M.E TRANSPORTATION ENGINEERING

OBJECTIVES
- To introduce the students with the principles and practice of transportation engineering which focuses on Traffic and Transportation Engineering and Highway Engineering.
- To enable the students to have a strong analytical and practical knowledge of Planning, Designing and solving the transportation problems.
- To strengthen the students knowledge and technical know how to be efficient Transport Engineers.

OUTCOME
- The students after completion of this course will have an in-depth knowledge in Traffic Engineering, Transport Planning, Highway Design and Construction, Sustainable Urban and Transport Development and will be efficient enough to take up projects in the field.
- As the students have an hands on experience in working with the Software, live projects, field visits to various organizations and training sessions during the course of study, they will be full fledged Transport and Highway Planner.
## UNIVERSITY DEPARTMENTS
### ANNA UNIVERSITY :: CHENNAI 600 025
#### REGULATION 2013
### M.E. TRANSPORTATION ENGINEERING
#### CURRICULUM AND SYLLABUS FOR I TO IV SEMESTERS (FULL TIME)

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# M.E. TRANSPORTATION ENGINEERING CURRICULUM AND SYLLABUS FOR I TO VI SEMESTERS (PART TIME)

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<td>Waterways Transportation System – Planning and Design</td>
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OBJECTIVE:

- The students is expected to understand the properties and use of various materials and construction, analysis of stress distribution, evaluation and maintenance of flexible and rigid pavements.

UNIT I  PAVEMENT MATERIALS  

UNIT II  PAVEMENT CONSTRUCTION  
Subgrade - Significance and functions, evaluation of soil strength, CBR and plate load test, earth work grading, preparation of subgrade, quality control test, subgrade stabilization. Flexible pavements - specification of materials, construction method and field control checks for various types of flexible pavements, super pave concept, new materials like polymer modified bitumen, geo synthetics. Rigid pavements - specification and method of construction, quality control tests, construction of various types of joints

UNIT III  DESIGN OF FLEXIBLE PAVEMENTS  
Factors affecting design and performance - Stresses and deflection in homogenous masses, Burmister’s 2 layer, 3 layer and multi-layer theories , wheel load stresses, ESWL, pavement behavior under transient traffic loads, problems on above. CBR method, principle, advantages and application, testing as per IRC, AASHTO, and asphalt institute, problems on above.

UNIT IV  DESIGN OF RIGID PAVEMENTS  
Factors affecting design and performance, types of stresses ,causes and factors affecting stresses, EWL, Westergaard’s analysis, Bradbury’s coefficient, wheel load stresses, warping- frictional-combined stresses, problems on above.IRC design chart, design of longitudinal, contraction and expansion joints, and design of slabs.

UNIT V  PAVEMENT EVALUATION AND MAINTENANCE  

TOTAL : 45 PERIODS

OUTCOME:

- The students would have gained knowledge on the Material properties, Design, Evaluation  and Management of Pavement Systems.

REFERENCES:

3. Specifications for” Road and Bridge works”, Fourth Revision, MoSRT&H(India), 2001

TE8102 QUANTITATIVE TECHNIQUES FOR TRANSPORTATION ENGINEERING

OBJECTIVE:
• Provides Knowledge on Statistical and Analytical Techniques and its application in traffic and transportation engineering

UNIT I SAMPLING AND SURVEY METHODS

UNIT II PROBABILITY DISTRIBUTIONS

UNIT III SIGNIFICANCE TESTING
Hypotheses testing – Types of error – One tailed and two tailed test – Small sample and large sample test – Selection of significance level - Chi square test

UNIT IV LINEAR REGRESSION MODELS
Simple and Multiple Linear Regression – Coefficient of correlation – Stepwise regression – Tests on significance of the regression – T and F tests, ANOVA, Poisson Regression – GLM – Basics and Significance of Non-linear regression analysis

UNIT V ADVANCED TECHNIQUES
Network Flow Problems – Transportation and Assignment Problems – Maximal flow Shortest Route Delphi Technique, Brain Storming, Neural Network – Application in Transportation Network Planning

TOTAL: 60 PERIODS

OUTCOME:
• Students would have understood the method of sampling and basics of statistical technique and to relate it to solve traffic and transportation issues.
REFERENCES:

