MAHATMA GANDHI UNIVERSITY

SCHEME AND SYLLABI

FOR

M. Tech. DEGREE PROGRAMME

IN

CIVIL ENGINEERING

WITH SPECIALIZATION IN

TRANSPORTATION ENGINEERING

(2013 ADMISSION ONWARDS)

SCHEME AND SYLLABI FOR M. Tech. DEGREE PROGRAMME IN CIVIL ENGINEERING WITH SPECIALIZATION IN TRANSPORTATION ENGINEERING

SEMESTER-II

Sl. No	Course No.	Subjects	Hrs/Week			Evaluation Scheme (Marks)					Credits (C)
						Sessional			ESE	Total	
			L	T	P	TA	CT	Sub Total			
1	MCETE 201	Urban Planning	3	1	0	25	25	50	100	150	4
2	MCETE 202	Transportation Economics	3	1	0	25	25	50	100	150	4
3	MCETE 203	Traffic Engineering II	3	1	0	25	25	50	100	150	4
4	MCETE 204	Pavement Evaluation	3	1	0	25	25	50	100	150	4
5	MCETE 205	Elective III	3	0	0	25	25	50	100	150	3
6	MCETE 206	Elective IV	3	0	0	25	25	50	100	150	3
7	MCETE 207	Transportation Engineering Lab II	-	-	3	25	25	50	100	150	2
8	MCETE 208	Seminar II	-	-	2	50	-	50	0	50	1
Total			**18**	**4**	**5**	**225**	**175**	**400**	**700**	**1100**	**25**

Elective III (MCETE 205)		Elective IV (MCETE 206)	
MCETE 205-1	Traffic Flow Theory	MCETE 206-1	Computer simulation application in transportation engineering
MCETE 205-2	Transportation Facility Design	MCETE 206-2	Highway Materials
MCETE 205-3	Road Safety and Environment	MCETE 206-3	Public Transport Planning
MCETE 205-4	Ground Improvement and Reinforced Earth Techniques	MCETE 206-4	Decision Models in Management

L- Lecture, **T**- Tutorial, **P**- Practical, **C**- Credits

TA- Teacher's Assessment (Assignments, attendance, group discussion, tutorials, seminar)

CT- Class Test (Minimum of two to be conducted by the Institute)

ESE- End Semester Examination (To be conducted by the Institute through concerned affiliating university.)

Electives: New Electives may be added by the department according to the needs of emerging fields of technology. The name of the elective and its syllabus should be submitted to the University before the course is offered.

MCETE 201 **URBAN PLANNING**

L	T	P	C
4	0	0	4

Module 1: Land use Activities and Spatial standards

Land use Activities: Analysis and prediction of important land use activities like population, employment, housing, shopping, leisure, transport.

Spatial standards: Spatial standards for residential, industrial, commercial and recreational areas, space standards for facility areas and utilities, Process of implementation, Provisions of Town Planning Act, zoning, subdivision practice, metro region concept.

Module 2: Sustainable Urban Structure and Road Networks

Urban structure, Location of transport facilities- Classification of roads and streets, Basic types of transport networks- Planning the sustainable region – Social city region- city centers, the inner city- suburbs- small towns and new communities, mixed urban-rural areas. Sustainable town.

Module 3: Urban Renewal

Urban Renewal: Growth and decline of cities. Factors in city re-vilastion, Meaning of urban renewal, Significance, Necessity, Objectives of re-planning, urban renewal as a part of metropolitan plan, the process of urban renewal, identification of renewal areas, renewal policies and strategies and management of renewal areas, central areas and their renewal.

Module 4: Concept of New Towns

Concept of New Towns: National and regional planning, Regional sustainability frameworks. Meaning, role and functions: Spatial planning and development considerations, scope and limitations of new town development, Indian and British experience of planning and development of new towns.

Recent Trends & Practices: In planning and development system in India, Outline of planning and development system in developed countries.

