COURSE STRUCTURE
AND
DETAILED SYLLABUS
(MR12Regulations)

for

M.Tech (Transportation Engineering)

(Applicable for the batches admitted from 2012-13)

MALLA REDDY ENGINEERING COLLEGE

(Autonomous)

Maisammaguda, Dhulapally (PO) Via (Hakimpet), Hyderabad- 500 014.

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MALLA REDDY ENGINEERING COLLEGE
(Autonomous)
Maisammaguda, Dhulapally (Post via Hakimpet), Secunderabad – 500 014.

August/September 2012

Academic Regulations 2012 for M.Tech. (Regular)
(*Effective for the students admitted into first year from the academic year 2012-2013*)

The M.Tech Degree of Malla Reddy Engineering College, Hyderabad shall be conferred on candidates by the Jawaharlal Nehru Technological University Hyderabad (JNTUH), Hyderabad who are admitted to the program and fulfill all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS:

Admission to the above program shall be made subject to the eligibility, qualifications and specialization prescribed by the university/college from time to time.

Admissions shall be made on the basis of merit rank obtained by the qualifying candidate at an Entrance Test conducted by the university/college or on the basis of any other order of merit approved by the university/college (say **PGECET / GATE)** subject to reservations prescribed by the university/college from time to time.

Candidates seeking admission to programmes on a part time basis should be working in or around the place where the programme is being run after passing qualifying examination.

2.0 AWARD OF M. TECH. DEGREE:

2.1 A student shall be declared eligible for the award of the M.Tech degree, if he pursues a course of study and completes it successfully for not less than two academic years and not more than four academic years.

2.2 A student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the year of his admission, shall forfeit his seat in M.Tech course.

2.3 The minimum instruction for each semester 90 clear instruction days.

3.0 A. COURSE OF STUDY:

A candidate after securing admission must pursue the prescribed course of study for the following duration.

M.Tech - Four Semesters

Each Semester shall be of 22 Weeks of duration including examinations.

A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

The following specializations are offered at present for the M.Tech course of study..

1. Control Engineering
2. Computer Science and Engineering
3. Computer Science
4. Control Systems
5. Digital Systems & Computer Electronics
6. Structural Engineering
7. Thermal Engineering
8. Transportation Engineering
9. VLSI System Design

and any other course as approved by the authorities of the university/college from time to time.

Each subject is assigned certain number of credits depending upon the number of contact hours as follows.

Theory subjects	***4 Periods / Week***	***3 Credits***
Practical/ Drawing	***4 Periods / Week***	***2 Credits***
Seminar	***_***	***2 Credits***

Comprehensive Viva – Voce/ Independent Study ***2 Credits***
Project Work ***40 Credits***
(Each period will be of 50 minutes duration)

3.0 B. Departments offering M. Tech Programs with Specializations mentioned below:

Civil Engineering Department	1. Structural Engineering 2. Transport Engineering
Computer Science & Engineering Department	1. Computer Science & Engineering 2. Computer Science
Electrical Electronics Engineering Department	1. Control Systems 2. Control Engineering
Electronics & Communication Engineering Department	1. Digital Systems & Computer Electronics 2. VLSI System Design
Mechanical Engineering Department	1. Thermal Engineering

4.0 ATTENDANCE:
The programs are offered on a unit basis with each subject being considered unit.
4.1 A candidate shall be deemed to have eligibility to write end semester examinations in a subject if he has put in at least 65% of attendance in that subject.

4.2 ***Shortage of attendance up to 10% in any subject (i.e. 65% and above and below 75%) may be condoned by the College Academic Committee on genuine and valid reasons on representation by the candidate with supporting evidence.***
4.3 A candidate shall get minimum required attendance at least in three (3) theory subjects in the present semester to get promoted to the next semester. In order to qualify for the award of the M.Tech. Degree, the candidate shall complete all the academic requirements of the subjects, as per the course structure.

4.4 ***Shortage of attendance below 65% shall in no case be condoned.***

4.5 A stipulated fee shall be payable towards condonation of shortage of attendance.

5.0 EVALUATION:
The performance of the candidate in each semester shall be evaluated subject-wise, with a maximum of 100 marks for theory and 100 marks for practical, on the basis of Internal Evaluation and End Semester Examination.

5.1 For the theory subjects 60 marks shall be awarded based on the performance in the End Semester Examination, 40 marks shall be awarded based on the Internal Evaluation. The internal evaluation shall be made based on the better of the marks secured in the two Mid Term-Examinations conducted one in the middle of the Semester and the other immediately after the completion of instruction each for a total of 30 marks. Each mid term examination shall be conducted for a duration of 120 minutes with 4 questions to be answered out of 6 questions. In addition, there shall be two assignments evaluated for 10 marks each and average of the two taken as the final assignment mark. The sum of the best of the two mid examinations and the assignment marks obtained shall be the final marks for internal evaluation.

5.2 For practical subjects, 60 marks shall be awarded based on the performance in the End Semester Examinations, 40 marks shall be awarded based on the day-to-day performance as internal Marks.
And 25 marks to be awarded by conducting an internal laboratory test. The End Examination shall be conducted by the teacher concerned and another faculty member of the same Department, as suggested by the Head of Department.

5.3 There shall be two seminar presentations during I year I semester and II Semesters. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee. The Departmental Committee consists of Head of the

Department, supervisor and two other senior faculty members of the department. For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful. *There shall be no external examination for Seminar*

5.4 Every candidate shall be required to execute his P.G. Project and submit his Dissertation, after taking up a topic approved by the Project Review Committee (PRC). The PRC shall be constituted by the Head of the Department, and shall consist of the Head of the Department, the Project supervisor, and a Senior faculty member of the Department. The PG project shall start immediately after completion of the I Year II Semester, and shall be of one year duration. The student has to decide his topic for his M.Tech Project Work within the first 6 weeks of the summer vacation at the end of the II semester and should submit his PG Project Work Proposal to the PRC, on whose approval he can register for the PG project. The PRC will monitor the progress of the project work through Two-Seminar presentations – one during II Year I Semester, and one before the submission of the PG Project/ Dissertation. The student shall submit a project Report at the end of that semester by the PRC as SATISFACTORY or UNSATISFACTORY. In the case of Unsatisfactory declaration, the student shall resubmit the Project report after carrying out the necessary modifications / additions in the Project work, within the specified time as suggested by the PRC. The student can submit the Dissertation, only after completion of 40 weeks from the Date of Registration, after obtaining the approval from PRC. Extension of time, within the total permissible limit for the completion of the Degree, may be considered by the PRC, on sufficient valid/ genuine grounds.

5.5 There shall be a Seminar presentation in the II year I Semester, for the award of 50 marks. The seminar shall be on the topic chosen for PG Project/ Dissertation Work and the assessment will be done by the same PRC as constituted above. There shall be no external marks for the Seminar.

There shall be a Comprehensive Viva-Voce in II year II Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members in that area of specialisation. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he/she studies during the M.Tech course of study. The Comprehensive Viva-Voce is valued for 100 marks by the Committee. There are no internal marks for the Comprehensive viva-Voce

5.6 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

5.7 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.4) he has to reappear for the End Examination in that subject. A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and he has failed in the end examination. In such case candidate must re-register for the subject(s) and secure required minimum attendance. Attendance in the re-registered subject(s) has to be calculated separately to become eligible to write the end examination in the re-registered subject(s). The attendance of re-registered subject(s) shall be calculated separately to decide upon the eligibility for writing the end examination in those subject(s). In the event of taking another chance, the internal marks and end examination marks obtained in the previous attempt are nullified.

5.8 In case the candidate secures less than the required attendance in any subject(s), he shall not be permitted to appear for the End Examination in that subject(s). He shall re-register the subject when next offered.

