

Transportation Engineering
Pavement Design
01TR1201
(PCC)

Objective of the Course:

- To impart the knowledge to the student related to pavement analysis and design.
- To design flexible pavements using different empirical, semi-empirical and theoretical approach.
- To design the rigid pavement as per IRC and ASSTHO.

Credit Earned: 3
Students learning outcomes:

After successful completion of the course it is expected that student will be able to,

1. Analyse the stresses, strain and deflections in rigid and flexible pavement.
2. Understand the factors governing pavement design.
3. Understand the important feature of pavement design.
4. Design flexible and rigid pavement.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	0	0	03	50	30	20	25	25	150

Detailed Syllabus

Sr No.	Title of the unit	Number of hours
1	Basics of Pavements	04
	Components of pavement structure, Functions of pavement layers – Flexible and Rigid pavement, Importance of sub grade soil on pavement performance	
2	Stresses in Pavements	06
	Flexible pavement – stresses in layered system and homogeneous mass, concept of shear failure Rigid pavement – analysis of warping stress by Thomlinson’s and Westergaard’s theory, critical combinations of stresses.	
3	Pavement design factor	08
	Pavement design factor – Loading characteristics – static, impact and repeated load, environmental factors, modulus of resilience for different layers, traffic – load equivalency factor, equivalent wheel load, effect of dual wheels and tandem axles	
4	Flexible pavement design	12
	Flexible pavement design using AASHTO design guide, IRC : 37 – 2018, Triaxial method, McLeod method, calibrated mechanistic design procedure, Asphalt institute method for stabilized and un-stabilized and base and sub grade layer	
5	Rigid Pavement design	12
	Design of rigid pavement using IRC : 58 – 2015, AASHTO guideline, Bradbury’s approach, Arlington test, Pickett’s corner load theory and related charts, PCA method for stabilized and un-stabilized and base and sub grade layer, Design of tie bar and dowel bar, Design of Joint	
		42

Transportation Engineering**Suggested Theory Distribution**

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	5%	20%	25%	25%	20%

Instructional Method and Pedagogy:

1. Use of Learning Management system like canvas
2. Demonstration through presentations on power point and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

Recommended Study Material:**Reference Book:**

1. Yoder, E.J. and Witczak, M.W., Principles of Pavement Design, John Wiley and sons,1975
2. Yang H. Huang, Design of functional pavements, Pearson Prentice Hall,2004
3. Gary N. Durham, W. Allen Marr, and Willard L. De Groff, Resilient Modulus Testing for Pavement Components ASTM Stock Number: STP1437, USA,2003
4. Andrew R. Dawson, Pavements Unbound Taylor & Francis Group plc, London, UK, 2004
5. Khanna S.K., Justo C.E.G., Highway Engineering, Nem Chand & Bros., Roorkee, 2001
6. Kadiyali L.R., Principles & Practice of Highway Engineering, Khanna Publishers, 2003
7. IRC: 37-2001, Guidelines for the Design of Flexible Pavements
8. IRC: 58-2011, Guidelines for the Design of Plain Jointed Rigid Pavements,2001