References:

1. Margaret Roberts, “Town Planning Techniques”, Hutchinson Educational Publication.

2. Modak N.V., Ambedkar V.N., “Town and Country Planning and Housing”, Orient Longman Limited.
3. Barry Cullingworth and Vincent Nadin’ “Town and Country Planning in The UK” Routledge.
4. Andrew Blowers, Ed, Planning for a sustainable environment- A report by the town and country Planning association, Earthscan Publication Ltd, London.
5. Ross J Gittel, “ Renewing Cities”, Princeton University Press.
6. Gupta R.G., Planning and Development of Towns, New Delhi.
7. Ramegauda K.S., “Urban and Regional Planning”, Mysore University

MCETE 202 TRANSPORTATION ECONOMICS

L	T	P	C
4	0	0	4

Module 1: Introduction

Introduction: Need for economic evaluation, costs and benefits of transport project, time horizon, basic principles, interest rate, time value of money, Supply and demand Models, Consumer's surplus and social surplus criteria, framework of social accounting: accounting rate of interest, social opportunity cost, rate of interest, social time preference rate of interest, accounting prices of goods and services, measuring input costs, applications of social accounting frame work.

Module 2: Benefits due to Transport Improvements and transport Costs

Benefits due to Transport Improvements: Direct Benefits: Reduced vehicle operation costs, value of travel time savings, value of increased comfort and convenience, cost of accident reduction, reduction in maintenance cost; negative benefits due to increased noise and air pollution. Indirect Benefits: Increased land values, increased development and demand.

Transport Costs: Fixed and Variable costs, cost of improvement, maintenance cost and other related costs, cost estimating methods, accounting for inflation, theory of transport supply and road planning.

Module 3: Economic Analysis

Economic Analysis: The generation and screening of project ideas. Different methods of economic analysis - Annual cost and benefit ratio methods, discounted cash flow method, determination of IRR and NPV. Examples of economic analysis of (i) different types of road surfaces (ii) different options for intersection improvement (iii) proposals for bypas to a city (iv) different strategies of pavement maintenance.

Module 4: Financing

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

References:

1. Winfrey R, “Highway Economic Analysis”, International Textbook Company.
2. Kenneth J. Button, “Transport Economics”, Edward Elgar Publishing

3. David A. Hensher, Ann M. Brewer, “Transport : An Economics and Management Perspective”, Oxford University Press
4. Emile Quinet, Roger Vickerman, “Principles Of Transport Economics”, Edward Elgar Publishing
5. Road User Cost Study, Central Road Research Institute
6. Ian G. Heggie, Transportation Engineering Economics, McGraw Hill.
7. IRC:SP:30-1993, Manual on Economic Evaluation of Highway Projects in India
8. Kadiyali L.R., “Principles & Practice of Highway Engineering”, Khanna Publishers,2003
9. Khanna S.K., Justo C.E.G., “Highway Engineering”, Nem Chand & Bros., Roorkee, 2001
10. Woods, K.B., Berry, D.S. and Goetz, W.H., `Highway Engineering', McGraw Hill Book Co.

MCETE 203 TRAFFIC ENGINEERING II

L	T	P	C
4	0	0	4

Module 1: Traffic Forecast and Design Hourly Volume for Varying Demand Conditions

Traffic Forecast: General travel forecasting principles, different methods of traffic forecast - Mechanical and analytical methods, Demand relationships

Design Hourly Volume for Varying Demand Conditions: Concept of Design vehicle units and determination of PCU under mixed traffic conditions, Price-volume relationships, demand functions. Determination of design hourly volume; critical hour concept.

Module 2: Highway Capacity and Accident Analysis

Highway Capacity: Factors affecting capacity, level of service; Capacity studies - Capacity of different highway facilities including unsignalised and signalised intersections. Problems in Mixed Traffic flow; Case studies.

Accident Analysis: Analysis of individual accidents and statistical data; Methods of representing accident rate; Factors in traffic accidents; influence of roadway and traffic conditions on traffic safety; accident coefficients; Driver strains due to roadway and traffic conditions.

Module 3: Traffic Flow Theory and Probabilistic Aspects of Traffic Flow

Traffic Flow Theory: Fundamental flow relationship and their applications, Traffic flow theories and applications; Shock waves; Queuing theory and applications.

Probabilistic Aspects of Traffic Flow: Vehicle arrivals, distribution models, gaps and headway distribution models; gap acceptance merging parameters, delay models, applications.

Module 4: Simulation

Simulation: Fundamental principle, application of simulation techniques in traffic engineering, general simulation process, formulation of simulation models, physical, analog and symbolic models, measure of effectiveness, analytical, numerical and Monte Carlo techniques, representation and scanning, physical and memorandum, comparison, applications.

1.

