Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCED518	Pavement Design and Analysis	3	0	0	3

Course Objective

This course aims to provide a comprehensive scientific insight of pavement system. The course aims to provide students with an in-depth theoretical understanding of different types of pavements. It also incorporates the concepts of different types of pavement design philosophy, their principles and analysis procedures. Furthermore, the course discusses the pavement construction practices.

Learning Outcomes

Upon successful completion of this course, the students should be able to:

- Develop an understanding of pavement design concepts.
- Design of flexible and rigid pavement utilizing various codal provisions.
- Knowledge of different pavement performance evaluation methods and rehabilitation techniques.
- Exposure to different construction practices.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	**Introduction:** Historical development of pavements, Introduction to traffic loading, Understanding the concept of equivalent standard axle load (ESAL), Factors affecting structural design of pavement. Analysis of single, two and multi layer flexible pavement.	7L	Understanding the evolution of pavement design concept.
2	**Flexible Pavement Analysis & Design:** Introduction to different types of flexible pavements, and design factors, Stress and strain analysis of flexible pavements. Introduction to multilayers elastic theory. Design of flexible pavements as per IRC 37, AASHTO	10L	Understanding the design principles and analysis procedures for flexible pavements.
3	**Rigid Pavement Analysis & Design:** Load and temperature stresses in rigid pavements-Westergaard's, Bradburry's and Picket's concepts, Stress and strain (deflection) analysis of rigid pavements. Design of rigid pavements as per IRC 58, AASHTO, and PCA methods	10L	Understanding the design principles and analysis procedures for rigid pavements.
4	**Pavement Performance Evaluation:** Introduction to Benkelman Beam method and design of HMA overlay as per IRC 81. Introduction to white-topping (conventional, thin, ultra-thin) and their design as per IRC:SP-76-2008. Introduction to drainage requirement for pavements. Pavement performance evaluation and distresses. Data requirement and database development. Different types of rehabilitation and maintenance strategies.	7L	Understanding on different methods for pavement performance evaluation and rehabilitation techniques.

5	**Pavement Construction Practices:** Construction practices for building flexible and rigid pavements, Introduction to different types of overlays on flexible and rigid pavements (PCC over HMA, HMA over PCC, HMA over HMA, PCC over PCC) and their design philosophy.	7L	Understanding on different pavement construction practices.
	Total Contact Hours	**42L**	

Text Books:

1. Yoder, E.J. and Witczak, M.W., Principles of pavement design. John Wiley & Sons,1991.
2. Huang, Y.H., Pavement analysis and design. Upper Saddle River, NJ: Pearson Prentice Hall, 2004.

Reference Books:

1. Chakroborty, P. and Das, A. Principles of Transportation Engineering, PHI Pvt. Ltd., 2012
2. Mallick, R.B. and El-Korchi, T., Pavement engineering: principles and practice. CRC Press, 2008.
3. IRC: 37-2012 Tentative Guidelines for the Design of Flexible Pavements, Indian Road Congress, Delhi.
4. IRC: 58-2011 Tentative Guidelines for the Design of Rigid Pavements, Indian Road Congress, Delhi.
5. IRC: 81-1997 Guidelines for Strengthening of Flexible Road Pavements Using Benkelman Beam Deflection Technique, Indian Road Congress, Delhi.
6. IRC: SP:76-2015 Guidelines for Conventional and Thin Whitetopping