

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

**Credit Based Grading System
Civil Engineering, VI-Semester
CE- 6004 Highway Engineering**

Unit - I

High way planning, Alignment & Geometric Design: Principles of highway planning, road planning in India and financing of roads, classification patterns. Requirements, Engg. Surveys for highway location.

Cross sectional elements- width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, numerical problems.

Unit – II

Bituminous & Cement Concrete Payments: Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars. Brief study of recent developments in cement concrete pavement design, fatigue and reliability.

Unit – III

Low Cost Roads, Drainage of Roads, Traffic Engg. & Transportation Planning: Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam roads-types, specifications, construction, maintenance and causes of failures.

Surface and sub-surface drainage, highway materials: properties and testing etc.

Channelised and unchannelised intersections, at grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages, marking, signs and signals, street lighting. Principles of planning, inventories, trip generation, trip distribution, model split, traffic assignment, plan preparation.

Unit - IV

Airport Planning, Runway & Taxiway: Airport site selection. air craft characteristic and their effects on runway alignments, windrose diagrams, basic runway length and corrections, classification of airports.

Geometrical elements: taxi ways and runways, pattern of runway capacity.

Unit - V

Airport, Obstructions, Lightning & Traffic control: Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar, VOR enroute traffic control.

Reference Books & Study Materials:

- 1.Highway Engineering by Gurucharan Singh
- 2.Principles of Pavement Design by E.J. Yoder & M.W. Witzech
- 3.Highway Engineering by O'Fleherty
- 4.Highway Engineering by S.K. Khanna & C.E.G. Justo
- 5.Airport Planning & Design by S.K. Khanna & M. G. arora
- 6.Foresch, Charles "Airport Planning"
- 7.Horonjeff Robert "The Planning & Design of Airports"
- 8.Sharma & Sharma, Principles and Practice of Highway Engg.
- 9.Haung, Analysis and Design of Pavements
- 10.Relevant IRC & IS codes
- 11.Laboratory Mannual by Dr. S.K. Khanna
- 12.Highway Engg. By Hews & Oglesby
- 13.Highway Material by Walker

List of Experiments:

1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value
4. Determination of California Bearing Ratio values
5. Determination of penetration value of Bitumen
6. Determination of Viscosity of Bituminous Material
7. Determination of softening point of bituminous material
8. Determination of ductility of the bitumen
9. Determination of flash point and fire point of bituminous material
10. Determination of Bitumen content by centrifuge extractor
11. Determination of stripping value of road aggregate
12. Determination of Marshall stability value for Bituminous mix
13. Determination of shape tests on aggregate