5.9 Laboratory examination for M.Tech courses must be conducted with two Examiners, one of them being Laboratory Class Teacher and second examiner shall be other Laboratory Teacher or any other member from inside/outside of the college.

6.0 EVALUATION OF PROJECT/ DISSERTATION WORK:

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Project Review Committee.

6.1 A Project Review Committee (PRC) shall be constituted with Principal as chair person Heads of all the Departments which are offering the M.Tech programs and two other senior faculty members.

6.2 Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical subjects).

6.3 After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the Departmental Committee for its approval. Only after obtaining the approval of Departmental Committee the student can initiate the Project work. ***Departmental Committee Consists of Head of the Department as Chairman, along with two Senior Professors and few subject experts too.***

6.4 If a candidate wishes to change his supervisor or topic of the project he can do so with approval of Departmental Committee. However, the Departmental Committee shall examine whether the change of topic/supervisor leads to a major change of his initial plans of project proposal. If so, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.

6.5 Candidate shall submit status report (in a bound-form) in two stages at least with a gap of 3 months between them.

6.6 The work on the project shall be initiated in the beginning of the second year and the duration of the project is for two semesters. A candidate is permitted to submit Project Thesis only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Principal (through Head of the Department) and shall make an oral presentation/demonstration before the PRC.

6.7 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College / School/ Institute.

6.8 The thesis shall be adjudicated by one examiner selected by the College. For this, Head of the Department shall submit a panel of 5 examiners to the Principal of the College, who are eminent in that field with the help of the concerned guide and Head of the department.

6.9 If the report of the examiner is not favorable, the candidate shall revise and resubmit the Thesis, in the time frame as described by PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.

6.10 If the report of the examiner is favorable, viva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report candidates work as:

A. Excellent
B. Good
C. Satisfactory
D. Unsatisfactory

Head of the Department shall coordinate and make arrangements for the conduct of viva-voce examination.

If the report of the viva-voce is unsatisfactory, the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination, he will not be eligible for the award of the degree unless he is asked to revise and resubmit by the Board.

7.0 AWARD OF DEGREE AND CLASS:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M. Tech. Degree he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured	*Program Credits*
First Class with Distinction	70% and above	***From the Aggregate secured for all the 88 credits***
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

8.0 WITH-HOLDING OF RESULTS:

If the candidate has not paid any dues to the university or if any case of in-discipline is pending against him, the result of the candidate will be withheld and he will not be allowed into the next higher semester. The issue of the degree is liable to be withheld in such cases.

9.0 TRANSITORY REGULATIONS:

Candidate who have discontinued or have been detained for want of attendance or who have failed after having undergone the course are eligible for admission to the same or equivalent subjects as and when subjects are offered, subject to rule 5.5 and 2.0 of these regulations.

10.0 GENERAL:

10.1 The academic regulations should be read as a whole for purpose of any interpretation.

10.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

10.3 The College may change or amend the academic regulations and syllabus at any time and the changes and amendments made shall be applicable to all the students with effect from the date notified by the College.

10.4 Wherever the word he, him or his occur, it will also include she, her and hers.

10.5 Wherever the word 'Subject' occurs in the above regulations, it implies the 'Theory Subject' and 'Practical Subject' or 'Lab'.

10.5 Transfers not allowed among group colleges.

MALLAREDDY ENGINEERING COLLEGE
(Autonomous)
M.Tech Transportation Engineering

I YEAR **I SEMESTER**

COURSE STRUCTURE

S.No	CODE NO	GROUP	SUBJECT	L	T/P/D	CREDITS
1	MR121201		Traffic Engineering and Management	3	1	3
2	MR121202		Transport Infrastructure Design	3	1	3
3	MR121203		Urban Transportation policy and Planning for sustainable development	3	1	3
4	MR121204		Pavement Analysis and Design	3	0	3
5	MR12P0M3	Elective -I	Applied Statistics	3	0	3
	MR121205		Ground Improvement Methods			
	MR121206		Project Management			
6	MR121207	Elective -II	Remote Sensing and GPS	3	0	3
	MR121208		Concrete Technology			
	MR121209		Principles of Bridge Engineering			
7	MR121210	Lab	Transportation Engineering lab and studio- I	0	3	2
8	MR121211		Seminar	0	2	2
Total credits						**22**

I YEAR **II SEMESTER**

COURSE STRUCTURE

S.No	CODE NO	GROUP	SUBJECT	L	T/P/D	CREDITS
1	MR121212		Traffic Analysis	3	1	3
2	MR121213		Land Use Transportation Modeling	3	1	3
3	MR121214		Highway Project Formulation & Economics	3	1	3
4	MR121215		Pavement Construction, Maintenance and Management	3	0	3
5	MR121216	Elective - III	Intelligent Transportation Systems	3	0	3
	MR121217		Mass Transportation System Planning & Management			
	MR12P0M6		Optimization Techniques			
6	MR121218	Elective - IV	GIS Applications in Transportation Engineering	3	0	3
	MR121219		Environmental Impact Assessment for Transportation Projects			
	MR121220		Advanced Travel Demand Modeling			
7	MR121221	Lab	Transportation Engineering Lab - II	0	3	2
8	MR121222		Seminar	0	2	2
Total credits						**22**

II YEAR **I SEMESTER**

COURSE STRUCTURE

S.No	CODE NO	GROUP	SUBJECT	L	T/P/D	CREDITS
1	MR121223		Project Seminar	0	3	
2	MR121224		Comprehensive Viva	-	-	
Total credits						

II YEAR **II SEMESTER**

COURSE STRUCTURE

S.No	CODE NO	GROUP	SUBJECT	L	T/P/D	CREDITS
1	MR121225		Project work and seminar			
Total credits						

Note: All End Examinations (Theory and Practical) are of three hours duration.

T-Tutorial L – Theory P – Practical D-Drawing

2012-2013

2012-2013 **Code: MR121201**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. I –SEM	**L**	**T/P/D**	**C**
	3	**1/-/-**	**3**

TRAFFIC ENGINEERING AND MANAGEMENT

Unit 1: Basic concepts of traffic characteristics: Speed, Volume and concentration – their basic relationship, Traffic measurement surveys like volume studies, speed studies, headway studies, delay studies, gap acceptance studies, intersection studies, travel time studies, accident studies, parking studies etc – Methods of computation, their presentation of data and analysis, Traffic studies for planning bypasses around towns

Unit2: Highway Corridor analysis: Traffic capacity analysis concepts, segment capacity, Queue delay, travel time sub period analysis, bus stop capacity for transit and highway corridors , performance measures.

Unit3: Intersection control and analysis: Roundabouts , Signal design- Methods, types, LOS and capacity determination, Uniform and incremental delay, Adjustment factors, Saturation flow rate, lane grouping analysis, signal coordination, signal controllers, ITS application and system architecture, timing plan design for pretimed control and traffic actuated control, queue accumulation polygons, coordinated semi actuated operation unsignalised intersection, 2 way Stop controlled intersection, LOS criteria, critical gap, potential and movement capacity, All way stop controlled intersection, overview with planning and design applications

Unit4: Traffic safety Management : Accident investigation and analysis, Road accident collection and record system, Post accident reconstruction, Road safety auditing , Traffic impact analysis of landuse, Approaches to highway safety , Traffic calming measures , analysis of accident data and mathematical formulation , traffic control devices, Markings, Signs, Access management

Unit5: Transportation System Management:Guidelines for low cost traffic management techniques for urban areas – IRC Specifications, Advanced transit technologies, Bus route network planning and management

REFERENCES:

