

I Analysis of Statically Determinate Pin-Jointed Trusses

Stability and Determinateness, Force analysis of Compound and complex trusses, Tension co-efficient method – application to simple space trusses

II. Deflection of Pin-Jointed Trusses:

Application of Castigliano's theorem and principle of virtual work, Unit load method, Graphical method – Williot - Mohr diagram

III. Influence Lines for statically determinate beams and trusses:

ILD for reaction, SF and BM of simple and compound beams, ILD for member forces of simply supported truss girders with parallel and non-parallel chords; effect of moving live loads; Focal length and counter bracing

IV. Three-Hinged Arches:

Eddy's theorem, BMD, Normal thrust and Radial shear at any c/s, Influence Lines

V. Suspension Bridges:

Analysis of cables, effect of temperature, anchor cables, three-hinged stiffening girder, ILD for BM and SF

VI. Masonry Structures:

Conditions for stability; stability and stress analysis of dams Retaining walls: supporting backfills - without and with surcharge

VII. Energy Concepts:

Principle of virtual work; Maxwell-Betti reciprocal theorem; Castigliano's theorem; Application to determinate structures

References:

- i. TIMOSHENKO S. P. & YOUNG : Theory of Structures
- ii. JUNNARKAR S. : Mechanics of Structures

- I. Introduction to Plastic Analysis & Limit State Design:**
Stress-strain curve for mild steel; bending of beams; plastic analysis approach; limit states for steel design

- II. Simple Bolted Connections & Welded Connections :**
Types of bolts & bolted joints; bearing type connections; slip-critical connections
Weld types; design of groove welds and fillet welds
Eccentric Connections

- III. Tension Members & Compression Members**
Design procedure of tension members, Design of axially-loaded compression members, column splice

- IV. Beams**
Design procedure for rolled beams, (a) Laterally supported beams
(b) Laterally unsupported beams

- V. Plate Girder**
Design of Panel Sections, Stiffeners and Curtailment of Flange plates

- VI. Gantry Girder**
Design procedure of gantry girder

- VII. Roof Trusses**
Load combinations, Analysis of truss, Deflection of truss, Design procedure

References:

- i. IS : 800 – 2007 Code of Practice for General Construction in Steel
- ii. SP : 6(1) – 1964 Handbook for Structural Engineers : I. Structural Steel Sections
- iii. DUGGAL S. K.: Design of Steel Structures; Tata McGraw Hill
- iv. SUBRAMANIAN N.: Design of Steel Structures; Oxford University Press

I. Introduction and Highway Development in India:

Different modes of Transportation, Characteristics of Road Transport, Brief history and development of Road Construction, Jayakar Committee Recommendations, Road Classification, Long term Road Plans, Vision – 2021, NHDP, Rural Roads Development Plan

II. Highway Alignment, Survey and Detailed Project Report:

Fundamental Principles of Highway Alignment, Factors controlling the selection of alignment, Engineering Surveys for a Highway Project, Drawings, Preparation of Detailed Project Reports (DPR)

III. Geometric Design of Highways:

Road Cross-sectional Elements: Width of Carriageway, Formation Width, Right of Way, Camber, Shoulder, Kerb, Road Margins, Design Speed, Sight Distances, Design of Horizontal curves, Super elevation, Extra widening on Horizontal curves, Transition curves, Set back distance at curves, Gradient, Design of Vertical curves – Summit and Valley curves

IV. Traffic Engineering:

Traffic Characteristics, Traffic Studies, Traffic Volume, Traffic Forecast, Traffic Capacity, Traffic Control Devices, Parking Studies, Accident Studies, Highway Safety, Intersections- At grade and Grade Separated Intersections, Traffic Control Devices, Traffic Signs, Traffic Signal Systems, Traffic Islands, Road Markings, Highway Lighting, Intelligent Transportation Systems

V. Pavement Design:

Types of Pavements, Flexible and Rigid, Pavement composition, Unconventional Pavements, Flexible Pavement Design as per IRC, Stresses in Concrete Pavements, Modulus of subgrade reaction, Design of rigid pavements as per IRC, Highway Drainage

VI. Highway Materials and Construction

Subgrade Soil, Aggregates, Bitumen, Tar, Emulsion, Modified Bitumen, Cement Concrete, Tests on Aggregates, Tests on Bitumen, Bituminous Mix Design, Construction of WBM roads, Soil Stabilised Roads, Different types of Bituminous Constructions, Construction of cement Concrete Pavements, Equipments used in Highway Construction

VII. Pavement Evaluation and Maintenance:

Pavement Evaluation-Structural and Functional, Benkelman Beam, Falling Weight Deflectometer (FWD), Dynamic Cone Penetrometer (DCP), Roughness measurement, Distresses in flexible and concrete pavements, Maintenance and Rehabilitation of Pavements, Overlay Design as per IRC

References :

- i. KHANNA S. K. and JUSTO C. E. G.: Highway Engineering
- ii. KADYALI L. R. and LAL N. B. : Principle and practices of Highway Engineering
- iii. CHAKRABORTY P. and DAS A.: Principles of Transportation Engineering

I. Introduction:

Fluid and continuum, Physical properties of fluids, Rheology of fluids.

