

1152CE124 (VTUR15)	HIGHWAY ENGINEERING	L	T	P	C
		2	2	0	3

Course Category: Programme Elective

A. Preamble

Students undergoing this course are expected

- To understand the basics of geometric design and able to design the flexible and rigid pavement.

B. Prerequisites

- NIL

C. Link to other Course(s)

- Pavement Analysis and Design

D. Course Outcomes

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's taxonomy)
C01	To prepare plan for highway networks	K2
C02	To design highway geometrics	K3
C03	To design flexible and rigid pavements	K3
C04	To suggest modern materials and methods of highway construction	K2
C05	To understand the various parameters involved in pavement evaluation and its maintenance.	K3

E. Correlation of COs with POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L	L		L			L	L			L			
CO2	L	M	M	M				M			M			
CO3	L	L	M	M				M			M			
CO4	L	L		M	M	L		M			M			
CO5	L	L		M			L	M			L			

F. Course Content

UNIT I HIGHWAY PLANNING AND ALIGNMENT 6+6

Significance of highway planning – Modal limitations towards sustainability - History of road development in India – Classification of highways – Locations and functions – Factors influencing highway alignment – Soil suitability analysis - Road ecology - Engineering surveys for alignment, objectives, conventional and modern methods.

UNIT II GEOMETRIC DESIGN OF HIGHWAYS 6+6

Typical cross sections of Urban and Rural roads — Cross sectional elements - Sight distances – Horizontal curves, Super elevation, transition curves, widening of curves – Vertical curves - Gradients, Special consideration for hill roads - Hairpin bends – Lateral and vertical clearance at underpasses.

UNIT III DESIGN OF FLEXIBLE AND RIGID PAVEMENTS 6+6

Design principles – pavement components and their role - Design practice for flexible and rigid Pavements (IRC methods only).

UNIT IV HIGHWAY CONSTRUCTION MATERIALS AND PRACTICE 6+6

Highway construction materials, properties, testing methods – CBR Test for subgrade - tests on aggregate & bitumen – Construction practice including modern materials and methods, Bituminous and Concrete road construction, Polymer modified bitumen, Recycling, Different materials – Glass, Fiber, Plastic, Geo-Textiles, Geo-Membrane– Quality control measures - Highway drainage — Construction machineries.

UNIT V EVALUATION AND MAINTENANCE OF PAVEMENTS 6+6

Pavement distress in flexible and rigid pavements – Pavement Management Systems - Pavement evaluation, roughness, present serviceability index, skid resistance, structural evaluation, evaluation by deflection measurements – Strengthening of pavements- Widening of Roads– Types of maintenance – Highway Project formulation.

TOTAL 30+30: 60 Periods

G. Learning Resources

TEXT BOOKS:

1. Khanna.S. K., Justo.C.E.G and Veeraragavan A. "Highway Engineering", Nemchand Publishers, 2014.
2. Subramanian K.P., "Highways, Railways, Airport and Harbour Engineering", Scitech Publications (India), Chennai, 2010
3. Indian Road Congress (IRC), Guidelines and Special Publications of Planning and Design.

REFERENCES:

1. Kadiyali.L.R. "Principles and Practice of Highway Engineering", Khanna Technical Publications, 8th edition Delhi, 2013.
2. Yang H. Huang, "Pavement Analysis and Design", Pearson Education Inc, Ninth Impression, South Asia, 2012
3. Ian D. Walsh, "ICE manual of highway design and management", ICE Publishers, Ist Edition, USA, 2011
4. Fred L. Mannering, Scott S. Washburn and Walter P.Kilareski, "Principles of Highway Engineering and Traffic Analysis", Wiley India Pvt. Ltd., New Delhi, 2011
5. Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi, 2010