References:

1 Babkov, V.F. “Road conditions and Traffic Safety”, MIR publications, - 1975.

2 Kadiyali, L.R., “Traffic Engineering and Transport Planning”, Khanna Publications.

3 Drew, D.R., “Traffic Flow Theory and Control”, McGraw Hill Book Co.

4 Wohl and Martin, “Traffic Systems Analysis for Engineers and Planners”, McGraw Hill Book Co.

5 Pignataro, Louis, “Traffic Engineering - Theory and Practice”, John Wiley.

6 Barenbag, `Traffic Flow Theory' - Monograph

7 Jerry Banks, John S. Carson II, Bary L. Nelson, David M Nicol, “Discrete event system Simulation”, PHI India

MCETE 204 PAVEMENT EVALUATION

L	T	P	C
4	0	0	4

Module 1: Introduction and Pavement and surface condition

Introduction: Structural and functional requirements of flexible and rigid pavements, pavement distress, different types of failures and causes

Various factors affecting the surface condition, skid resistance and roughness measurements, causes and measures to reduce pavement slipperiness, unevenness, ruts, pot holes, cracks

Module 2: Evaluation of Surface Condition and Condition of pavement structure

Methods of pavement surface conditions evaluation by physical measurements, by riding comfort and other methods, their applications.

Factors affecting pavement structural condition, effects of subgrade soil, moisture, pavement layers, temperature and environment on structural stability

Module 3: Evaluation of pavement structural condition and model pavements

Evaluation of pavement structural condition by non-destructive tests such as FWD, BBD, plate load tests and other methods, evaluation by destructive test method and specimen testing.

Testing of model pavements under controlled conditions, test setup and instrumentations.

Module 4: Pavement Management Systems

Importance of PMS, objectives, project and network level management, evaluation models – AASHO, CRRI, HDM, Road Transport Investment Model.

References:

1. Yoder and Witczak, “Principles of Pavement Design”, John Wiley and Sons
2. Woods K B, “Highway Engineering Handbook”, McGraw Hill
3. David Croney, The design and performance of Road Pavements HMSO Publications
4. HRB/TRB/IRC Publications.
5. Haas and Hudson,’Pavement management system’ McGrawHill BookCo. Newyork
6. Per Ullitz, Pavement analysis, Elsevier, Amsterdam
7. Shahin M Y, Pavement management for Airports, Roads and Parking Lots, Second edition.

MCETE 205-1 TRAFFIC FLOW THEORY

L	T	P	C
3	0	0	3

Module 1: Traffic stream characteristics and Description using distributions and Traffic Stream Models

Traffic stream characteristics and Description using distributions: Measurement, Microscopic and Macroscopic study of Traffic Stream Characteristics Goodness of Fit Tests - Flow, speed and concentration; Use of counting, Interval and Translated Distributions for describing Vehicle Arrivals, Headways, Speeds, Gaps and Lags; Fitting of Distributions

Traffic Stream Models: Fundamental Equation of Traffic flow, Speed-Flow-Concentration Relationships, Normalised relationships, Fluid Flow Analogy Approach, shock Wave Theory, Platoon Diffusion and Boltzman like Behaviour of Traffic Flow, Car-Following Theory, Linear and Non linear Car Following Models, Acceleration Noise

Module 2: Queuing Analysis

Queuing Analysis : Fundamentals of Queuing Theory, Demand Service Characteristics, Deterministic Queuing Models, Stochastic Queuing Models, Multiple Service Channels, Models of Delay at Intersections and Pedestrian Crossings

Module 3: Highway Capacity and Level- of – Service Studies

Highway Capacity and Level- of – Service Studies: Concepts, Factors affecting Capacity and Level of Service, Capacity Analysis of Different Highway Facilities, Passenger Car Units, Problems in Mixed Traffic Flow

Module 4: Simulation Models

Simulation Models : Philosophy of Simulation Modelling, Formulation of Simulation Model, Methodology of System Simulation, Simulation Languages, Generation of Random Numbers, Generation of Inputs-Vehicle Arrivals, Vehicle Characteristics, Road Geometrics, Design of computer Simulation Experiments, Analysis of Simulation Data, Formulation of Simulation Problems in Traffic Engineering and Validation.

