Mechanical properties - Resilient modulus, dynamic modulus and fatigue characteristics of bituminous mixes.

UNIT IV **15 hours**

Weathering and Durability of Bituminous Materials and Mixes - Performance based Bitumen Specifications - Superpave mix design method Cement Concrete for Pavement Construction: Requirements, design of mix for CC pavement, joint filler and sealer materials.

Transactional Mode:

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

Suggested Readings:

1. *RRL, DSIR, Bituminous Materials in Road Construction, HMSO Publication, 1955*
2. *IS and IRC Publications on relevant topic.*

COURSE TITLE: Traffic & Pavement Engineering Lab
COURSE CODE: MTE105

L	T	P	Credits
0	0	2	1

Total:30 Hours

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

1. Determine the various parameters affecting the pavement.
2. Test and analyze the properties of bitumen pavement.

Course Contents

List of Experiments:

1. Determination of specific gravity and water absorption of coarse aggregate.
2. Determination of particle size distribution.
3. Determination of aggregate impact value.
4. Determination of aggregate crushing value.
5. Determination of Los Angeles abrasion value of aggregates.
6. Determination of flakiness index and elongation index of coarse aggregate.
7. Determination of penetration value of bitumen.
8. Determination of softening point value of bitumen.
9. Determination of ductility value of bitumen.

COURSE TITLE: Pavement Materials and Evaluation Lab
COURSE CODE: MTE109

L	T	P	Credits
0	0	2	1

Total: 15 Hours

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

1. Interpret the properties of different pavement materials.
2. Conduct quality control tests on Cement.
3. Comprehend the importance of building components and building services.
4. Illustrate the impact of building construction on society and demonstrate awareness of contemporary issues.

Course Contents

List of Experiments:

- Tests on Soils (Gradation, Atterberg limits, OMC and CBR
- Test on Aggregates (Aggregate grading and Proportioning, Impact, B Abrasion crushing, water absorption, specific gravity)
- Tests on Bitumen and Bitumen Mixes (Marshall method of mix design and Bitumen content test)
- Pavement Evaluation tests (Benkelman beam test)
- Exposure to latest software

Course Title: Business Ownership
Course Code: MTE110

L	T	P	Credits
2	0	0	2

Total Hours: 30

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

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

Course Content

UNIT I **10 Hours**

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

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

UNIT II **5 Hours**

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

UNIT III **5 Hours**

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

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

UNIT IV **10 Hours**

Entrepreneurship: Introduction, Concept/Meaning and its need, Competencies/qualities of an entrepreneur, Entrepreneurial Support System

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

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

Transaction Modes

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

Suggested Readings

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

COURSE TITLE: Intelligent Transportation Systems
COURSE CODE: MTE106

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Compare ITS & ATIS
2. Interpret about the Advanced Transportation Management System
3. Comprehend about APTS, CVO, new technology and ETC
4. Comprehend the regional architecture, integration of infrastructure and operational planning.

Course Contents

UNIT I **12 hours**

Introduction to Intelligent Transportation Systems (ITS) – Definition of ITS and Identification of ITS Objectives, Historical Background, Benefits of ITS - ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), video data collection.

UNIT II **10 hours**

Telecommunications in ITS – Importance of telecommunications in the ITS system, Information Management, Traffic Management Centres (TMC). Vehicle – Road side communication – Vehicle Positioning System.

UNIT III **10 hours**

ITS functional areas – Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control Systems (AVCS), Advanced Public Transportation Systems (APTS), Advanced Rural Transportation Systems (ARTS).

UNIT IV **13 hours**

ITS User Needs and Services – Travel and Traffic management, Public Transportation Management, Electronic Payment, Commercial Vehicle Operations, Emergency Management, Advanced Vehicle safety systems, Information Management.

Automated Highway Systems - Vehicles in Platoons – Integration of Automated Highway Systems. ITS Programs in the World – Overview of ITS implementations in developed countries, ITS in developing countries.

