

**CIVIL ENGINEERING DEPARTMENT**

**M.TECH. TRANSPORTATION ENGINEERING**

**Course of Study & Scheme of Examination  
2016-17**



**Maulana Azad National Institute of Technology,  
Bhopal**

**SCHEME**  
**M. TECH IN TRANSPORTATION ENGINEERING**

***FIRST SEMESTER***

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
TRE511	Analysis and Design of Pavement Structures	3	-	-	3
TRE512	Traffic Engineering and Management	3	-	-	3
TRE513	Transport Planning	3	-	-	3
	Elective 1	3	-	-	3
	Elective 2	3	-	-	3
	Open elective1	3	-	-	3
TRE514	Lab practice 1	-	-	3	2
TRE515	Seminar 1	-	2	-	2
Total credits 22					

***SECOND SEMESTER***

Course Number	Subject	Scheme of Studies Periods per week			Total Credits
		L	T	P	
TRE521	Highway Construction and Maintenance	3	-	-	3
TRE522	Public Transport System	3	-	-	3
TRE523	Highway Geometrical Design	3	-	-	3
	Elective 3	3	-	-	3
	Elective 4	3	-	-	3
	Open elective2	3	-	-	3
TRE524	Lab practice 2	-	-	3	2
TRE525	Seminar 2	-	2	-	2
Total credits 22					

**LIST OF DEPARTMENT ELECTIVES**

- TRE531 Geotechnical Investigations and Field Testing
- TRE532 Analysis and Design of Highway Intersections
- TRE533 Concrete Technology
- TRE534 Bridge and Tunnel Engineering
- TRE535 Fundamentals of Remote Sensing, GIS and GPS
- TRE536 Highway Maintenance Management System
- TRE537 Environmental Impact Assessment
- TRE538 Planning and Design of Airports
- TRE 539 Intelligent Transport Systems

**LIST OF OPEN ELECTIVES**

- TRE551 Probability and Statistics
- TRE552 Optimization Techniques
- TRE553 Construction Management
- TRE554 Engineering Economics and Project Management

***THIRD SEMESTER***

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
TRE611	Major Project Dissertation Phase- I	-	-	-	23
Total credits 23					

***FOURTH SEMESTER***

Course Number	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
TRE648	Major Project Dissertation Phase- II	-	-	-	23
Total credits 23					

## **SYLLABUS**

### **M.TECH INTRANSPORTATION ENGINEERING FIRST SEMESTER**

#### **TRE511 ANALYSIS AND DESIGN OF PAVEMENT STRUCTURES**

Introduction , Importance and Functions of Various Components of Pavement Structures, Analysis of Stresses in Flexible and Rigid Pavements, Methods for Design of Flexible and Rigid Pavements, Design and Construction of Joints.

#### **References**

1. Highway Engineering- S.K. Khanna & C.E.G. Justo. Nem Chand & Bros;
2. Pavement Deign- Yoder & Witczak, John Wiley & Sons
3. Principles of Transportation Engineering- Chakroborti and Das, PHI Learning Pvt. Ltd.
4. IRC: 37-2012 "Guidelines for Design of Flexible Pavements
5. IRC: 58-2011 "Guidelines for Design of Rigid Pavements

#### **TRE512 TRAFFIC ENGINEERING AND MANAGEMENT**

Introduction, Traffic Characteristics, Traffic Studies, Urban Travel Characteristics, Design, Operation and Control of Traffic Facilities, Techniques for Traffic Management. Road Safety. Advance topic like Road Safety, traffic forecasting etc.

#### **References**

1. Traffic Engineering and Transport Planning- L.R. Kadiyali, Khanna Publisher.
2. Principles of Transportation Engineering- Chakroborti and Das, PHI Learning Pvt. Ltd.
3. Traffic Engineering- Matson, Smith and Hurd, McGraw-Hill Inc

#### **TRE513 TRANSPORT PLANNING**

Hierarchical Levels of Planning, General Concept and Process, Travel Demand Estimation and Forecasting, Regional Transport Planning, Trip Generation Methods, Modal Split Analysis, Behavioral Approach, Two Stage Model Split Models. Trip Distribution, Growth Factor Method, Gravity Models, Intervening Opportunity and Competing Opportunity Models, Land Use Transport Planning Models, Network Assignment.

#### **References**

1. Traffic Engineering and Transport Planning, L.R. Kadiyali, Khanna Publisher.
2. Principles of Transportation Engineering, Chakroborti and Das, PHI Learning Pvt. Ltd.
3. Traffic Engineering - Matson, Smith and Hurd, McGraw-Hill Inc

### **TRE514 LAB PRACTICE 1**

Testing of Highway Materials and Pavement: Testing of Materials like Aggregates, Bitumen, Bituminous Mixes, Modified Bitumen, Emulsion, Benkelman Beam Studies.