References:

1. TRB-SR No.165-Traffic Flow Theory, Transportation Research Board, Washington-D.C.
2. May, A.D, Traffic Flow Fundamentals, Prentice-Hall, NJ
3. Drew D.R, Traffic Flow Theory and Control, McGraw-Hill, New York.
4. TRB Special Report 209: Highway Capacity Manual, Transportation Research Board, Washington DC,1985.
5. Wohl M. and Martin, B.V., “Traffic System Analysis for Engineers and Planners”, McGraw-Hill, New York.
6. McShane W R & Roess R P, “Traffic Engineering”, Prentice-Hall, NJ
7. Mannering F.L & Kilareski, W.P., “Principles of Highway Engineering and Traffic Analysis”, John Wiley & Sons.
8. Neylor, T. H et al., “Computer Simulation Techniques”, John Wiley.

MCETE 205-2 TRANSPORTATION FACILITY DESIGN

L	T	P	C
3	0	0	3

Module 1: Introduction

Introduction: Design of highways, design of at-grade intersections, design of signalized intersection, design of grade separated intersection, terminal design, and design of facilities for non-motorised transport.

Module 2: Terminal Planning & Design

Terminal Planning & Design: Terminal functions, analysis of terminals, process flow charts of passenger & goods terminals, terminal processing time, waiting time, capacity & level of service concept, study of typical facilities of highway, transit, airport and waterway terminals, concept of inland port.

Module 3: Design of Highways

Design of Highways: Hierarchy of highway system, functions, design designations, concepts in horizontal & vertical alignment, integration, optical design, geometrical standards for mobility & accessibility components, landscaping and safety considerations, evaluation and design of existing geometrics.

Module 4: Design of Intersections

Design of Intersections: Review of design of at-grade intersections, signal coordination – graphic methods & computer techniques, grade separated intersections – warrants for selection, different types & geometric standards, spacing & space controls, ramps & gore area design.

References:

1. Kadiyali, L.R., “Traffic Engineering and Transport Planning”, Khanna Publishers.
2. IRC-SP41: Guidelines for the Design of At-Grade Intersections in Rural & Urban Areas
3. Salter, R J., Highway Traffic Analysis and Design, ELBS.
4. Edward K. Morlock, “Introduction to Transportation Engineering & Planning, International Student Edition”, Mc-Graw Hill Book Company, New York.

MCETE 205-3 ROAD SAFETY & ENVIRONMENT

L	T	P	C
3	0	0	3

Module 1: Introduction

Introduction: Multidisciplinary approach to planning for traffic safety and injury control; Causes of road accidents; Control measures; Roles of vehicle, roadway traffic, driver, and environment, crash and injury causations; Accident analysis, pre crash and post crash models; Conflict points.

Module 2: Safety Auditing

Safety Auditing: Road safety Audit; stages of auditing; methods involved; case studies.

Mixed traffic flow; Traffic calming Measures; Strategies adopted in various countries; case studies

Module 3: Traffic pollution

Transport related pollution; Road transport related air pollution, sources of air pollution, effects of weather conditions, Vehicular emission parameters, Urban and non urban traffic noise sources, Noise pollution, noise barriers; pollution standards, measurement and analysis of vehicular emission; Imitative measures.

Module 4: EIA

EIA: EIA requirements of Highways projects, Procedure; MOEF World Bank/UK guidelines; EIA practices in India.

References:

1. Evans S.K., Traffic Engineering Handbook, Institute of Traffic Engineers, USA
2. Wohl M., Martin B.V., “Traffic system analysis of Engineers & Planners”, McGraw Hill, New York.
3. Babkov V.F., “Road Conditions & Traffic Safety”, MIR Publishers, Moscow, 1975
4. Kadiyali L.R., “Traffic Engineering & Transport Planning”, Khanna Publishers, 2003
5. Little A.D., “The state of art of Traffic Safety”, Paraeger Publishers, New York, 1970
6. Relevant IRC codes.

MCETE 205-4 GROUND IMPROVEMENT & REINFORCED EARTH TECHNIQUES

L	T	P	C
3	0	0	3

Module 1: Introduction

Introduction: Subgrade, functions, Importance of Subgarde soil properties on pavement performance. Soil Survey: Soil survey procedure for highways and ground water investigation. Identification and significance of soil characteristics, Soil classification for highway engineering purpose, Effect of water in soils swelling/shrinkage, Cohesion and plasticity in soil.

Module 2: Soil

Soil: Moisture movement-ground water, Gravitational water, held water, soil suction. Drainage: General principles, Subsoil drainage. Frost Action Soil: Frost susceptible soils, Air and soil temperature, Heat flow through soils, Depth of frost penetration, Loss of strength during frost melting. Strength Evaluation of subgarde soil. Compaction of soils; field and Laboratory methods and equipment.

