Year & Sem:	Course Code: CE3603	Course Name: **Pavement Materials Characterization**	No. of Credits: 4	L	T&PS	P
				2	2	0

Unit-I: Subgrade Soil Characterization: Properties of subgrade layers; different types of soils, Mechanical response of soil; Soil Classification; Index and other basic properties of soil; A critical look at the different laboratory and in-situ procedures for evaluating the mechanical properties of soils viz. SPT, DCPT, CPT, CBR, Plate Load test & resilient modulus; Suitability of different type of soil for the construction of highway embankments and pavement layers; Field compaction and control.

Unit-II: Aggregate Characterization: Origin, Classification, Types of aggregates; Sampling of aggregates; Mechanical and shape properties of aggregates, Aggregate texture and skid resistance, polishing of aggregates; Proportioning and Blending of aggregates: Super pave gradation**,** Fuller and Thompson's Equation, 0.45 power maximum density graph; Use of locally available materials in lieu of aggregates.

Unit-III: Bitumen and Bituminous Concrete Mix Characterization: Bitumen sources and manufacturing, Penetration, viscosity and superpave grading, Advanced tests on bitumen, Importance of Moduli of Bituminous Mixes in design, Permanent Deformation Parameters and other Properties. Modified bitumen: Crumb Rubber Modified bitumen, polymer modified bitumen; Introduction to emulsified bitumen and its characterization; Long term and short term ageing and its effect on bitumen performance, Tests to simulate ageing of bitumen viz. RTFOT and PAV. Desirable properties of bituminous mixes, Design of bituminous mixes: Marshall's specifications, Introduction to super pave mix design procedure.

Unit-IV: Cement and Cement Concrete Mix Characterization: Types of cements and basic cement properties, Special cements; Quality tests on cement; Tests on cement concrete including compressive strength, flexural strength, modulus of elasticity and fatigue properties; Introduction to advanced concretes like self compacted concrete, Light weight concrete, Roller Compacted Concrete for pavement application; IS method of cement concrete mix design with case studies; Role of different admixtures in cement concrete performance; Joint fillers for Jointed Plain Cement Concrete Pavements and their characterization

References/Text Books:

1. Atkins, N. Harold, Highway Materials, Soils and Concretes, Fourth Edition, 2002, Prentice-Hall.
2. Kerbs Robert D. and Richard D. Walker, Highway Materials, McGraw-Hill, 1971.
3. Relevant IRC and IS Codes of Practices (Separate List will be given).
4. Read, J. And Whiteoak, D., "The Shell Bitumen Handbook", Fifth edition, Shell Bitumen, Thomas Telford Publishing, London 2003.
5 Relevant IRC and IS codes

Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III syllabus for MID-II and Unit IV syllabus for MID-III examinations.