1. Traffic Engineering by Roger P.Roess, William R. Mc. Shane, Elena S.Prassas , Prentice hall
2. IRC Codes
3. Traffic Engineering - Theory & Practice - Louis J.Pignataro, Prentice Hall Publication. Mathematical Methods by V. Ravindranath, Etl, Himalaya Publications. 2009-2010.
4. Principles of Highways Engineering and Traffic Analysis - Fred Mannering & Walter Kilareski, John Wiley & Sons Publication.
5. Transportation Engineering - An Introduction - C.Jotin Khisty, Prentice Hall Publication Fff
6. Fundamentals of Transportation Engineering - C.S.Papacostas, Prentice Hall India.
7. I.T.E. Traffic Engineering Hand Book.
8. Fundamentals of Traffic Engineering – McShane & Rogers
9. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers
10. Metropolitan Transportation Planning, John W Dickey, Tata McGraw Hill

2012-2013 **Code: MR121202**

MALLA REDDY ENGINEERING COLLEGE

(Autonomous)

I YEAR M.TECH. T.E. I –SEM

L	T/P/D	C
3	1/-/-	3

TRANSPORT INFRASTRUCTURE DESIGN

Unit 1: Functional Classification of Highway System; Design Controls – Topography, Driver characteristics, Vehicle Characteristics, Traffic, Capacity and Level of Service, Design Speed. Objectives of Geometric Design, Cross Section Elements: Design specifications; Pavement Surface characteristics – Skid Resistance, Road Roughness; Camber, Objectives, design standards. Specifications for hill roads

Unit 2 : Horizontal Alignment and Vertical Alignment of roads: Sight Distances – Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance ; Objectives of horizontal curves; Super elevation; Extra- widening on Curves; Transition Curves – Objectives and Design. Transition Curve setting methods and calculations , Introduction to MX Roads software ; Vertical Alignment : Gradients – Types of Gradients, Design Standards; Vertical Curves – Summit Curves, Valley Curves and Design criteria for Vertical Curves; Importance of Sight Distances for Horizontal and Vertical Curves ; Combination of Vertical and Horizontal Curves – Grade Compensation

Unit 3 : Geometric Design of Intersections : Types of Intersections; Design Principles for Intersections; Design of At-grade Intersections – Channelization, Objectives; Traffic Islands and Design standards; Rotary Intersection – Concept, Advantages and Disadvantages; Grade separated Interchanges – Types, warrants and Design standards.

Unit 4 : Miscellaneous Elements: Requirements of Pedestrians; Pedestrian facilities on Urban Roads; Cycle Tracks – Guidelines and Design standards; Bus bays –Types and Guide lines; Design of On-street and Off street Parking facilities – Guidelines for lay out Design.; Design of Ramp

Unit 5 : Airport and Railway Infrastructure Design – Runway orientation, Site selection, Wind rose analysis Geometric design standards for runways, taxiways, aprons , Airport capacity analysis, Terminal design; GEOMETRIC DESIGN OF RAILWAY TRACK: Gradients- Grade Compensation- Cant and Negative Superelevation- Cant Deficiency – Degree of Curve – Crossings and Turn outs .

REFERENCES:

1. Principles and Practice of Highway Engineering, L.R.Kadiyali and N.B.Lal, Khanna
2. Traffic Engineering and Transportation Planning, L.R.Kadiyali, Khanna Publications
3. Highway Engineering, C.E.G.Justo and S.K.Khanna, Nem Chand and Brothers.
4. IRC Codes for Signs, Markings and Mixed Traffic Control in Urban Areas.

2012-2013 **Code: MR121203**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E.I –SEM	**L**	**T/P/D**	**C**
	3	**1/-/-**	**3**

URBAN TRANSPORTATION POLICY AND PLANNING FOR SUSTAINABLE DEVELOPMENT

Unit 1: Introduction: Role of transportation in the economic development of nations, overview of transport modes, growth trends, National Transport Policy of India – Case studies, transportation planning in the developing world; and comparative international transportation policies; Fundamentals of transportation , Principles of planning, evaluation, selection, adoption, financing, and implementation of alternative urban transportation systems; formulation of community goals and objectives, inventory of existing conditions; transportation modeling trip generation, distribution, modal choice, assignment

Unit 2: Data Collection And Inventories: Collection of data – Organisation of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

Unit 3: Travel Demand issues: Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Detailed approach on 4 step travel demand estimation; Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

Unit 4: Demand analysis and 5. supply analysis planning : Planning for sustainable urban mobility, positive and negative externalities in urban transport, congestion pricing, parking policy, demand management , Urban travel and transportation system characteristics - a systems perspective, Data management and use in decision making , Demand analysis , Urban activity analysis, Supply analysis; Plan Preparation And Evaluation: Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis

Unit 5: Metropolitan cities: Design issues in urban mobility, integrating land use and transport planning; , Overview of urbanization process, city structure and urban activity and infrastructure systems, Economic and social significance of urban infrastructure systems; Transport's Role in tackling Social Inclusion, Economic Impacts of Transport Policy

REFERENCES:

1. Introduction to Transportation Planning – M.J.Bruton; Hutchinson of London Ltd.
2. Introduction to Urban System Planning - B.G.Hutchinson; Mc Graw Hill.
3. Traffic Engineering and Transport Planning - Kadiyali L.R., Khanna Publishers
4. Lecture notes on UTP - Prof. S. Raghavachari , R.E.C.Warangal.
5. Metropolitan transportation planning – John W. Dickey, Tata Mc Graw Hill

2012-2013 **Code: MR121204**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. I –SEM	**L**	**T/P/D**	**C**
	3	**1/-/-**	**3**

PAVEMENT ANALYSIS AND DESIGN

Unit 1: Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

2. Stresses In flexible and Rigid Pavements: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements; Stress In Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts; Stresses In Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars

3. Material Characteristics: CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of Geo Synthetics.Non destructing testing

4. Design Of Flexible pavements & Rigid Pavements: Development of design methods, Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, IRC Methods for highways and low volume roads, Design Of Rigid Pavements: Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Prestressed and Continuously Reinforced Cement Concrete Pavement Design, Rigid Pavement Design for Low Volume Rural Roads and highways. Design Of Overlays: Types & Design of Overlays: IRC Methods of Overlay Design, Importance of Profile Correction Course.

5. Runway design : Aircraft configurations, Flexible airport pavements - IS specifications and design, Corps of Engineers, FAA methods, AI methods ; Rigid airport pavements – IS specifications, PCA method, Corps of Engineers method, FAA method.

REFERENCES:

1. Design of Functional Pavements, Nai C. Yang, McGraw Hill Publications
2. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers
3. Principles of Pavement Design, Yoder.J. & Witzorac Mathew, W. John Wiley & Sons Inc
4. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc.
5. Pavement and Surfacings for Highway & Airports, Micheal Sargious, Applied Science Publishers Limited.
6. IRC Codes for Flexible and Rigid Pavements design

2012-2013 **Code: MR12P0M3**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. I –SEM

L	T/P/D	C
3	0/-/-	3

APPLIED STATISTICS
(Elective –I)

1. Introduction to Sampling Techniques and statistical Distributions

Frequency Distribution; Mean, Standard Deviation;, Skewness; Kurtosis; Definitions and Applications; Simple random Sampling; Dispersion, Variance and covariance Standard error Stratified random Sampling; Systematic sampling; Sample size determination; Applications in Traffic Engineering;

Distributions: concept of discrete and continous randomvariables.Binomial,Poisson,Exponential and Normal distributions; Fitting of Distributions; Mean and Variance;Chi-square test of goodness-of-fit; Chi-square distribution; Students T-distribution; Snadectors,F-Distribution. Applications in Traffic Engineering

2. Probability:

Laws of Probability; Conditional probability and independent events; Laws of expectations.addition,multiplication theorems of probability and Baye's theorem

3. Tests of Significance & Confidence Interval:

Large sample and small sample tests; Tests for single mean, Means of two samples, Proportions, two variances, observed correlation coefficients, Applications. Intervals for means, Variance and; Application in Traffic Engineering problems.