Module 3: Soil Strength and Stress in soils

Soil Strength: Strength Evaluation of subgrade soil. Compaction of soils field and Laboratory methods and equipment

Stress in soils: Theories of elastic and plastic behaviour of soils. Function: Stability of embankments

Module 4: Ground Improvement Techniques

Ground Improvement Techniques: Reinforcing embankment and fibers, Methods of reducing settlement due to consolidation in foundations of road embankment. Vertical Sand Drains: Design criteria, constriction and uses.

References:

1. Terzaghi K., Peck R.B., “Soil Mechanics in Engineering Practice”, Asia Publishing House , New Delhi, 1962
2. Alam Singh, “Text Book of Soil Mechanics”, S. Chand Publication, New Delhi
3. Relevant IS codes.

MCETE 206-1 COMPUTER SIMULATION APPLICATIONS IN TRANSPORTATION ENGINEERING

L	T	P	C
3	0	0	3

Module 1: Introduction

Introduction: Need of simulation, advantages and disadvantages, areas of application, system approach, components of system, discrete and continuous systems, model of system, types, discrete – event system simulation, steps involved, simulation examples, general principles, and simulation softwares.

Module 2: Models in Simulation and Random Numbers

Models in Simulation: Statistical models, terminology and concepts, discrete and continuous distributions, Poisson process, empirical distributions, queuing models, characteristics, notation, measures of performance, networks of queues.

Random Numbers: Pseudo random numbers, generation, techniques for generating random numbers, tests for random numbers, random – variate generation, inverse-transform technique, acceptance – rejection technique, special properties.

Module 3: Analysis of simulation data and Validation of simulation models

Analysis of simulation data: Input modeling, data collection, distribution identification, parameter estimation, goodness – of –fit tests, fitting selecting input models, multi variate and time series input models

Validation of simulation models: Model building, verification, calibration and validation, output analysis, measure of performance, comparison and evaluation of alternate system designs, metamodeling, and optimization via simulation

Module 4: Applications of Simulation

Applications of Simulation: Simple queuing problems - Inventory problems - Simulation of ports - Railway platforms and level crossings - Traffic signals.

References:

1. Martin Whol, Brian V. Martin, “Traffic System Analysis for Engineers and Planners”, Mc Graw Hill Book Company.
2. Geoffrey Gordon, “System Simulation”, 2nd Edition, Prentice Hall, India, 2002.
3. Narsingh Deo, “System Simulation with Digital Computer”, “Prentice Hall, India, 2001
4. Jerry Banks and John S. Carson, Barry L. Nelson, David M. Nicol, “Discrete

Event System Simulation", 3rd Edition, Prentice Hall, India, 2002

5. Shannon, R.E. "Systems Simulation, The Art and Science", Prentice Hall, 1975
6. Thomas J. Schriber, "Simulation using GPSS", John Wiley, 1991.

MCETE 206-2 **HIGHWAY MATERIALS**

L	T	P	C
3	0	0	3

Module 1: Subgrade and bitumen

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

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

Module 2: Bituminous Mixes

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

Module 3: Bituminous mix design

Bituminous mix design: Weathering and Durability of Bituminous Materials and Mixes - Performance based Bitumen Specifications - Superpave mix design method.

Module 4: Cement Concrete for Pavement Construction

Cement Concrete for Pavement Construction: Requirements, and design of mix for CC pavement, Types of joints- joint filler and sealer materials.

References:

1. RRL, DSIR, Bituminous Materials in Road Construction ', HMSO Publication.
2. RRL, DSIR, Soil Mechanics for Road Engineers', HMSO Publication.
3. ISI and IRC Publications on relevant topics.
4. Freddy L. Roberts, Prithvi S. Kandhal, Ray Brown, Dah-Linn Lee, Thomas W. Kennedy, Hot Mix Asphalt Materials, Mixture Design and Construction, NAPA Education Foundation, Lanham, Maryland
5. Asphalt institute, The Asphalt Hand Book'
6. Kadiyali L.R., “Traffic Engineering & Transport Planning”, Khanna Publishers, 2003
7. Kadiyali L.R., “Principles & Practice of Highway Engineering”, Khanna Publishers,2003
8. Khanna S.K., Justo C.E.G., “Highway Engineering”, Nem Chand & Bros., Roorkee, 2001

MCETE 206-3 PUBLIC TRANSPORT PLANNING

L	T	P	C
3	0	0	3

Module 1: Development of Public Transit System

Development of Public Transit System: Historical Growth, Modes of public transport and comparison, public transport travel characteristics, technology of bus, rail, rapid transit systems, basic operating elements.