#### **References**

1. Highway materials and pavement testing- Khanna, Justo and Veeraragavan, Nemchand & Bro.
2. Principle of Transportation Engineering- Chakroborti and Das PHI Learning Pvt. Ltd

### **TRE515 SEMINAR 1**

## **SECOND SEMESTER**

### **TRE521 HIGHWAY CONSTRUCTION AND MAINTENANCE**

Sub-grade analysis and design, type of highway construction: WBM, WMM, DLC, type of bituminous construction: construction techniques and quality control, type of cement concrete construction, joints etc. highway maintenance.

#### **References**

1. Highway Engineering- S.K.Khanna& C.E.G. Justo, Nem Chand and Bro.
2. Principles of Transportation Engineering- Chakroborti and Das, PHI Learning Pvt. Ltd
3. MORTH Specification "Specification for Bridge and Roads Works"

### **TRE522 PUBLIC TRANSPORT SYSTEM**

Mass Transportation Characteristics, Urban Public Transportation Planning, Terminals and their Functions, Basic Concepts for Analysis and Design of Public Transport Routes, Economic Evaluation Methods.

#### **References**

1. Traffic Engineering and Transport Planning- L.R. kadiyali, khanna Publishers.
2. Public Transportation Planning, Operation ,& Management- Gray, GE Hoel, L.A, Prentice Hall.

### **TRE523 HIGHWAY GEOMETRICAL DESIGN**

Design Controls and Criterion, Cross Sectional Elements, Sight Distance, Horizontal and Vertical Alignment, Intersection Geometrics.

#### **References**

1. Principles of Transportation Engineering- Chakroborti and Das-PHI Learning Pvt. Ltd
3. Principles & Practice of Highway Engg.- L.R. Kadiyali, Khanna Publishers
4. Highway Engineering- S.K. Khanna & C.E.G. Justo, Nem Chand & Bros

### **TRE524 LAB PRACTICE 2**

Traffic Studies, Speed Studies, Traffic Volume Studies, O&D Studies, Parking and Accident Studies.

#### **References**

1. Traffic Engineering and Transport Planning- .R. Kadiyali, Khanna Publisher.
2. A Course in Traffic planning and Design- S.C Saxena, CBS, Publishers
3. Highway Engineering- S.K.Khanna& C.E.G. Justo, Nem Chand & Bros

### **TRE525 SEMINAR 2**

## **DEPARTMENT ELECTIVES**

### **TRE531 GEOTECHNICAL INVESTIGATIONS AND FIELD TESTING**

Introduction, Methods of Exploration, Sampling, Penetration Tests, Field Testing of Soils, Plate Load Tests, Tri-axial Tests, Planning of Exploration and Testing Program for Transport Infrastructure Projects.

#### **References**

1. Basic & Applied Soil Mechanics- Gopal Ranian and A.S.R. Rao., NEW AGE
2. Principles & Practice of Highway Engineering- L.R. Kadiyali, Khanna Publisher
3. Highway Engineering -S.K.Khanna& C.E.G. Justo,Nem Chand & Bros

### **TRE532 ANALYSIS AND DESIGN OF HIGHWAY INTERSECTIONS**

General Considerations of Design, Types of Maneuvers, Conflict Points, Intersection Geometrics, Capacity and Level of Service Concepts, Design of Traffic Signal, Grade Separated Intersections.

#### **References**

1. Traffic Engineering and Transport Planning -,L.R. kadiyali, Khanna Publishers.
2. A Course in Traffic planning and Design- S.C Saxena, CBS, Publishers.
3. IRC: SP-41 "Guidelines for the Design of At-Grade Intersection in Rural & Urban Areas

### **TRE533 CONCRETE TECHNOLOGY**

Introduction, Concrete Making Materials, Types of Concrete, Properties and Test of Fresh and Hardened Concrete, Concrete Mix Design Methods, Concrete Paving Mix Etc.

#### **References**

1. Concrete Technology- ,M.S. Shetty, S. Chand Publishers.
2. Concrete Technology- M.L. Ghambhir, McGraw Hill Education
3. Building Material - S. C. Rangwala, Charotar Publishing

### **TRE534 BRIDGE AND TUNNEL ENGINEERING**

Bridge Engineering; Introduction, Types of Bridges, Site Selection, IRC and Railway Loadings, Component Parts of Bridge Structure, Inspection and Maintenance of Bridges, Testing and Rehabilitation, Tunnel Engineering: Introduction, Terminology, Types of Tunnels, Tunnel Lining, Preliminary Investigations, Ground Improvement Techniques, Ventilation and Lighting, Tunnels in Difficult Ground Conditions.