4. Multivariate data analysis:

Types of data; Basic vectors and matrices, Analysis of Variance; Correlation matrices; Principal component analysis, Time series analysis for multi variables

5. Regression and correlation:

Linear regression and correlation; regression coefficients Multiple correlation; Multiple correlation coefficient; Standard error of estimate; Curvilinear regression models; Application in Transportation Engineering

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

2012-2013 **Code: MR12120**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. I –SEM	**L**	**T/P/D**	**C**
	3	**0/-/-**	**3**

GROUND IMPROVEMENT METHODS
(Elective –I)

Unit 1.Introduction to Ground Modification: Need and objectives of Ground Improvement, Classification of Ground Modification Techniques – suitability and feasibility, Emerging Trends in ground improvement.

Unit 2. Mechanical and Hydraulic Modification: Methods of compaction, Shallow compaction, Deep compaction techniques – Vibro floatation, Blasting, Dynamic consolidation, pre-compression and compaction piles, Field compaction control.; Hydraulic Modification: Methods of dewatering – open sumps and ditches, Well-point system, Electro-osmosis, Vacuum dewatering wells; pre-loading without and with sand drains, strip drains and rope drains.

Unit 3. Physical and Chemical modification: Stabilisation with admixtures like cement, lime, calcium chloride, fly ash and bitumen. Grouting: Categories of grouting, Art of grouting, Grout materials, Grouting techniques and control.

Unit 4. Reinforced Earth Technology: Concept of soil reinforcement, Reinforcing materials, Backfill criteria, Art of reinforced earth technology, Design and construction of reinforced earth structures.

Unit 5. Soil Confinement Systems: Concept of confinement, Gabion walls, Crib walls, Sand bags, Evergreen systems and fabric formwork.; Miscellaneous Techniques: Design, Construction and applications of stone columns, lime columns.

REFERENCES:

1. Manfred R. Hanusmann - Engineering principles of ground modification - Mc. Graw-Hill pub. Co., New York.
2. Robert M. Koerner - Construction and Geotechnical methods in Foundation Engineering – Mc.Graw-Hill Pub. Co., New York.
3. Winterkorn and Fang - Foundation Engineering Hand Book – Van Nostrand Reinhold Co., New York.
4. Aris C. Stamatopoulos & Panaghiotis C. Kotzios – Soil Improvement by Preloading – John Wiley & Sons Inc. Canada.
5. P. Purushothama Rao – Ground Improvement Techniques – Laxmi Publications (P) Limited.

2012-2013 **Code: MR121206**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. I –SEM	**L**	**T/P/D**	**C**
	3	**0/-/-**	**3**

PROJECT MANAGEMENT
(Elective –I)

Unit 1. Introduction to Project Management: A systems Approach, Systems Theory and Concepts, Organisation, Management Functions, Overview of Management Objectives, Tools and Techniques, Project Management – Processes and Organisational Structures – Team Management – Project Manager as a Team Leader – Leadership Qualities, PMIS

Unit 2. Construction Cost and Value Engineering: Types of Estimates, Implementation of Cost Controls, Project Cost Forecasting, Cost Optimisation and Resources Planning - Value Engineering, Techniques for Project Selection, Break-Even Analysis, Cost Modelling, Energy Modelling, Life Cycle Cost Approach.

Unit 3. Contract Management: Tendering and Contracting, Laws of Contracts, subcontracts, Potential Problems, Post Contract Problems, Documents, Conditions, Arbitration, Special Features of International Contracts. ; Human Resource Management: Man Power Planning – Training – Motivation – Industrial Relations – Welfare Measures – MIS – Components and Structure – Personal Management; Resource Management and Inventory: Basic concepts, labour requirements & productivity, non-productive activities, site productivity, equipment and material management, inventory control

Unit 4. Quality Management and Safety in Construction Industry: Quality control by statistical methods, sampling plan, control charts, ISO 14000, Safety Measures, Safety Programmes, Safety Awareness and Implementation of Safety Plan – Compensation; Construction Management Practices: Implementation of Procedures and Practices – International Experiences – Case Studies – Examples

Unit 5. Project Scheduling and Analysis Methods: CPM, PERT, Linear programming, queuing concept, simulation, bidding models, game theory.

REFERENCES:

1. Herold Kerzner - Project Management - A systems approach to Planning, Scheduling and Controlling. CBS Publishers and Distributors.
2. K.Waker A Teraih and Jose M.Grevarn; Fundamentals of Construction Management and Organisations.
3. Anghel Patterson - Construction Cost Engineering Handbook - Marcel Dekken Inc.
4. Dell Isola - Value Engineering in Construction Industry, Van Nostrand Reinhold Co.,
5. Choudhary, S. Project Management, Tata McGraw Hill Publishing Co., Ltd.,
6. Raina UK, Construction management Practices, Tata Mc Grawhill Publishing Company Ltd.
7. Sengupta B and Guha H, Construction Management and Planning, Tata McGraw-Hill Publishing Company Limited, New Delhi.

2012-2013 **Code: MR121207**

MALLA REDDY ENGINEERING COLLEGE
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I YEAR M.TECH. T.E. I –SEM	**L**	**T/P/D**	**C**
	3	**0/-/-**	**3**

REMOTE SENSING & G.P.S
(Elective –II)

Unit 1 : Remote Sensing:
Basic Principles – Introduction, Electromagnetic and its properties, interaction with Earth surface materials, recent developments in Remote sensing, Social and legal implications of Remote Sensing, status of Remote Sensing. Characteristics of imaging remote sensing instruments, satellite remote sensing system – a brief over view, other remote sensing satellites.
Unit 2: Pre-Processing Of Remotely Sensed Data:
Introduction, cosmetic operation; Geometric connection and registration, atmospheric correction.
Image Transforms: Introduction, arithmetic operations, empirically based image transforms, Principal component analysis, multiple discriminant analysis etc.
Unit 3 : Enhancement Technique and Filtering Techniques:
Introduction, human visual system, contrast enhancement; Pseudo color enhancement. Thematic information extraction, classification and accuracy assessment and change detection. Hyper spectral and radar sensors
Filtering Technique Classification Low-pass (smoothing filters) High pass (sharpening) filters, edge detection, frequency domain filters, geometrical basis, classification, unsupervised and supervised classification, classification accuracy. Rectification of digital land satellite imagery. Image enhancement, spectral and spatial filtering
Unit 4 : Global Positioning Systems:
Introduction, Elements of satellite surveying, e global positioning system, GPS satellites, Adjustment computations, GPS observables, GPS- space segment, Control segment, User segment, GPS satellite signals, Receivers; Static, Kinematic and Differential GPS .
Unit 5 : Applications of Remote sensing and GPS in Transportation Engineering : Intelligent Transport System, Urban Transport Planning, Accident Studies, Transport System Management, Road Network Planning

REFERENCES:
1. GPS Satellite Surveys, Alfred Leick, Willey & Sons
2. Principles of Remote Sensing, Paul Jumani, ELBS, 1985.
3. Computer processing of remotely sensed Images an Introduction – Paul M.Mather, John Wiley & Sons 1989.

2012-2013 **Code: MR121208**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. I –SEM	**L**	**T/P/D**	**C**
	3	**0/-/-**	**3**

CONCRETE TECHNOLOGY
(Elective –II)

Unit 1 : Cement and Admixtures Portland cement – Chemical composition - Hydration, setting and fineness of cement – structures of hydrated cement – mechanical strength of cement gel–water held in hydrate cement paste – Heat of hydration of cement – Influence of compound composition on properties of cement – tests on physical properties of cement – I.S. specifications – Different types of cements – Chemical Admixtures

Unit 2 : Aggregates: Classifications of aggregates - particle shape and texture - bond, strength and other mechanical properties of aggregate - specific gravity, bulk density, porosity, absorption and moisture content of aggregate - bulking of sand - - soundness of aggregate - alkali-aggregate reaction - thermal properties - sieve analysis - fineness modulus - ~~grading curves~~ - grading of fine and coarse aggregates - - maximum aggregate size – combined aggregate grading – BIS grading.

