

CODE: CE 311

STRUCTURAL ANALYSIS-I

Lectures : 3 Periods/Week

Sessional marks : 40

University : 3 Hours

University Exam. Marks : 60

Exam

Credits: 3

UNIT – I

Displacements Of Determinate Structures Using Energy Methods

Maxwell's reciprocal theorem; Maxwell – Betti's generalized reciprocal theorem; Castigliano's theorems; Application of Castigliano's theorem for calculating deflection of beams, frames and trusses; Virtual work method for deflections.

UNIT – II

Influence Lines For Statically Determinate Structures

Moving loads and influence lines; Influence lines for beam reactions; Influence lines for shearing force; Influence lines for bending moment; Calculation of maximum shear force and bending moment at a section for rolling loads; Calculation of absolute maximum bending moment; Influence lines for simple trusses.

UNIT – III

Propped Cantilevers

Analysis of propped cantilever by method of consistent deformations.

Fixed Beams

Fixed moments for a fixed beam of uniform section for different types of loading; Effect of sinking of a support; Effect of rotation of a support; Bending moment diagram for fixed beams.

Clapeyron's Theorem of Three Moments

Analysis of continuous beam by Clapeyron's theorem of three moments.

UNIT – IV

Strain Energy Method

Strain energy method for analysis of continuous beams and rigid joined plane frames up to second degree redundancy.

Redundant Pin Jointed Frames

Analysis of pin jointed frames (only single degree of redundancy); Forces in indeterminate pin jointed frames due to temperature variation and lack of fit; Composite structure.

UNIT-V

Slope Deflection Method

Slope - deflection equations; Principles of the method; Applications of the method to the analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with sidesway.

Moment Distribution Method

Principles of the method; Application of the method to analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with side sway.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Analysis of Structures vols. 1 & 2 by Vazirani & Ratwani; Khanna Publishers; Delhi.

REFERENCES

1. Structural Analysis by Devdas Menon, Narosa Publishinh House.
2. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications
3. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House
4. Structural analysis by R. C. Hibbeler, Pearson Education.
5. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill.

CODE: CE 312

DESIGN OF CONCRETE STRUCTURES -I

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT – I

Introduction

Role of structural engineer; Reinforced concrete; Structural elements ; Loads on structures ; Strength and serviceability ; Methods of design ; Codes of practice.

Design of beams for Flexure (Working Stress Method)

Assumptions; Permissible stresses in concrete and steel; Transformed section; Analysis and design of beams for flexure of singly reinforced, doubly reinforced and flanged sections.

UNIT-II

Design For Flexure (Limit State Method)

Assumptions; Limit states; Partial safety factors; Modes of failure; Maximum depth of neutral axis; Analysis and design for flexure of singly reinforced, doubly reinforced and flanged sections.

Design of beams for Shear, Bond and Torsion (Limit State Method)

Design for shear ; Design for bond – Development length Torsion – Introduction, Effect of torsion, IS Code provisions.

UNIT-III

Deflection And Cracking

Span/Effective depth ratio; Calculation of short-term deflection and long term deflection; Cracking; Bar spacing controls.

Design and detailing of the following

Simply supported and Cantilever beams (**Limit State method**).

UNIT-IV

Continuous Beam (Limit State Method)

Design of continuous beam.

One way Slabs (Limit State Method)

Design of Simply supported, Cantilever and Continuous slabs.

UNIT-V

Two Way Slabs (Limit State Method)

Design and detailing of two way slabs

Stair Case

Types of stair Cases; Design & Detailing of Dog-legged stair case (**Limit State method**)

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Reinforced concrete, Vol.1 by H. J. Shah, Charotar publishing house Pvt. Ltd.

REFERENCES

1. Reinforced Concrete (limit state design) by Ashok K. Jain; NemChand& Bros., Roorkee
2. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hil.
3. Plain And Reinforced Concrete Code of Practice: IS 456-2000.

