Maharshi Dayanand University, Rohtak

Scheme of Examination of M.Tech.

TRANSPORTATION ENGINEERING & MANAGEMENT

W.E.F. SESSION 2014-15.

Maharshi Dayanand University, Rohtak
Scheme of Examination of M.Tech.
TRANSPORTATION ENGINEERING & MANAGEMENT
SEMESTER-I

EFFECTIVE FROM 2014-15

Course No.	Course Title	Teaching Schedule			Marks		Total	Duration of Exam (Hrs)
		L	T	P	Sessional	Exam.		
MTTEM 101	Transportation Systems Planning	4	-	-	50	100	150	3
MTTEM 102	Highway & Airport Pavement Materials	4	-	-	50	100	150	3
MTTEM 103	Numerical Methods & Applied Statistics	4	-	-	50	100	150	3
MTTEM 104	High Rise Structures	4	-	-	50	100	150	3
	Elective-1	4	-	-	50	100	150	3
MTTEM 105	Computational Laboratory	-	-	3	50	50	100	3
MTTEM 106	Transportation Engineering Laboratory	-	-	3	50	50	100	3
TOTAL		20	-	6	350	600	950	-

Elective- I

MTTEM 107 – Planning and Design of Airports

MTTEM 108 – Transportation Systems, Analysis and Modeling

MTTEM 109 – Geometric Design of Highway

Maharshi Dayanand University, Rohtak
Scheme of Examination of M.Tech.
TRANSPORTATION ENGINEERING & MANAGEMENT
SEMESTER-II

EFFECTIVE FROM 2014-15

Course No.	Course Title	Teaching Schedule			Marks		Total	Duration of Exam (Hrs)
		L	T	P	Sessional	Exam.		
MTTEM 201	Analysis & Structural Design of Pavements	4	-	-	50	100	150	3
MTTEM 202	Mass Transit Systems	4	-	-	50	100	150	3
MTTEM 203	Advanced Railway Engineering	4	-	-	50	100	150	3
MTTEM 204	Strength and Deformation Behaviour of Soil	4	-	-	50	100	150	3
	Elective – II	4	-	-	50	100	150	3
MTTEM 205	Traffic & Transportation Engineering Laboratory	-	-	3	50	50	100	3
MTTEM 206	Transportation Engineering Design Practice	-	-	3	50	50	100	3
TOTAL		20	-	6	350	600	950	-

Elective- II

MTTEM 207- Bridge Engineering

MTTEM 208 –Highway Construction Practice

MTTEM 209- Design and Construction of Rural Roads

Maharshi Dayanand University, Rohtak
Scheme of Examination of M.Tech.
TRANSPORTATION ENGINEERING & MANAGEMENT
SEMESTER-III

EFFECTIVE FROM 2014-15

Course No.	Course Title	Teaching Schedule			Marks		Total	Duration of Exam (Hrs)
		L	T	P	Sessional	Exam.		
MTTEM 301	Traffic Engineering and Traffic Flow Theory	4	-	-	50	100	150	3
MTTEM 302	Transportation and Environment	4	-	-	50	100	150	3
MTTEM 303	Seminar & Technical Writing	-	-	2	100	-	100	-
MTTEM 304	Dissertation Phase-I	-	-	4	200	-	200	-
TOTAL		8	-	6	400	200	600	-

Maharshi Dayanand University, Rohtak
Scheme of Examination of M.Tech.
TRANSPORTATION ENGINEERING & MANAGEMENT
SEMESTER-IV

EFFECTIVE FROM 2014-15

Course No.	Course Title	Teaching Schedule			Marks		Total	Duration of Exam (Hrs)
		L	T	P	Internal	External		
MTTEM 401	DISSERTATION & VIVA (Phase II)	-	-	24	200	400	600	3
TOTAL			-	24	200	400	600	

NOTE:

1. The Dissertation shall be evaluated by an examination committee consisting of the head of the department, Dissertation Supervisor and one External examiner.

