

Major Elective – 1
(Group – 4)
Highway Geometric Design

Course Objectives:

1. To give detailed knowledge of Highway Geometric elements, their importance in highway design.
2. To make the students conversant with techniques of designing highway geometric elements.
3. To make the students familiar with the procedure of fixing the designed geometric elements on the field.

Course Contents:

1. Highway Geometrics: Importance, highway system elements-road user and vehicular characteristics, mix traffic characteristics, classification of rural & urban roads, neighbourhood roads, roads in residential areas, geometric design factors-design speed, topography, traffic & environmental factors.
2. Cross-sectional Elements: Road surface characteristics- evenness, friction & skidding, camber values & implementation, lane width criteria for different modes, kerb, median, road margins, cross-sectional details for different categories of roads.
3. Sight distances: Sight distance factors & types, overtaking zones, grade impact, sight distances on head-light criteria.
4. Alignment: Alignment issues, factors, horizontal alignment, super-elevation design and implementation, pavement widening, transition curves, setting up of transition curves by surveying equipments, set back distances, vertical alignment, types of gradients and vertical curves, design of vertical curves & implementation.
5. Intersection Geometrics: Types of intersections, blind intersections, sight distances, island geometrics, geometrics for merging & diverging, geometrics for bus stop layouts, parking areas & fly-overs, rail-road level crossing.

Practical work:

1. Field surveys: Measurement of existing highway geometric elements.
2. Design of geometric elements: SSD, OSD, Horizontal curve, Set-back distance, Widening, Vertical curve.
2. Setting out Horizontal curves – Simple circular, compound, reverse and transition curve on the field.
3. Setting out of Vertical curve on the field.
4. Finding problematic spots on existing highway and suggesting remedies.
5. Fixing alignment on the ground.
6. Preparation of drawings, quantity estimation, use of computer and softwares.

References:

1. Kadiyali L.R., *Principles & Practice of Highway Engineering*, Khanna Publishers,2003
2. Khanna S.K., Justo C.E.G., *Highway Engineering*, Nem Chand & Bros., Roorkee, 2001
3. F. L. Mannering, W. P. Kilareski and S. S. Washburn, *Principles of Highway Engineering and Traffic Analysis*. Wiley India Pvt. Ltd., New Delhi.
4. James H. Banks, *Introduction to Transportation Engineering*, WCB-McGraw Hill, New York
5. Relevant IRC codes: IRC:32-1969, IRC:38-1988, IRC:39-1986, IRC:64-1990, IRC:66-1976, IRC:73-1980, IRC:80-1981, IRC:86-1983, IRC:92-1985, IRC:103-1988, IRC:106-1990, IRC:SP:23-1983, IRC:SP:41-1994
6. Green, *Highway Geometric Design*.