

20CE4601B – PAVEMENT ANALYSIS AND DESIGN

Offering Branches	CE	Credits:	3
Course Category:	Professional core course	Lecture-Tutorial-Practical:	3-0-0
Course Type:	Theory	Continuous Evaluation:	30
Prerequisites:	20BS1101- Engineering Mathematics I 20CE3502 - Highway Engineering	Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Compute the material specifications and design factors of pavements	K3
CO2	Analyze stresses in flexible and rigid pavements	K4
CO3	Calculate the Design of flexible and rigid pavements	K4
CO4	Examine the constructional operations and equipment's	K3
CO5	Explain the concept of strengthening of existing pavements and pavement management system	K4

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2					2							2	2
CO2	2	2			2	3							2	3
CO3	3	3			3	3							3	3
CO4	2												2	2
CO5	2												2	3
Avg.	2	3			3	3							2	3

1- Low

2-Medium

3-High

Course Content

UNIT-1	<p>DESIGN FACTORS Types of pavement – Factors affecting design of pavements – wheel loads –ESWL Concept- tyre pressure – contact pressure, Material characteristics – Environmental and other factors.</p> <p>MATERIAL CHARACTERISTICS Highway Materials – Soil, Aggregate, Bitumen and Tar- Tests on aggregates -Tests on Bitumen -Marshall's Method of Bituminous Mix design.</p>	CO1
UNIT-2	<p>STRESSES IN FLEXIBLE PAVEMENT Stresses in flexible pavement – layered systems concept – one layer system – Boussinesq Two layer system – Burmister Theory for Pavement Design</p> <p>STRESSES IN RIGID PAVEMENT Stresses in rigid pavements – stresses due to warping, stresses due to loads, stresses due to friction.</p>	CO2
UNIT-3	<p>FLEXIBLE PAVEMENT DESIGN CBR Method of Flexible Pavement Design- IRC method of flexible pavement design.-AASHTO Method of Flexible Pavement design</p> <p>RIGID PAVEMENT DESIGN IRC method of Rigid pavement design - Types of Joints – Use of Tie Bars and Dowell Bars. Design of RCC pavements</p>	CO3
UNIT-4	<p>HIGHWAY CONSTRUCTION Introduction – Construction of Earth Roads- Gravel Roads – WBM Roads- Bituminous Pavements- Cement Concrete Roads</p> <p>ADVANCES IN HIGHWAY CONSTRUCTION AND CONSTRUCTION</p>	CO4

	EQUIPMENTS Steps in Construction- Reinforced Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization and Soil-lime Stabilization, Specific equipments for bituminous roads and for concrete roads construction	
UNIT-5	PAVEMENT MANAGEMENT SYSTEM Need for Highway Maintenance- Failures in Flexible Pavements-Rigid Pavement Failures- Pavement Evaluation-Benkleman Beam method- Overlays Design STRENGTHING OF EXISTING PAVEMENT Over lay design – Types of Overlays - Methods of Overlay – Importance of Highway Drainage – Design of Surface Drainage - Design of Sub Surface Drainage	CO5
Learning Resources		
Text Books	<ol style="list-style-type: none"> 1. Highway Engineering, (7th Edition) by Khanna S., Kand Justo C.J., Nemchand & Bros, NewDelhi, 2000. 2. Principles and Practices of Highway Engineering by Kadiyali L.R and Dr.Lal N.B., Khanna Publishers, New Delhi, 2003. 3. Principles of pavement design Yoder, Jhon Willey & Sons, New Delhi, 2012. 	
Reference Books	<ol style="list-style-type: none"> 1. IRC Code for flexible pavement – IRC – 37 -2001. 2. IRC Code for Rigid pavement – IRC – 58 – 2002. 3. Pavement Analysis and Design, (2nd edition) by Yang H. Huang, Pearson Education, Delhi, 2008. 4. Principles of Highway Engineering And Traffic Analysis, (4th edition) by Fred L. Mannering, Wiley student publication, India, New Delhi, 1990. 4. Construction planning, equipment and measures by Peurifoy R.L., Tata McGraw-Hill Publications, New Delhi, 2006 	
e- Resources & other digital material	<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/105/105/105105165 2. https://nptel.ac.in/courses/105/101/105101087 	