

SHRI VENKATESHWARA UNIVERSITY



Syllabus

M.TECH (Highway Engineering)

PART-TIME

(Two Years Post Graduation Programme)

(w.e.f. 2019-20)

**SCHOOL OF ENGINEERING &
TECHNOLOGY**

Evaluation for M.Tech (Highway Engineering Part time)

SEMESTER-IV													
Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	WHE-401	Pavement Construction and Evaluation	3	0	0	20	10	30		70		100	3
2	WHE-041	Regional Transportation Planning	3	0	0	20	10	30		70		100	3
3	WHE-411	Transportation Engineering Software Lab	0	0	4				25		25	50	2
4	WHE-421	Mini Project	0	0	4				50		50	100	2
		Total										350	10

DETAILED SYLLABUS

M.Tech. (Highway Engineering) IV Semester

WHE-401: PAVEMENT CONSTRUCTION AND EVALUATION

Course Type: Core; Instruction: L-T-P-C: 3-0-0-3

Course Outcomes: *At the end of the course, students will be able to*

CO1	Select appropriate earth moving and compaction equipment depending upon the requirement.
CO2	Prepare quality assurance and quality control plans in an attempt to construct better performing pavements.
CO3	Evaluate the pavements based on the functional and structural characteristics.
CO4	Evaluate the safety aspects of the pavements specifically in terms of friction and other related distresses.
CO5	Select maintenance technique depending upon the intensity of the distresses.

Detailed Syllabus:

Highway Construction Equipment:

Applications and safety aspects of earth moving equipments, compaction equipments, road making equipments, concreting equipments and paving equipments.

Pavement Construction:

Construction and preparation of subgrade soil, construction of sub-base layer, construction of base layer, construction of bituminous surface layers, construction of cement concrete surface layer and MoRT&H specifications.

Functional Evaluation of Pavements:

Introduction, factors affecting pavement deterioration, functional condition evaluation techniques, roughness measurements, Identification of uniform sections, serviceability concepts, visual and ride rating techniques

Structural Evaluation of pavements:

Structural condition evaluation techniques, NDT procedures, rebound deflection, deflection bowl measurement and analysis, IRC overlay design method, structural evaluation using falling weight deflectometer, back calculation of layer moduli, ground penetrating radar for pavement evaluation, evaluation of pavement safety: skid resistance and hydroplaning.

Pavement Maintenance:

Routine maintenance, periodic maintenance, special repairs, responsive maintenance programme, rehabilitation and reconstruction, treatment strategies and selection

READING:

- 1) **David Croney and Paul Croney**, *The Design and Performance of Road Pavements*, Third Edition, McGraw-Hill Professional, 1997.
- 2) **Haas, R., W.R. Hudson and J.P. Zaniewski**. *Modern Pavement Management*, Krieger Publishing Company, Malabar, Florida, USA, 1994.
- 3) **Mallick, R.B. and T. El-Korchi** *Pavement Engineering – Principles and Practice*, CRC Press, Taylor and Francis Group, Florida, USA, 2009.
- 4) **Ministry of Road Transport and Highways**. *Specifications for Road and Bridge Works*, Fifth Edition, Indian Roads Congress, New Delhi, India, 2013.
- 5) **Nai C. Yang**, *Design of Functional Pavements*, McGraw-Hill Book Company, New York, USA, 1972 (Digitised in 2007)
- 6) **Papagiannakis, A.T. and E.A. Masad** *Pavement Design and Materials*, John Wiley and Sons, New Jersey, USA, 2008.
- 7) **Rajib B. Mallick and Tahar El-Korchi**, *Pavement Engineering: Principles and Practice*, Second Edition, CRC Press, London, 2013
- 8) **Shahin, M.Y.** *Pavement Management for Airports, Roads, and Parking Lots*, Third Edition, Kluwer Academic Publisher, Massachusetts, USA, 2005.

WHE-411: TRANSPORTATION ENGINEERING SOFTWARE LABORATORY

Course Type: Core; Instruction: L-T-P-C: 0-0-3-2

Course Outcomes: *At the end of the course, students will be able to*

CO1	Estimate Travel Demand using transportation planning packages like VISUM.
CO2	Design isolated and coordinated traffic signals using SIDRA.
CO3	Design Flexible and Rigid Pavements using Ken layer and Ken slab software.
CO4	Simulate traffic at mid block as well as at Intersections using VISSIM.

Detailed Syllabus:

Exercises on Usages of the Packages and Mini-Project:

TRANSPORTATION PLANNING PACKAGES:

Trip Generation - Multiple Linear Regression Analysis. Trip Distribution - Growth Factor Methods, Gravity Model. Mode Choice - Logit Model.

Trip Assignment - All or Nothing Technique. VISUM

CUBE

Land use Transportation Planning

TRAFFIC ENGINEERING PACKAGES:

MXRoad VISSIM SIDRA SUMO VISWALK VISTRO

VISUM Safety VISWALK

PAVEMENT EVALUATION & ECONOMIC ANALYSIS PACKAGES:

Ken-layer & Ken-slab HDM – IV

READING:

1. User Manuals of various packages.

WHE-041: REGIONAL TRANSPORTATION PLANNING

Course Type: Elective; Instruction: L-T-P-C: 3-0-0-3

Course Outcomes: *At the end of the course, students will be able to*

CO1	Delineate regions for transportation planning.
CO2	Estimate demand for both regional and intercity passenger travel.
CO3	Estimate regional goods travel demand.
CO4	Plan and evaluate regional transportation networks.

Detailed Syllabus:

Delineation of Regions:

Concept of Region, Types of regions, Hierarchy of activities & Issues Related to Regional Planning, Hierarchy of Regions, mega region development, Methods of Delineation Regions

– Qualitative approaches – Quantitative approaches, Formal regions – weighted index method and factor analysis method; Functional regions – flow analysis & gravitational analysis.

Regional Passenger Travel Demand Estimation:

Comparison of Urban and Regional travel; Factors Affecting Passenger Flows, Use of Mathematical Models to Estimate Passenger Travel Demand, Direct Demand Models, Abstract Mode Models, Mode Specific Models, case studies.

Intercity Passenger Travel:

Definition of Intercity travel, dimensions of intercity travel decision making, aggregate and disaggregate models.

Regional Goods Travel Demand Estimation:

Factors Affecting Goods Flows; Characteristics of freight travel; Use of Mathematical Models to Estimate Freight Demand; Aggregate and disaggregate models – Freight Generation, trip distribution, mode choice & traffic assignment; Input – output model, MIT Model, etc.

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. Special features of low volume Roads – Rural Road Network Planning

READING:

1. C.J. Khisty and B. Kent Lall, Transportation Engineering, Prentice Hall of India Pvt. Ltd., 2002.
2. C.S. Papacostas and P.D. Prevedouros, Transportation Engineering and Planning, Prentice Hall of India Pvt. Ltd., 2001.

WHE-421 Mini Project (Credits- 0:0:4 = 2)

Teaching Scheme Lectures: 4hrs/week

Course Outcomes: At the end of the course, the student will be able to:

1. Identify structural engineering problems reviewing available literature.
2. Study different techniques used to analyze complex structural systems.
3. work on the solutions given and present solution by using his/her technique applying engineering principles.

Syllabus Contents:

Mini Project will have mid semester presentation and end semester presentation. Mid semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available.

End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution.

Continuous assessment of Mini Project at Mid Sem and End Sem will be monitored by the departmental committee.