

PCCI4304 **STRUCTURAL ANALYSIS -II** (3-0-0)

Module - I

Plastic Analysis: Plastic modulus, shear factor, plastic moment of resistance, Load factor, Plastic analysis of continuous beam and simple rectangular portals, Application of upper bound and lower bound theorems

Module – II

Analysis of redundant plane truss (single degree), analysis of continuous beams and plane frames by slope deflection method and moment distribution method, analysis of Continuous beam and simple portals by Kani's method

Module - III

Analysis of two hinged and fixed arches for dead and live loads, Suspension cables with two hinged stiffening girders, introduction to force and displacement method, matrix, methods of analysis: flexibility and stiffness, methods; Application to simple trusses and beams

Reference Books:

1. Structural analysis by C.S. Reddy TMH Publ
2. Structural analysis a matrix approach by Pandit & Gupta, TMH Publ.
3. Indeterminate Structures: J.S.Kinney
4. Limit Analysis of Structures: Monikaselvam, Dhanpat Ray Publ
5. Indeterminate Structural Analysis: C.K.Wang ,TMH

PCCI4305 IRRIGATION ENGINEERING (3-0-0)

MODULE-I

1. **Introduction:** Necessity of Irrigation in India, Advantages and disadvantages of Irrigation, Techniques of water distribution in farms, Quality of irrigation water.
2. **Water requirements of Crops:** Crops and crop season, Duty and Delta, Consumptive use, Irrigation requirements, Estimation of consumptive use of water by climatic approaches, Irrigation efficiencies, Soil moisture-irrigation relationship.
3. **Canal Irrigation:** Classification of canals, Canal losses, Alignment of canals, Design of stable channels using Kennedy's and Lacey's theory, Garret's diagram, Cross section of irrigation canals
4. **Lining of Irrigation Canals:** Advantages and economics of lining, Various types of lining, Design of lined canals.

MODULE-II

5. **Reclamation of Water Logged and Saline Soils:** Causes and control of water logging. Reclamation of saline and alkaline land, Surface and Sub-surface drainage.
6. **Types of Cross-Drainage Works:** Types of CD works, Selection of a suitable type to suite a particular condition, Design consideration for CD works.
7. **Diversion Head works:** Weirs and Barrages, Types of weirs and barrages, Layout of a diversion head works, Introduction to different components of a diversion head works.
8. **Design of weirs and barrages:** Bligh's creep theory, Design of weir using Bligh's theory, Lane's weighted creep theory, Khosla's theory, Khosla's method of independent variables, Exit gradient.
9. **Canal Falls:** Necessity, Proper location, Types, Design and detailing of one type of fall.

MODULE-III

10. **Gravity Dams:** Typical cross section, Various forces acting on gravity dam, Combination of forces for design, Modes of failure and criteria for structural stability, High and low gravity dam, Design of high dam, Typical section of low gravity dam.
11. **Earth Dams:** Types, Causes of failure, Preliminary section of an earth dam, Seepage control in earth dams
12. **Spillways:** Descriptive study of various types of spillways.

Reference Books:

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg, Khanna Publication, New Delhi
2. Irrigation Engg. By B.C. Punmia and Pande, Laxmi Publication, New Delhi
3. Irrigation Engg. By Birdie and Das, Dhanpat Rai, New Delhi
1. Irrigation Engg. By Sharma and Sharma, S. Chanda and Company, New Delhi

PCCI5301 DESIGN OF STEEL STRUCTURE (3-0-0)
(Based on limit state method as per IS:800-2007)

Module I

Introduction, advantages/disadvantages of steel, structural steel, rolled steel section, various types of loads, design philosophy

Limit state design method, limit states of strength and serviceability, probabilistic basis for design

Riveted, bolted and pinned connections,

Welded connections-assumptions, types, design of fillet welds, intermittent fillet weld, plug and slot weld, failure of welded joints, welded joints vs bolted and riveted joints

Module II

Tension members, types, net cross-sectional area, types of failure, slenderness ratio, design of tension members, gusset plate.