NOTE:

Award of Grades Based on Absolute Marks

The University will follow system of grading for all (irrespective of no. of students) based on absolute marks (**after applying moderation if any**) as given below:

Marks		Grades		Marks
85	≤	A+	≤	100
75	≤	A	<	85
60	≤	B	<	75
50	≤	C	<	60
40	≤	D	<	50
00	≤	F	<	40

GRADE POINTS:

The grading divisions of academic performance will be as under:-

Letter Grades	Performance	Division
A+	Excellent	First
A	Very Good	First
B	Good	First
C	Fair	Second
D	Pass	Third
F	Repeat	Fail

NOTE:

1. The paper setter shall set each theory paper of 100 marks covering entire syllabus. However the Examiner shall evaluate the performance of the student in the theory paper finally by assigning one of the grades out of A+, A, B, C, D & F. The examination of practical courses shall also be evaluated on the basis of these grades.

2. The Sessional of theory and practical courses shall also be evaluated in the basis of these grades.

3. The choice of student for any elective shall not be binding on the department to offer it.

4. The grading system is define at the end of scheme of studies & examinations and will be supplied by the University to the examiner(s).

MTTEM-101 TRANSPORTATION SYSTEMS PLANNING

L- T- P		Exams Marks	: 100
4- 0- 0		Sessionals Marks	: 50
		Total Marks	: 150
		Duration of Exam	: 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Brief Description of urban and regional transportation systems, Definition of a system; System analysis: scope and limitations, Transportation planning based upon system Analysis, Survey and analysis of existing conditions, Models for trip generation, trip Distribution, traffic assignment and modal split; Analysis of future conditions, Plan synthesis and evaluation.

Reference:

1. L.R. Kadiyalli, Traffic Engineering and Transport Planning, Khanna Publishers, 7th edition, 2008
2. C. S. Papacostas, P. D. Prevedouros, Transportation Engineering and Planning, PHI Publication, 3rd edition, 2002.
3. M.J. Bruton, Introduction to Transportation Planning (Built Environment), Routledge, 1992.
4. J.D. Fricker and R. K. Whitford, Fundamentals of Transportation Engineering: A Multimodal System Approach, Pearson Education, PH, 2005.
5. Ortuzar & Willumsen, Modeling Transport, John Wiley, 1990

MTTEM-102 HIGHWAY AND AIRPORT PAVEMENT MATERIALS

L- T- P
4- 0- 0

Exams Marks   : 100
Sessionals Marks   : 50
Total Marks   : 150
Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Conventional aggregates and their evaluation, Bituminous binders- Properties, testing and Applications; Bituminous mixes- Design, testing and evaluation; Materials for cement Concrete and semi-rigid pavements, Design of mixes for stabilized roads; Non-conventional and new pavement materials- their application and limitations.

Reference:

1. Atkins & Harold**,** Highway Materials, Soils, and Concretes, Prentice Hall Pearson, 4th Ed.**,** 2003
2. Y. Richard Kim, Modeling of Asphalt Concrete, 2008, Mc Graw Hill Professional.
3. Relevant IRC, ASTM, AASHTO and other Codes, Manuals and Specifications
4. P.G. Lavin, Asphalt Pavements, Taylor and Francis, 1st Ed. 2007

MTTEM-103 NUMERICAL METHODS AND APPLIED STATISTICS

L- T- P

4- 0- 0

Exams Marks   : 100
Sessionals Marks   : 50
Total Marks   : 150
Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Linear system – Gaussian elimination and Gauss – Jordan methods – matrix inversion – Gauss seidel method – Nonlinear equations – Regula falsi and Newton- Raphson methods – interpolation – Newton's and Lagrange's interpolation

Linear Programming – Graphical and Simplex methods – Measures of central tendency, dispersion, skewness and Kurtosis – Probability – conditional probability – Bayes' theorem

Random variable – two dimensional random variables – standard probability distributions – Binomial Poisson and normal distributions - moment generating function

Sampling distributions – confidence interval estimation of population parameters – testing of hypotheses – Large sample tests for mean and proportion – t-test, F-test and Chi-square test – curve fitting-method of least squares

Regression and correlation – rank correlation – multiple and partial correlation – analysis of variance one way and two way classifications – experimental design – Latin square design – Time series analysis.

Reference:
1. Bowker and Liberman, Engineering Statistics, Prentice-Hall, 1972.
2. Venkatraman, M.K., Numerical Methods in Science and Engineering, National Publisher Company.

