

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

1 : MODELLING, ANALYSIS AND SIMULATION

Course Objective

To cover concepts, techniques, tools for modeling and simulation systems and environments through the use of computers.

Course Contents :

Modelling Process : Taxonomy of model types; Steps in model building; Simulation; Algorithms and Heuristics; Simulation Languages

Primitive Models : Establishing relationships via physical laws; Establishing relationships via curve fitting; Parameters estimation problems; Elementary state transition models.

Forecasting : Nature of data; Statistical attributes of data; probability distributions and their mechanisms; Generation of random numbers; Time series.

Pattern Recognition : Neighborhood and distances; Cluster analysis,, Individual and group preference patterns.

Growth and Decay Processes : Discrete and continuous growths; Limits to growth; Competition among species; Growth process and integral equations; Discrete event approach; population planning.

Simulation of Discrete and Continuous Processes : Monte Carlo methods; Stochastic Simulation; System identification; Inverse problems; Virtual reality; typical example and case studies related to Civil Engineering.

Pre-requisite : Nil

Reference Books:

1. R Haberman, Mathematical Models, Prentice Hall.
2. D. P. Maki and M. Thompson, Mathematical Models and Applications, Prentice Hall
3. R.E. Shannon, System Simulation: Art and Science, Prentice Hall

Practical:

Based on content following practical are carried out:

1. Introduction to modeling in transportation engineering.
2. Basic laws and applications of probability.
3. Probability distributions.
4. Programmes of probability distributions and applications in problem solving.
5. Random number generation.
6. Queuing theory problems and application in transportation.
7. Semester problem.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

2 : TRAFFIC ENGINEERING AND FIELD STUDIES

Course Objectives :

The contents of this course have been developed in such a manner, so that trained students may contribute to the design, operation and maintenance of a safe and efficient transportation system. The course content shall enrich the students with the knowledge for assessing traffic engineering problems quantitatively.

Course Contents :

Introduction. Traffic Characteristics, Traffic Studies. Traffic Controls and Operations. Planning and Administration, New Technologies.

Pre-requisite : Nil

Reference Books :

1. Mc Shane, W.,R. and Roes, R.P. "Traffic Engineering", Prentice Hall, Englewood Cliffs, New Jersey 1990.
2. Pignataro, L J., "Traffic Engineering : Theory and Practice" Prentice Hall, Inc., Englewood Cliffs, New Jersey, 1973
3. Matson, T.M., Smith, W.S., and Hurd, F.W., "Traffic Engineering" McGraw Hill Book Company, Inc. New York
4. Kadiyali L. R., "Traffic Engg. & Transport Planning", Khanna Publishers, Delhi-6

Practical:

To achieve the objective the following practical will be conducted;

1. Traffic volume studies
2. Spot –speed studies
3. Moving car method observations
4. Parking studies
5. Origin –Destination studies
6. Problems related to traffic engineering
7. Desire line diagrams.
8. LOS study using VRT
9. Semester problem

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

3 : HIGHWAY MATERIALS & TESTING

Course Objective:

To provide detailed knowledge about characteristics, testing, and standard specification of various types of highway materials keeping in view the serviceability requirements of highways pavements.

Course Contents :

Introduction – Highway Materials, Aggregates, Binders, Additives and their Suitability. Aggregates – Physical and Strength Characteristics. Grading Requirements and Proportioning, Texture, Polishing and Skid Resistant. Bituminous Binders – Classification, Characteristics and Applications, Road Tars, Fluxing of Binders. Theological Characteristics – Adhesion and Stripping Penetration Index, Viscosity, Temperature Susceptibility of Viscosity, Modified Binders, Fillers and Theory, Specification. Bituminous Mixes – Design of Bituminous Mixes and Methods of Testing, Marshal, Hubbard, Hveem and Triaxial Method. Concrete Paving Mixes – Mix Design Methods, IRC, Absolute Volume, Road Note No. 4, Vibrated Concrete Mix design, Design of DLC and SFRC Mixes.