Unit 3 : Fresh Concrete and Hardened Concrete: workability - factors affecting workability - measurement of workability by different tests - effect of time and temperature on workability - segregation and bleeding - Mixing of concrete - different types of mixing – vibration of concrete– setting times of fresh concrete quality of mixing water. water/cement ratio - Abram's law – Gel space ratio Maturity concept - effective water in mix - nature of strength of concrete - strength in tension and compression - Griffith's hypothesis - autogenously healing - curing of concrete - influence of temperature on strength - steam curing - testing of hardened concrete – relation between compressive and tensile strength - factors affecting strength - non-destructive testing methods. Durability of concrete - code provisions.

Unit 4 : Elasticity, Shrinkage and Creep: Modulus of elasticity – static and dynamic modulus of elasticity - Poisson's ratio - early volume changes - swelling - shrinkage - mechanism of shrinkage - factors affecting shrinkage - differential shrinkage - moisture movement - creep of concrete - factors influencing creep - relation between creep and time - nature of creep - effects of creep in structural concrete – Code provisions – Rheology of creep.

Unit 5 : Concrete Mix Design– factors in the choice of concrete mix proportions – statistical quality control – Acceptance criteria as per IS 456-2000 – various mix design methods for normal concrete – BIS method – Road note no.4 method, ACI method – High strength concrete mix design – durability aspects in concrete mix design as per IS 456-2000.

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville, ELBS publications.
2. Concrete Technology by M.S.Shetty, S.Chand & Co.

REFERENCES:

1. Special Structural concretes by Rajat Siddique, Galgotia Publications.
2. Design of Concrete Mixes by N.Krishna Raju, CBS Publications.
3. Concrete: Micro Structure by P.K.Mehta, ICI, Chennai.

2012-2013 **Code: MR121209**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. I –SEM	**L**	**T/P/D**	**C**
	3	**0/-/-**	**3**

PRINCIPLES OF BRIDGE ENGINEERING
(Elective –II)

Unit 1 : Concrete Bridges: Introduction-Types of Bridges-Economic span length-Types of loading-Dead load-live load-Impact Effect-Centrifugal force-wind loads-Lateral loads-Longitudinal forces-Sesmic loads- Frictioal resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forces and effects-Width of raodway and footway-General Design Requirements.

Unit 2 : Solid slab Bridges: Introduction-Method of Design. Girder Bridges: Introduction-Method of Design-Courbon's Theory.

Unit 3 : Continuous Bridges: Introduction- Span lengths- Analysis of Continuous bridges-Decking of Girders with constant Moment of Inertia-Continuous bridges with variable Moment of Inertia-Method of Analysis -Girders with Parabolic Soffit-Method of plotting Influence lines-Girders with Straight Haunches-Design steps for Continuous Bridges.

Unit 4 : Pre-Stressed Concrete Bridges: Basic principals- Method of Pre-srtessing-Pretensioning and Post-tensioning- Comparision-Freyssinet Method-Magnel-Blanet System-Lee-Mc call system-Basic Assumptions-Losses in Prestress-Equation based on Initial and final stress conditions-Cable Zone-Design of selections-Condition of first crack- Ultimate load design-Shear-Vertical Prestressing-Diagonal Tension in I-section-End Block-Magnel's method-Emperical Method-General Design requirements-Mild steel reinforcement in prestessed concrete member-Concrete cover and spacing of pre-stressing steel-Slender beams-Composite Section-Propped-Design of Propped Composite Section-Unproped composite section-Two-stage Prestressing-Shrinking stresses-General Design requirements for Road Bridges.

Unit 5: Analysis of Bridge Decks: Harmonic analysis and folded plate theory-Grillage analogy- Finite strip method and FEM. Sub-structure of bridges: Substructure- Beds block-Piers- Pier Dimensions-Design loads for piers- Abutments- Design loads for Abutments.

REFERENCES:

1. Design of Concrete Bridges by M.G.Aswani, V.N.Vazirani and M.M.Ratwani.
2. Bridge Deck Behaviour by E.C.Hambly.
3. Concrete Bridge Design and Practice by V.K.Raina.

2012-2013 **Code: MR121210**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. I –SEM	**L**	**T/P/D**	**C**
	0	**/3/**	**2**

TRANSPORTATION ENGINEERING LAB AND STUDIO – I

1. Traffic inventory surveys – Classified Volume count surveys, Speed studies, Headway studies, Delay studies, Gap acceptance studies, Parking studies, Accident investigation studies
2. Road geometric design – Cross sectional elements design, Horizontal and vertical alignment design, Intersection design , Overview of MX roads
3. Pavement design for flexible and rigid pavements – Soil characterisation, Pavement material characterization tests, Traffic characterization
4. Quality control and Quality assurance issues: Blending of aggregates, Job Mix formula design, Pre- construction, During construction and Post construction quality control tests
5. Traffic impact assessment on mixed land use environment

2012-2013 **Code: MR1212112**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. II –SEM	**L**	**T/P/D**	**C**
	3	**1/-/-**	**3**

TRAFFIC ANALYSIS

Unit 1 : Traffic Flow Description: Traffic Stream Characteristics and Description Using Distributions: Measurement, Microscopic and Macroscopic Study of Traffic Stream Characteristics - Flow, Speed and Concentration; Use of Counting, Interval and Translated Distributions for Describing Vehicle Arrivals, Headways, Speeds, Gaps and Lags; Fitting of Distributions, Goodness of Fit Tests.

Unit 2 : Traffic Stream Models: Fundamental Equation of Traffic Flow, Speed-Flow-Concentration Relationships, Normalised Relationship, Fluid Flow Analogy Approach, Shock Wave Theory - Flow-Density diagram use in Shockwave analysis; Use of Time-space diagram for shockwave description; Bottleneck situations and shockwaves; traffic signal and shockwave theory; numerical Examples for application of shockwave theory;, Platoon Diffusion and Boltzman Like Behaviour of Traffic Flow, Car-Following Theory, Linear and Non-Linear Car-Following Models, Acceleration Noise, Fuel consumption models

Unit 3 : Queuing Analysis: Fundamentals of Queuing Theory, Demand Service Characteristics, Deterministic Queuing Models, Stochastic Queuing Models, Multiple Service Channels, Analysis of M/M/1 system; Assumptions and Derivation of System State Equations; Application of M/M/1 analysis for parking Garages and Toll Plazas- numerical Examples; Analysis of D/D/1 system for delay characteristics; Traffic Signal analysis as D/D/1 system; Computation of delays and queue dissipation Time – Numerical Examples.

Unit 4: Pedestrian Delays And Gaps: Pedestrian Gap acceptance and delays; Concept of Blocks, Anti-blocks, Gaps and Non-Gaps; Underwood's analysis for Pedestrian Delays; Warrants for Pedestrian Crossing Facilities – Minimum Vehicular Volume Warrant, Minimum Pedestrian Volume Warrant, Maximum Pedestrian Volume Warrant;

Unit 5 : 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.; Basic concepts of simulation modelling application for Signalised Intersections, Pedestrian Crossings and Transit scheduling.

