

Branch Name:	CIVIL ENGINEERING
Program Code:	ET106
Course Title:	Highway Engineering
Course Code:	2ET1060504T
Pre-requisite Course:	Know about highway planning and its classification, geometric design highway, bituminous materials, flexible and rigid pavement, pavement failures, survey of traffic, traffic control devices.

Course Objectives:

CO-1: Planning, design, construction, operation, and maintenance of Highway.

CO-2: To learn about safe and effective transportation of people and goods.

CO-3: To study the future traffic flows, design of highway intersections/interchanges, geometric alignment and design, highway pavement materials.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topic	Total Hours	Weight age (%)
01	Introduction Scope of highway engineering, Highway planning and development in India, Classification of rural and urban roads, Road patterns, Planning and alignment surveys.	04	10
02	Geometric Design of Highway Highway geometric design: Cross sectional elements, width, surface, camber, Sight distances – SSD, OSD, ISD, HSD, Design of horizontal and vertical alignment, curves, super-elevation, widening, gradients, summit and valley curves.	09	22
03	Highway Materials Sub grade soil, aggregates, binder materials, bituminous materials, bituminous paving mixes, cement and cement concrete –their engineering and physical properties, basic tests.	07	16
04	Design of Pavement Pavement design factors, Design of flexible (GI and CBR method) and rigid pavements (fatigue concept), Construction of earthen, Gravel, WBM, Bituminous, Cement concrete, RCC and Pre-stressed concrete roads, Soil stabilized roads.	07	16

05	Maintenance of Pavement Pavement failures, Surface and sub-surface drainage, alignment, drainage and maintenance, arboriculture, street lighting, Highway administration, economics and finance, road safety audit	07	16
06	Traffic Engineering Basic elements, road users, vehicles users, traffic flow characteristics, speed & volume studies, surveys, parking studies, Accident studies, causes, collision and condition diagrams, preventive measures, Traffic control markings, signs, signals, intersections & rotaries.	08	20

List of Text and Reference Books:

1. Dr. S.K. Khanna and Dr. C.E. G. Justo, "Highway Engineering", Nem Chand & Bros., Roorkee.
2. L.R. Kadiyali, "Highway Engineering", Khanna Publishers, New Delhi.
3. L.R. Kadiyali, "Traffic Engineering and Transport Planning," Khanna Publishers, New Delhi.
4. S.K. Sharma, "Principles, Practice and Design of Highway Engineering", S. Chand & Co., New Delhi.
5. IRC – 37 "Guidelines for Design of flexible Pavements", IRC, New Delhi, 2001.
6. IRC – 67 "Code of Practice for Road Signs", IRC, New Delhi – 2001.
7. IRC: 58, 2002: "Guidelines for the Design of Plain Jointed Rigid Pavements for Highways", IRC, N. Delhi, December, 2002.

E-Resources:

1. <http://nptel.ac.in/>

Course Learning Outcomes (CLO):

1. Know about highway planning and its classification.
2. Carry out geometric design of highway.
3. Carry out laboratory tests on aggregates and bituminous materials.
4. Carry out preliminary design of flexible and rigid pavement.
5. Know about pavement failures, its maintenance, importance of drainage, hill roads and their challenges.
6. Carry out survey of classified traffic volume count and spot speed study on highway.
7. Know about importance and working of different traffic control devices.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Know about highway planning and its classification.	L-1
CLO2	Carry out geometric design of highway.	L-6
CLO3	Carry out laboratory tests on aggregates and bituminous materials.	L-5
CLO4	Carry out preliminary design of flexible and rigid pavement.	L-3
CLO5	Know about pavement failures, its maintenance, importance of drainage, hill roads and their challenges.	L-2
CLO6	Carry out survey of classified traffic volume count and spot speed study on highway.	L-4
CLO7	Know about importance and working of different traffic control devices.	L-2

L1- Remember, **L2-** Understand, **L3-** Apply, **L4-** Analyze, **L5-** Evaluate, **L6-** Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CLO1	H	M	M	M			M					M	M	M	
CLO2	H	H	M	M			M					M	M	M	M
CLO3	M	H	M	M	M	M	L	L				M	M	M	M
CLO4	M	M	H	M		M	M					M	M	M	M
CLO5	M	H	M	M		M						M	M	M	M
CLO6	M	H	M	M		L							M	M	M
CLO7	M	L	M	M	M							M	M	M	

H: High, **M:** Medium, **L:** Low