CODE: CE 313

DESIGN OF STEEL STRUCTURES -I

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT – I

Introduction

What are steel structures; What a steel structure consists of ; Structural steel; Products of structural steel ; Standards , Codes and Specifications; Fatigue ; Brittle fracture ; Corrosion protection of steel structures ; Design philosophies; Methods of structural analysis ; Plate(Local) buckling; Classification of sections.

Structural steel fasteners : Introduction; Welding - Shield metal arc welding, Automatic submerged arc- welding, Types of welds, Quality of welds, Weld symbols and notation, Specifications for welding ;

Bolting-Types of failure, Design specifications, High- strength bolts.

Tension members

Introduction, Net area; Shear-lag ; Design of tension members

UNIT - II

Compression members

Introduction ; Euler's buckling theory; Behaviour of real columns; Types of sections; Design of columns; Validity of design strength calculations; Design of compression members; Design Procedure ; Built-up compression members

UNIT – III

Beams

Introduction; Flexural behaviour of beams which does not undergo lateral buckling; Flexural behaviour of beams which undergo lateral buckling ; Shear behaviour; Web buckling and Crippling ; Design strength in bending ; Design strength in shear; Limit state serviceability – Deflection.

UNIT – IV

Beam-columns

Introduction; Analysis of beam-columns; Modes of failure; Design specifications

Column Splices

Introduction; Column splices.

UNIT – V

Column Bases and Caps

Introduction; Different types of Column Bases; Design of Slab Base and Gusset Base; Foundation Bolts.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Design of steel structures by K. S. Sai Ram, Pearson Education, 2010.
2. Limit State Design of Steel Structures by S.K.Duggal, Tata McGraw Hill Education Pvt.Ltd.

REFERENCE BOOKS

1. Steel Structures - Design and Practice by N. Subramanian, Oxford University Press.
2. Limit state design of steel structures by M.R.Shivkar , PHI Learning.
3. General Construction In Steel – Code of Practice: IS 800-2007.

CODE: CE 314/1

REMOTE SENSING &GIS

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT-I

Basic Concepts

Definitions; Introduction to RS; Necessity and Importance; and Application and Scope.

Electromagnetic Radiation Introduction

Solar Radiation; Electromagnetic Spectrum; Interaction of EMR with the atmosphere; Atmospheric Windows; Scattering and Transmission; Specular and Diffuse surfaces; Reflectance and Absorption in RS.

Sensors

Spectral Constraints; Spectral bands for Sensors; Multispectral Instruments; Photon, Infrared and Thermal Detectors; Photo multipliers; Charge Coupled Devices; Multispectral Line Scanners; Photographic Systems; Sensors for Ultra-violet Region; Visible Region; Infra-red Region; Microwave region. Classification of Sensors - Multispectral Scanner (MSS); Thematic Mapper™; Electro-optical Sensors; Linear Array; Push-broom Sensors; Thermal Scanners; Passive Microwave Radiometers; RADAR; SLAR; and SAR. Application of Laser: Gamma- radiation; Microwave in RS.

Data Acquisition Platforms

Remote Sensing Platforms; Multiconcept in acquiring RS Data; Characteristics of Space Platforms; and Airborne platforms 5. Data Formats for Digital Satellite Imagery Band Sequential Format; Band Interleaved by Line Format; Run-length, Encoding Format.

Data Products

Computer compatible tapes; Hard Copy Output; Generation of B/W and FC's; Generally Supported Scales of the Data Products; Information about Annotation of the Products.

UNIT- II

Digital Image Processing

Introduction to Image Analysis; Ground truth; Conversion of Data into Information. Initial Statistical Extraction; Universal and Multivariate Statistics; Histogram and its Significance in RS. Digital Data Processing; Introduction : Missing Scan lines; Destripping Methods; Geometric Correction and Registration; Atmospheric Corrections; Illumination and View angle Effects; Enhancement Techniques; Human visual system; Linear, Histogram Equalization - Gaussian and other Contrast Enhancements: Pseudo colour Enhancement; Edge Enhancement; Image Transformation - Arithmetic Operations; Empirically Based Image Transforms; Principle Component Analysis; Discriminant Analysis; Hue, Saturation and Intensity Transfer; Fourier Transform; Fast Fourier Transform; Vegetation Indices; Filtering Techniques- Introduction: Low Pass Filters; High Pass Filters; Edge Detection; Frequency Domain Filters; Point and Neighborhood Operation; Image Processing Display Systems; Software for Image Processing; Definition of a Gray Level Image.

