School : Engineering Department: Civil Engineering

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Course Code: CE438 Name: Pavement Design 3 - 0 - 0 : 3 Credits: 3 Hours

Abstract

The course is designed to cover various theoretical and practical aspects of design of flexible and rigid pavement. Different types of pavements commonly adopted in India will be introduced. The need for considering the structural and functional performance of pavements will be explained. Various design parameters required for design of pavements such as traffic considerations, material characterization, analytical tools, etc will be discussed in detail.

2. Objective: what the course seeks to do

Learning Pavement Material Properties

- LO1: Design Parameters
- LO2: Theoretical background of pavement Layered Structures and rigid pavement

LO3: Design of flexible pavement and Rigid pavement using ITC method

3. Prerequisites of the course: Basic Transportation Engineering

4. Course outline and suggested reading

Pavement Materials, Pavement as multilayed structure, subgrade, base and subbase, bituminous materials, individual properties, non-linear models of granular materials and bituminous mixes elastic modules and Poisson's ratio, concrete pavement, Pavement Design, AASHTO, Shell, Asphalt Institute, Japan, Austoroads methods, analytical pavement design, Indian context, overlay design, Pavement Management, Pavement evaluation, Benkelman beam and Falling Weight Deflectometer, pavement maintenance management, financial viability.

5. Referenced books

1. E. J. Yoder and M. W. Witczak, Principles of Pavement Design, 2nd Edition, John Wiley & Sons.

2. D. Croney and P. Croney, The Design and Performance of Road Pavements, 2nd Edition, McGraw-Hill, International Series in Civil Engineering, 1992.

3. Ministry of Surface Transport, Government of India, Specification for Road and Bridge Work, 3rd revision, Published by IRC, 1995.

6. Course Plan

Sl No.	Торіс	Contents	No. of Classes				
1	Introduction	Introduction to pavement materials					
2	Analysis of flexible pavement	One-Layer Structure, Two Layer Structure and Three Layered Structure					
3	Design of flexible pavement	Flexible pavement design as per IRC, AASHTO, Shell, Asphalt Institute, Japan, Austoroads methods	7				
4	Analysis of rigid pavement	Load stress, temperature stress, tie bar, dowel bar, joints, influence chart	6				
	Design of rigid pavement	Rigid pavement design as per IRC	5				
5	Design of overlay	Overlay design as per IRC	4				
6	Pavement evaluation techniques	Pavement Management, Pavement evaluation, Benkelman beam and Falling Weight Deflectometer, pavement maintenance management, financial viability.	6				
Total: 30							

Classes

7. Evaluation plan

Sl	Mode of assessment	Туре	Marks	Duration	Date
No.					
1	Class Test – I	Objective	25	30 min	
2	Class Test – II	Objective	25	30 min	
3	Assignment – I		25		
4	Class Test – III	Descriptive	40	1 hour	
	(Major)				
5	Class Test – V	Objective	25	30 min	
6	End Semester	Descriptive	60	2 hrs	As decided by the
0					CoE

6. Pedagogy: Lecture and Discussion; Tutorial; Assignment; Quiz.

7. Expected outcome: Towards the end of the course the students are expected to do

- CO1 Understand and analyse the forces acting on pavements using knowledge of science, mathematics, and engineering.
- CO2 Apply knowledge and perform analysis of the pavements to calculate the responses.
- CO3 Develop the capacity to comprehend the characteristics of various pavement materials, the significance of various tests on them, and thereafter analyse the results
- C04 Learn to design and specify appropriate pavement thicknesses and layer configurations for both flexible and rigid pavements.