Transactional Mode:

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

Suggested Readings:

1. *ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.*
2. *Sussman, J. M., Perspective on ITS, Artech House Publishers, 2005.*
3. *National ITS Architecture Documentation, US Department of Transportation, 2007 (CD-ROM).*

COURSE TITLE: Advance Engineering Geology
COURSE CODE: MTE107

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Classify the various geological agents and processes involved.
2. Identify the available minerals by their properties and behaviour.
3. Classify and identify the available rock in the construction site.
4. Interpret the different geological features and their engineering importance and apply the geological concepts in civil engineering projects.

Course Content

UNIT I **10 hours**

PHYSICAL GEOLOGY: -

Geology in civil engineering – branches of geology; structure of earth and its composition; weathering of rocks – scale of weathering; soils landforms and processes associated with river, wind, groundwater and sea; relevance to civil engineering; Plate tectonics.

UNIT II **10 hours**

MINEROLOGY: -Physical properties of minerals – Quartz group, Feldspar group; Pyroxene - hypersthene and augite, Amphibole, hornblende; Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.

UNIT III **12 hours**

PETROLOGY: - Classification of rocks - distinction between Igneous, Sedimentary and Metamorphic rocks; Engineering properties of Rocks- Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

UNIT IV **13 hours**

STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD: -Geological maps – attitude of beds, study of structures; folds, faults and joints – relevance to civil engineering; Geophysical methods – Seismic and electrical methods for subsurface investigations.

GEOLOGICAL INVESTIGATION: Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings; Coastal protection structures; Investigation of Landslides and earthquakes - causes and mitigation; seismic zonation – seismic zones of India.

Transactional Modes

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

Suggested Readings:

1. Parbin Singh, "Engineering and General Geology", S.K.Kataria& Sons, 2008.

2. Venkatareddy. D. Engineering Geology, Vikas Publishing House Pvt. Ltd. 2010

SEMESTER: II

COURSE TITLE: Road Transport Management & Economics
COURSE CODE: MTE201

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Comprehend the issues & challenges in the Transportation Sector
2. Develop skills required for Transport planning & formulation.
3. Interpret the optimization techniques for Transport Planning & Pricing.
4. Analyze the processes for Transport project execution and control.

Course Contents

UNIT I **15 hours**

Motor Vehicles Act -statutory provision for road transport and connected organizations. Route scheduling, Freight transport, Vehicle scheduling, Optimum fleet size, Headway control strategies, Crew scheduling.

UNIT II **15 hours**

Depots and Terminals -Principles and types of layouts, Depot location, Twin depot concept, Crew facilities. Design of parking facilities – Bus terminal, bus stops and bus bays

UNIT III **15 hours**

Transportation costs - Supply and demand - elasticity of demand; Supply of transport services - Economics of traffic congestion - Pricing policy. Vehicle operating costs - Fuel costs - Maintenance and spares - Depreciation - Crew costs - Value of travel time savings - Accident costs.

UNIT IV **15 hours**

Economic analysis of projects - Methods of evaluation - Cost-benefit ratio, first year rate of return, net present value, and internal-rate of return methods; Indirect costs and benefits of transport projects.

Financing of road projects - methods – Private Public Partnership (PPP) - Toll collection - Economic viability of Build-Operate-Transfer Schemes – Risk Analysis - Case Studies.

Transactional Mode:

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

Suggested Readings:

1. *Winfrey, Economic analysis for Highways, International Textbook Company, Pennsylvania, 1969.*
2. *CRRI, Road User Cost Study in India, New Delhi, 1982*
3. *IRC, Manual on Economic Evaluation of Highway Projects in India, SP30, 2007*

COURSE TITLE: Transportation Planning
COURSE CODE: MTE202

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Comprehend the urban transportation and illustrate planning.
2. Classify trip and demonstrate trip production models.
3. Interpret various split models on transportation engineering.
4. Analyze the land use between various transport means and suggest an alternative plan for land use.