UNIT-III

Analysis and Interpretation Techniques

Introduction; Visual Analysis and Interpretation; Digital Analysis and Image Processing; Image Classification; Morphological Approaches for Boolean Images and Grey Level Images: Introduction; Concepts of Erosion, Dilation, Opening, Closing, Edge Detection; Classification, Geometrical, Unsupervised, Supervised; Training Sample Selection. Parallelepiped Classifier. Centroid Classifier, Maximum Likelihood Method, Hybrid Methods, Decision-Tree Classifier; Incorporation of non-spectral features like texture; Use of External Data; Contextual Information; Feature-Sub feature Study; Classification Accuracy.

Application of Remote Sensing in the Appraisal and Management of Natural Resources

Digital Analysis of Satellite Data for Integration, Assessment and Management of Natural Resources such as -Classification of Landforms, Soil, Land use, Forest and Vegetation. Range of Biomass Estimation. Water Resources Evaluation, River morphology. Reservoir Sedimentation, Rainfall - Runoff. Glacier Inventory, Drought Assessment, Crop Acreage . Forest Coverage, Irrigation System Performance Evaluation, Dam site Investigation, Flood Mapping, Management and Damage Assessment, Mapping of Potential Groundwater Zones, Coastal Management and Ocean Parameters. Town and Urban Planning, Planning Transportation Routes, Mapping of Waste Lands - Type, Extent, Distribution, Development. Role of RS in the Detection of Temporal Changes Introduction; Change Detection - Nature of Change Detection, Change Detection Algorithms, Image Differencing, Image Rationing Classification Comparisons, Pre-processing to improve Change Detection, Concepts of Parallel Processing and Advanced Techniques in Image Processing with Parallel Computing. Changes in - Morphology of Landforms, Drainage Systems. Water bodies, Saline areas. Land use. Forest Cover.

GEOGRAPHIC INFORMATION SYSTEM

UNIT-IV

Fundamental Concepts of GIS

Introduction, Various Definitions of GIS. Ordinary' Mapping to Geographic Information Systems; GIS Architecture (GIS Subsystems); Components of a GIS; The Four Ms; GIS Workdow; Fundamental Operations of GIS; Levels of Use of a GIS; Objective of GIS; The Theoretical Framework of a GIS; Accuracy in a GIS; Data Exploration; Thematic Layering; Levels of Measurement in GIS; Categories of GIS; Topology.

GIS Data Models

Introduction; GIS Data Types; Spatial Data Models; Vector Data Model; Raster Data Model; Image Data; Vector GIS and Raster GIS —Advantages and Disadvantages; Attribute Data Models; Digital Elevation Model; DEM and Geographical Information Systems; Applications of DEM; Data Structure for Continuous Surface Model.

Data Acquisition

Data Acquisition in GIS ; Analog Maps; Aerial Photographs; Satellite Imagery; Ground Survey; Global Positioning System; Reports and Publications; Digitizers (for Vector Data Input); Scanners (for Raster Data Input); Digital Mapping by Aerial Photographery; Remote Sensing with Satellite Imagery; Rasterisation; Vectorisation; Advanced Technologies for Primary Data Acquisition; Digital Mapping by Aerial Photogrammetry; Digital Data Acquisition; Data Processing; Digitizing Issues; Functions of GIS; Spatial Data Relationships; Topology; Comparison of Analog Map Vs Digital Map.

GIS Spatial Analysis

Computational Analysis Methods. Visual Analysis Methods. Data storage-vector data storage. attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

Application of GIS

Introduction; Some Applications of GIS; GIS Application Areas and User Segments; Custom GIS Software Application; Important GIS User Interface Issues; Geographic Visualization; Geographic Query Languages; Guidelines for the Preparation of a GIS: Application of GIS for Land Use and Housing Management; Application of GIS in the Assessment of Physical Transformation of an Urban Area; Land use/Land cover in water resources. Surface water mapping and inventory. Rainfall - Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring. Watershed management for sustainable development and Watershed characteristics

UNIT – V

Satellite Positioning System

The Science of Navigation Navigation Definition; Navigation-System Overview; Coordinate frames, Sensors, Mechanization equations. Navigation-error sources, Error analysis and correction; Types of Inertial Systems; Positioning Systems; Complementary Filters.