Pre-requisite : Nil

Reference Books :

1. Kerbs and Walkes, Highway Materials, McGraw Hill Book Co., 1971
2. ASTM Highway Testing Manuals – EI Centre
3. Relevant IS, IRC, ASTM Codes.

Practical

1. Terminology of non-bituminous materials, bitumen and bitumen-aggregate.
2. Highway stone aggregate testing.
3. Highway bitumen material testing.
4. Theological characteristics of adhesion and stripping.
5. Bituminous paving mixes and marshall mix design.
6. Modified binders and quality control requirements of it.
7. IRC concrete mix design.
8. Concrete mix design using road note no. 4 method.
9. Design of SFRC mixes.
10. Seminar.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

4 : TRAFFIC FLOW THEORY AND MANGEMENT

Course Objectives :

To study the movement of vehicles in a network mathematically and possible management measures for operating the highway facility efficiently.

Course Content :

Introduction, Components of Traffic Flow System, 3-Component System, Modern Concept in System Identification, Driver Behaviour Modelling, Simulation, The controlled Access Concept, Freeway Concept, System Performances, Measures of Effectiveness. Mathematical Modelling, Probabilistic and Stochastic Models of Traffic Flow Process, Discrete and Continuous Modelling Headways, Gaps and Process of Gap acceptance, Macroscopic Models, Car-Following Model, Queueing Models, Fundamental and Developments of Queueing Processes, Applications, Fundamental of Traffic Management, Principles and Methodology, Traffic Systems Management, Techniques of Management, Exclusive Bus Lanes Traffic Management Techniques, Speed Control and Zoning, Parking Control, Traffic Segregation and Channelization, Principles and Design of Traffic Signs, Their Placement and Visibility. Transportation System Management, Route and Network Management, Area Traffic Management, City Wide Traffic Control and Management, Centralized Data Processing and Monitoring.

Pre-requisite : Nil

Reference Books :

1. Drew D.R., "Traffic Flow Theory and Control", Mc Graw Hill Book Company, New York, 1968
2. May A.D. "Traffic Flow Fundamentals", Prentice Hall, Englewood Cliffs, New Jersey, 1990
3. Garber N.J., Hoel L.A., "Traffic and Highway Engineering", West Publishing Company, New York, 1988
4. Khisty C. J. "Transportation Engineering – An Introduction", Prentice Hall, Englewood Cliffs, New Jersey, 1990.

Practical:

1. Traffic flow characteristics
2. Analysis of speed, flow and density relationships
3. General and linear speed- density relationship
4. Problems on bottleneck and shockwaves
5. TSM objective and process layout
6. Air Qqqquality impact
7. Transportation demand management and ITS
8. Traffic segregation and bikeways
9. Parking studies and management
10. Semester problem

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

5: TRANSPORTATION PLANNING

Course Objectives :

To familiarises the students about the planning process and techniques for urban areas. The course also introduces the state level planning, regional planning and corridor planning.

Course Content :

Hierarchical Level of Planning, Passenger and Goods Transportation, General Concept and Process, Urban Travel Characteristics, Private & Public Travel Behaviour Analysis Travel Demand Estimation and Forecasting, Trip Generation Methods and their Comparison, Modal Split Analysis, Behavioural Approach, Two stage Modal Split Models. Trip Distribution – Growth Factor Method, Gravity Model, Intervening Opportunity and Competing Opportunity Models, Entropy Maximizing and Linear Programming Methods. Network Assignment, Capacity Restrained and Simultaneous Distribution, Direct Demand Models. Land-use Transport Planning, Transport Related Land use Models. Corridor Type Travel Planning, Statewide and Regional Transportation Planning.

Pre-requisite : Nil

Reference Books :

1. Hutchinson, B.G., “Principles of Urban Transport Systems Planning “ Mc Graw Hill, New York, 1974
2. Kadiyali, L. R. “Traffic Engineering and Transport Planning”, Khanna Publishers, 1997
3. Florian Michael, “Transportation Planning Models”, Elsevier Science Publishers, B.V. Netherlands, 1984
4. Wright H, and Paquette, R. J., “Highway Engineering”, John Wiley & Sons, U.S.A., 1987
5. Ortuzar, J. D., Willumsen, L. G. “Modelling Transport”, John Wiley & Sons, Newyork.