Course Contents

UNIT I **15 hours**

Urban Transportation Planning - Goals and objectives - Hierarchical levels of transportation planning - Forecast - Implementation - Constraints. UTP survey - Inventory of land use.

UNIT II **15 hours**

Trip generation - Trip classification - productions and attractions - Multiple regression models - Category analysis - Trip production models - Trip distribution models - Linear programming approach.

UNIT III **15 hours**

Modal split models -Behavioral models - Probabilistic models - Utility functions - logit models - Two stage model. Traffic assignment - Assignment methods - Route-choice behavior - Network analysis.

UNIT IV **15 hours**

Landuse and its interaction - Lowry derivative models - Quick response techniques - non-Transport solutions for transport problems. Characteristics of urban structure. Town planning concepts.

Preparation of alternative plans -Evaluation techniques - Plan implementation – Monitoring- Financing of Project – Case studies.

Transactional Mode:

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

Suggested Readings:

1. *Hutchinson, B.G., Principles of Urban Transport Systems Planning, Scripta, McGraw-Hill, NewYork, 1974.*
2. *Khisty C.J., Transportation Engineering - An Introduction, Prentice Hall, India, 2002.*

COURSE TITLE: Airport Infrastructure Planning & Design
COURSE CODE: MTE210

L	T	P	Credits
3	1	0	4

Total: 60 Hours

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

1. Classify the different components of airport and aircrafts.
2. Analyze the requirements of an airport layout with respect to international regulations.
3. Interpret the airport runway design.
4. Design Taxiways & Aprons.

Course Content

UNIT I **15 hours**

AIR TRANSPORTATION: Airport terminology, component parts of Aeroplan, Classification and size of airports; Aircraft characteristics. Air traffic control need for ATC, Air traffic control network, Air traffic control aids –enroute aids, landing aids. Airport site location and necessary surveys for site section, airport obstructions.

UNIT II **15 hours**

PLANNING: Airport master plan – FAA recommendations, Regional Planning, ICAO recommendations, Estimation of future airport traffic needs- layout of Air Port

RUNWAYS: Runway orientation, basic runway length, corrections for elevation, temperature and gradient, runway geometric design

UNIT III **15 hours**

TAXIWAYS AND APRONS: Loading aprons – holding aprons – Geometric design standards, exit taxiways – optional location, design, and fillet and separation clearance.

UNIT IV **15 hours**

TERMINAL SERVICE FACILITIES: Passenger, baggage and cargo handling systems; Lighting, visual airport marking, airport lighting aids, airport drainage.

OPERATIONS AND SCHEDULING: Ground transportation facilities; Airport capacity, runway capacity and delays.

Transactional Mode:

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

Suggested Readings:

1. *Khanna S.K., Arora M.G., Jain S.S., "Airport Planning & Design", 1 st Edition, Nemchand Bros. Roorkee, 2009.*
2. *2. Robert Horonjeff, Francis McKelvey, William Sproule and Seth Young, "Planning and Design of Airports" 5 th Edition, 2010.*

COURSE TITLE: Railway Infrastructure. Planning & Design
COURSE CODE: MTE209

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Illustrate the Railway planning, design, construction and maintenance and planning and design principles of Airports and Harbor's.
2. Illustrate the basic procedure of railway construction and its maintenance
3. Illustrate the planning of airport and its components in layout.
4. Comprehend the airport design and interpret the basic needs in the airport construction.

Course Contents

UNIT I **10 hours**

Planning of Railway Lines Network Railways operational system, historical background of Indian railways, plans and developments, policy and standards, traffic forecast and surveys, railway alignment, project appraisal and organization setup.