Compression members, effective length, slenderness ratio, types of cross-section, classification of cross-section, design of axially loaded compression members, lacing, battening, design of column bases, and foundation bolts.

Module III

Design of beams, types of c/s, lateral stability of beams, lateral torsional buckling, bending and shear strength, web buckling and web crippling, deflection, design procedure.

Plate girders- various elements and design of components

Eccentric and moment connections, roof trusses

Reference Books:

1. Limit State Design of Steel structures by S.K. Duggal, TMH Publication
2. Steel Structures- Design & Practice by N. Subramanian, Oxford University Press
3. Design of steel structures by S.S.Bhavikatti, I.K. International Publishing house, New Delhi.
4. Design of Steel Structures by K. S. Sairam- Pearson

PCCI5304 **TRANSPORTION ENGINEERING-II** (3-0-0)

Module-I

History of Indian railways, component parts of railway track, problems of multi gauge system, coning of wheels, alignments and survey, permanent way track components , Type of rail sections ,creep of rails, wear and failure in rails , Ballast requirements, sleeper requirements, types of sleepers, various train resistances

Module-II

Geometric design: Gradients and grade compensation, various speeds on a railway track, super-elevation, horizontal and vertical curves,
Points and crossings, Design of simple turn-out, Signalling and interlocking,

Module-III

Airport site selection, Air craft characteristics, various surface of an airport, Wind rose diagram, Geometric elements of run way and taxiway , holding apron, parking configuration , terminal building , visual aids, air traffic control, airport marking and lighting.

Reference Books:

1. A text book of railway engineering , By S.C.Saxena and M.G.Arora
2. Air-port Engineering by S.K.Khanna and M.G.Arora
3. Railway Engineering by Satish Chandra & MM Agrawal, Oxford University Press.

PECI5305 **PAVEMENT DESIGN** (3-0-0)

Module – I

Introduction: Classification of pavements, Difference between highway and runway pavements, Factors affecting structural design, Characteristics of traffic loading, Concept of VDF and Computation of design traffic.

Module – II

Principles of pavement design: Concepts of structural and functional failures, Performance criteria; Analysis of pavements: ESWL, Analysis of flexible and concrete pavements.
Design of pavements: IRC, AASHTO and other important methods of design of bituminous and concrete pavements.

Module – III

Pavement evaluation techniques: Benkelman beam, Falling weight deflectometer and other equipments, Concepts of pavement maintenance management.

Reference Books:

1. Principles of Pavement Design, E. J. Yoder & M.W. Witzack, John Wiley and Sons, New York.
2. Principles of Transportation Engineering, P. Chakroborty & A. Das, PHI Publication.
3. Pavement Analysis and Design, Y. H. Huang, Prentice Hall

HSSM3302 **OPTIMIZATION IN ENGINEERING** (3-0-0)

Module-I (10 Hours)

Idea of Engineering optimization problems, Classification of optimization algorithms, Modeling of problems and principle of modeling.

Linear programming: Formulation of LPP, Graphical solution, Simplex method, Big-M method, Revised simplex method, Duality theory and its application, Dual simplex method, Sensitivity analysis in linear programming

Module -II (10 Hours)

Transportation problems: Finding an initial basic feasible solution by Northwest Corner rule, Least Cost rule, Vogel's approximation method, Degeneracy, Optimality test, MODI method, Stepping stone method

Assignment problems: Hungarian method for solution of Assignment problems

Integer Programming: Branch and Bound algorithm for solution of integer Programming Problems

Queuing models: General characteristics, Markovian queuing model, M/M/1 model, Limited queue capacity, Multiple server, Finite sources, Queue discipline.

Module -III (10 Hours)

Non-linear programming: Introduction to non-linear programming.

Unconstrained optimization: Fibonacci and Golden Section Search method.

Constrained optimization with equality constraint: Lagrange multiplier, Projected gradient method

Constrained optimization with inequality constraint: Kuhn-Tucker condition, Quadratic programming

Introduction to Genetic Algorithm.

