DCE 501 : DESIGN OF STEEL STRUCTURES

Credits: 04 **Semester V**

Module No.	Content	Teaching Hours
I	**Structural Steel Connections:** Properties and designation of structural steel as per BIS Codes, Riveted connections, types of rivets, permissible stresses in rivets as perBIS:800, types of riveted joints, specifications as per BIS 800 for riveted joints, design of riveted joints for axially loaded members, testing and inspection of riveted joints as per BIS:800 Welded connections: Types of welds, permissible stresses in welds, types of welded connections, design of butt and fillet welded connections subjected to axial loads, testing and inspection of welded joints as per BIS:800	16
II	**Tension Members:** Permissible stresses in tension for steel, design of tension members as per BIS:800 (flats, angles and tee sections only) **Compression Members:** Concept of buckling of columns, effective length and slenderness ratio, permissible stresses in compression as per IS:800, strength of columns of single and built up sections with the help of table of permissible Compressive stresses. IS specifications for design of compression members, design of angle, struts and axially loaded columns (no built up columns); use of tacking rivets	16
III	**Beams:** BIS specifications for the design of simply supported steel beams including design of base plate at the ends (laterally restrained beams only), structural behavior, deflected shapes and function of various elements of a plate girder and free hand sketching of a plate girder and its elements. **Roof Truss:** Form of trusses, pitch of roof truss, spacing of trusses, spacing of purlins, connection between purlin and roof covering, joint details of roof trusses, loading for roof truss, weight of roof truss, wind loads, snow loads, combination of loads, design of various elements of truss	16

Text Books:

1. *Duggal,S.K. (2010), Limit State Design of Steel Structures, Tata McGraw Hill, New Delhi.*

Reference Books:

1. *Sai Ram, K.S. (2010), Design of Steel Structures, Pearson Publishers, New Delhi.*
2. *Subramanian, N. (2011), Design of Steel Structures, Oxford University Press, New Delhi.*

3. *Englekirk, R.E. (1994), Steel Structures: Controlling Behavior through Design, John Wiley and Sons Publishers, New Delhi.*

DCE 502 : HIGHWAY ENGINEERING

Credits: 04 **Semester V**

Module No.	Content	Teaching Hours
I	**Introduction:** Importance of Highway transportation, functions of IRC, CRRI, & MOST, classification of roads organization of a state highway department **Road Geometrics:** Glossary of terms used in geo-metrics and their importance: Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient Design and average running speed, stopping and passing sight distance, horizontal and vertical curves including transition curves and super elevation. Methods of providing super elevation sketch of typical cross-sections in cutting and filling on straight alignment and at a curve.	12
II	**Road Material:** Different types of road materials in use, soil, aggregate, binders function of soil as highway sub grade **California Bearing Ratio:** Method of finding CBR value and its significance Testing aggregates: Los Angeles Abrasion test, impact test, crushing strength test, water absorption test and soundness test Aggregates. **Binders:** Common binders, cement, bitumen and tar, properties as per IS specifications, penetration and viscosity test of bitumen, procedures and significance, cut back and emulsion and their uses, bitumen modifiers **Road Pavements:** Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components **Flexible pavements:** sub base necessity and purpose, stabilized sub base: purpose of stabilization, types of stabilization, base Course: Preparation of base course: prime coat, tack coat Surfacing **Rigid Pavements:** Construction of concrete roads as per IRC specifications: Form laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used	12
III	**Hill Roads :** **Introduction:** Typical cross-sections showing all details of a typical hill road in cut, partly in cutting and partly in filling problems of hill areas	12

[Diploma in Engineering]

DCE 503 : SOILMECHANICS

Credits: 04 **Semester V**

Module No.	Content	Teaching Hours
I	**Introduction**: Soil formation, Transport and deposit of soil, Soil composition, Basic definitions, phase relationships, Index properties, Particle size analysis, Shape and size, Grain size distribution curves, Relative density, Consistency of soils, Determination of important physical and index properties of soils, soil classification systems with specific reference to Unified soil classification and IS soil classification systems, Field identification tests. **Soil Structure:** Soil structure, single grained structure, honeycomb structure, flocculent and dispersed structures, structure of composite soils. Role of soil structure on the behavior of soils.	12
II	**Soil-Water Relations:** Soil-water systems, Capillarity, Geostatic stresses, Effective and neutral stress, Capillary flow, Darcy's law, Permeability, Factors affecting permeability, Determination of permeability in the laboratory and in the field, Piping, Quick sand condition, Seepage, Governing differential equation for flow through soils. Different kinds of flow: steady state and transient flow, Graphical method of solving steady state flow equation	12
III	**Compaction:** General Principles, Moisture- Density Relationship, Optimum Moisture Content, Relevant Laboratory and Field Tests, Factors Affecting Compaction, Field Compaction, Compaction Techniques. **Compressibility and Consolidation:** Fundamentals, 1-D Consolidation, Normally and Over- Consolidated Clays, Void Ratio- Pressure Relationships, Determination of Pre-Consolidation Pressure, Compressibility Characteristics, Terzaghi's One Dimensional Consolidation Theory and Coefficient of Consolidation, Time Consolidation and Settlement, Settlement Analysis,, Vertical Sand Drains **Shear Strength of Soil:** Mohr-Coulomb Failure Criterion, Direct Shear Test, Unconfined Compression Test, Triaxial Tests: Unconsolidated Undrained, Consolidated Drained and Consolidated Undrained Tests, Vane Shear Test,	12

	Shear Strength of Clays.	