II. Fluid Statics:

Pressure-density-height relationship, Manometers, Pressure on plane and curved surfaces, Center of Pressure, Buoyancy, Stability of immersed and floating bodies

III. Kinematics of Fluid Flow:

Types of fluid flows: Continuum, & free molecular flows. Steady and unsteady, uniform and non-uniform, Laminar and turbulent flows, Rotational and irrotational flows, Compressible and incompressible flows, One, two and three dimensional flows, streamlines, Continuity equation, Stream function and velocity potential.

IV. Dynamics of Fluid Flow:

Euler equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, Orifice, Venturi meter, Orifice meter, Notches and weirs, Momentum equation

V. Laminar and Turbulent Flows:

Equation of motion for laminar flow through pipes and parallel plates, turbulent flow, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, resistance to flow, minor losses, power transmission through a pipe.

VI. Boundary Layer concept:

Boundary layer concept, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sub-layer, separation and its control, drag and lift, drag on a sphere, a two dimensional cylinder, and an aerofoil, Magnus effect.

VII. Dimensional Analysis and Hydraulic Similitude:

Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance, geometric, kinematics and dynamic similarity, model studies.

References:

- i. S.K.Agarwal: Fluid Mechanics & Machinery, TMH.
- ii. Hunter Rouse, Elementary Mechanics of fluids, John Wiley & Sons.
- iii. I.H.Shames, Mechanics of Fluids McGraw Hill,
- iv. Dr.D.S. Kumar, Fluid Mechanics and Fluid Power Engineering, S.K. Kataria and Sons
- v. Modi, P.N.and Seth, S.H., Hydraulics and Fluid Machines, Standard Book House

AIMS AND OBJECTIVES

1. Developing the following language skills:

LISTENING: To enable the learners to listen and understand the spoken French language which uses the elementary spoken structures.

SPEAKING: To enable the learners to speak and engage in simple dialogues in French.

READING SKILLS AND TEXTUAL COMPREHENSION: To enable the learners to read and understand the elementary texts in French.

WRITING: To enable the learners to write simple sentences and short paragraphs in French.

2. To enable the learners to manipulate the simple grammatical structures of the language and the most essential vocabulary.

3. To expose the learners to France culture and Francophonie .

DURATION OF THE COURSE**ONE SEMESTER****GRAMMAIRE :**

Le pronom personnel, Articles définis et indéfinis, Nationalités, professions, nombres, les jours de la semaine, les mois de l'année, Négation, Articles partitifs, expression de la quantité, Les chiffres, Adjectifs démonstratifs, Adjectifs qualificatifs (mas/fém., pluriel etc.) et possessifs, Utilisation de « est-ce que ? » et « qu'est-ce que c'est ? » quel, quelle etc., Trois formes d'interrogation, L'impératif, Le présent, futur proche, passé récent, le futur, Le passe composé

OBJECTIFS COMMUNICATIFS

Se présenter et présenter quelqu'un (salutations formelle et informelle), Demander et donner des infos personnelles, Parler de goûts et des préférences et leurs degrés, Formule de politesse, Décrire une personne ou un lieu, Ecrire une carte postale, e-mail Parler de, activités quotidiennes, Décrire la ville, des amis, des parents etc.

Text Book recommended: Jumelage - Niveau-1, (Unit-0, 1 & 2)

Reference Books recommended:

- ✓ **Le Nouveau sans Frontières-1, CLE International**
- ✓ **Alter Ego-1**
- ✓ **Campus- 1, CLE international**
- ✓ Libre Echange- 1, Didier
- ✓ 450 Exercices de phonétique, CLE International (2010)
- ✓ **Echo - A1.**

Evaluation : A candidate's performance is evaluated on the basis of

- a. Internal Assessment: Mid Sem: 25 Marks, Assignment & Viva 15 Marks (External will be involved)
- b. Final examination at the end of the course. 60 Marks