TE8103 TRAFFIC ENGINEERING DESIGN AND MANAGEMENT

OBJECTIVE:
• Provides a basic understanding on Traffic Engineering – Planning, Design, Operation and Management

UNIT I TRAFFIC CHARACTERISTICS
Physical, Physiological, Psychological, Environmental Characteristics, Traffic Stream Characteristics, Vehicle Characteristics – Static and Dynamic, Urban Road and Road Characteristics – Geometric Design – An Overview

UNIT II SURVEYS AND STUDIES IN TRAFFIC ENGINEERING
Conventional and Modern Methods of Traffic Survey and Studies – Volume and Capacity – Headway concepts and applications – Speed and Delay – Origin and Destination, Parking, Accident – Level of Services (LoS)

UNIT III DESIGN OF TRANSPORT INFRASTRUCTURE
Sight Distance, Design of Cycle Tracks, Pedestrian Facilities, Parking Facilities – On Street, Off Street Multi level Street Lighting

UNIT IV INTERSECTION DESIGN
Design of Intersection – At grade intersection – Uncontrolled, Channelisation, Rotary, Traffic Signal Control, Signal Co-ordination, Grade Separated Intersection - Types and Design

UNIT V TRAFFIC OPERATION AND MANAGEMENT

TOTAL: 45 PERIODS

OUTCOME:
• Students would be aware of the basic Principles and Design ,Planning and Management of Transportation system.

REFERENCES:
2. James L. Pline (Edr) 'Traffic Engineering Hand Book’, Institute of Transportation Engineers, Washington DC, USA, 1999

**TE8104 TRANSPORTATION SYSTEMS PLANNING**

**OBJECTIVE:**
- To impart knowledge in the rudiments and advancements in Transportation Planning and Travel Demand Forecasting

**UNIT I TRANSPORTATION SYSTEM STATUS**

**UNIT II INVENTORIES AND SIMULATION MODELING**

**UNIT III FOUR STAGE MODELING PROCESS**

**UNIT IV ADVANCED TRAVEL FORECASTING**
Advanced Travel Demand Forecasting Methods - Activity Based Modeling – Comparison of Conventional and Activity Based Modeling – Integration of Systems Simulation Modeling and Transportation Network Planning for Sustainability.

**UNIT V LAND USE TRANSPORT MODEL (LUT)**
Accessibility Measures and Basic Theories – Lowry Derivatives Model- Garin Model – Approach and Simulation Modeling in LUT Model - Multimodal Transportation Planning.

**OUTCOME:**
- Students would be aware of the Principles and Planning of Transportation Infrastructure.

**REFERENCES:**
OBJECTIVE:
- To give the students hands-on experience on the various testing procedures of pavement materials as per the IRC standards.

I PAVEMENT MATERIAL TESTING
- Testing on Bitumen:
  - Specific Gravity of Bitumen.
  - Penetration Test.
  - Softening Point Test.
  - Ductility of Bitumen.
- Tests on Road Aggregates.
  - Specific Gravity of Aggregates.
  - Los Angeles Abrasion Test.
  - Aggregate Impact Test.
  - Sieve Analysis, Flakiness and Elongation Index.

II TESTS ON BITUMINOUS MIXTURE.
- Design of Bituminous Mixes.
- Marshal Stability Test.

III PAVEMENT EVALUATION – ROUGHNESS AND DISTRESS EVALUATION
- Visual pavement condition survey - patches, potholes, ravelling, edge breaking and cracking.
- Skid resistance measurements.
- Texture Depth.
- MERLIN
- Benkelman Beam Deflection test.

OUTCOME:
- The students on completion of the laboratory classes would have knowledge on properties and testing procedures of pavement materials.

TOTAL : 60 PERIODS

LIST OF EXERCISES
Conduct of the following surveys related to Transport Development, Analysis, Inferences and Proposals.

i) Volume count
ii) Spot speed
iii) Speed and delay studies
iv) Parking studies
v) Origin and destination studies
vi) Physical inventory using total station survey equipment
vii) Environmental impact – Noise studies and vehicular emission measurement
viii) Lighting studies

TOTAL : 60 PERIODS
LABORATORY EQUIPMENT REQUIREMENTS
(For a batch of 25 students)
1. Automatic traffic counter - 2 Nos.
2. Dopplar radar - 2 Nos.
3. Road measurement and data acquisition system - 1 No.
5. Five gas analyzer - 1 No.
7. Total station - 1 No.