REFERENCES:

1. Traffic Flow Theory: A Monograph , TRB Special Report 165
2. Fundamentals of Transportation Engineering – C.S.Papacostas, Prentice Hall India Publication
3. Principles of Highway Engineering and Traffic Analysis – F.L.Mannering & W.P.Kilareski, John Wiley Publishers.
4. Traffic Flow Fundamentals – A.D.May, , Prentice Hall India Publication
5. Fundamentals of Traffic Engineering – McShane & Rogers

2012-2013 **Code: MR121213**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. II –SEM	**L**	**T/P/D**	**C**
	3	**1/-/-**	**3**

LAND USE TRANSPORTATION MODELLING

Unit 1: Land Use And Transportation Engineering:
Transportation modeling in Planning; Models and their role, Characteristics of Transport demand and supply, Equilibrium of supply and demand, Modelling and decision making, Issues in Transportation modeling and structure of the classic transport model.

Unit 2 : Land Use Transportation and Activity Models:
Introduction to Land Use Planning; Relation between Transportation and Land Use Planning; The economic base mechanism and allocation mechanism; Spatial allocation and employment interrelationship; Garin Lowry models.; Activity modelling

Unit 3 : General Travel Demand Models and Regional Transport Models:
Aggregate, Disaggregate models ; Behavioral models; Recursive and direct demand Models; Linear, Non-Linear models; Logit, discriminant and probit models; Mode split models - Abstract mode and mode specific models. Regional Transport Models: Factors affecting goods and passenger traffic; Prediction of traffic; Growth factor models; Time function iteration models; Internal volume forecasting models.

Unit 4: Regional Network Planning:
Problems in Developing Countries, Network Characteristics - Circuitry, Connectivity, Mobility, Accessibility and Level of Service Concepts - Network Structures and Indices – Network Planning – Evaluation - Graph Theory – Cut sets – Flows & Traversing – Optimum Network - Inter-modal Co-ordination. – Rural Road Network Planning.; User equilibrium concepts

Unit 5: Advanced Spatial analysis Modelling :Applications of Artificial Neural networks, Cellular automata, Fuzzy logic systems, Genetic algorithms, artificial intelligence concepts to transportation Modelling

REFERENCES:

1. Modelling Transport by Jhan De Dios Ortuzar. Luis E.Willumsen. John Wiley& Sons. 1970/1975.
   a. Urban Development Models - Ed. By R.Baxter, M.Echenique and J.Owers; The Institute of Transportation Engineering, University of California.
2. Economic Models and Economic Forecast - Robert S, Pindyek, Daniel L.Rubin Field; McGraw Hill.
3. Land Use Transportation Planning Notes - S.R.Chari, REC Warangal.
4. Regional and Urban Models- A.G.Wilson; Pion, London.
5. Urban Modeling - Michael Batty.
6. Behavioral Travel Demand Models - Peter R. Stopher ARNIM.H.MEYBURG.
7. Introduction to Transportation Engineering and Planning, Morlok EK, McGraw Hill

2012-2013 **Code: MR121214**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. II –SEM	**L**	**T/P/D**	**C**
	3	**1/-/-**	**3**

HIGHWAY PROJECT FORMULATION & ECONOMICS

Unit 1 : Project Formulation: Requirements in project formulation, Criteria fixation, Components of project, Non-monetary and monetary Criteria in formulation of project, Decision making Criteria input in Project formulation. Preparation of DPR - Guidelines , Transport Projects and development of cash flow diagrams, Cost and benefit components, Discounting criteria, Preparation of Project, Highway Planning, Traffic infrastructure, Project formulation, Road Network project development. Need for Economic Evaluation; Principles of economic evaluation; Welfare economics; Social costs, Vest change, Rate of return

Unit 2 : Road user costs: Value of Travel time Savings - Economic concept of evaluation of travel time savings; Issues connected with evaluation of travel time savings. Vehicle operating costs- Components of VOC, Road User Cost study in India; Accident costs; Methodologies for economic evaluation of an accident ; Factors involved, Basic methods of economic analysis

Unit 3 : Basic methods of economic analysis; Equivalent Uniform Annual Cost Method; Present worth of cost method; Equivalent uniform annual net return method; Net present value method; Benefit cost ratio method; Rate of Return Method. Applications of these methods to highway projects.

Unit 4 : Project appraisal by shadow pricing with case studies.; Toll system analysis , Financial analysis ; Budgeting

Unit 5 : Environmental impact assessment: Basic Concepts, Objectives, Transportation Related Environmental Impacts – Vehicular Impacts – Safety and Capacity Impacts – Roadway Impacts – Construction Impacts, Environmental Impact Assessment – Environmental Impact Statement, Environment Audit, Typical case studies

REFERENCES:

1. Transportation Engineering Economics - Heggie. I. G.; Mc Graw Hill Publishers.
2. Economic Analysis for Highways - Winfrey.R; International TextBook Company.
3. Traffic Engineering and Transport Planning - L.R Kadiyali, Khanna Publishers.
4. Road User Cost Study, CRRI
5. Road Project Appraisal, for Developing Countries, J.W.Dickey ,John Wiley & Sons.

2012-2013 **Code: MR121215**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. II –SEM

L	T/P/D	C
3	1/-/-	3

PAVEMENT CONSTRUCTION MAINTENANCE AND MANAGEMENT

Unit 1 : Pavement management system

Components of PMS and their activities; Major steps in implementing PMS; Inputs; Design, Construction and Maintenance; Rehabilitation and Feedback systems; Examples of HDM and RTIM packages; Highway financing; Fund generation; Evaluating alternate strategies and Decision criteria ; Pavement Maintenance Management Components of Maintenance Management and Related Activities – Network and Project Level Analysis; Prioritization Techniques and Formulation of Maintenance Strategies

Unit 2 : Pavement Inventories and Evaluation

Serviceability Concepts ;Visual Rating ;Pavement Serviceability Index; Roughness Measurements ;Distress Modes – Cracking Rutting Etc; Pavement Deflection – Different Methods, Skid Resistance, Roughness, Safety – Aspects; Inventory System – Assessment of Deficiencies

Unit 3 : Pavement Maintenance and Quality Control

Causes of Deterioration, Traffic and Environmental Factors, Pavement Performance Modelling Approaches and Methods of Maintaining WBM, Bitumen and Cement Concrete Roads, Quality Assurance; Quality Control – ISO 9000 , Sampling Techniques – Tolerances and Controls related to Profile and Compaction

Unit 4 : Construction of Base, Subbase, Shoulders and Drain

Roadway and Drain Excavation, Excavation and Blasting, Embankment Construction, Construction of Gravel Base, Cement Stabilised Sub- Bases, WBM Bases, Wet Mix Construction; Crushed Cement Bases, Shoulder Construction; Drainage Surface, Turfing Sand Drains; Sand Wicks; Rope Drains, Geo-Textile Drainage; Preloading Techniques

Unit 5: Bituminous Pavement Construction and Cement Concrete pavement construction:

Preparation and Laying of Tack Coat; Bituminous Macadam ,Penetration Macadam, Built up Spray Grout, Open Graded Premix, Mix Seal, Semi-Dense Asphalt Concrete-Interface Treatments and Overlay Construction, IRC Specifications, Introducing Mechanical Mixers, Pavers, Finishers ; Cement Concrete Pavement Analysis - Construction of Cement Roads, Manual and Mechanical Methods, Joints in Concrete and Reinforced Concrete Pavement and Overlay Construction –Related Equipment

REFERENCES:

1. Haas and Hudson , W. R. Pavement management systems –McGraw Hill publications
2. Sargious, M. A. – Pavements and surfacing for highways and airports – Applied Science Publishers ltd
3. Bridge and Pavement maintenance- Transportation Research Record no.800, TRB
4. Shahin M.Y, 1994- Pavement management for airports, roads and parking lots
5. Bent Thagesan, 1996- Highway and Traffic engineering for developing countries

2012-2013 **Code: MR121216**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. II –SEM	**L**	**T/P/D**	**C**
	3	**0/-/-**	**3**

INTELLIGENT TRANSPORT SYSTEMS
(ELECTIVE –III)

Unit 1 : Fundamentals of ITS: Definition of ITS s, The historical context of ITS from both public policy and market economic perspectives, Types of ITS; Historical Background, Benefits of ITS

Unit 2 :Sensor technologies and Data requirements of ITS: Importance of telecommunications in the ITS system,

Information Management, Traffic Management Centres (TMC). Application of sensors to Traffic management; Traffic flow sensor technologies; Transponders and Communication systems; Data fusion at traffic management centres; Sensor plan and specification requirements; Elements of Vehicle Location and Route Navigation and Guidance concepts; ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), GIS, video data collection

Unit 3 : ITS functional areas – Advanced Traffic Management systems (ATMS), Advanced Traveler Information systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control systems (AVCS), Advanced Public Transportation systems (APTS), Advanced Rural Transportation systems (ARTS).

