19CE3502 – HIGHWAY ENGINEERING

Course Category:	Program Core	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisites:	19BS1101 – Engineering Mathematics – I 19CE3306 – Surveying	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	**Comprehend** the highway development and planning in India	K1
CO2	**Perform** geometric design of highway alignment and management of traffic	K3
CO3	**Design** traffic intersection and choose material for highway	K3
CO4	**Deal** with the design procedures of flexible and rigid pavements	K4
CO5	**Understand** the constructional and maintenance issues related to highways	K2

Contribution of Course Outcomes towards achievement of Program Outcomes

		PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2	2										3	2
CO2		2	2										3	2
CO3		2	2		2	2							3	2
CO4		2	2									2	3	2
CO5		2	2										3	2

1- Low **2-Medium** **3-High**

Course Content

UNIT-1	**HIGHWAY DEVELOPMENT** Highway development in India–Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports. **HIGHWAY PLANNING** Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Planning Surveys.	**CO1**
UNIT-2	**HIGHWAY GEOMETRIC DESIGN** Importance of Geometric Design- Highway Cross Section Elements- Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Super elevation and Extra widening- Design of Vertical Alignment- Gradients- Vertical curves. **TRAFFIC ENGINEERING AND MANAGEMENT** Traffic Volume Studies- Speed studies- Parking Studies - Road Accidents-Causes and Preventive measures - Road Traffic Signs – Types – Road Markings-Types of Road Markings.	**CO2**
UNIT-3	**INTERSECTION DESIGN** Types of Intersections –Traffic Islands - Design of Traffic Signals –Webster Method –IRC Method. Types of Grades Separated Intersections- Rotary Intersection –Advantages and Disadvantages of Rotary Intersection. **HIGHWAY MATERIALS** Subgrade soil: California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Tests for Road Aggregates – Bituminous Materials: Tests on Bitumen – Marshall Method of Mix Design.	**CO3**
UNIT-4	**DESIGN OF FLEXIBLE PAVEMENTS** Objects & Requirements of pavements – Types – Functions of pavement components – Design factors – Flexible Pavement Design Methods – CBR method – IRC method **DESIGN OF RIGID PAVEMENTS** Design Considerations – wheel load stresses – Temperature stresses – Frictional	**CO4**

	stresses – Combination of stresses – Design of Joints – IRC method	
UNIT-5	**HIGHWAY CONSTRUCTION** Types of Highway Construction – Construction of Gravel Roads – Construction of Water Bound Macadam Roads – Construction of Bituminous Pavements – Construction of Cement Concrete Pavements. **ADVANCES IN HIGHWAY CONSTRUCTION** Soil stabilisation, Soil-Cement Stabilisation, Soil-Lime Stabilisation	**CO5**

Learning Resources

Text Books	1. Highway Engineering, (9th edition) by Khanna, S.K. and Justo, C.E.G., Nem Chand Bros, Roorkee, 2010. 2. Traffic Engineering and Transportation Planning, (7th edition) by Kadiyali, L.R., Khanna Publishers, New Delhi, 2010. 3. Specifications for Roads and Bridges - Manual for Maintenance of roads, Most publications, 1976.
Reference Books	1. Fundamentals of Transportation Engineering, (3rd edition) by Papacostas, C.S., Prentice Hall of India Pvt.Ltd, New Delhi, 2009. 2. Principles of Highway Engineering by Kadiyali, L.R., Khanna Publishers, New Delhi, 2012. 3. Traffic Planning and Design by Saxena, Dhanpat Rai Publishers, New Delhi, 2010. 4. Transportation Engineering - An Introduction, (3rd edition) by Jotin Khisty. C, Prentice Hall, Englewood Cliffs, New Jersey, 2012.
e-Resources& other digital material	http://nptel.ac.in/courses.php http://jntuk-coeerd.in/