Total number of equipments-10

OUTCOME:
• The students would have an understanding on conducting various types of traffic surveys involving data collection its analysis and the inference and way of presentation.

TE8201 MASS TRANSIT SYSTEM PLANNING

OBJECTIVE:
• To identify the role of various modes of Mass Transportation like Bus and Rail and its Planning and Management

UNIT I TRANSIT SYSTEM AND ISSUES 6

UNIT II PUBLIC TRANSIT SYSTEM 9

UNIT III BUS TRANSIT PLANNING AND SCHEDULING 10

UNIT IV RAIL TRANSIT TERMINALS AND PERFORMANCE EVALUATION 10

UNIT V IMPACT OF TRANSIT 10

OUTCOME:
• The students would have knowledge on planning of various transit systems like bus and rail, their scheduling and management strategies.
REFERENCES:
1. Michael J. Bruton, "An Introduction to Transportation Planning", Hutchinson, 1985

TE8202 ROAD SAFETY SYSTEM

OBJECTIVES:
- Helps in identifying the reasons for road accidents and scientific investigation.
- Provides knowledge on safety audit and its methodology

UNIT I DESCRIPTION OF PROBLEMS
Causes of accidents – Human factors – Vehicles – Road and its condition – Environmental Studies

UNIT II ACCIDENT ANALYSIS TECHNIQUES
Collision Diagram – Preparation, Spatial Analysis of Accidents – Methods and GIS in Accident Analysis - Black Spot, Black Route and Area Identification

UNIT III BEFORE AND AFTER STUDIES

UNIT IV SAFETY AUDIT

UNIT V ACCIDENT STUDIES AND INVESTIGATION
Accident data – Identification of Accident Prone Location – Prioritisation – Investigation – Problems and Remedies

TOTAL: 45 PERIODS

OUTCOME:
- The students would have gained knowledge on different aspects of road safety audit and its methodology

REFERENCES:
OBJECTIVE:
- Helps in understanding the basic concept of Sustainable Urban and Transport Development and its influence on region, city and built environment.

UNIT I SUSTAINABLE URBAN AND TRANSPORT PRINCIPLES 8

UNIT II URBAN PLANNING AND ENVIRONMENT 7
Environment and Resources, Sustainability Assessment, Future Scenarios, Form of Urban Region, Managing the change, Integrated Planning, Sustainable Development

UNIT III THE URBAN BUILT-IN ENVIRONMENT 9
Urban Form, Land Use, Compact Development, Principles of street design- complete streets, Transport Integrated Urban land use Planning, Guidelines for Environmentally sound Transportation

UNIT IV SUSTAINABLE TRANSPORTATION MODES PLANNING 11

UNIT V TRAVEL AND TRANSPORT 10

TOTAL: 45 PERIODS

OUTCOME:
- Students would have learnt the importance of sustainable urban and transport planning and its benefits to the human community.

REFERENCES:
3. Sustainable Transportation and TDM – Planning the balances, Economic, Social and Ecological objectives; Victoria Transport Policy Institute, 2007
4. UNCHS, Habitat, Cities in a Globalizing world, Global report on Human Settlement, 2001

OBJECTIVE:
- Offers basic and fundamental principles of Systems Approach and its application in simulating and modeling the complex and dynamic traffic and transportations systems.
UNIT I SYSTEMS APPROACH CONCEPT

UNIT II MODEL CONCEPTUALISATION

UNIT III MODEL DEVELOPMENT AND SCENARIO ANALYSIS

UNIT IV MODEL VERIFICATION AND VALIDATION
Concepts of Model Verification – Model Calibration – Model Validation - Sensitivity and Dimensional Analysis – Methods of SD Model Validation – Comparison of Conventional Model Validation with Simulation Model Validation efforts.

UNIT V MODELING TRANSPORTATION SYSTEMS

TOTAL: 45 PERIODS

OUTCOME:
- Students would have the knowledge in system Dynamics simulation Modeling efforts.

REFERENCES:

TE8205 URBAN AND REGIONAL PLANNING

OBJECTIVES:
- Provides a basic knowledge on Urbanization and its trend.
- Deals with different types of plan, its implementation, regional development and management for sustainable Urban growth.

