Program : **Diploma in Civil Engineering**	
Course Code : **6011C**	Course Title: **Pavement Design and Maintenance**
Semester : **6**	Credits:**4**
Course Category: **Program Elective**	
Periods per week: **4 (L:4, T:0, P:0)**	Periods per semester:**60**

Course Objectives:

- To enable students to identify the types of pavements and their uses.
- To introduce highway pavement design concepts and material properties,
- To impart the knowledge of the design of flexible and rigid highway pavements \

Course Prerequisites:

Topic	Course code	Course name	Semester
Explain types of road materials Distinguish the construction of flexible and rigid pavements		Transportation Engineering	5

Course Outcomes:

On completion of the course student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Identify the components of the given type of pavement and Suggest the type of pavement for the given situation.	13	Understanding
CO2	Design the flexible pavement using the provisions of IRC	15	Applying
CO3	Design the concrete pavement using the provisions of IRC	15	Applying
CO4	Decide the type of maintenance required under different damaged conditions	15	Understanding
	Series Tests	2	

CO – PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							2
CO2	3						
CO3	3						
CO4		3					

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

On completion of the course, the student will be able to:

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Identify the components of the given type of pavement and suggest the type of pavement for the given situation.**		
M1.01	Identity the Types of pavement	1	Understanding
M1.02	Contrast Rigid and flexible pavement	2	Understanding
M1.03	Explain surface characteristic and Factors affecting selection of type of pavement	2	Understanding
M1.04	List the factors affectingpavement design	2	Remembering
M1.05	Explain wheel load	2	Understanding
M1.06	Explain Traffic factors, Environmental factors, Road geometry and material which affect pavement design.	2	Understanding
M1.07	To Relate Characteristics of soil and Drainage situation	2	Understanding

Contents:

Types of pavement - Flexible, Rigid and Semi Rigid - Comparison of Rigid and flexible pavement according to Design precision, life maintenance, initial cost, stages of construction, availability of materials, surface characteristic, penetration of water in the pavement, utility location, glare and night visibility, Functions and characteristics of pavement, Factors affecting selection of type of pavement.

Factors affecting pavement design - design wheel load, Traffic factors, Environmental factors, Road geometry and material, Characteristics of soil and Drainage situation.

CO2	**Design the flexible pavement using the provisions of IRC**		
M2.01	Explain suitable method for flexible pavement	5	Remembering
M2.02	Explain the guide lines of Indian Road Congress(IRC37) for design of flexible pavement	5	Understanding
M2.03	Make use of Indian Road Congress guide lines for design of flexible pavement(overview only)	5	Applying
	Series Test – I	1	

Contents:

Methods of flexible pavement design-Theoretical method, Empirical method with and without soil strength test

IRC37 guidelines for design of flexible pavement (overview only)

CO3	**Design the concrete pavement using the provisions of IRC**		
M3.01	Summarise the Factors affecting design of concrete pavement	4	Understanding
M3.02	Explain the guide lines of Indian Road Congress (IRC58) for design of concrete pavement	5	Applying
M3.03	Illustrate the Joints in concrete pavement,its Need, Types, requirements and spacing	6	Understanding

Contents:

Factors affecting design of concrete pavement

IRC58 guidelines for design of concrete pavement (overview only)

Joints-Need, Types, requirements, spacing of joints

CO4	**Decide type of maintenance required under different damaged conditions**		
M4.01	Identity the Types of pavement maintenance, its need for inspection.	2	Understanding
M4.02	Explain the need for maintenance schedule for damaged roads	2	Understanding
M4.03	Summarise the causes of pavement failure and remedial measures for flexible and rigid pavements	4	Understanding
M4.04	Illustrate the types of damages in flexible pavement.	4	Understanding
M4.05	Illustrate types of damages in rigid pavement and methods of repair.	3	Understanding

	Series Test – II	1	

Contents:

Types of pavement maintenance - routine, periodic, and special

Need for inspection and maintenance schedule, Causes of pavement failure and remedial measures. Typical flexible and rigid pavement failures.

Types and causes of damages in flexible pavement - surface defects - cracks, Deformations - Rutting, fatigue, settlement and upheaval. Disintegration - loss of aggregate, stripping, pothole. Remedial measures - slurry seal, liquid seal, fog seal, patching, ready mix patch.

Types of damages to rigid pavement - cracking, spalling, slab rocking, settlement, joint sealant failure. Methods of repair - repair of spalled joints, full depth reconstruction, replacement of dowel bars

Text / Reference:

T/R	Book Title/Author
T1	Highway Engineering ,Kadiyali, L.R., Khanna Book Publishing House, New Delhi (ISBN: 978-93-86173-133)
R1	Principles of Transportation engineering, Chakroborty, Partha Das, Animesh., Prentice-Hall of India Pvt.Ltd
R2	Transportation Engineering Vol. I & II, Vazirani, V N, Chaondola, S P; Khanna Publishers. Delhi
R3	Principles of Pavement Design, Yoder, E J; Wiley India Pvt Ltd.
R4	Pavement Evaluation and Maintenance Management system, Kumar R S; University Press (India), Pvt. Ltd.

Online Resources:

Sl.No	Website Link
1	https://www.civil.iitb.ac.in/tvm/1100_LnTse/401_lnTse/plain/plain.html
2	https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/pm/publications/fpdm201801.pdf?sfvrsn=149199e9_4
3	https://thelibraryofcivilengineer.files.wordpress.com/2015/09/irc-58-1988-guidelines-for-the-design-of-rigid-pavements-for-highways-1st-revision.pdf
4	https://thelibraryofcivilengineer.files.wordpress.com/2015/09/irc-37-1984-guidelines-for-the-design-of-flexible-pavements-1st-revision.pdf