Recommended text books

1. A. Ravindran, D. T. Philips, J. Solberg, " *Operations Research- Principle and Practice*", Second edition, Wiley India Pvt Ltd
2. Kalyanmoy Deb, " *Optimization for Engineering Design*", PHI Learning Pvt Ltd

Recommended Reference books:

1. Stephen G. Nash, A. Sofer, " *Linear and Non-linear Programming*", McGraw Hill
2. A.Ravindran, K.M.Ragsdell, G.V.Reklaitis," *Engineering Optimization*", Second edition, Wiley India Pvt. Ltd
3. H.A.Taha,A.M.Natarajan, P.Balasubramanie, A.Tamilarasi, " *Operations Research*", Eighth Edition, Pearson Education
4. F.S.Hiller, G.J.Lieberman, " *Operations Research*", Eighth Edition, Tata McDraw Hill
5. P.K.Gupta, D.S.Hira, " *Operations Research*", S.Chand and Company Ltd.

PEME5308 **NON-CONVENTIONAL ENERGY SOURCES**

(3-0-0)

Module I

(10 Classes)

Energy, Ecology and environment: Introduction, Classification of Energy Resources, Common Forms of Energy, Energy Chain, Advantages and Disadvantages of Conventional Energy Sources, Importance and Salient Features of Non-Conventional Energy Sources, Environmental and ecological Aspects of Energy use, Environment-Economy-Energy and Sustainable Development, World Energy Status, Energy Scenario in India.

Energy Conservation and Energy Storage: Salient Features of "Energy Conservation Act, 2001", Various Aspects of Energy Conservation, Principles of Energy Conservation, General Electrical ECO's (Energy Conservation Opportunities),

Solar Energy: Basics, The Sun as a Source of Energy, Sun, Earth Radiation Spectrums, Extraterrestrial and Terrestrial Radiations, Spectral Energy Distribution of Solar Radiation, Depletion of Solar Radiation, Measurements of Solar Radiation, Solar Time (Local Apparent Time), Solar Radiation Geometry, Solar Day Length, Empirical Equations for Estimating Solar Radiation(Hourly Global, Diffuse and Beam Radiations) on Horizontal Surface Under Cloudless and Cloudy Skies, Solar Radiation on Inclined Plane Surface only (empirical relations for numerical)

Module II

(15 Classes)

Solar Thermal Systems: Solar Collectors: Flat plate and concentric collectors, Solar Water Heater, Solar Passive Space - Heating and Cooling Systems, Solar Refrigeration and Air-Conditioning Systems, Solar Cookers, Solar Furnaces, Solar Green House, Solar Dryer, Solar Distillation (or Desalination of Water),

Solar Photovoltaic Systems: Solar Cell Fundamentals, Solar Cell Characteristics, Solar Cell Classification, Solar Cell, Module, Panel and Array Construction, Solar PV Systems, Solar PV Applications.

Wind Energy: Origin of Winds, Nature of Winds, Wind Turbine Siting, Major Applications of Wind Power, Wind Turbine Types and Their Construction, Wind Energy Conversion Systems (WECS), Effects of Wind Speed and Grid Condition (System Integration),

Module III

(15 Classes)

Biomass Energy: Photosynthesis Process, Usable Forms of Biomass, their Composition and Fuel Properties, Biomass Resources , Biomass Conversion Technologies, Urban Waste to Energy Conversion, Biomass Gasification ,Biomass Liquefaction, Biomass to Ethanol Production, Biogas Production from Waste Biomass, Energy Farming.

Miscellaneous Non-conventional Technologies

Geothermal Energy: Applications, Origin and Distribution of Geothermal Energy, Types of Geothermal Resource.

Ocean Energy: Tidal Energy, Wave Energy, Ocean Thermal Energy

Fuel Cell Technology: Types, Principle of operation, Advantages and disadvantages.

Text Book:

1. Non Conventional Energy Sources: B.M Khan, TMH Publications
2. Renewable Energy Sources and Emerging Technology: D.P.Kothari and etal., PHI
3. Renewable Energy Sources & Conversion Technology: N.K.Bansal, Manfred Kleenman & Michael Meliss, TMH Publication.