MTTEM-104 HIGH RISE STRUCTURES

L- T- P
4- 0- 0

Exams Marks   : 100
Sessionals Marks   : 50
Total Marks   : 150
Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Analysis of tall building frames, Lateral load analysis, multi bay frames, gravity loads, settlement of foundation. Analysis of shear walls - plane shear walls, in filled frames, coupled frames, frames with shear walls. Principle of three dimensional analysis of tall buildings; perforated cores, pure torsion in thin tubes, bending and warping of perforated cores. Analysis of floor system in tall buildings, Vierendal girders, diagrid floors. Elastic and inelastic stability of frames and shear walls. Analysis of thermal stresses.

Reference:
1. B S Smith & A Coull, *Tall Building Structures:* - John Wiley & Sons.
2. W. Schueller, *High Rise Building Structures*: John Wiley & Sons.

MTTEM-105 COMPUTATIONAL LABORATORY

L- T- P   Exams Marks   : 50
0- 0- 3   Sessionals Marks   : 50
                 Total Marks   : 100
                 Duration of Exam   : 3hrs.

Computer programming in C++. ; Development of computer programs to solve problems related to civil engineering using matrix method.

MTTEM-106 TRANSPORTATION ENGINEERING LABORATORY

L- T- P
0- 0- 3

Exams Marks   : 50
Sessionals Marks   : 50
Total Marks   : 100
Duration of Exam   : 3 hrs.

- Penetration Ratio and Penetration Viscosity Number of Bituminous binders
- 10% Fines Test for aggregates
- Moisture sensitivity test for bitumen adhesion
- Viscosity-Temperature relationships for bituminous binders
- Rheological properties of bituminous binders
- Design of Bituminous mixes

ELECTIVE-I

MTTEM-107 PLANNING AND DESIGN OF AIRPORTS

L- T- P
4- 0- 0

Exams Marks   : 100
Sessionals Marks   : 50
Total Marks   : 150
Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Classification of airports- ICAO standards ; Planning for airport- Airport components- Zoning laws ; Runways- orientation and geometric design- Runway patterns ; Taxiways- alignment geometry and turning radius- exit taxiways ; Aprons- planning and design ; Design principles of critical, semi-critical, non-critical airport pavements- FAA and PCA methods ; Airport hangars- their planning and design criteria ; Airport landscaping, grading and drainage general aspects ; Airport terminal and amenities ; Airport lighting and marking.

Reference:
1. N.J. Ashford, P.H. Wright, *Airport Engineering*, 3rd Edition, 1992, John Wiley
2. R.M. Horonjeff, F.X. Mc Kelvey, W.J Sproule, *Seth Young, Planning and Design of Airports*, *TMH International Publishers*, Fifth Edition, 2009
3. Khanna, Arora and Jain, *Planning and Design of Airports*, Nemchand Bros., 2001
4. Wells, Alexander; Young, Seth, *Airport Planning & Management*, McGraw Hill,5th Edition, July,2009
5. De N. Richard, & Odoni, *Airport Systems: Planning, Design, and Management*, McGraw Hill Amedeo, 1st Edition, 2004.

MTTEM-108 TRANSPORTATION SYSTEMS, ANALYSIS AND MODELING

L- T- P   Exams Marks   : 100
4- 0- 0   Sessional Marks   : 50
                                                       Total Marks   : 150
                                                       Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Systems modeling- definitions ; Transport models, Model building kit, Mathematical modeling and its calibration, Data collection and application of models ; Land use and transportation interaction ; Future forecasts using models ; Evaluation and analysis of transportation systems

Reference:
1. P.H. Wright, N.J. Ashford, R.J. Stammer, *Transportation Engineering: Planning and Design*, 4th Edition, December 1997
2. *Principles of Highway Engineering and Traffic Analysis*, John Wiley & Sons, 3rd Ed., 2004.
3. M.D. Meyer and E.J. Miller, *Urban Transportation Planning. Urban Transportation Planning*: *A Decision-Oriented Approach*, 2nd edition, McGraw-Hill, 2001
4. B.G. Hutchinson, *Urban Transportation Planning*, Mc. Graw Hill, 1974

MTTEM-109 GEOMETRIC DESIGN OF HIGHWAY

L- T- P   Exams Marks   : 100
4- 0- 0   Sessionals Marks   : 50
                                                     Total Marks   : 150
                                                     Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Traffic surveys: Speed, volume, delay, origin and destination, parking; Traffic controls: Traffic signs, signals, road marking and other traffic control aids; Traffic safety: Accidents, causes and prevention ;traffic flow theory, light hill and Witham's theory the queuing theory and its application to traffic engineering problems, car flow theory ; Simulations of traffic: scanning technique