Practical

Based on the content following problems will be solved using computers:

1. Four Stage Modelling in Transportation Planning
2. Trip Generation models: Regression model
3. Trip generation model: Cross- classification
4. Trip distribution methods
5. Mode choice/ modal split problems
6. Network coding
7. Trip Assignment
8. Land-use planning models.
9. Semester problem

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective1 : AIRPORT PLANNING AND DESIGN

Course Objective :

The main objective of this course is to make the students aware of the basic principles, Techniques and methodologies of planning and design of airports.

Course Contents :

History and development of aviation in India, Aviation organizations and their functions, Deregulation. Aircraft characteristics, Master plan, Site selection, Obstructions, Air traffic, Demand and forecasting, Airport configuration. Geometric design of landing area. Runway orientation, Exit taxiways, Separation clearance. Structural design of landing area, ESWL concepts, FAA method and LCN-PCN method of pavement design, Modern evaluation techniques. Runway capacity and its improvement, Delay related capacity, Gate position and gate capacity. Terminal area, Space requirements, Aircraft parking system, Terminal related visual aids. Air traffic control, Flight rules, Navigational and landing aids, VASI, PAPI enroute air traffic control, ILS, MLS. Airport drainage, Design runoff, Surface and subsurface drainage. Airline cost, Methods of costing, Pricing and policies, Hub and spoke operations.

Pre-requisite : Nil

Reference Books :

1. Khanna, S.K., Arora, M.G. and Jain, S.S., "Airport Planning and design, Nem Chand & Bros., Roorkee, 1999
2. Horenjeff, R. and McKelvey, F. "Planning and Design of Airports", Fourth edition, Mc Graw Hill Company, New York, 1994.
3. Ashford, N. and Wright, P.H., "Airport Engineering", Third edition, John Wiley and Sons, New York, 1992.

Practical:

1. Runway orientation and wind rose diagram (Data Collection and Drawing)
2. Computation of runway length with sketches: plans and sections
3. Corrected runway length calculations
4. Design of exit taxiway
5. Runway pavement design: LCN,FAA and CBR Methods
6. Flow of passenger and cargo in the terminal area.
7. Terminal lay outs
8. Runway drainage: Lay out and Design
9. Site visit to International/ Domestic airport
10. Semester problem

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective1 : HIGHWAY GEOMETRIC DESIGN

Course Objective :

In this course, it is proposed to present a variety of design standards for different types of highway facilities. Besides familiarity with the standards, the detailed design of traffic facilities such as at-grade intersections, flyovers and parking lots shall be useful to the students in the future professional practice.

Course Contents :

Design controls and criteria. Roadway capacity analysis and design of lane requirements. Cross-section elements. Sight distance. Horizontal alignment. Vertical alignment. Geometric of at-grade intersections and Interchanges Geometric design for parking.

Introduction to MXROADS & HEADS softwares in Road Design.

Pre-requisite : Nil

Reference Books :

1. Garber, N. J., Hoel, L.A., "Traffic and Highway Engineering", West Publishing Company, New York, 1988
2. Khistry, C.J., "Transportation Engineering – An Introduction", Prentice Hall, Englewood Cliffs, New Jersey, 1990
3. Jones, J.H., "The Geometric Design of Modern Highways", E&FN SPON Ltd., London, 1961
4. Relevant codes IRC, AASHTO Standards.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective1 : PAVEMENT SYSTEMS MANAGEMENT

Course Objectives

To counteract the problems of bad condition of roads causes discomfort, safety risk, larger travel time and travel cost, more fuel consumption and affected the quality of social life, national security and national economy. To create manpower in the country in the area of pavement systems management to meet the present and future needs, regarding overall road development.