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

Unit 4 : ITS Architecture – Regional and Project ITS architecture; Concept of operations; ITS Models and Evaluation Methods; Planning and human factor issues for ITS, Case studies on deployment planning and system design and operation; ITS and safety, ITS and security, ITS as a technology deployment program, research, development and business models, ITS planning

Unit 5: ITS applications: Traffic and incident management systems; ITS and sustainable mobility, travel demand management, electronic toll collection, ITS and road-pricing.; Transportation network operations; commercial vehicle operations and intermodal freight; public transportation applications; ITS and regional strategic transportation planning, including regional architectures: ITS and changing transportation institutions Automated Highway Systems- Vehicles in Platoons – Integration of Automated Highway Systems. ITS Programs in the World – Overview of ITS implementations in developed countries, ITS in developing countries

REFERENCES:

1. Fundamentals of intelligent transportation systems planning By Mashrur A. Chowdhury, Adel Wadid Sadek
2. Lawrence A. Klein , Sensor technologies and Data requirements of ITS
3. ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.
4. Sussman, J. M., Perspective on ITS, Artech House Publishers, 2005.
5. National ITS Architecture Documentation, US Department of Transportation, 2007

2012-2013 **Code: MR121217**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. II –SEM	**L**	**T/P/D**	**C**
	3	**0/-/-**	**3**

MASS TRANSPORTATION SYSTEM PLANNING & MANAGEMENT
(ELECTIVE –III)

Unit 1 : Transit System: Role of Transit - Types of Transit Modes - Buses - LRT, RTS - Air cushioned and Maglev System – S- Bahn Dual Mode Busses, Para Transit - Dial - a- Ride-Taxi- Jitney and Ridesharing – PRT Networks -DRTS ; System Characteristics: Technological Characteristics – Resistances, acceleration & velocity Profiles – Operational characteristics speed, capacity & payloads – Route capacity – Comfort conditions - Performance relationships - Public and Private Operations - Modes for Intercity Transport.

Unit 2: Estimation Of Transit Demand: Data requirements & Collection techniques, Conventional Methods - Destination Survey - Bus Stop Surveys and Analysis - Mode Split Models - Captive and Choice Riders - Attitudes of Travellers - Patronage Determination.

Unit 3: Bus Route Network Planning: Route Systems - Route Location, Route Structure, Route Coding Techniques, Route Capacity - Planning of Transit Network - Different Types - Service Area Coverage - Evaluation - Selection of Optimal Network - Path Building Criteria - Integration with UTPS. Scheduling: Patterns of Bus Services - Frequency of Services - Special Services - Single Route Bus Scheduling - Fleet Requirement, Marginal Ridership Concept - Use of Optimisation Technique - Load Factor - Depot Location - Spacing of Bus Stops; Bus Stops And Terminal Designs: Type Design – Bus stop capacities – Bus Parking patterns at Terminals and Wayside Stations – Integration.

Unit : 4 Mass Transit Corridor Identification & Planning: Corridor identification - Network Compression Method - Planning of Rapid Transit System - System Selection - Supporting and Enclosing Structures - System Evaluation - Track Structures - Power Supply and Distribution - Signal System - Aesthetics and Noise Consideration - Cost of Construction - Station Arrangements - Platform Capacity - Fare Collection, Transit Marketing.

Unit 5: Mass Transport Management Measures: Performance Indicators –- Preferential Treatment to HOV: Exclusive Bus Lanes - Bus Streets - Contra Flows - Reversible Lanes - Bus Bypass - Bus Pre-emption Signals for Bus Operations.

REFERENCES:

1. A. Black, Urban Mass Transport Planning, McGraw Hill
2. V.R. Vuchic, Urban Public Transport System and Technology, Prentice Hall Inc
3. G.E. Gray and CA Hoel: Public Transport Planning Operation and Management, Prentice Hall
4. White PR, Planning for Public Transport, UCL Press Ltd.

2012-2013 **Code: MR12P0M6**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. II –SEM

L	T/P/D	C
3	0/-/-	3

OPTIMIZATION TECHNIQUES
(ELECTIVE –III)

1. **Linear programming:**
   Introduction and formulation of models; convexsity ; graphical &simplex method; two phase method; degeneracy, non-existent and unbounded solutions; duality in L.P. Dual simplex method, Big-M Method sensitivity analysis; Revised simplex method; Transportation and Assignment problems.

2. **Non-linear programming:**
   Classical optimization methods; equality and inequality constraints; Lagrange multipliers; &Kuhn-tucker conditions; quadratic forms; quadratic programming and Beal's methods.

3. **Search methods:**
   One dimensional optimization; Fibonacci search; multi dimensional search methods; univariate search; gradient methods; steepest descent/ascent methods; conjugate gradient method; Fletcher- reeves method; penalty function approach.

4. **Dynamic programming**:
   Belman's Principle of optimality; recursive relations; solution of L.P. Problem; simple examples.

5. **Integer linear programming:**
   Gomory's cutting plane method; branch and bound algorithm; traveling salesman problem; knapsack problem; linear C-1 problem.

REFERENCES:

1. Introduction to optimization-J.C.Paint; Jain brothers; New Delhi.
2. Optimisation theory and applications-S.S.Rao; Wiley Eastern Ltd., New Delhi.
3. Optimization method-K.V.Mital; Wiley Eastern Ltd... New Delhi.
4. Introduction to OR J.K. SHARMA Introduction to OR S.D .SHARMA

2012-2013 **Code: MR121218**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. II –SEM	**L**	**T/P/D**	**C**
	3	**0/-/-**	**3**

GIS APPLICATIONS IN TRANSPORTATION ENGINEERING
(ELECTIVE –IV)

Unit 1 : Introduction: Definitions of GIS – Components of GIS – Geographic data presentation: maps – mapping process – coordinate systems – transformations – map projections – geo referencing - data acquisition.

Unit 2 : Geographic Data Representation, Storage, Quality and Standards: Storage - Digital representation of data –Data structures and database management systems – Raster data representation – Vector data representation –Concepts and definitions of data quality – Components of data quality – Assessment of data quality –Managing data errors – Geographic data standards.

Unit 3 : GIS Data Processing, Analysis and Modeling: Raster based GIS data processing – Vector based GIS data processing – Queries – Spatial analysis – Descriptive statistics – Spatial autocorrelation – Quadrant counts and nearest neighbour analysis – Network analysis – Surface modeling – DTM; Data Management:The data base designs and approaches, 3 classic data models, Nature of geographic data, Spatial data models, Databases for GIS ; Implementation and Maintenance of GIS, Evaluation of alternative systems, System justification and Development of an implementation plan

Unit 4 : Application of GIS in Transportation Engineering – I : Intelligent information system for road accessibility study, GIS data base design for physical facility planning, Decision support systems for land use planning

Unit 5 : Application of GIS in Transportation Engineering – II: GIS applications in environment impact assessment and environment monitoring, GIS based Highway alignment, GIS based road network planning, GIS based traffic congestion analysis and accident investigation, Utility management.