Reference:
1. L.R. Kadiyalli, *Traffic Engineering and Transport Planning*, Khanna Publishers, 7th Edition, 2008.
2. C.A.O'Flaherty, *Transport Planning and Traffic Engineering*, Arnold, 1997.
3. R. P. Roess, E. S. Prassas, & W.R. Mc Shane, *Traffic Engineering*, Prentice Hall, 3rd Edition, 2004
4. May, *Traffic Flow Fundamentals*, Prentice Hall, 1989
5. F. L. Mannering, *Principles of Highway Engineering and Traffic Analysis*, 4th Edition, 2008, John Wiley

SEMESTER –II

MTTEM-201 ANALYSIS AND STRUCTURAL DESIGN OF PAVEMENTS

L- T- P   Exams Marks   : 100
4- 0- 0   Sessionals Marks   : 50
                                                 Total Marks   : 150
                                                 Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Theories of pavement design, Factors affecting pavement design; Methods of flexible pavement design- applications of CBR, Burmister, Asphalt Institute, AASHTO and IRC Methods. ; Load and temperature stresses in rigid pavements- Westergaad's, Bradburry's and Pickets concepts; Design of rigid pavements by PCA, AASHTO and IRC methods;
Design of joints in rigid pavements; Evaluation of pavement distress; Design aspects of flexible and rigid overlays.

Reference:
1. Yoder and Witzack, *Principles of Pavement Design*, John Willey and Sons, October 1975
2. Yang H. Huang*, Pavement Analysis and Design*, PH, 2nd Edition, 2004.
3. *Relevant IRC, ASTM, AASHTO and other Codes*, Manuals and Specifications
4. D. Croney & P. Croney, *the Design and Performance of Road Pavements*, Mc Graw Hill Professional, 3rd Edition. 1998 Richard J Salter, *Highway design and construction*, Palgrave Macmillan, 1988

MTTEM-202 MASS TRANSIT SYSTEMS

L- T- P		Exams Marks	: 100
4- 0- 0		Sessionals Marks	: 50
		Total Marks	: 150
		Duration of Exam	: 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Mass Transit concepts- Trip interchanges and assignments ; Urban transportation problems, Modes of mass transit- their planning, construction and operation, Case studies of existing mass transit systems ; Technical and economic evaluation of mass transit projects

References:
1. C. S. Papacostas, P. D. Prevedouros, *Transportation Engineering and Planning*, PHI Publication, 3rd edition, 2002
2. S. Grava, *Urban Transportation Systems*, Mc. Graw Hill Professional, 1st Ed. 2002.
31. J.D. Fricker, & R.K. Whitford, *Fundamentals of Transportation Engineering*, Pearson, PH, 2004
4. V.R. Vuchic, *Urban Transit Systems and Technology*, John Wiley & Sons, February 2007
5. C.A. O'Flaherty, *Transport Planning and Traffic Engineering*, Arnold, 1997
6. J. E. Anderson, *Transit Systems Theory*, Lexinton Books, USA

MTTEM-203 ADVANCED RAILWAY ENGINEERING

L- T- P   Exams Marks   : 100
4- 0- 0   Sessionals Marks   : 50
                                             Total Marks   : 150
                                             Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Track and track stresses, Train resistances and hauling power of locomotives ; Railway track components: Important features, Railway curves, Super elevation, Gradients and grade compensation, Points and crossing and their design approaches. ; Construction and maintenance of railway track, Control of train movements; Signals and interlocking,
Modernization of railways and future trends; Track standards and track rehabilitation.

Reference:
1. J.S. Mundrey, *Railway Track Engineering*, Tata McGraw Hill Co. Ltd., 3rd Edition, 2000.
2. M.M. Agarwal, *Railway Track Engineering*, Standard Publishers, 1st Ed. 2005.
3. S. Chandra and Aqarwal, *Railway Engineering*, Oxford University Press, 1st Ed. Feb 2008.
4. A.D. Kerr, *Fundamentals of Railway Track Engineering*, Simmons Boardman Pub Co (December 30, 2003)