Course Contents :

Pavement Management Process. Pavement Evaluation and Performance. Design Alternatives; Analysis Evaluation and Selection. Implementation of PMS. Case Studies Related to PMS.

Pre-requisite : Nil

Reference Books :

1. Haas, R.C.G. and Hudson, W.R., "Pavement Management System", McGraw Hill Company, Inc. New York
2. Yoder E.J., "Principals of Pavement Design", Second Edition, John Wiley & Sons, Inc. New York 1975.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective2: HIGHWAY CONSTRUCTION AND MANAGEMENT

Course Objectives :

To impart detailed information on the construction specifications and techniques of various types of roads, and procedures for laboratory and field testing of paving mixes and quality control practices.

Course Contents :

Types of Highway Construction, Water Bound Macadam (WBM) , Wet Mix Macadam (WMM), Dry Lean Concrete (DLC), Stabilized Roads, Bituminous Construction and Cement Concrete Constructions. Types of bituminous constructions, Interface treatments, Wearing Courses for roads and Bridge deck slabs, Selection of wearing course under different climatic and traffic conditions, IRC specifications, Construction techniques and Quality Control, Concrete road construction, tests on concrete mixes, Construction equipments, Methods of construction of joints in concrete pavements, Quality Control in construction of concrete pavements. Construction of continuously reinforced, Prestressed, Steel Fibre Reinforced (SFRC), Pavements, IRC, MOST, ACI specifications, Ferrocement, Ferro-fibrocrete, Pavement and overlay construction. Hill Landsides – causes and control measures. Hill road construction practices, Construction of bituminous and cement concrete roads at high attitudes, Hill road drainage, Construction and maintenance problems and remedial measures.

Pre-requisite : Nil

Reference Books :

1. H.M.S.O. (London), “Bituminous Materials in Road Construction”, 1966
2. Hewes, Laurance, Isley “American Highway Practice”, New York, John Wiley and Sons, Inc. Vol. II, 4th Edition, 1949
3. Sherrad H.M., “Australlian Road Practices”, Melbourne University Press, 1958
4. H.M.S.O. (London), Concrete Roads, 1966
5. Sparkes, F.N. and Smith A.F., “Concrete Roads”, Edward Amola and Co., London, 1952
6. MOSRTH Roads and Bridge Specifications.

Practical

1. Highway construction practices in flexible pavement: ER,GR,WBM,BBM,WMM
2. Highway construction practices in rigid pavements: PQC, Concrete Mix Design, Pavement construction
3. Joints in rigid pavements
4. Overlay and white topping constructions
5. Bar chart, CPM and PERT
6. Introduction to Microsoft planning software.
7. Highway construction Machinery
8. Visit to Highway construction site

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective2: MASS TRANSPORTATION SYSTEM

Course Objectives :

To develop and systematize the basic concepts and technical aspects of mass transportation system.

Course Contents :

History and role of Transit, Recent Trends Mass Transportation Characteristics. Demand Characteristics, Spatial, Temporal and Behavioural Characteristics of Transportation Demand. Urban Mass Transportation Planning, Demand Surveys, Estimation and Demand Projection, Four Stages of Planning. Performance Evaluation of Mass Transport System, Structure of Decision Making, Evaluation and Selection Methods, Selection Procedures, Economic Evaluation Methods. Terminals and their Functions. Design, Typical Characteristics. Scheduling, Service Analysis, Vehicle Dispatch Policy, Vehicle Requirements, Spacing of Bus Tropos, Route Spacing and Performance. Operational and Management Issues, Reserved Bus Lanes, Signal Preemption, Dial-a-Bus, Vehicle Monitoring and Control System, Modal Coordination, Special Studies, Underground Transportation, Para transit, Rail Transit, Case Studies.

Pre-requisite : Nil

Reference Books :

1. Vuchic V.R., "Urban Public Transportation System and Technology", Prentice Hall, Inc. Englewood Cliffs, New Jersey, 1981.
2. Agarwal M.K., "Urban Transportation in India", INAE, Allied Publishers Ltd., 1996.
3. Grey G.E. & Hoel, LA, "Public Transportation" Prentice Hall, Englewood Cliffs, N.J.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major elective 3 : GIS – GPS IN CIVIL ENGINEERING

Course Objectives :

This course covers the fundamental of Geographical Information System. Some applications irrelevant to various engg. Disciplines have also been described.