Coordinate Frames and Transformations Coordinate Frame Definitions; ECEF coordinate systems; Points and Vectors; Vector Transformations; Rotating Reference Frames.

Systems Concept

Continuous-Time Systems; Discrete Time Systems; State-Space Analysis; Systems with Random Inputs.

Discrete Linear and Nonlinear Kalman Filtering Techniques Weighted Least Squares (WLS); Kalman Filter; Performance Analysis; Implementation Issues; Numeric Issues; Suboptimal Filtering.

Inertial Navigation Accelerometers; INS Mechanization Equations; INS Error Equations; INS Augmented Error State Equations; The Earth Geoid and Gravity Model; Single-channel error models; Initialization Techniques; Lever-arm compensation.

The Global Positioning System GPS System Overview; The Mathematics of the GPS; Solution of the Pseudorange Equations; GPS Error Sources; Geometric Dilution of Precision; Two-Frequency Receivers; Carrier-Phase Observables; Differential GPS; DGPS Implementation Protocol.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Remote Sensing and Geographic Information System, M. Ami Reddy, JNTU. Hyderabad. 2001, B.S. Publications. Bank Street, Hyderabad.
2. Remote Sensing and its applications by LRA Karayana, University Press 1999.

REFERENCE BOOKS

1. Principles of Remote Sensing, A.N.Patel and Surendra Singh, Scientific Publishers (India), Jodhpur.
2. Remote Sensing and Image Interpretation, T.M.Lillesand and R.W.Kiefer, John Willey and Sons, 1987, Sold at Universal Bookshop, New Delhi-29
3. Manual of Remote Sensing Vol I & II, Robert B. Reeves et al, American Society of Photogrammetry, Falls Church, 2nd Edn 1983.
4. Remote Sensing Principles and Interpretation, F.F. Sabins Jr., W.H. Freeman & Co., San Francisco, 1978
5. Remote Sensing Optics & Optical Systems, Philip N, Stater. Addison Wesley Publishing Co.. Ma, USA.
6. Applied Remote Sensing, C.P. Lo. Longman Inc., New York.
7. Remote Sensing ; Digital Image Analysis, Richards, Sold at Universal Bookshop, New Delhi-29
8. 22, Introductory digital Image Processing: A Remote Sensing Perspective, John RJensen. Printice Hall, 1986
9. Introduction to Satellite Remote Sensing, FI.C.Misra, Sold at: The Managing Director GIS India, Shantinivas, 6-3-1149/2/AI, B.S.Makhta,Begumpet.Hyderabad-16.
10. GIS by Kang - tsung chang. TMH Publications & Co.

CODE: CE 314/2

ENVIRONMENTAL ENGINEERING -I

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT-I

Introduction to Water Supply Engineering

Need for protected water supply system, Objectives of Water supply systems, Water borne diseases, Role of Environmental Engineers, Evolution of Water supply system.

Quantity and Demand of Water

Estimation of water demand for a city or town, Per capita consumption, Factors affecting Per capita consumption, Fire demand, Fluctuations in demand, Prediction of Population.

UNIT-II

Sources and Intake works

Classification of sources of water supply, Choice of Source, Suitability with regard to Quality and Quantity, Types of Intakes, Capacity of Storage Reservoirs, Mass Curve Analysis.

Transportation of Fresh Water and Waste water

Types of Conduits, Capacity and Design, Materials for Pipes, Laying and Jointing of Pipes, Leakage Tests, Classification of Pumps, Choice of Pumps.

UNIT-III

Quality of and Analysis Water

Impurities in Water, Analysis of Physical, Chemical and Biological Parameters of Fresh Water and Waste water, Standards for Potable Water-WHO and BIS Comparison. Water Quality Standards for Industries, Construction and Agriculture.