MTTEM-204 STRENGTH AND DEFORMATION BEHAVIOUR OF SOIL

L- T- P   Exams Marks   : 100
4- 0- 0   Sessionals Marks : 50
                      Total Marks   : 150
                      Duration of Exam : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Introduction: Physico-Chemical aspects, Failure theories, Yield criteria, Elastic and Plastic Analysis of soil, Mohar's diagram; Stresses in Soil: Description of state of stress and strain at a point, stress distribution problems in elastic half pace. Boussinessqu, Westergard Mindlin and Kelvin problems. Distribution of contact pressure. Analysis of Elastic settlement. ; Soil Plasticity. ; Shear Strength of Soils: Experimental determination of shear strength, Types of Tests base on drainage condition and their practical significance, Skempton's and hankel's pore water pressure, Coefficients, Stress Path, Shear strength of unsaturated soil, Row's stress dilatancy theory. Constitutive Models: Constitutive Models in Soil Mechanics: Isotropic Elastic, Anisotropic Plasticity and Viscous Models. Representing Soil Behavior using these Models. ; Advances in Constitutive models.

Reference:
1. A.P.S. Selvadurai, *Plasticity & Geomechanics*, Cambridge University Press, 2002
2. W.F. Chen, *Limit Analysis & Soil Plasticity*, Elsevier Scientific, 1975.
3. C. S. Desai and J. T. Christian, *Numerical Methods in Geotechnical Engineering*, McGrew Hill, New York.
4. R. F. Scott, *Principles of Soil Mechanics*, Addison & Wesley.

MTTEM-205 TRAFFIC & TRANSPORTATION ENGINEERING LABORATORY

L- T- P   Exams Marks   : 50
0   0   3   Sessionals Marks : 50
                                                             Total Marks   : 100
                                                             Duration of Exam : 3hrs.

- Traffic volume studies
- Spot speed studies
- Accident and Parking studies
- Design of Traffic rotaries and Intersections
- Traffic simulation modeling
- Road safety audit

Use of software for geometric design and alignment of highway

MTTEM-206 TRANSPORTATION ENGINEERING DESIGN PRACTICE

L- T- P   Exams Marks   : 50
0   0   3   Sessional Marks   : 50
                                    Total Marks   : 100
                                    Duration of Exam : 3hrs.

- Soil-Cement / Soil-lime Mix Design
- Blending of aggregates
- Design and blending of sub-base material
- Characterization of Aggregate and Bituminous materials
- Viscoelastic Characteristics of bituminous and modified binders
- Modified Marshall test for bituminous mixes
- Repeated Load Testing of pavement materials

Use of software's for Pavement Analysis and Design

ELECTIVE –II

MTTEM-207 BRIDGE ENGINEERING

L- T- P
4- 0- 0

Exams Marks   : 100
Sessionals Marks   : 50
Total Marks   : 150
Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all. Use of relevant codes of practice are permitted in the examination.

Introduction, historical review, engineering and aesthetic requirements in bridge design. Introduction to bridge codes. Economic evaluation of a bridge project. Site investigation and planning;. Scour - factors affecting and evaluation. Bridge foundations - open, pile, well and caisson. Piers, abutments and approach structures; Superstructure - analysis and design of right, skew and curved slabs. Girder bridges - types, load distribution, design. Orthotropic plate analysis of bridge decks. Introduction to long span bridges - cantilever, arch, cable stayed and suspension bridges. Methods of construction of R.C Bridges, Prestressed concrete bridges and steel bridges Fabrication, Launching & creation. Design and construction of construction joints.

Reference:
1. V. K. Raina, *Concrete Bridges Practice Analysis, Design and Economics*, Shroff Publications, New Delhi 2nd Ed. 2005.
2. Vazirani, Ratwani and Aswani, *Design of Concrete Bridges*, Khanna Publishers, 2nd Ed. 2008.
3. IRC codes for Road bridges- IRS Sec I , II, III
4. IRS Codes of Practice for Railway bridges.
5. B. M. Das, *Principles of Foundation Engineering,* Thomson, Indian Edition, 2003.

MTTEM-208 HIGHWAY CONSTRUCTION PRACTICE

L- T- P   Exams Marks   : 100
4- 0- 0   Sessionals Marks   : 50
                                                   Total Marks   : 150
                                                    Duration of Exam   : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Embankment, formation cutting in soil and hard rock, sub grade; ground improvement; Retaining walls on hill roads; granular & stabilized sub bases/bases; bituminous surfacing; Recycled pavements; concrete roads; non conventional pavements; road construction equipments.

