LESSON PLAN

Name of Faculty : Sahil Bangar **Discipline : Civil Engg** **L T P**
Subject : Highway Engg Theory **Semester : 5th** **3 - 4**
Lesson plan Duration : 15 weeks

Week	Lecture Day	THEORY TOPIC (including Assignments / Seeminar / Group Discussion / Sessional Tests)	Delivery Date of Lecture		Whether the Lesson Plan Followed ?
			Expected	Actual	Yes / No
1st	1	Introduction to the subject			
	2	**1.1 Introduction** 1.1.1 Importance of Highway engineering 1.1.2 Functions of IRC and CRRI			
	3	1.1.2 Functions of MoRTH & NHAI 1.1.3 IRC Classification of roads			
2nd	1	**1.2 Elements of Road Geometrics** 1.2.1 Glossary of terms used in road geometrics and their importance			
	2	1.2.2 Concept of camber and gradients- their types and functions 1.2.3 Concept of Design speed, average running speed, stopping and overtaking sight distance.			
	3	1.2.4 Curves- Necessity and types (horizontal and vertical curves including transition curves) 1.2.5 Super elevation-Definition, methods of providing super elevation and concept of widening of roads on curves			
3rd	1	1.2.6 Sketch of typical cross-sections in cutting and filling on straight alignment and at a curve			
	2	**2.1 Highway Surveys, Alignment and Plan** 2.1.1 Topographic Map-Concept and uses 2.1.2 Road surveys for highway location-Stages of road surveys (map study, reconnaissance, preliminary surveys, final location and detailed surveys)			
	3	2.1.3 Highway alignment-Definition and requirements 2.1.4 Standards for preparing highway plans-Stages and objectives.			
4th	1	2.1.5 Basic considerations governing alignment for a road in plain and hilly area 2.1.6 Setting out alignment of road- Highway location, bench marks and control pegs for embankment and cutting.			
	2	**2.2 Highway Materials** 2.2.1 Different types of road materials – (Soil, Aggregates and Binders) their common types, functions & requirements.			
	3	2.2.2 Introduction to California Bearing Ratio, method of finding CBR value and its significance.			

5th	1	2.3.3 Bitumen and Tar their properties as per BIS specifications, penetration, softening point, ductility and viscosity test of bitumen, procedures and significance.			
	2	2.3.4 Cut back, emulsion and Bitumen modifiers (CRMB, PMB) their functions.			
	3	**3.1 Highway Pavements Construction** 3.1.1 Highway pavement: Flexible and rigid pavement, their merits and demerits, typical crosssections, functions of various components			
6th	1	3.1.2 Sub-grade preparation: - Borrow pits, making profiles of embankment, construction of embankment, compaction, preparation of subgrade			
	2	3.1.2 Sub-grade preparation: - Methods of checking camber, gradient and alignment as per recommendations of IRC, equipment used for subgrade preparation.			
	3	Revision			
7th	1	**Assignment – 1 / Group discussion / Technical Quiz / Seminar**			
	2	**Sessional Test - 1**			
	3	3.1.3 Stabilization of subgrade. Types of stabilization mechanical stabilization, lime stabilization, cement stabilization; fly ash stabilization etc. (introduction only)			
8th	1	3.1.4 Stabilization of sub base & base course: Granular base course: a) Water Bound Macadam (WBM) b) Wet Mix Macadam (WMM) c) Bitumen Courses: (i) Bituminous Macadam (ii) Dense Bituminous Macadam (DBM)			
	2	3.1.5 Surfacing: Definition and types of surfacing a) Prime coat and tack coat b) Surface dressing with seal coat c) Open graded premix carpet d) Seal coat e) Bituminous Concrete f) Bituminous penetration macadam.			
	3	3.1.6 Rigid Pavements:- Construction of concrete roads as per IRC specifications: Form work laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used. Roller compacted concrete.			
	1	**4.1 Hill Roads:** 4.1.1 Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling			

9th	2	4.2 Special problems of hill areas 4.2.1 Landslides: Causes, prevention and control measures, use of geo-grids, geo-flexbiles, geo-synthetics			
	3	4.2.2 Drainage 4.2.4 Snow: Snow clearance, snow avalanches, frost 4.2.3 Soil erosion			
10th	1	4.2.5 Land Subsidence			
	2	**Assignment – 2 / Group discussion / Technical Quiz / Seminar**			
	3	**Sessional Test - 2**			
11th	1	4.3 Highway Drainage: 4.3.1 Necessity of road drainage work, cross drainage works			
	2	4.3.2 Surface and subsurface drains and storm water drains: - Location, spacing and typical details of side drains, side ditches for surface drainage.			
	3	4.3.3 Intercepting drains, pipe drains in hill roads, details of drains in cutting embankment, typical cross sections.			
12th	1	**5.1 Highway Maintenance:** 5.1.1 Common types of road failures of flexible pavements: Pot hole, cracks, rutting, alligator, cracking, upheaval - their causes and remedies			
	2	5.1.2 Maintenance of bituminous road such as crack sealing, patch-work and resurfacing. 5.1.3 Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms)			
	3	**5.2 Highway Safety:** 5.2.1 Best practices in engineering design for road safety: Geometry of the road, Segregation of local traffic, Pedestrian facility, Bus bays, Illuminations, Development of junction, Signage and road safety audit.			
13th	1	5.2.3 Essential road construction safety tips: Wear the proper safety equipment, Control traffic, Avoid blind spots, Be Constantly Aware of Surroundings			
	2	**5.3 Airport Engineering:-** 5.3.1 Concept of Airport engineering.			
	3	5.3.2 Factors to be considered while selecting a site for an airport with respect to zoning laws.			
14th	1	5.3.3 Introduction to Runways, Taxiways, Apron and Hanger.			
	2	5.3.4 Types of pavement used in airport runway.			
	3	Revision			

15th	1	**Assignment – 3 / Group discussion / Technical Quiz / Seminar**			
	2	**Sessional Test - 3**			
	3	Revision			