

CE/BOS/CE 303/0210

**K L UNIVERSITY**  
**TRANSPORTATION ENGINEERING (09 – CE 303)**

**SYLLABUS**

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**UNIT – 1** Highway Development in India: History of Road Development, Highway classification, Highway planning in India.

**Highway Alignment:** Factors governing alignment; Engineering surveys.

**Highway Geometric Design:** Terrain classification, design speed, vehicle characteristics, Highway cross-section elements; Sight distance; Design of horizontal alignment; Design of vertical alignment.

**UNIT – II Pavement Materials and Characterization:** Soil Characterization – classification (IS classification, AASHTO classification), permeability, volume stability, compaction, strength- CBR Test, Plate bearing test. Evaluation of Aggregates: Shape tests (Angularity number, flakiness index, elongation index), Toughness, crushing strength; hardness – soundness and durability; aggregate proportioning, Bituminous materials-Road Bitumen and Road Tar, distillation tests; Consistency-standard tar viscometer, equi-viscous temperature, softening point, penetration, float test, ductility; Bitumenous mix design; Behavior under cyclic loading.

**UNIT – III Pavement Design:** Pavement types, components of flexible pavement, components of rigid pavement, design strategies, comparison of highway and airport pavements, stress distribution in layered media, one layer and two layer systems, Equivalent single wheel load, Design factors of Flexible Pavement; Design of flexible pavements – Group index method, CBR method, IRC-37 2001 recommendations.; Stresses in concrete pavements – stresses due to load, stresses due to temperature change, frictional stresses; Joints; Design of Rigid Pavements as per IRC recommendations; Pavements under special situations – rural roads, on black cotton soils, on desert soils.

**UNIT - IV Highway Construction:** Construction equipment, earthwork – compaction machinery, principles of field compaction, granular sub-base, water bound macadam, Construction of water bound macadam roads; bituminous road construction and quality control; construction of concrete pavements and its maintenance; Measuring the riding quality of finished surfaces – unevenness indicator, bump integrator.

Stabilized Soil Roads: Mechanical Stabilization; principles of admixture stabilization, lime stabilization, cement stabilization, bituminous stabilization, choice of stabilizer; design of soil lime mix, construction of lime stabilized soil sub-base, cement stabilized soil sub-base.

**UNIT – V TRAFFIC ENGINEERING**

Introduction; Traffic Surveys – Traffic Volume, Speed and Delay, Origin and Destination Survey; Intersections – Elements of intersection operation, Intersections at grade separations; Traffic Control Devices – Traffic Signs, markings, traffic signals, parking.

**TEXT BOOKS:**

1. Principles of transportation and Highway Engineering by G. V. Rao, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1996.

**REFERENCE BOOKS:**

1. Principles of Transportation Engineering by Partha Chakroborty and Animesh Das. Prentice Hall of India, New Delhi, 2003.
2. Railway Engineering by S. C. Rangwala . Charotar Publishing House Pvt Ltd., New Delhi, 2008.

**LIST OF EXPERIMENTS**

1. Aggregate crushing testing machine
2. Aggregate impact testing machine
3. Deval's abrasion testing machine
4. Los angeles abrasion testing machine
5. Ductility testing machine
6. Compaction pedestal
7. Marshal stability testing machine
8. California bearing ratio testing machine
9. Softening point (ring & ball) apparatus
10. Universal penetrometer
11. Pensky martin closed cup apparatus
12. Orifice viscometer
13. Thermostatically controlled water bath
14. Electric heater
15. Bitumen extraction apparatus