UNIT I BASIC CONCEPTS POLICIES AND PROGRAMMES
Definitions and Concept- Urbanization, Towns, Cities, Metropolis, Megalopolis, Satellite and New towns, CBD, Peri urban areas, Suburban areas, Census Definition, Classification of urban settlements, TOD, National policies, National Urban Transport Policy 2006, National Policy for Urban street vendors 2009- Programme objectives and salient features of Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Urban infrastructure development scheme for small and medium towns (UIDSSMT), Rajiv Awas Yojana (RAY),
UNIT II  PLANNING PROCESS  8
Steps in Planning Process- Plans; levels; objectives, content, and data requirement-regional plan, master plan, detail development plan, city development plan, development control regulation, Zoning Regulation, Layout and Building Regulations.

UNIT III  SOCIO ECONOMIC AND SPATIAL PLANNING  10
Economic and social concepts in urban and regional planning and their relevance, Economic principals of zoning, Components of sustainable development, Inclusive development, Compact cities, Quality of life-Form of cities, issues related to inner city fringe areas, and suburban areas, Application of Remote sensing and GIS in Urban and Regional planning.

UNIT IV  PROJECT FORMULATION AND EVALUATION  10
Urban infrastructure projects planning, appraisal, formulation, feasibility and preparation of detailed project report, site planning, layout, road network, and service ducts under the road, Environmental impact assessment, and Traffic assessment.

UNIT V  URBAN GOVERNANCE AND MANAGEMENT  9
Planning laws; Town and Country planning act: Urban Development authorities Act, Constitutional (74th Amendment) Act 1992- Local bodies, Functions, powers and Interfaces

TOTAL: 45 PERIODS

OUTCOMES:
- Students will be aware of various Acts, Policies and Programmes related to Urban Planning and Development.
- Students will be in a position to formulate, appraise and conduct feasibility studies on urban projects

REFERENCES:
1. CMDA, Second Master Plan for Chennai, Chennai 2008
4. Singh V.B, "Revitalised Urban Administration" in India, Kalpaz publication, Delhi 2001

TE8211  CAD FOR TRANSPORTATION ENGINEERING  L T P C
0 0 4 2

OBJECTIVE:
- Helps in formulation and evaluation of Transportation Engineering projects using softwares

LIST OF EXERCISES
Formulation and evaluation of the following Transportation Projects.
i) Rotary Design
ii) Traffic signal Design
iii) Multi level / Surface level Parking Design
iv) Public transport route evaluation
v) Transport Planning for a small area

LABORATORY EQUIPMENT REQUIREMENTS
(For a batch of 25 students)

1. Automatic traffic counter - 2 Nos.
2. Dopplar radar - 2 Nos.
3. Road measurement and data acquisition system - 1 No.
5. Five gas analyzer - 1 No.
7. Total station - 1 No.
8. Softwares such as TRANSYT, CUBE, ARC GIS, Emme/2, TransCAD and Geomedia - 6 Nos.(one in each software)

Total number of equipments - 10
Total number of softwares - 6

OUTCOME:
• The students would have gained knowledge on various Transportation software tools and their application in solving transportation problems on a real time basis.

TE8301 TRAFFIC FLOW THEORY L T P C 3 0 0 3

OBJECTIVE:
• To impart knowledge in Traffic Flow Characteristics, Flow Modeling and Computer Simulation

UNIT I TRAFFIC FLOW FUNDAMENTALS 10

UNIT II TRAFFIC FLOW CHARACTERISTICS 10

UNIT III QUEUING MODELS 8
Queuing Theory – Types of Queuing Model – Queuing Characteristics and Behaviour – Transition Diagram – Queuing Cost Model Application to Traffic Engineering

UNIT IV TRAFFIC DELAYS 8
Delay at Intersections - Type of delays - Manual measurement – Saturated and oversaturated intersections – Arrival Pattern
UNIT V  SIMULATION MODELS

OUTCOME:
• Students would have knowledge of Traffic Flow characteristics and the theory of Traffic Flow that would help them to develop an efficient transport system.

REFERENCES:

TE8302 TRANSPORT ECONOMICS

OBJECTIVE:
• Provides knowledge in economic evaluation and Public private partnership in developing road infrastructure projects and application of systems simulation techniques in modeling transport economic systems.