UNIT II **10 hours**

Component of Railway Track and Rolling Stock Permanent way, forces acting, rails, function of rails, rail fixtures and fastenings, sleepers and ballast, rail joints, elements of junctions and layouts, types of traction, locomotives and other rolling stock, brake systems, resistance due to friction, wave action, wind, gradient, curvature, starting, tractive effort of a locomotive, hauling power of a locomotive.

UNIT III **15 hours**

Track Construction and Maintenance Special considerations and construction practices, track laying, inspection and maintenance, maintenance tools, maintenance of rail surface, track drainage, track circuited lengths, track tolerances, mechanized method, offtrack tampers, shovel packing, ballast confinement and directed track maintenance, bridge maintenance, renewal, classification of renewal works, through sleeper renewals, mechanized relaying, track renewal trains.

UNIT IV **10 hours**

Railway Station and Yards Site selection, facilities, classification, platforms, building areas, types of yards, catch sidings, ship sidings, foot over bridges, subways, cranes, weigh bridge, loading gauge, end loading ramps, locomotive sheds, ash-pits, water columns, turntable, triangles, traverse, carriage washing platforms, buffer stop, scotch block, derailing switch, sand hump, fouling mark. High Speed Railways Modernization of railways, effect of high-speed track, vehicle performance on track, high speed ground

transportation system, ballast less track, elevated railways, underground and tube railways.

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

Suggested Readings:
1. Clifford F. Bonnett, "Practical Railway Engineering", 2nd Edition, Imperial College Press, London, 2005.
2. Gupta, B.L. and Amit Gupta, "Railway Engineering", Third Edition, Standard Publishers, New Delhi, India, 2005
3. J.S. Mundrey, "Railway Track Engineering", Fourth Edition, Tata McGraw-Hill Education Private Limites, New Delhi, 2010.

COURSE TITLE: Transportation Simulation Lab
COURSE CODE: MTE211

L	T	P	Credits
0	0	4	2

Total:30 Hours

Course Contents

List of Experiments:

1. Driver testing Experiments
2. Intersection designs
3. Signal Design.
4. Origin and Destination Studies
5. Computer Software: Principles of TRIPS, CUBE, Demo Versions, Case studies.
6. Traffic Simulation studies using VISSIM.
7. Cellular applications.
8. Accident Studies.

COURSE TITLE: Geographical Information Systems & Remote Sensing
COURSE CODE: MTE205

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Interpret the concepts of Photogrammetry and compute the heights of objects
2. Comprehend the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies.
3. Apply knowledge of GIS software and able to work with GIS software in various application fields
4. Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems

Course Contents

UNIT I **15 hours**

GIS Definition –Map and map analysis – Automated cartography – History and development of GIS – Hardware requirement – Type of data – Spatial and non- spatial data – Data structure– Vector and raster – Files and data formats – Data compression.

UNIT II **10 hours**

Spatial analysis –Data retrieval – Query – Overlay – Vector data analysis – Raster data analysis – Modelling in GIS – Digital Elevation Model – DTM – Types of output data – Output devices – Sources of errors – Types of errors – Elimination – Accuracies - The Global Positioning system and its applications.

UNIT III **10 hours**

Concepts and foundations of remote sensing - electromagnetic spectrum - EMR interaction with atmosphere, water vapour, ozone - Basic principles of photogrammetry – Spectral Signature and Spectral Signature curves - Remote sensing platforms and sensors.

Satellite system parameters, sensor parameters, earth resources and meteorological satellites, microwave sensors, Data Acquisition and interpretation - Visual Image Interpretation – Visual Image Interpretation Equipment - Digital Image Processing – Classification.

UNIT IV **10 hours**

Applications in Survey, mapping and monitoring of land use/land cover - Transportation planning - Infrastructure development - Natural resources

management - Urban Planning, Environment - Coastal Zone Management – Air Quality - Development of Resources Information Systems.

