3 : Highway Materials and Construction

Course Objectives:

1. To provide knowledge of different materials used for highway construction, their suitability, standard tests, field applications.
2. To make students familiar with highway construction procedure.
3. To give an idea regarding techniques of highway construction in problematic situations.

Course Contents:

1. Soil: Properties, Classification, Compaction, Consolidation, Application of Tests, Results and use of Geotextile materials.
2. Soil Stabilization – Methods, Principles, Test Significance, Design of Soil – Stabilized Mix, Control.
3. Aggregates Types, Tests, Desired Properties, Aggregate Blending Methods.
4. Bituminous Materials – Types, Tests, Properties, Blending.
5. Mix Designs – Bituminous Mixes, Admixtures, Tests, Results, Control. (Marshall Stability Test)
6. Highway Construction Methods: Embankment, Sub- Base, Base and Surface Courses, Flexible Pavements, Rigid Pavements. Materials for road construction, Specification and tests, Macadam construction, surfacing and surface treatment. Asphalt mix design.
7. Surface and Subsurface Drainage.
8. Road Work in Desert, Swampy, Hilly Area in Problematic Situation.

Practical work:

List of the tests are given below.

Tests on Soil

Sr. No.	Test
1	Soil Classification
2	Proctor test / Compaction test
3	California Bearing Ratio test
4	Soil-Cement stabilization test

Tests on Aggregate

5	Impact test
6	Crushing test
7	Los Angeles Abrasion test
8	Specific Gravity and Water absorption test
9	Shape test
10	Stripping Value test

Tests on Bitumen

11	Penetration test
12	Softening Point test
13	Ductility test
14	Flash and Fire Point test
15	Viscosity test
16	Bitumen Content test

Tests on Bituminous Mix

17	Marshall Stability test

Field Visit:

1. Hot – mix plant visit,
2. Road construction site visit: Earth work construction procedure and bituminous mix laying, spreading and rolling procedure.

References:

1. Walker and Martin. *Asphalt Pavement Engg*.
2. Kerbs and Walker, *Highway Materials*
3. HMSO, *Soil Mechanics For Road Engineers*
4. HMSO, *Bituminous Materials For Engineers*
5. MOST Standards for Highway constructions
6. Atkins Harold N., *Highway Materials, Soils, and Concrete*, Prentice Hall, 1996.
7. IRC: 37-2001, *Guidelines for the Design of Flexible Pavements*.
8. Kadiyali L.R.and Lal, N. B., *Principles & Practice of Highway Engineering*, Khanna Publishers, Delhi.
9. Khanna S.K., Justo C.E.G., *Highway Engineering*, Nem Chand & Bros., Roorkee.
10. Various IRC codes for construction of Bituminous & Concrete Roads
11. Partho Chakraborty and Animesh Das, *Principles of Transportation Engineering*, PHI