UNIT I  ECONOMIC EVALUATION

UNIT II  MODELING OF ROAD USER COSTS
Components of vehicle operating cost – Factors affecting vehicle operating cost – Value of Travel Time Saving - Accident Cost – Concept of Route Switching Mechanism. - Ripple effects in developing new infrastructure – Simulation Modeling exercise.

UNIT III  TRANSPORT DEMAND SUPPLY CONCEPT

UNIT IV  TRANSPORT PRICING

UNIT V  FINANCING TRANSPORT SYSTEM

TOTAL: 45 PERIODS
OUTCOME:
- Students would be equipped with the economic principles in dealing with transport supply and demand.

REFERENCES:

TE8001 ADVANCED SYSTEM DYNAMICS MODELING IN TRANSPORTATION ENGINEERING

OBJECTIVE:
- To provide advanced level of knowledge in System Dynamics Modeling in Transportation Engineering

UNIT I COMPLEXITY AND SYSTEMS THINKING 8

UNIT II ADVANCED MODELING EFFORTS 8

UNIT III ADVANCED SIMULATING TECHNIQUES 10

UNIT IV MODELING PROCESS 10

UNIT V SOPHISTICATED DYNAMICS MODELING 9

TOTAL: 45 PERIODS

OUTCOME:
- The students would have gained knowledge the simulation techniques in System Dynamics Modeling in Transportation Engineering

REFERENCES:
2. Thirumurthy A.M., Environmental Facilities and Urban Development in India – A System Dynamics Model for Developing Countries, Academic Foundations, India, 1992

TE8002 AIRPORT SYSTEM PLANNING AND DESIGN L T P C
3 0 0 3

OBJECTIVE:
- Provides a basic understanding on Airport Systems Planning and Operation

UNIT I AIRPORT PLANNING
10
Airport – Accessibility – Transport Connections – Road and Rail, Expansion – Feasibility Studies – Environmental and Social Issues – Forecasting Future Traffic – Airfield Capacity and Delay - Aircraft characteristics – Airport Site Selection

UNIT II AIRPORT COMPONENTS
10
Airport Classification, Planning of Airfield Components – Runway, Taxiway, Apron, Hanger, Passenger Terminals

UNIT III AIR ROUTE PLANNING AND EVALUATION
9
Demand driven dispatch – Airline Fleet Planning Models – Network Revenue Management – Airport Performance, Slot Issues, Hub Operation, Demand Management, Multi-airport Systems

UNIT IV PASSENGER CHOICE, SCHEDULING AND FLEET ASSIGNMENT
7
Load Factor Analysis, Airline Schedule Development, Introduction to PODS Passenger Choice Models, Decision Window Model, Fleet Assignment

UNIT V AIRLINE ECONOMICS
9
Pricing – Privitization and Deregulation, Willingness to pay and Competitive Revenue Management

TOTAL: 45 PERIODS

OUTCOME:
- Students would have understood the basics of air route Planning, Network revenue Management.

REFERENCES:
OBJECTIVE:

- Provides an exposure to various Environmental Laws and importance of EIA on Transportation Projects with respect to noise, air pollution, visual intrusion etc.

UNIT I  ENVIRONMENTAL STANDARDS IN URBAN AREAS AND EIA  
Laws concerned with protection of the environment such as Environmental Protection Act, Air and Noise Pollution Act, Motor Vehicle Act, Town and Country Planning Act, Development Control Regulation, Coastal Regulation Zone

UNIT II  MEASUREMENT AND POLLUTION PREDICTION  
Measurement of Air and Noise Pollution, Land Acquisition, Rehabilitation, Collection, Compilation and Presentation of Pollution and Impact Data, Measuring Impact before construction, at the time of construction and after construction, Prediction, Modeling and Validation

UNIT III  ENVIRONMENTAL QUALITY AND MANAGEMENT  
Importance of EIA, Environmental Appraisal, EIA Statement, Vehicle and Traffic Noise, Ambient Noise Level, Health Effects, Vibration – Damage to building, Exhaust Emission – Pollutant, Health effects, Air Pollution, Urban Ambient Air Quality Standards, Effects on Human being, Vegetation and Animals

UNIT IV  ENVIRONMENTAL MAINTENANCE AND LEGAL SYSTEMS  

UNIT V  MITIGATIVE MEASURES AND POLICIES  
Mitigative Measures for Air and Noise Pollution Policies and Strategies, Involvement of Stakeholders, Public Participation, Institutional Arrangements.