References:

1. MOST, Specifications for Road and Bridge Work (4th Revision), Ministry of
   Road Transport and Highways, 2001.

2. C. A. O' Flaherty, Highways – The Location, Design, Construction, &
   Maintenance of Pavements, Butterwsorth Heinemann, 2002.

3. R. N. Hunter, Bituminous Mixtures in Road Construction, Thomas Telford
   Services Ltd., 1995.

4. P. H. Wright, Highway Engineering, John Wiley & Sons, 1996.

5. C. H. Oglesby, and R. G. Hicks, Highway Engineering, John Wiley & Sons, 198.

MTTEM-209 DESIGN AND CONSTRACTION OF RURAL ROADS

L- T- P
4- 0- 0

Exams Marks   : 100
Sessionals Marks : 50
Total Marks   : 150
Duration of Exam : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Rural Road Development; Introduction to Rural Road Construction Scheme in India and its Objectives; Classifications of Roads; Importance of Rural Road Connectivity; Planning of Rural Roads Core Network; Preparation of DPR; Specification of Rural Roads; Use of Alternate Materials in Rural Roads; Construction Methods and Techniques Used in Rural Roads; Quality Control in Rural Road Construction Projects; Maintenance of Rural Roads.

References:

1. Brown, J. Victor, and C. N. Conner, Low cost roads and bridges, Gillette Co. Publications, 1933.
2. K. N. Ramanujam, Rural Transport in India, Mittal Publications, 1993.
3. R. Lamm, A. Beck, and T. Ruscher, How to Make Two-Lane Rural Roads Safer, WIT Press, 2007.
4. L. Odier, Low Cost Roads: Design, Construction and Maintenance, Unesco, Butterworths, 1971.
5 G. R. Chatburn, and J. Wiley and Sons, Highway Engineering, Rural Roads and Pavements, Inc. Publication, 2010.
6. Rural Development Study, World Bank Publications, 1998
7. Geometric Design Standards for Rural (Non-Urban) Highways, IRC: 73-1980.
8. Rural Roads Manual, IRC: SP: 20-2002.
9. Manual on Economic Evaluation of Highway Projects in India, IRC: SP: 30-1993.
10. Hill Road Manual, IRC: SP: 48-1998.
11. Guidelines for Quality Systems for Road Construction, IRC: SP: 57-2000.
12. Guidelines for the Design of Flexible Pavements for Low Volume Rural Roads, IRC: SP: 72-2007.
13. Manual for Construction and Supervision of Bituminous Works, MORT&H: 2001.
14. Specifications for Rural Roads, Ministry of Rural Development, Government of India, IRC, 2004.
15. Quality Assurance Hand Book for Rural Roads Volume-I and Volume-II, Ministry of Rural Development, Government of India, NRRDA.

MTTEM-301 TRAFFIC ENGINEERING AND TRAFFIC FLOW THEORY

L- T- P
4- 0- 0

Exams Marks : 100
Sessionals Marks : 50
Total Marks : 150
Duration of Exam : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

Traffic surveys: Speed, volume, delay, origin and destination, parking; Traffic controls:
Traffic signs, signals, road marking and other traffic control aids; Traffic safety: Accidents, causes and Prevention; traffic flow theory: Light hill and Witham's Theory the queuing theory and its application to traffic engineering problems, car flow theory; Simulations of traffic: scanning technique

Reference:
1. L.R. Kadiyalli, *Traffic Engineering and Transport Planning*, Khanna Publishers, 7th Edition, 2008.
2. C.A.O'Flaherty, *Transport Planning and Traffic Engineering*, Arnold, 1997.
3. R. P. Roess, E. S. Prassas, & W.R. Mc Shane, *Traffic Engineering*, Prentice Hall, 3rd Edition, 2004
4. May, *Traffic Flow Fundamentals*, Prentice Hall, 1989
5. F. L. Mannering, *Principles of Highway Engineering and Traffic Analysis*, 4th Edition, 2008, John Wiley.

MTTEM-302 TRANSPORTATION AND ENVIRONMENT

L- T- P   Exams Marks   : 100
4- 0- 0   Sessionals Marks : 50
                                             Total Marks   : 150
                                             Duration of Exam : 3 hrs.

