Devi Ahilya Vishwavidhyalaya, Indore, India Institute of Engineering & Technology					III Year B.Tech. (Civil Engineering)	
Course Code & Name	**Instructions Hours per Semester and Credits**					
6RVPC2 **Transportation Engineering - I**	**Classroom Instruction (CI)**		**Lab Instruction (LI)**	**Term Work (TW) and Self Learning (SL)**	**Total no. of Hours Per semester**	**Total Credits (Total Hours/30)**
	L	**T**	**P**	**TW+SL**	**120**	**4**
	20	**10**	**20**	**70**		

Course Learning Objectives:

1. Understand railway planning and geometric design: Gain knowledge of railway track components, layouts, and geometric features.
2. Apply highway planning and alignment principles: Learn methods of highway development, classification, and engineering surveys for alignment.
3. Analyse geometric design of highways: Study cross-sectional elements, sight distances, horizontal and vertical alignments, and pavement design.
4. Explore highway maintenance and public transportation systems: Understand maintenance practices and the role of public transportation in urban development.
5. Learn fundamentals of tunnel engineering: Study tunnelling methods, alignment, ventilation, lighting, and drainage considerations.

Prerequisite(s): Applied Mechanics, Surveying, Geotechnical Engineering

COURSE CONTENTS

Unit I:

Railway: Introduction, Rails, Sleepers, Rail fastenings. fish bolts, spikes, bearing plates, chain keys, check and guard rails, Requirement of good ballast, various materials used as ballast, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track.

Unit II:

Railway: Geometric Design, Station & Yards; Points and Crossings & Signaling and interlocking: Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency, various curves, speed on curves. Types, locations, general equipment, layouts, marshaling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards, principles of signaling and interlocking.

Unit III:

Highway Planning and Alignment: Different modes of transportation, historical Development of road construction, Highway Development in India, Classification of roads, Road pattern, Highway planning in India, Highway alignment, Engineering Surveys for alignment, Highway project. History and present state of public transportation, role of public transportation in urban development, transit systems, route development.

Unit IV:

Geometric Design of Highways The highway crosses sectional elements, Sight Distance, Types of sight distances, Design of horizontal alignments, Super elevation, Widening of Pavements on horizontal curves-transition Curves, Design of Vertical alignments, Gradients-summit and Valley Curves.

UNITV:

Tunnel Engineering: general considerations in tunnelling, size and shapes of tunnels, alignment of tunnels, methods of tunning, ventilation, lighting and drainage in tunnels.

COURSE OUTCOME:

CO. No.	CO	PO
CO1	Learn about railway geometric features and track components.	PO-1, PO-2, PO-7, PO-12
CO2	Ability to plan highway alignments and decide best geometric features.	PO-1, PO-2, PO-6, PO-7, PO-12
CO3	Analyse geometric design of highways including sight distance, curves, and gradients.	PO-1, PO-2, PO-6, PO-7
CO4	Learn about highway maintenance practices and public transportation systems.	PO-1, PO-6, PO-7, PO-8
CO5	Apply modern concepts of tunnel engineering for safe and efficient design.	PO-1, PO-2, PO-6, PO-7

Books recommended:

1. Khanna, S.K. & Justo, C.E.G. – *Highway Engineering*, Nemchand & Bros, Roorkee, 2001.
2. Chakraborty, P. & Das, A. – *Principles of Transportation Engineering*, Prentice Hall of India Pvt. Ltd., New Delhi, 2005.
3. Rangwala, S.C. – *Railway Engineering*, Charotar Publication House, Anand.
4. Arora & Saxena – *Railway Engineering*, Dhanpat Rai & Sons.
5. Kadiyali, L.R. – *Traffic Engineering and Transport Planning*, Khanna Publishers, Delhi, 2009.
6. Ministry of Road Transport and Highways – *Specifications for Road and Bridge Works*, Fourth Edition, Indian Roads Congress, New Delhi, 2001.
7. IRC – *Codes of Practice*.
8. Khisty, C. Jotin & Lall, B. Kent – *Transportation Engineering: An Introduction*, Third Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2002.
9. Rao, G.V. – *Principles of Transportation and Highway Engineering*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1996.
10. McShane, W.R. & Roess, R.P. – *Traffic Engineering*, Prentice Hall, New Jersey, USA, 1990.

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	

6RVPC2.CO1	1	1	-	-	1	-	-	-	-	-	-	1
6RVPC2.CO2	1	1	-	-	-	1	1	-	-	-	-	1
6RVPC2.CO3	1		-	-	-	1	1	1	-	-	-	-
6RVPC2.CO4	2	-	-	-	-	3	3	3	-	-	-	-
6RVPC2.CO5	3	3	-	-	-	3	2	-	-	-	-	-