Course Contents :

Introduction : Geographical Concepts and Terminology, Difference between Image Processing System and Geographic Information System (GIS), utility of GIS, various GIS packages and their salient features, Essential components of a GIS. Data Acquisition : Scanners and Digitizers, Method of Digitization, Raster and Vector Data, Data Storage, Verification and Edition. Data Preprocessing; Format Conversion, Data Compression, Data Reduction and Generalization, Run Length Coding, Merging, Edge Matching, Rectification and Registration, Interpolation. Data Base Structure - Hierarchical Data, Network Systems. Relation Database. Data Management - Conventional Database Management Systems, Spatial Database Management. Data Manipulation and Analysis – Reclassification and Aggregation, geometric and Spatial Operations on Data Measurement and Statistical Modelling. Data Output – Types of Output. Application of GIS in various Natural Resources Mapping & Monitoring, Engineering Application, GPS Application.

Pre-requisite : Nil

Reference Books :

1. Principles of Geographic information Systems for Land Resources Assessment, P.A. Borough, Oxford University Press, 1986
2. Manual of Remote Sensing Vol. 2, American Society of Photogrammetry and Remote Sensing.
3. Geographic Information Systems : A Management Perspective, Stan Aronoff, WDL Publications, 1991.

Practicals :

The Practical design based on theory classes & practical applicability.

1. Introduction to GPS receiver
2. Data capture by various techniques using GPS receiver, Part I
3. Data capture by various techniques using GPS receiver, Part II
4. Data processing using software
5. Computing position, time and velocity and preparing final output such as Maps and Reports.
6. Introduction to GIS Models : Raster and Vector Models
7. Map registration and Digitization process.
8. Attribute table creation and joining to vector data
9. Thematic map generation.

10 Semester problem: A case study of small area.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major elective 3 : PAVEMENT ANALYSIS AND DESIGN

Course Objectives :

To make the students fully conversant with the latest methods of analysis and design of flexible and rigid pavements along with their strengthening techniques.

Course Contents :

Importance and functions of various component of pavement structures, Stresses in flexible pavements, Analytical techniques, Multilayered solutions, Design concepts, Sub grade stresses and deflection, Shear failures, equivalent single wheel and axle loads, vehicle Damage factor, Loading characteristics, Static, Impact and repeated loads, Effects of dual and tandem axles. Tyre pressure and total load, Equivalent stress and equivalent deflection criterion, Wheel load, Climatic and environmental factors. Structural and functional distress in pavements, Design of flexible pavements, CBR method, Triaxial method, Mcleod method, Analytical methods, Multilayer elastic theory and design, Design for low cost pavements. Rigid pavements, Equivalent wheel load, Stresses, Sub grade theories, Westergaard's analysis , Methods of design for dense liquid, Elastic solid sub grades, Temperature stresses and their evaluation, CRC Pavements Prestressed concrete slabs, Tie bars, Dowel bars, SFRC pavements, Pavement flexible and rigid overlay, IRC method of design.

Pre-requisite : Nil

Reference Books :

1. E.J. Yoder, Principles of Pavement Design, 2nd Edition, 1975 John Wiley & Sons, Inc. New York.
2. Khanna & Justo, Highway Engineering – Nem Chand & Brothers, Roorkee, 1997
3. Kadiyali L. R. Principles & Practice of Highway Engg. Khanna Pub. 2000.
4. Chakroborty P., Das A, Principles of Transportation Engg., PH1, 2005

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective 4 : TRANSPORTATION ECONOMICS AND PROJECT EVALUATION

Course Objectives :

To highlight basic principles of economics, methods of cost analysis and techno economic feasibility of project.