#### **References**

1. Bridge Engineering- S.P. Bindra, Dhanpat Rai Publication
2. Railway, Bridge and Tunnel - B.L. Gupta, Standard Publications

### **TRE535 FUNDAMENTALS OF REMOTE SENSING, GIS AND GPS**

Introduction of Remote Sensing and GIS, Geographical Concepts and Terminology, Essential Components of GIS, Various GIS Packages and Salient Features, Application of Remote Sensing, GIS in Urban Transportation Planning and Infrastructure Development, Basic Concepts of GPS.

#### **References**

1. Principles of remote sensing- Keifer, Wiley and Sons.
2. Principles of GIS- Burrough, Hofman-Wellenhof, Springer
3. Introduction to Remote Sensing- Londo.Gonzalez, The Guilford Press

### **TRE536 HIGHWAY MAINTENANCE MANAGEMENT SYSTEM**

Types of Highway Maintenance, Distresses in Flexible and Rigid Pavements and their Remedial Measures, Maintenance Management Process, Evaluation and Performance, Analysis and Selection, Prioritization, Resource Allocation.

#### **References**

1. Pavement Management System- Haas. McGraw-Hill Book Company
2. Principles & Practice of Highway Engineering- L.R. Kadiyali, Khanna Publishers
3. Highway Engineering- S.K.Khanna & C.E.G. Justo, Nem Chand & Bros

### **TRE537 ENVIRONMENTAL IMPACT ASSESSMENT**

Nature of the problem, Impact analysis procedure for processing EIA and EIS, elements of EIA: air, water, noise etc, various methodology of EIA, case histories for transportation infrastructure projects.

#### **References**

1. Introduction to EIA - John Glasson, Taylor and Francis.
2. Environment Engineering - P .V Rao, Prentis Hall India Pvt. Ltd.

### **TRE538 PLANNING AND DESIGN OF AIRPORTS**

Basic Principles and Concepts Of Planning, Design Of Airports, Air Craft Characteristics, Runway Design, Modern Evaluation Techniques, Airport Marking and Lighting, Air Traffic Control.

**References**

1. Airport Planning and Design - S.K Khanna, Arora and Jain, Nem Chand Brothers
2. Planning and Design of Airports - Robert Horonjeff and Francis X. Mc, McGraw-Hill Education
3. Airport Engineering- G.V. Rao, McGraw-Hill Education

**OPEN ELECTIVES**

**TRE551 PROBABILITY & STATISTICS**

Concept of Probability Theory, Statistics and Numerical Methods for Solving Engineering Problems, Testing of Hypothesis, Concept of Design of Experiments, Correlation and Regression.

**References**

1. Engineering Mathematics - B. S. Grawal, Khanna Publishers
2. Engineering Mathematics - H.K. Das, S Chand & Co Ltd

**TRE552 OPTIMIZATION TECHNIQUES**

General Optimization Procedure, Concepts of Optimality, Linear Programming and its Application in Transport Infrastructure Problems, Unconstrained and Constrained Optimization, Search Technique, Fibonacci and Golden Search.

**References**

1. An Introduction to Numerical Methods and Optimization Techniques- R. W Daniels, Tata McGraw-Hill Education
2. Engineering Optimization- S.S. Rao, John Wiley and Sons.
3. Optimization for Engineering Design- K. Deb, PHI Learning Pvt. Ltd.

**TRE553 CONSTRUCTION MANAGEMENT**

Construction Management: Principle and Function of Management, Construction Site Management, Organization Charts and Manuals, Personnel in Construction, Welfare Facilities, Labor Laws and Human Relation, Safety Engineering, Specification and Types of Specification, Types of Contracts, Notice Inviting Tenders, Departmental Method of Construction, Security Deposit, Earnest Money, Administrative Approval, Technical Sanction, Condition of Contract and Arbitration, Accountancy & Book Keeping Cash Book Profit Bills and Loss Accounts Auditing of Bills and Vouchers, Various Forms Used in Construction Work, Measurement Book, Material at Site Account, Impreset Account, Stock Tools and Plants, Various Types of Bills

**References**

1. Construction Engineering and Management- P.S Ghalot, New Age International
2. Principal Of Construction Management- Roy Pilcher, McGraw-Hill Book Co
3. Estimation and Costing- B.N Datta, Sangam Books



**TRE554 ENGINEERING ECONOMICS AND PROJECT MANAGEMENT**

Introduction Of Engineering Economics, Its Application & Principles, Economics Problems, Demand and Supply, Demand Forecasting Methods, Cost Estimation, Time Value of Money, Present Worth , Future Worth, Capitalized Cost and Annual Worth, Rate of Return Analysis Principal and functions of Project management, construction management of projects, project Planning, Bar Chart, CPM And PERT Analysis, Difference between CPM and PERT Analysis, Crashing of Network, Resource Leveling and Probability in PERT Analysis.

**References**

1. Basics of Engineering Economy- Leland Blank, P. E., McGraw-Hill Education.
2. CPM And PERT Analysis- K.R. Arora
3. Construction Engineering and Management- S. Seetharaman, Umesh Publications.