Reference:

1. Renewable Energy Sources:Fundamentals & Applications:G.N.Tiwari & M.K.Ghosal, Narosa Pub
2. Non Conventional Energy Resources: D.S. Chauhan and S.K.Srivastava, New Age International
3. Non Conventional Energy Sources: H.P.Garg
4. Non-Conventional Energy Systems: G.D.Rai, Khanna publications
5. Solar Energy Technology: Sukhatme and Nayak, TMH
6. Renewable Energy, Godfrey Boyle, Oxford University Press

PEIT5301 **E-COMMERCE** (3-0-0)

Module –I (Lecture Hour 11)

Basics of E-commerce

Basic Elements, of e-commerce, e-commerce framework, basic infrastructure for e-commerce: Technical, capital, media, Human Resource, Public policy

Technical Infrastructure

Internet connectivity, protocols, web server, software for web server, e-commerce software, security threats to e-commerce, protecting e-commerce system

Module –II (Lecture Hour 12)

Payment System for E-commerce

Online payments system, pre-paid and post-paid electronic payment systems, Electronic data interchange (EDI)

Business Models for E-commerce

Revenue Model, Business model based on strategies, Marketing on the web: Internet based Advertisement, Website usability, consumer oriented e-commerce

Module –III (Lecture Hour 12)

Internet Business Strategies

Electronic marketplaces, Electronic Auctions, Mobile Commerce, Virtual Communities

Textbooks

1. Ecommerce, Gary P. Schneider, Cengage Learning
2. Electronic Commerce: Framework Technologies & Applications, Bharat Bhasker, TMH

Reference Books

1. Electronic Commerce: A Manager's Guide, Kalakota & Whinston, Pearson
2. E-commerce, Jibitesh Mishra, Macmillan
3. E-commerce: Concepts, models & strategies, C.V.S Murthy, Himalaya Publishing

ENVIRONMENTAL ENGINEERING LAB (0-0-3)

A. Water Quality Analysis

1. Determination of pH (Electrometric and Colorimetric).
2. Determination of turbidity by using Nephelometer.
3. Determination of alkalinity and acidity.
4. Optimum dose of coagulants by jar test.
5. Total Hardness.
6. Total solids and suspended solids.
7. Residual chlorine.
8. Chlorides.
9. Chemical Oxygen Demand.
10. Biochemical Oxygen Demand.
11. Dissolved Oxygen.

B. Ambient Air Quality Analysis

12. Respirable Particulate Matter (PM10).
13. Total Suspended Particulate matter (TSP).
14. Determination of SO₂ in ambient air.
15. Determination of NO_x in ambient air.

C. Noise Pollution measurement

16. Indoor and ambient noise level analysis

D. Microbiological Analysis of Water

17. Microbiological culture analysis of bacterial samples
18. MPN Test

Laboratory Manual:

1. Geotechnical Engineering Laboratory Manual.
2. Environmental Engineering Laboratory Manual.
3. Standard Methods for the Examination of Water and Wastewater- AWWA, APHA, WEF, (USA), 20th edition, 2001.

TRANSPORTATION ENGINEERING LAB (0-0-3)

1. Determination of aggregate crushing value.
2. Determination of Los Angeles abrasion value of aggregates.
3. Determination of aggregate impact value.
4. Determination of penetration value of bitumen.
5. Determination of softening point value of bitumen.
6. Determination of ductility value of bitumen.
7. Determination of flash and fire point of bitumen.
8. Determination of specific gravity of bitumen.
9. Determination of stripping value of aggregate.
10. Determination of flakiness index and elongation index of coarse aggregate.
11. Determination of specific gravity and water absorption of coarse aggregate.
12. Determination of CBR of soil subgrade
13. Design of GSB and WMM
14. Marshall method of mix design
15. Demonstration of advanced equipments for characterization of pavement materials.

DESIGN & DETAILING OF STEEL STRUCTURES (0-0-3)

1. Design and detailing of steel roof trusses/ industrial buildings
2. Design of columns(with lacing and battening) and column bases
3. Design of plate girders
4. Detailing of structural steel connections, seated and framed connections