Course Contents :

- 1) Principles : Purpose and major considerations in Transport economics. Analysis, Identification and measurement of transportation cost and benefits.
- 2) Cost and Benefits : Capital Cost, Inflation cost, Interest during construction, maintenance cost , Road user cost, Vehicle Operating cost, Accident Cost, Congestion Cost, and Pricing. Non user cost and consequences. Saving and Benefits, Road user benefits, and Consumer surplus. Social Costs and benefits from transportation projects.
- 3) Methods of Economic Analysis :- Characteristics and basic understanding of methods, Comparison and Limitations of various methods. Ranking of independent alternative projects.
- 4) Techno Economic Feasibilities Studies and Evaluation of Alternative Projects . Welfare Economics, Evaluation and appraisal of transport investments. Special Considerations for transportation economics in analysis for developing countries. independent alternative projects.

Reference Books :

1. Baker : Hand book of Highway Engineering, Van Nostrand.
2. Heggie I. G. : Transport Engineering Economics, MC Graw Hill
3. Harison : The Economics of Transport Appraisal, Croom Helm , London
4. Alder A : Economic Appraisal of Transport Projects.
5. Garber & Hoel : Traffic & Highway Engineering , West Publishers
6. IRC SP 30 : Manual on Economic Evaluation of Highway Projects.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective 4 HIGHWAY SAFETY AUDITS

Course Content:

Introduction to road safety engineering, role of road safety policy, road safety plans, causative factors in accidents, biomechanics of accidents and crashworthiness (frequency and nature of injuries, biomechanics of impact, injury severity scaling, vehicle crashworthiness) collision analysis and effective road safety engineering, education and enforcement measures for accident reduction. Estimating accident savings and economic benefits of it.

Procedures in road safety audit, design standards, audit tasks, stages of road safety audit, key legal aspects. Road design issues in RSA's. Structuring RSA report.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective 4: INTERSECTION DESIGN AND ANALYSIS

Course Objectives :

To make the students aware of the problems of intersections, the basic principles of their design, operations and control. Various methods in for use in different countries for analyzing and Intersection are to be highlighted in this course.

Course Content :

General consideration for location of various types of intersection, Principle of design, Types of manouvres, Relative speed, Conflict points and areas, Intersection geometrics. Capacity and LOS concepts, Operational analysis of signalized Intersections by HCM method, Swedish Method, British Method, Delay and its evaluation. Priority control and no control intersections, Capacity and level of service of uncontrolled Intersections. Rotary Intersections, Justification, Design factors, design and capacity, Mini-roundabouts. Weaving Sections, Types, One sided and two sided weaving sections, Operational evaluation. Grade Separated Intersections, Types, Suitability and economic justification, design of grade separation, Interchange ramps, Capacity of grade separated intersections. Warrants for signal, Design of signal by HCM, Webster, and IRC method. Turn control by islands, Pedestrian control, Design of speed change lanes and median lanes, Intersections signs, Marking and lighting.

Pre-requisite : Nil

Reference Books :

1. Khistry C.J., "Transportation Engineering, An Introduction", Prentice Hall, New Jersey, 1990.
2. McShane, W. R. and Roes, R.P, "Traffic Engineering", Prentice Hall, New Jersey, 1990.
3. Institute of Transportation Engineers, "Transportation and Traffic Engineering Hand Book", ITE Prentice Hall, New Jersey, 1976
4. Hamburger, W.S., and Kell, J.H., "Fundamentals of Traffic Engineering", 11th Edition, ITS, California, 1984.
5. Transportation Research Board, "Highway Capacity Manual", SR-209, TRB, 1985, 1994.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective 5 : MULTIMODAL TRANSPORTATION SYSTEM PLANNING & DESIGN

Course Objective :

To make the student aware of the technological aspects of Multi Model Transport System (MMTS) analysis, Planning and design methods.

Course Contents :

Transportation scenario, Technology Vision – 2020, Public transportation, Multi model transport technology, MRTS, LRT, Street Car, Sky train, Multiple modes. Four stage planning, Behaviour analysis, Multinomial and nested logit models, Revealed and stated preference. Planning of multi modal transport system for Indian cities. Design of integrated network, Parking facilities, Land use, Station area development, Operating strategy of public transport system. Case Study.