Module 2: Transit Network Planning

Transit Network Planning: Objectives, principles, Intercity and Regional transit system, considerations, transit lines – types, geometry and characteristics, transit routes and their characteristics, timed transfer networks, prediction of transit usage, network evaluation, accessibility considerations.

Module 3: Transit Scheduling and Transit Infrastructure Facilities

Transit Scheduling: Components, determination of service requirements, scheduling procedure, marginal ridership, crew scheduling.

Transit Infrastructure Facilities: Design of bus stops, design of terminals – principles of good layout, types of layout, depot location, twin depot concept, crew facilities and amenities.

Module 4: Transit Agency and Economics

Transit Agency and Economics: Organizational structure of transit agency, management and personnel, transit system statistics, performance and economic measures, operations, fare structure.

References:

1. Vukan R. Vuchic, “Urban Transit: Operations, Planning and Economics”, Wiley Sons Publishers.
2. Peter White, “Public Transport”, UCL Press
3. Kadiyali L.R., “Traffic Engineering and Transport Planning”, Khanna Publishers
4. Khisty, C J., “Transportation Engineering – An Introduction”, Prentice-Hall, NJ
5. TCRP Report 30, TCRP Report 95, TCRP Report 100

MCETE 206-4 DECISION MODELS IN MANAGEMENT

L	T	P	C
3	0	0	3

Module 1: Management Decisions and Linear Programming

Management Decisions: Concepts, Operation research. Decision environment, Decision making processes.

Linear Programming: Advanced Methods- Heuristics, Simplex method, duality, post- optimality analysis, non linear programming, Sensitivity analysis, Unconstrained and constrained optimization, Kuhn- Tucker theory; Quadratic programming applications.

Module 2: Transportation LP problems

Transportation LP problems: Assignment problems, Queuing theory, Queuing Models, Markov decision processes; Applications to inventory management and Replacement processes.

Module 3: Simulation

Simulation: Discrete event simulation; Generation of random variables, simulation processes and languages.

Network models. Shortest path method, maximum flow. Minimum spanning tree problem.

Module 4: Decision making

Decision making: Integer programming, goal programming, dynamic programming. Decision theory. Role of knowledge; Deterministic and probabilistic situation, Single and multiple person decision making.

References:

1. N.D.Vora. Quantititative Techniques in mManagement, S.Chand Publications
2. Ravindran, D.T.Philips and J.J.Solberg, “Operations Research; Principles and Practice”, John Wiley, 2nd Edition 1987
3. S. Bazzarra, J.J. Jarvis and H.D. Sherali, “Linear Programming and Network Flows”, 2nd Edition , John Wiley, 1990
4. L. Winston, “Operations Research; Application and Algorithms”, Kent P.W.S. 2nd Edition, 1991
5. A. Taha, “Operations Research; An Introduction”, MacMillan, 1982
6. Kapoor, “Computer Assisted Decision Models” Tata McGrw-Hill, New Delhi, 1991.
7. Neylor, T.H. et al., “Computer Simulation Techniques”, John Wiley.

MCETE 207 TRANSPORTATION ENGINEERING LAB- II

L	T	P	C
0	0	3	2

Traffic Surveys: Volume count, Speed study, Parking study, Intersection turning movements, Speed and Delay study, Moving observer survey, Traffic noise measurement, Vehicle emission testing, Road lighting, Driver reaction time, Road side and house hold interviews.

Study of traffic engineering softwares for microscopic and macroscopic flow modeling, signal designs etc.

Mini project report based on field and laboratory studies and data collected should be submitted.

MCETE 208 SEMINAR-II

L	T	P	C
0	0	2	1

Each student shall prepare a seminar paper on any topic of interest related to the core/ elective courses being undergone in the second semester of the M. Tech programme. He/she shall select paper from reputed international journals. They should get the paper approved by the Programme Coordinator/Faculty Members in the concerned area of specialization and shall present it in the class in the presence of Faculty in-charge of seminar class. Every student shall participate in the seminar. Grade will be awarded on the basis of the student's paper, presentation and his/her participation in the seminar.

Goals: This course is designed to improve written and oral presentation skills and to develop confidence in making public presentations, to provide feedback on the quality and appropriateness of the work experience, and to promote discussions on design problems or new developments.