REFERENCES:

1. Lo, C.P. & Yeung A.K.W., Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, New Delhi, 2002.
2. Burrough, P.A., Principles of Geographical Information Systems, Oxford Publication, 1998.
3. Clarke, K., Getting Started with Geographic Information Systems, Prentice Hall, New Jersy, 2001.
4. DeMers, M.N., Fundamentals of Geographic Information Systems, John Wiley & Sons, New York,2000.
5. Geo Information Systems – Applications of GIS and Related Spatial Information Technologies,ASTER Publication Co., Chestern (England), 1992
6. Jeffrey, S. & John E., Geographical Information System – An Introduction, Prentice-Hall, 1990
7. Marble, D.F., Galkhs HW & Pequest, Basic Readings in Geographic Information Systems, Sped System Ltd., New York, 1984.
8. GIS for Urban & Regional Planning, Scholten & Stillwen 1990, Kulwer Academie Publisher.
9. GIS A Management, Perspenfi Stan Aronoff, WDL Publisher.
   GIS By Stonffer

2012-2013 **Code: MR121219**

MALLA REDDY ENGINEERING COLLEGE
(Autonomous)

I YEAR M.TECH. T.E. II –SEM	**L**	**T/P/D**	**C**
	3	**0/-/-**	**3**

ENVIRONMENTAL IMPACT ASSESSMENT FOR TRANSPORTATION PROJECTS
(ELECTIVE –IV)

Unit 1: Introduction: Environment and its interaction with human activities - Environmental imbalances - Attributes, Impacts, Indicators and Measurements - Concept of Environmental Impact Assessment (EIA), Environmental Impact Statement, Objectives of EIA, Advantages and Limitations of EIA

Unit 2: Environmental Indicators - Indicators for climate - Indicators for terrestrial subsystems - Indicators for aquatic subsystems - Selection of indicators - Socio-economic indicators - Basic information - Indicators for economy - Social indicators - Indicators for health and nutrition - Cultural indicators - Selection of indicators.

Unit 3: Environmental Impact Assessment For Transportation Projects: Basic Concepts, Objectives, Transportation Related Environmental Impacts – Vehicular Impacts – Safety & Capacity Impacts – Roadway Impacts – Construction Impacts, Environmental Impact Assessment – Environmental Impact Statement, Environment Audit, Typical case studies

Unit 4: Environmental Issues in Industrial Development: On-site and Off-site impacts during various stages of industrial development, Long term climatic changes, Green house effect, Industrial effluents and their impact on natural cycle, Environmental impact of Highways, Mining and Energy development

Unit 5:. Methodologies for Carrying Environmental Impact Assessment: Overview of Methodologies Adhoc, Checklist, Matrix, Network, Overlays, Benefit Cost Analysis, Choosing A Methodology, Review Criteria.

REFERENCES:

2. Rau, J.G. and Wooten, D.C., (1996), "Environmental Impact Assessment", McGraw Hill Pub. Co., New York

UNESCO, (1987), "Methodological Guidelines for the Integrated Environmental Evaluation of Water Resources 1. Jain, R.K., Urban, L.V., Stracy, G.S., (1991), "Environmental Impact Analysis", Van Nostrand Reinhold Co., New York

3. Development", UNESCO/UNEP, Paris
4. Canter, L.W., (1997), "Environmental Impact Assessment", McGraw Hill Pub. Co., New York

2012-2013 **Code: MR121220**

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I YEAR M.TECH. T.E. II –SEM	**L**	**T/P/D**	**C**
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ADVANCED TRAVEL DEMAND MODELLING
(ELECTIVE –IV)

Unit 1 : Qualitative Variables: Role of Soft variables in Travel Demand Forecasting; Attitudes; Psychometric scaling Techniques – One-dimensional Scaling – Multidimensional Scaling; Basic Rating Scales: Comparative Rating Scales, Non – Comparative Rating scale, Itemised rating scale, graphic rating scale; Specific Attitude scales; Successive Categories; Principal Components Factor Analysis; Attitudinal Models.

Unit 2 : Discrete Choice And time use Analysis: Utility Concept; Mode choice; Logit Models; Dogit Model; Nested Logit Model; Probit Model; Route Choice Modelling; Combined Travel Demand Modelling; Model Parameter Estimation – Maximum Likelihood and Maximum Entropy Estimates.; Activity patterns; Activity scheduling; Activity Time Allocation studies; Activity Episode Analysis; Travel Duration Analysis

Unit 3 : Stated Preference Methods: Stated preference vs. Revealed Preferences; Design Issues; Survey Methods, Conjoint Analysis; Functional Measurement; Trade off Analysis, Transfer Price Method

Unit 4 : Model Aggregation And Transferability: Aggregation bias and forecasting; Aggregation Methods; Temporal Stability and geographical stability of Models; Transfer Model Updating Procedures – Transferring with Aggregate and Disaggregate sample data; Transferability Measures ; Simplified Transport Demand Models: Sketch planning Methods; Incremental Demand Models; Model estimation from traffic Counts; IVF Models, Marginal and Corridor Models; Gaming Simulation, Quick Response Techniques

Unit 5 : Advanced Modelling Techniques - I: GO Models; Entropy Models; Equilibrium Assignment Techniques, Multipath Assignment – Dial's Algorithm; Knowledge Based Expert System; Neuro – Fuzzy Application; ANN Techniques; Genetic Algorithms; Object Oriented Programming; Decision Support Systems; Goal Programming

REFERENCES:

1. Orterzar, J. de D. and L.G. Willumasen. Modelling Transport, Wiley Publishers
2. Oppenheim N. Urban Travel Demand Modelling: From Individual Choices to general Equilibrium. John Wiley & sons, Inc
3. Time use Analysis, Special Issue, Transportation, 26, Kluwer Academic Publishers
4. Michael Florian, Economics & Mathematical Systems: Traffic Equilibrium Methods.
5. Wilson A.G., J.D. Coelho, Sm. Macgill and HCWL Williams. Optimisation in Location and Transport Analysis, John Wiley & Sons
6. Ben Akiva, Discrete Choice Analysis: Theory and Application to Travel Demand, MIT Press

2012-2013 **Code: R1212221**

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I YEAR M.TECH. T.E. II –SEM **L T/P/D C**
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TRANSPORTATION ENGINEERING LAB AND STUDIO - II

1. Pavement evaluation using Visual rating, Deflection and Roughness
2. Pavement inventory surveys
3. Pavement asset management
4. DPR preparation ; Overview of HDM - 4
5. Road safety design and auditing; Accident investigation approach using GIS and GPS

SNo	Objective of the study	List of experiments to be conducted	Outcome
1	Pavement evaluation using Visual rating, Deflection and Roughness	a. Benkelman Beam test	Deflection of the pavement
		b. Roughness test	IRI
		c. Field survey by visual assessment of the pavement distress	PCI
2	Pavement inventory surveys	Videography survey	Inventory of the existing pavement, Road network definition, Database creation
3	Pavement asset management	Visual rating tests, Material characterization tests, Structural conditions , Surface condition tests	Maintenance Policy development
4.	DPR preparation ; Overview of HDM - 4	Material characterization studies	CBR, Design mix
		Traffic surveys such as CVC , Speed studies	Estimation of AADT and VOC
		Total station survey	Geometric design of road
		Field surveys for quarry chart preparation	
5	Road safety design and auditing; Accident investigation approach using GIS and GPS	Total station surveys, Videography survey, Road inventory survey; Accident data collection; Survey formats generation; GPS survey	Suggestions for Improvement of road safety