Reference Books :

1. Vuchic, V.R. “Urban Public Transportation System and Technology”, Prentice Hall Inc., New Jersey, 1981
2. Agarwal, M.K., “Urban Transportation in India”, INAE, Allied Publishers, New Delhi, 1996.
3. Simpson, B.J., “Urban Public Transport Today”, Chapman and Hall, London U.K., 1994
4. White Peter, “Public Transport – Its Planning, Management and Operation”, UCL Bros. 1995.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Major Elective 5 : TRANSPORTATION SYSTEM ANALYSIS

Course Objectives :

This course shall provide a basic introduction to the field of transportation system analysis incorporating concepts from engineering, operation research and public policy analysis.

Course Content :

System Elements and Attributes, Components of Transportation System, Transportation Networks, Vehicles and Containers, Challenges of Transportation System Analysis, Transportation Scenario, Prediction of Flows, Systems of models, Cost concepts, Theory of Supply and demand, Demand for Transportation, Derived Demand, Model of Consumer Behaviour, Applications in Passenger and Freight Transportation. Case Study on Disaggregate Prediction of Behaviour, Choice Model, Service Levels, Incremental Analysis, Transportation System Performance, Components, Spatial and Temporal Structure, Performance Function Examples. Consumer Choice, Dimensions and their Implications, Choice Structure, Aggregate and Disaggregate approach, Multinomial Logic Model . Travel Market Equilibration in Networks, Basic Issues, Behavioural Basis of Path Choice, Possible Flow Distribution Rules, Influence of Network Representation and other Approximations. Case Study on Network Analysis, Service Variables, Technologies, Flow dimensions, Equilibrium Model, Specification of Transportation and Activity System Options, Flow Pattern Prediction, Prediction of Impacts, New Alternatives.

Pre-requisite : Nil

Books :

1. Ben-Akiva, M., Lerman, S.R. "Discrete Choice Analysis : Theory and Application to Travel Demand", The MIT Press, Cambridge, 1987
2. Steenbrink P.A., "Optimization of Transport Network"., John Willey & Sons, New York 1978.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Inter disciplinary 1: TRANSPORTATION AND ENVIRONMENT

Course Objective :

To make the students familiar with the factors, measurements, Analysis, prediction techniques for noise and pollution and their control measures.

Course Contents :

Modes of Transportation, Mixed traffic flow, Transport related pollution, Technology Vision – 2020. Urban and non-urban traffic noise sources, Noise level factors, Effects of traffic noise, Measurement and prediction, Control measures, Noise studies, Noise standards, Road transport related air pollution, Sources of air pollution, Effects of weather conditions, Vehicular emission parameters, Pollution standards, Measurement and analysis of vehicular emission, Mitigative measures. EIA requirements of highway projects, Procedures, MOEF/World Bank/IRC/UK Guidelines, EIA practices in India.

Pre-requisite : Nil

Reference Books :

1. Salter, R. J. "Highway Traffic Analysis and Design", Macmillan Press Limited, London, 1974.
2. Wilson, C.E. "Noise Control Measurement, Analysis and Control of Sound and Vibration", Harper and Row Publishers, New York, 1989.
4. Grand Jean, E. Gilgen A., "Environmental Factors in Urban Planning", Taylor and Francis Limited, London, 1976.

Assignments/Tutorials /Practicals

Glossary of technical terms of noise pollution.

1. Noise emitted by road traffic motor vehicles.
2. Detrimental effects of road traffic motor vehicles on human health.
3. Measurement using sound level meter and methods of prediction of highway traffic noise pollution.
4. Techniques of road traffic noise reduction.
5. Seminar.

