GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL (TRANSPORTATION ENGINEERING) (13)
Master of Engineering
Subject Code: 3731308
Semester – III
Subject Name: PAVEMENT MANAGEMENT SYSTEM

Type of course: Program Elective V

Prerequisite: Pavement Design, Construction and Evaluation

Rationale: The Indian Government has set ambitious plans for upgrading of the National Highways in a phased manner. It is required to maintain the existing pavement structures in good serviceable condition once the design and construction is completed and the pavement is put into use. Effective maintenance is required to provide long term and consistent quality of service, which in turn results into additional benefits like reduction in operating costs n increase in useful life of pavement structure. The objective of the course is to introduce the basic concepts of pavement management system.
The knowledge of construction techniques of various types of roads is backbone for the students. Various evaluation techniques are also covered in the course.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Pavement Maintenance & Management Process:** Application of system concepts to pavement management, pavement management levels- Network & Project level, functions - Data need, Pavement life cycle, assessment of pavement performance, evaluation of pavement structural capacity, distress & safety, combined measures of pavement quality, data management.	**10**
2	**Determining Present and Future Needs:** Establishing criteria – development of models for pavement deterioration – determining the future needs – rehabilitation and maintenance strategies – developing combined programmes for maintenance & rehabilitation.	**11**
3	**Project Level Design:** Framework for pavement design, characterization of physical design inputs, basic structural response models – variability, reliability and risk – generating alternate design strategies, rehabilitation design procedures, Overlay design, economic evaluation of alternate pavement design strategies – selection of optimal design strategy.	**12**
4	**Implementation:** Major steps in implementing PMS – pavement construction management & pavement maintenance management – information, research needs – cost and benefit of pavement	**12**

	management – future directions and need for innovations in pavement management, HDM applications.	
	TOTAL	**45 Hrs**

Suggested Specification table with Marks (Theory): (For ME only)

Bloom's Taxonomy for theory marks weightage (%) for cognitive Domain/level

Cognitive Domain	Remembrance	Comprehension	Application	Analysis	Evaluate	Create
Weightage (%)	10	10	30	20	20	10

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Haas R. C. G., Hudson W. Ronald, Zaniewski John P., Modern Pavement Management, Krieger Publishing Company, 1994
2. Oecd, Pavement Management Systems, O E C D 1987.
3. Shahin M. Y., Pavement management for airport, roads and parking lots, Chapman and hall 1994
4. Susan Brown, Pavement Management Systems, Transportation Research Board, 1993.
5. E.J.Yoder and M.W.Witczak, Principles of Pavement Design, John Wiley and Sons, New York, 1975
6. Tang, Pavement Design
7. Sharma & Shrama, Principles and Practice of Highway Engg.
8. IRC– 37, 2001, 2012, IRC – 58-1998, 2002.
9. Y.H.Huang, Pavement Analysis and Design. Prentice Hall, Englewood Cliffs, New Jersey, USA, 1993, ISBN-0-13-655275-7
10. H.N.Atkins, Highway Construction and Maintenance, Soils, and Concretes, Reston Publishing Company, Reston VA, 1983.
11. J.P.Watson, Highway Construction and Maintenance, Longman Scientific and Technical, New York, 1989.

List of Experiments:

1. Benkelman beam deflection study.
2. Pavement unevenness measurement by Bump Integrator.
3. Traffic volume count for EWLF.
4. O-D survey on the highway.
5. Forecasting of traffic.
6. Design for overlay.
7. Economic evaluation of pavement management.
8. Computer applications for the above problems.
9. Design of overlay on a selected stretch of highway with evaluation of the alternative designs.

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

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Sr. No.	CO statement	Marks % weightage
CO-1	To illustrate and analyze pavement with respect to evaluation of - quality, performance and distress.	20%
CO-2	To explain, discuss and compare models for data management, combined programming of maintenance and rehabilitation.	20%
CO-3	To exhibit, carry out and, compare between various methods of rehabilitation of pavement structures, overlay-designs etc.	20%
CO-4	To perform in pavement management framework in part and overall.	20%
CO-5	To use various software platforms, concurrent concepts and visualize scope for research.	20%

List of Tutorials: Problems based on syllabus.

Major Equipment:

1. **Bump Integrator**
2. **Benkelman beam**

List of Open Source Software/learning website:

1. **IITPAV**
2. **KENPAVE**