

Module 1

Chapter 1 : Introduction to Transportation systems

1-1 to 1-29

1.1 Introduction to Transportation Engineering : Comparison of various modes of transportation (Roadways, Railways, Airways and Waterways).

1.2 Introduction to Railway Engineering : Cross sectional elements of railway track (Foundation, Ballast, Sleepers and Rail), Introduction to turnout, Super elevation design, Negative Super elevation, Construction and Maintenance of Railway track.

1.3 Introduction to Airport Engineering : Elements of Airport, Site selection of Airport, Design of Runway length, Taxiway and Exit Taxiway design.

1.4 Introduction to Waterways : Definition of Docks, Harbour and Ports. Elements and types of Docks, Harbour and Port

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Module 2

Chapter 2 : Planning & Geometric Design of Highways

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2.1 Classification of roads based on various criteria : Road development plans, agencies related to highway development, Highway alignment (basic requirement and factors governing), hill roads, Surveys for highway location.

2.2 Terrain Classification : Vehicular Characteristics, Cross section elements of highways (width of carriage way, shoulders, medians, width of road way, right of way, camber & its profile).

2.3 Design speed : Sight distance, perception time, break reaction time, analysis of safe sight distance, analysis of overtaking sight distance, intersection sight distance.

2.4 Horizontal curves : Design of super elevation, its provisions, minimum radius of horizontal curves, widening of pavement, transition curves.

2.5 Gradients : Different types, maximum, minimum, ruling exceptional, grade compensation on curves.

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Module 4

Chapter 4 : Pavement Material and Design 4-1 to 4-49

4.1 Types of pavements : comparison of flexible and rigid pavements, Requirements of pavement materials, Soil: requirement of soils as subgrade material, CBR test.

Aggregate : Requirements of aggregate as Pavement material, Tests on aggregate with specified values. Bitumen: Requirements of bitumen as pavement material test on bitumen with specified values, variants of bitumen (Modified bitumen) and its uses. Introduction to Bituminous mix design using Marshall Stability test.

4.2 Flexible pavement design : Concepts related to flexible pavement design such as tyre pressure, contact pressure, ESWL, VDF and LDF. IRC approach for design (IRC: 37- 2001, IRC: 37- 2012), also IRC SP 72-2007/2015 and IRC 77 2008.

4.3 Rigid pavement design : Modulus of subgrade reaction, equivalent radius of resisting section, radius of relative stiffness, stresses on rigid pavement, combine loading temperature stress; Design of rigid pavements (IRC: 58- 2002; IRC: 58- 2011, IRC: 58- 2015. IRC: SP- 62- 2004, IRC: SP- 62-2014).

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Module-5

Chapter 5 : Pavement Construction, Soil Stabilization and Drainage **5-1 to 5-23**

5.1 Construction of different types of roads : Water bound macadam (WBM) road, WMM, bituminous pavements, cement concrete pavement. And joint (As per IRC, MORTH specifications) jointed reinforced, continuously reinforced; fiber reinforced; roller compacted concrete pavements.

5.2 Soil Stabilization : Significance, Principle of soil stabilization, different methods of soil Stabilization, use of Geosynthetics in highways and allied structures.

5.3 Highway drainage : Necessity/ Significance, mode of ingress of water in highway structure, Different methods of drainage- surface and subsurface drainage inking for the roads in hilly areas.

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Module 6

Chapter 6 : Pavement Evaluation, Failures & Maintenance 6-1 to 6-14

6.1 Evaluation of pavement : Structural and functional evaluation, methods of structural evaluation (working of Benkelman beam, FWD, LWD), methods of functional evaluation (working of Bump indicator, profilometric systems).

6.2 Distress / failure in Rigid and flexible pavement, reasons and measures.

6.3 Strengthening of existing pavement : Overlay and its types, design of overlay (Benkelman beam method).s

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