Inter disciplinary 1 APPLIED STATISTICS

1. Introduction & Sampling Techniques: Frequency distribution; Mean; Standard deviation; Standard error, Skewness; Kurtosis; Definitions and Applications; Simple random sampling; Stratified sampling; Systematic sampling; Sample Size determination; Applications in Traffic Engineering,

2. Statistical Distributions:

Binomial, Poisson, Exponential and Normal distributions; Fitting of distributions; Mean and variance; Chi-square test of goodness-of-fit; Applications in Traffic Engineering.

3. Probability: Laws of Probability; Conditional probability and Independent events; Laws of expectation.

4. Regression And Correlation: Linear regression and correlation; Multiple correlation; Multiple correlation coefficient; Standard error of estimate; Analysis of Variance; Curvilinear regression; Applications in Transportation Engineering.

5. Multi Variate Data Analysis: Types of data; Basic vectors and matrices; Simple estimate of centroid, Standard deviation, Dispersion, Variance and covariance; Correlation matrices; Principal component analysis; Time series analysis.

6. Exact Sampling Distributions:

Chi-square distribution; Students T-distribution; Snedectors F-distribution.

7. Tests Of Significance & Confidence Interval - I: Large sample and small sample tests; Tests for single mean, Means of two samples, Proportions, two variances, two observed correlation coefficients, paired T-tests, Applications.

8. Tests Of Significance & Confidence Interval - Ii: Intervals for mean, variance and regression coefficients; Applications in Traffic Engineering problems.

References:

1. Basic Statistics - Simpson and Kafks; Oxford and IBH Calcutta, 1969.
2. Fundamentals of Mathematical Statistics – Gupta, S.C and Kapoor, K.V.Sultanchand.
3. Multivariate Data Analysis –Cootey W.W & Cohens P.R.;John Wiley &Sons.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

Interdisciplinary Elective2 : ROAD SAFETY

Course Objective:

With the advent of revolution in motorization the developing countries have increasingly been witnessed roads as death traps. The prime objective is to make aware the global road accident scenario-country/region specific problems and evolve strategies for minimizing the incidence of road accidents.

Course Content:

Overview of road safety, global road safety scenario in 21st century, vulnerable road users, safety for children, road accident data recording, road safety measures and evaluation – engineering (road safety audit and transport planning vis-à-vis safety), enforcement (traffic control regulation and driver training and testing) and education (mass educational campaign for safety consciousness, marketing of road safety) measures, road safety management, road safety policy and biomechanics (post injury management, hazards reduction). Accident costing and insurance. Safety devices, standards and specifications.

Ref:

- 1) Kadiyalli, L.R. (2000) “ Traffic Engineering and Transportation Planning”, Khanna publishers, Delhi.
- 2) Mike Slinn, Peter Guest and Paul Matthews-“Traffic Engineering Design-Principles and Practice”, published by Elsevier, New Delhi.

GUJARAT TECHNOLOGY UNIVERSITY

M.Tech.(Civil)Transportation System Engineering

Syllabus

SEMINAR (ON ANY CONTEMPORARY TOPIC)

Course Objectives

In this course, the traffic engineering, pavement engineering or transportation systems concepts on specific contemporary topic will be studied and tools for preparing reports will be used by students to prepare report. Reporting, writing and presentation skill development in engineering and technology is the main objective.

PRESENTATION OF LITERATURE REVIEW

Course Objectives and Contents

In this course, the student will read and review the technical papers/articles from international and journals/conferences in the chosen topics from the area of traffic engineering, pavement engineering or transportation systems. Tools for preparing reports and presentation will be used by students to prepare report and to make presentation. Reporting and presentation skill development in engineering and technology is the main objective.

DISERTATION PHASE I

Course Objectives

The study of various topics from existing literature and application of the same for specific problem. Experiment Design and structure of report generation is main objective.

PAPER PRESENTATION

Course Objectives

The student will write a research papers from the research work carried out in the format desired by publishing agency and make presentation. This will improve research and writing capabilities.

DISERTATION PHHASE II

Course Objectives

Based on topic selected in **DISERTATION HHASE I** the actual cases will be studied with concepts data collection analysis simulation or relevant advanced methods and final thesis report will be prepared and presented.