OUTCOME:

- Students would have understood the impact of Transportation projects on the environment and to adopt mitigative measures in the planning stage.

REFERENCES:

3. David Banister; "Transport Policy and Environment" E&FN Spain, 1999
UNIT II    ITS ARCHITECTURE AND HARDWARE  9
Dynamic Message Sign – GPRS – GPS – Toll Collection

UNIT III    INTERSECTION MANAGEMENT  10
Video Detection – Virtual Loop - Cameras - ANPR – IR Lighting – Integrated Traffic Management –
Control Centre – Junction Management Strategies

UNIT IV    ADVANCED TRANSPORT MANAGEMENT SYSTEM  10
ATMS – Route Guidance – Issues - Travel Information – Pre Trip and Enroute Methods – Historical –
Components – Algorithm

UNIT V    ADVANCED TRAVELLER AND INFORMATION SYSTEM  8

TOTAL: 45 PERIODS

OUTCOME:
• On completion of the course the students would have knowledge on the various Principles and
  Aspects of Intelligent Transport System.

REFERENCES:

TE8005 LOGISTICS IN TRANSPORTATION ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
• Provides an understanding on Freight Transport, Modeling, Location of the Facility and its Management

UNITI LOGISTICS  7
Introduction – Trade Logistics Service, Freight Costs – Freight Demand Models

UNITII FREIGHT TRANSPORT  10
Econometric Models for Freight Forecasting – Input Output Models – Regional Network Systems –
Graph Theory Application in Network Planning

UNIT III DISTRIBUTION MANAGEMENT  10
Supply Chain – Warehousing – Facility Location, Inventory – Mode Choice – Distribution System,
Vehicle Routing and Scheduling
UNIT IV  LOGISTICS MANAGEMENT
Logistics outsourcing – IT Application in Freight Logistics – Technology in Logistics Management – Intermodal Transportation

UNIT V  ITS APPLICATION IN FREIGHT TRANSPORT
Commercial Fleet Management, Toll Plaza Analysis

TOTAL : 45 PERIODS

OUTCOME:
• Students will have a knowledge on the principles and practice of Freight Transport Modeling and provision of the Facilities

REFERENCES

TE8006  PAVEMENT MANAGEMENT SYSTEM

OBJECTIVE:
• To introduce the concepts of design, evaluation and performance of existing and new flexible and rigid pavements with due emphasis on systems approach and performance prediction models.

UNIT I  PAVEMENT MANAGEMENT PROCESS
Historical background – general nature and applicability of systems methodology – basic components of Pavement Management System –Network and Project level of PMS - PMS functions- planning pavement investments.

UNIT II  EVALUATION AND PERFORMANCE

UNIT III  DESIGN STRATEGIES
Framework for pavement design – design objectives and constraints – basic structural response models – characterization of physical design inputs – generating alternative pavement design – economic evaluation of alternative design – analysis of alternative design strategies – selection of optimal design strategy.
UNIT IV PERFORMANCE PREDICTION MODELS
Techniques for developing prediction models – AASHO, CRRI and HDM models – computer applications – Identification of alternatives – deterioration modeling – priority programming Methods

UNIT V REHABILITATION
Repair of pavement defects – maintenance of flexible and rigid pavements – bituminous and cement concrete overlays – system analysis

TOTAL: 45 PERIODS

OUTCOME:
• The students would have knowledge on the concepts of design, evaluation and performance of flexible and rigid pavements

REFERENCES:

TE8007 RAIL TRANSPORTATION SYSTEMS – PLANNING AND DESIGN

OBJECTIVE:
• To expose the various aspects of planning and design of Rail Transportation Systems.

