

18CE506	TRANSPORTATION ENGINEERING	L	T	P	C
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<b>Course Objectives:</b>					
1.	The objective of the course is to educate the students on various components of highway engineering				
2.	To educate the design concepts of components of railway engineering.				
3.	The course enables the students to develop skill on evaluation and maintenance.				
<b>UNIT I</b>	<b>HIGHWAY PLANNING AND ALIGNMENT</b>	<b>9</b>	<b>+</b>	<b>0</b>	
Highway Development in India - Jayakar Committee Recommendations and Realisations-Requirements of Ideal Alignment- Factors Controlling Highway Alignment-Engineering Surveys for Alignment -Conventional Methods and Modern Methods (Remote Sensing, GIS and GPS techniques)-Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards], Cross sections of different Class of Roads.					
<b>UNIT II</b>	<b>GEOMETRIC DESIGN OF HIGHWAYS</b>	<b>9</b>	<b>+</b>	<b>0</b>	
Design of Horizontal Alignments – Superelevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems] Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves-Sight Distances - Factors affecting Sight Distances, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD]-Geometric Design of Hill Roads [IRC Standards Only]					
<b>UNIT III</b>	<b>HIGHWAY MATERIALS, CONSTRUCTION, MAINTENANCE AND OPERATION</b>	<b>9</b>	<b>+</b>	<b>0</b>	
Desirable Properties of Highway Materials-Bitumen - Penetration, Ductility, Viscosity, Binder content and Softening point Tests.Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications]Highway Drainage [IRC Recommendations]Types of defects in Flexible pavements –Surface defects, Cracks,Deformation,Disintegration – Symptoms, Causes and Treatments.Types of Pavement, Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks Spalling of Joints and Mud Pumping – and Special Repairs.					
<b>UNIT IV</b>	<b>RAILWAY PLANNING AND DESIGN</b>	<b>9</b>	<b>+</b>	<b>0</b>	
Role of Indian Railways in National Development -Engineering Surveys for Track Alignment – Obligatory points - Conventional and Modern methods (Remote Sensing, GIS & GPS, EDM and other equipments)Permanent Way, its Components and Functions of each Component:Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps -Sleepers – Functions, Materials, Density. Ballasts – Functions, Materials, Ballastless Tracks Geometric Design of Railway Tracks – Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal and Vertical Curves (Derivations of Formulae and Problems)					
<b>Unit V</b>	<b>RAILWAY TRACK CONSTRUCTION MAINTENANCE AND OPERATION</b>	<b>9</b>	<b>+</b>	<b>0</b>	
Points and Crossings - Design of Turnouts, Signalling, Interlocking, Construction & Maintenance – Conventional, Modern methods and Materials, Track Drainage Track Modernisation– Automated maintenance and upgrading, Technologies, Re-laying of Track, Lay outs of Railway Stations and Yards, Rolling Stock, Tractive Power, Track Resistance, Level Crossings.					

<b>Total 45 Periods</b>	
<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Carry out surveys involved in planning and highway alignment
CO2	: Design cross section elements, sight distance, horizontal and vertical alignment
CO3	: Determine the characteristics of pavement materials
CO4	: On completing the course, the students will have the ability to Plan and Design various civil Engineering aspects of Railways.
<b>Text Books:</b>	
1.	Khanna K., Justo C.E.G., <i>Highway Engineering</i> revised 10 <sup>th</sup> edition Khanna Publishers, Roorkee, 2014.
2.	Kadiyali L. R, <i>Traffic Engineering and Transport Planning</i> , Khanna Publishers, New Delhi, 2019.
3.	Chandola S.P. <i>Transportation Engineering-2019</i>
<b>Reference Books:</b>	
1.	Sharma S.K., <i>Principles Practice and Design of Highway Engineering</i> , S.Chand & Co Ltd. New Delhi, 2006.
2.	Guidelines of Ministry of Road Transport and Highways, Government of India.
3.	Agarwal M.M., <i>Indian Railway Track</i> , 14 <sup>th</sup> Edition, Prabha and Co., New Delhi, 2002.
4.	Saxena S.C. <i>Highway &amp; Traffic Engineering</i> , 2014.
<b>E-References:</b>	
1.	<a href="https://nptel.ac.in/downloads/105101087/">https://nptel.ac.in/downloads/105101087/</a> - Transportation Engineering (Highways)
2.	<a href="https://nptel.ac.in/courses/105107123/">https://nptel.ac.in/courses/105107123/</a> - Transportation Engineering (Railways)
3.	<a href="https://nptel.ac.in/courses/105101087/19">https://nptel.ac.in/courses/105101087/19</a> - Pavement design

### CO-PO-PSO MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	1			1				1	1	3		1
CO2	2	2	2		2		1				1	1	3		
CO3	1	1		1									1		
CO4	3	2	1	1			1	1			1		3		1
CO5															

- 1 – Slightly**  
**2 – Moderately**  
**3 - Strongly**