Text Book

1. Arora, K.R. (2009), "Soil Mechanics & Foundation Engineering", Standard Publishers Distributors, New Delhi.

Reference Books/

1. V.N.S. (2010),"Soil Mechanics and Foundation Engineering", Marcel Dekker Publications, New Delhi.
2. Venkataramaiah, C. (2006), "Geotechnical Engineering", New Age Publications, New Delhi.
3. Ranjan, G. and Rao, A.S.R. (2000), "Basic and Applied Soil Mechanics", New Age Publication, New Delhi.

DCE 504 : ENGINEERING GEOLOGY

Credits: 04 **Semester V**

Module No.		
I	**Minerals :** Their physical and detailed study of certain rock forming minerals. **Rocks :** Their origin, structure, Texture and classification of igneous sedimentary and metamorphic rocks and their suitability as Engg. materials. Stratification, Lamination bedding. Outcrop-its relation to topography, dip and strike of bed, overlap, outlier and inlier. **Rock deformation :** Folds, Faults, joints unconformity and their classification, causes and relation to engg. Behaviour of rock masses	10
II	**Earthquake:** Causes, classification, seismic zones of India and Geological consideration for construction of building, projects in seismic areas. **Landslides:** Causes, classification and preventive measures. **Underground water:** Origin, Aquifer, Aquicludes, Artesian Wells, underground provinces of India and its role as geological hazard.	12
III	***Building Stones*** *Engg. properties of rocks, Alkali aggregate reaction, Grouting, Pozzolonic materials.* *Geological investigations for site selection of Dams and reservoirs tunnels, bridges and Highways.* *Principles of Geophysical explorations methods for subsurface structures*	12

Reference Books

1. Tony Waltham : Fundamentals of Engineering Geology ,SPON Press
2. J.M. Treteth : Geology of Engineers, Princeton, Von. Nostrand.

3. K V G K Gokhale , Text Book of Engineering Geology , B S Publication
4. Prabin Singh : Engg. and General Geology, Katson Publishing House.
5. Blyth F.G.M. : A Geology for Engineers, Arnold, London.

DCE 505: RAILWAYS, BRIDGES AND TUNNEL

Credit-4

UNIT – I: RAILWAYS

Introduction to Indian Railways, Railway surveys: Factors influencing the railways route, brief description of various types of railway survey, Classification of permanent way describing its component parts, Rail Gauge: Definition, types, practice in India, Rails – types of rails, Rail Fastenings: Rail joints, types of rail joints, fastenings for rails, fish plates, bearing plates, Sleepers: Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers.

UNIT-II BRIDGES

1. Introduction
   Bridge – its function and component parts, difference between a bridge and a culvert

2. Classification of Bridges
   Their structural elements and suitability:

   2.1 According to life-permanent and temporary

   2.2 According to deck level – Deck, through and semi-through

   2.3 According to material –timber, masonry, steel, RCC, pre-stressed

   2.4 According to structural form.

3. Bridge Foundations: Introduction to open foundation, pile foundation, well foundation, Piers Abutments, Piers-definition, parts; types –solid (masonry and RCC),
4. Bridge bearings, Purpose of bearings; types of bearings – fixed plate, rocker and roller

UNIT - III: TUNNELS

Definition and necessity of tunnels, Typical section of tunnels for a national highway and single and double broad gauge railway track, Ventilation –necessity and methods of ventilation, by blowing, exhaust and combination of blowing and exhaust, Drainage method of draining water in tunnels, Lighting of tunnels.

RECOMMENDED BOOKS

1. Vaswani, NK, “Railway Engineering”, Publishing House, Roorkee
2. Rangwala, SC, “Railway Engineering”, Anand, Charotar Book Stall
3. Deshpande, R, “A Text Book of Railway Engineering”, Poonam United Book Corporation
4. Algia, JS “Bridge Engineering”, Anand, Charotar Book Stall
5. Victor Johnson, “Essentials of Bridge Engineering” Oxford and IBH, Delhi
6. Rangwala S.C., “Bridge Engineering”, Anand, Charotar Book Stall

DCE 551: SOIL MECHANICS LAB.

Credits: 02

Semester V

1. Determination of water content and specific gravity of soil by specific
   Gravity bottle and pycnometer.

2. Determination of grain size distribution of soil.
   a. Sieve test.
   b. Hydrometer test.
3. Determination of Atterberg limits of soil.
   a. Liquid limit.
   b. Plastic limit.
   c. Shrinkage limit.
4. Determination of optimum moisture content and the maximum dry density.
   A Proctor compaction test.
   b. Modified proctor compaction test.
   c. Use of proctor penetration needle.

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5. Determination of coefficient of permeability of soil.
   a. Constant head permeameter.
   b. Falling head permeameter.
6. Measurement of soil compaction in the field.
   a. Core cutter method. b. Sand replacement method.