UNIT I INTRODUCTION
Railway Industry – Privatization – Financing – Competition with Road Transport

UNIT II DEPENDABILITY ASPECTS
Regularity, Reliability, Punctuality and Safety – Modern tools to improve dependability – Time Table – Development – Scheduling - Restoring

UNIT III MANAGEMENT OF RAILWAY OPERATIONS
Demand based Railway Planning – Freight and Passenger Train Services – Asset Maintenance and Management

UNIT IV URBAN RAIL TRANSIT PLANNING

UNIT V RAILWAY INFRASTRUCTURE
Modern Transit Facilities - Railway Track – Transfer Station – Structures – Bridges – Tunnels – Planning and Design aspects

TOTAL: 45 PERIODS

OUTCOME:
• The students would have gained knowledge on Rail Infrastructure Planning, Operation and Management.

REFERENCES:
1. Brain Richards, Transport in Cities

TE8008 REMOTE SENSING AND GIS IN TRANSPORTATION DEVELOPMENT

OBJECTIVE:
- Introduce the students, the recent techniques of Remote Sensing and GIS and its application in Traffic and Transportation Engineering

UNIT I INTRODUCTION TO REMOTE SENSING 10

UNIT II INTRODUCTION TO GIS 10
Basic Concept and Components – Hardware, Software – Data Spatial and non-spatial – Geo-referencing – Map Projection – Types of Projection – Simple Analysis – Data retrieval and querying

UNIT III DATA STRUCTURES AND ANALYSIS 9

UNIT IV BASIC APPLICATIONS IN TRANSPORTATION 8
Highway and Railway Alignment, location of transport terminals and roadside facilities, bus stops – Route optimization – Bus route rationalization – Accident analysis – Applications of Aerial Photography and Satellite Imagery

UNIT V ADVANCED APPLICATIONS 8
GIS as an integration technology – Integration of GIS, GPS and Remote Sensing Techniques – Advanced Traveler Information System (ATIS) – Automatic Vehicle Location System (AVLS)

TOTAL: 45 PERIODS

OUTCOME:
- The students would have knowledge on the basics of Remote Sensing and GIS techniques and their application in the Transport sectors.

REFERENCES:
OBJECTIVE:
- Helps in Design of Intersections, Interchanges, Parking and Terminal Facilities to be provided in an urban area

UNIT I  PRINCIPLES OF INTERSECTION DESIGN  8

UNIT II  DESIGN OF AT-GRADE INTERSECTIONS  10
Capacity and LOS, Design of Rotary and Signalised Intersections, Vehicle Actuated Signals, Signal Co-ordination, Area Traffic Control System (ATCS), Pedestrian Planning at Grade Intersections

UNIT III  DESIGN OF GRADE SEPARATED INTERSECTIONS  10

UNIT IV  PARKING FACILITIES  8
Parking – Demand – Characteristics – Space Inventory – Accumulation – Duration – Turn over – Index – Design of Multi Storeyed and Surface Parking facility

UNIT V  DESIGN OF TERMINAL FACILITIES  9

TOTAL: 45 PERIODS

OUTCOME:
- On completion of the course, the students would have gained knowledge on various urban transport infrastructure facilities and their design.

REFERENCES:

OBJECTIVE:
- To expose the various aspects of planning and design of Water Transportation Systems.

UNIT I  INTRODUCTION  9
Fresh Water and Salt Water Navigation – Ocean, Currents and Tide – Canals and Waterways – Ports – Types of Ships

UNIT II  LOGISTICS AND MULTIMODAL TRANSPORT  9
Containers – Distribution and Collection by Road and Rail – Vehicles and Equipment used – Trade Routes
UNIT III PORT AND TERMINAL MANAGEMENT
Role of ports in trade and transport – Port facility for handling liner, dry bulk and liquid trade – Basics of Port Business – Customs – Immigration, Port Health – Marine Safety – Pricing – Traffic Management in Port Premises

UNIT IV PORT PLANNING
Traffic Forecast, Demand, Users, Capacity – Berth occupancy – Service time – Waiting time – Principles of Planning Port Layout – Handling characteristics – Voyage Estimating

UNIT V INLAND WATER AND OTHER MODES OF TRANSPORT
Inland Water Transport – Planning, limitations and advantages – Case Studies – Pipelines – Ropeways – Beltways – other means of transport – Characteristics and Applications

OUTCOME:
• Students would have gained knowledge on various aspects of planning and design of Water Transportation Systems.

REFERENCES:
1. Leslie A.Bryan, “Principles of Water Transportation”, University of Chicago Press
3. “Shipping and Inland Water Transport for Eleventh Five Year Plan” – Report by Planning Commission