NOTE: Eight questions are to be set from whole syllabus and the students will have to attempt five questions in all.

The Road Environment**:** human factors in road user behavior, vehicle characteristics, driver, road and environment. Environmental Factors**:** impacts and mitigation measures of air quality, noise, severance, visual intrusion, impact on water quality, use of limited resources, impact on flora & fauna, vibration, dust ; Transport related pollution; Technology Vision-2020; Urban and non urban traffic noise sources, Noise pollution; Energy related aspects of different transport technologies. Traffic calming, Measures, Road transport related air pollution, sources of air pollution, effects of weather conditions, Vehicular emission parameters, pollution standards, measurement and analysis of vehicular emission; Imitative measures; EIA requirements of Highways projects, Procedure; MOEF World Bank/EC/UK guidelines ; EIA practices in India.

Reference:
1. K. Wark, C.F. Warner, & W.T. Davis, *Air Pollution: Its Origin and Control*, Prentice Hall. 3rd Ed. 1997.
2. R.W. Boubel, *Fundamentals of Air Pollution*, Academic Press, 4th Ed. 2007.
3. D. Vallero, *Fundamentals of Air Pollution*, Academic Press, 4th Ed. 2007.
4. L. Canter, *Environmental Impact Assessment*, McGraw-Hill International, 2nd Ed. 1995.

MTTEM -303 SEMINAR & TECHNICAL WRITING

L- T- P   Sessionals Marks : 100
0- 0- 2   Total Marks   :100

Every student will be required to present a seminar talk on a topic approved by the Department except on his/her dissertation & submit the report to the Department. The committee constituted by the Head of the Department will evaluate the presentation and will award the marks.

NOTE: A Student who is awarded the 'F' grade will be required to repeat the seminar on the same topic.

MTTEM-304 DISSERTATION PHASE-I

L- T- P   Sessionals Marks   : 200
0- 0- 4   Total Marks   : 200

Every student will carry out dissertation under the supervision of a Supervisor(s). The topic shall be approved by a Committee constituted by the Head of the concerned Deptt. Every student will be required to present two seminar talks, first at the beginning of the Dissertation (Phase-I) to present the scope of the work and to finalize the topic, and second towards the end of the semester, presenting the work carried out by him/her in the semester. The committee constituted will screen both the presentations so as to award the sessional grades out of A+, A, B, C, D and F. A student scoring 'F' grade shall have to improve this grade before continuing his/her Dissertation in the 4th semester failing which he/she shall have to repeat the Dissertation (Phase-I) next time in the regular 3rd semester.

SEMESTER-IV

MTTEM - 401 DISSERTATION & VIVA (Phase II)

L- T- P

0- 0- 24

Exams Marks   : 400

Sessionals Marks   : 200

Total Marks   : 600

Duration of Exam : 3hrs.

The Dissertation Phase-1 will be continued as dissertation in 4th Semester. The award of sessional grades out of A+, A, B, C, D and F will be done by an internal Committee constituted by the Head of the Deptt. This assessment shall be based on presentation (s), report, etc. before this committee. In case a student scores 'F' –grade in the sessional, failing which he/ she will not be allowed to submit the dissertation. At the end of the semester, every student will be required to submit three bound copies of his/her Master's dissertation of the office of the concerned Department. Out of these, one copy will be kept for department record & one copy shall be for the supervisor.

A copy of the dissertation will be sent to the external examiner by mail by the concerned department, after his/her appointment and intimation from the university. Dissertation will be evaluated by a committee of examiners consisting of the Head of the Department, dissertation supervisor(s) and one external examiner. There shall be no requirement of a separate evaluation report on the Master Dissertation from the external examiner. The external examiner shall be appointed by the University from a panel of examiners submitted by the respective Head of Deptt., to the Chairman, Board of Studies. In case the external examiner so appointed by the University does not turn up, the Director/ Principal of the concerned college, on the recommendation of the concerned Head of the Deptt. Shall be authorized, on behalf of the University., to appointed an external examiner from some other institution. The student will defend his/her dissertation through presentation before this committee and the committee will award one of the grades out of A+, A, B, C, D and F. Student scoring 'F' grade in the exam shall have to resubmit his /her Dissertation after making all correction / improvements and this dissertation shall be evaluated as above.

Note: The Scheme of awarding the Grades to the student in the course will be supplied by the University to the examiner(s).