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

Suggested Readings:
1. Burrough P.A. and Rachel A. McDonell, Principles of Geographical Information Systems, Oxford Publication, 2004.
2. C.P. Lo and Albert K. W. Yeung, Concepts and Techniques of Geographical Information Systems, Prentice- Hall India, 2006.
3. Thomas. M. Lillesand and Ralph. W. Kiefer, Remote Sensing and Image Interpretation, John Wiley and Sons, 2003.

COURSE TITLE: Environmental Impact Assessment
COURSE CODE: MTE206

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Identify the objectives and scope of EIA
2. Illustrate the necessity of public participation in EIA studies
3. Summarize the importance of Environmental Attributes
4. Quantify impacts for various developmental projects

Course Contents

UNIT I **15 hours**

INTRODUCTION TO EIA: Definition, Evaluation of EIA in INDIA, Rapid and Comprehensive EIA, EIA, EIS, FONSI and NDS. Need for EIA studies, Baseline data, Step-by-step procedure for conducting EIA, Advantages and Limitations of EIA, Hierarchy in EIA, Statutory requirements in EIA, MoEF guidelines in siting Developmental Projects.

UNIT II **10 hours**

OBJECTIVES AND SCOPE OF EIA: Contents of EIA, Methodologies and Evaluation Techniques of EIA, Selection for specific projects

PUBLIC PARTICIPATION IN EIA: Elements of Effective Public Participation, Benefits and Procedures, EMP and DMP, Environmental Information System, Environmental Monitoring Systems, Public information network

UNIT III **10 hours**

ENVIRONMENTAL IMPACT CASE STUDIES- Case studies on Human impact on Himalayan Ecosystem, Urban solid waste management with reference to Hyderabad City, Irrigation impacts of Upper Thunga Project (UTP) at Shimoga, Impact on air quality due to cement making – A case study of ACC limited, Madhukkarai, Coimbatore, Bhopal Gas tragedy.

UNIT IV **10 hours**

IMPACT QUANTIFICATION: Impact quantification study on - Water Resource Developmental projects, Hazardous waste disposal sites, Sanitary land filling, Mining projects, Thermal/Nuclear power plant and pharmaceutical industries.

Transactional Mode:

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

Suggested Readings:

- *Environmental Impact Analysis, Urban & Stacey, Jain R.K.*
- *Environmental Impact Assessment, Mc Graw Hill Inc, L.W. Canter (1996)*
- *Environmental Impact Assessment and Management, Daya Publishing house, Hosetti B.B., Kumar A. (2014)*

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

L	T	P	Credits
2	0	0	NC

Total hours: 30

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

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title

Course Content

Unit-I **8 Hours**

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

Unit-II **8 Hours**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

Unit-III **7 Hours**

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

Unit-IV **7 Hours**

skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions
useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Transactional Mode:

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

Suggested Readings:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books) Model Curriculum of Engineering & Technology PG Courses [Volume-I] [41]
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

Course Title: Constitution of India
Course Code: MTE214

L	T	P	Credits
2	0	0	NC

Total hours: 30

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

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

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

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

Course Content

Unit-I **8 Hours**

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

Unit-II **8 Hours**

Contours of Constitutional Rights & Duties:
- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit-III **7 Hours**

Organs of Governance:
- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- Executive
- President
- Governor
- Council of Ministers
- Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions

Unit-IV **7 Hours**

Local Administration:

- District's Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.
- Pachayati raj: Introduction, PRI: ZilaPachayat.
- Elected officials and their roles, CEO ZilaPachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

Election Commission:

- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women

Transactional Mode:

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

Suggested Readings:

1. *The Constitution of India, 1950 (Bare Act), Government Publication.*
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

SEMESTER: III

COURSE TITLE: Dissertation Phase-I*
COURSE CODE: MTE307

L	T	P	Credits
0	0	20	10

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

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

Course Content

The dissertation will normally contain:

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

Course Title: Research Methodology & IPR
Course Code: MTE308

L	T	P	Credits
3	0	0	3

Total hours: 45

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

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

COURSE CONTENT

Unit-I **10 Hours**

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

Unit-II **15 Hours**

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

Unit-III **10 Hours**

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

Unit-IV **10 Hours**

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

Transactional Mode:

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

Suggested Readings:

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

COURSE TITLE: Transportation System
COURSE CODE: MTE309

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Interpret the basic concepts of transportation and the importance of transportation.
2. Illustrate all modes and components of transport
3. Classify the integration of transportation.
4. Express the legal regulations related to land, air, sea and railway.

Course Content

UNIT I **10 hours**

Historical development of transport in India - 20-year Road Plans, National Transport Policy Recommendations, IRC, CRRI, Vision 2021, NHDP, PMGSY. Characteristics of different modes of transport and their integration and interactions - impact on environment.

UNIT II **12 hours**

Planning of railway - Passenger and goods terminals - layout - passenger facilities - traffic control.

Airport Planning-requirements and components. Design of runway and taxiway - Apron - parking configuration - terminal requirements - Airport marking and lighting - Air traffic control.

UNIT III **10 hours**

Planning of Harbours and ports - cargo handling - Containerization - Navigation aids - Inland waterways - Pipeline transportation.

UNIT IV **13 hours**

Urban transportation systems - Mass rapid transit system - Light rail transit - Personal rapid transit, guided way systems, cabin taxi, dual mode bus - Para transit systems - Demand responsive system - Intermediate public transport.

Transactional Mode:

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

Suggested Readings:

1. *Paquette, R.J., et al, Transportation Engineering Planning and Design, John Wiley & Sons, New York, 1982.*
2. *Alan Black, Urban Mass Transportation Planning, McGraw-Hill,*

COURSE TITLE: Bridge Engineering
COURSE CODE: MTE302

L	T	P	Credits
3	0	0	3

Total: 45 Hours

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

1. Interpret the basic concepts of transportation and the importance of transportation.
2. Illustrate all modes and components of transport
3. Classify the integration of transportation.
4. Express the legal regulations related to land, air, sea and railway.

Course Content

UNIT I **10 hours**

Introduction, Classification and Types. IRC Specifications for Road Bridges. Earthquake Resistant Design Considerations.

UNIT II **12 hours**

Analysis of Bridges - Effect of concentrated loads on slabs, Load Distribution Theories - Courbon's method, Hendry-Jaeger method and Guyon-Massonet method.
Design of PSC Bridges - Slab Type, T-beam Type, Box Type.

UNIT III **10 hours**

Classification and Design of Bearings - Metallic bearings, Elastomeric bearings, POT and PTFE bearings.

UNIT IV **13 hours**

Analysis and Design of Abutment and Pier. Introduction to Design of Open Well, Pile and Caisson Foundations.
Analysis and Design of Wing Walls

Transactional Mode:

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

Suggested Readings:

1. *N. Krishna Raju, "Design of Bridges", Oxford and IBH Publishing Co. Ltd., New Delhi and Kolkata (2001)*
2. T.R. Jagdeesh, M. A. Jayaram, "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd., New Delhi (2003) 19

3. D. Johnson Victor, "Essentials of Bridge Engineering", Oxford and IBH Publishing Co. Ltd., 5 th Edition, (2001)

4. M.J.N. Priestley, G. M. Calvi, "Seismic Design and Retrofit of Bridges"

Course Title: Disaster Preparedness & Planning
Course Code: OEC064

L	T	P	Cr.
3	0	0	3

Total: 45 Hours

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

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

Course Content

Unit I: 15 Hours

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

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

Unit II: 10 Hours

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

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

Unit III: 10 Hours

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

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

Unit IV: 10 Hours

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

Transactional Mode:

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

Suggested Readings:

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

SEMESTER-IV

Course Title: Dissertation Phase II*
Course Code: MTE402

L	T	P	Credits
0	0	0	20

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

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

Course Content

The dissertation will normally contain:

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