Methods of Purification of Water, Sequence of Treatment Units, Theory of Sedimentation, Sedimentation with Coagulation, Stock's Law, Design of Sedimentation and Coagulation tanks, Principles of Coagulation.

UNIT-IV

Filtration of Water

Theory of Filtration, Filter materials, Types of Filters, Design, Construction and Operation of Filters, Troubles in Rapid Sand Filters.

Disinfection of Water

Theory of Disinfection, Different Methods of Disinfection, Softening of Water, Removal of Colour, Odor and taste.

Miscellaneous Treatment Methods

Water softening: Methods of removing temporary and permanent hardness, Defluoridation, Aeration, Reverse Osmosis, Ozonation, Ion-exchange and UV filtration.

UNIT-V

Distribution system

General requirements, Service Reservoirs, Balancing Reservoirs, Layouts of Distribution networks, Pressure in distribution layouts, Analysis of Distribution networks by Hardy-Cross method. Types of Valves.

Water supply for Buildings

Domestic connections, Water meters, Pipe materials for Household Network, House hold reservoirs.

Pipe Appurtenances

Appurtenances in the distribution system, Ideal water supply system, Service connections, Fire hydrants, Loss of Head through pipes and pipe fittings, Case studies.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Elements of public health engineering by K. N. Duggal; S. Chand & Company Ltd., New Delhi.

2. Environmental Engineering Vol. I - Water supply engineering by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS

1. Water Supply and Sanitary Engineering Vol. 1 by Gurucharan Singh; Standard Publishers Distributors, Delhi.
2. Water Supply and Sanitary Engineering by G.S. Birde; Dhanpat rai and sons, Delhi.
3. Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development; Govt. of India, New Delhi.

CODE: CE 314/3 INFRASTRUCTURE PLANNING & MANAGEMENT

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT - I

An Overview Of Basic Concepts Related To Infrastructure

Introduction to Infrastructure, an overview of the Power Sector in India., an Overview of the Water Supply and Sanitation Sector in India., an overview of the Road, Rail, Air and Port Transportation Sectors in India. An overview of the Telecommunications Sector in India. ,an overview of the Urban Infrastructure in India, an overview of the Rural Infrastructure in India, an Introduction to Special Economic Zones, Organizations and layers in the field of Infrastructure, The Stages of an Infrastructure Project Lifecycle., an overview of Infrastructure Project Finance.

UNIT - II

Private Involvement In Infrastructure

A Historical Overview of Infrastructure Privatization. The Benefits of Infrastructure Privatization, Problems with Infrastructure Privatization, Challenges in Privatization of Water Supply: A Case Study, Challenges in Privatization of Power: Case Study, Privatization of Infrastructure in India: Case Study, Privatization of Road Transportation Infrastructure in India.

UNIT - III

Challenges To Successful Infrastructure Planning And Implementation

Mapping and Facing the Landscape of Risks in Infrastructure Projects, Economic and Demand Risks: The Case study for Political Risks, Socio-Environmental Risks, Cultural Risks in International Infrastructure Projects, Legal and Contractual Issues in Infrastructure, Challenges in Construction and Maintenance of Infrastructure.

UNIT - IV

Strategies For Successful Infrastructure Project Implementation

Risk Management Framework for Infrastructure Projects, Shaping the Planning Phase of Infrastructure Projects to mitigate risks, Designing Sustainable Contracts, Introduction to Fair Process and Negotiation, Negotiating with multiple Stakeholders on Infrastructure Projects.

UNIT - V

Sustainable Development Of Infrastructure

Information Technology and Systems for Successful Infrastructure Management, - Innovative Design and Maintenance of Infrastructure Facilities, Infrastructure Modeling and Life Cycle Analysis Techniques, Capacity Building and Improving the Governments Role in Infrastructure Implementation, An Integrated Framework for Successful Infrastructure Planning and Management - Infrastructure Management Systems and Future Directions.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS:

1. Grigg, Neil, Infrastructure engineering and management, Wiley, (1988).
2. Haas, Hudson, Zaniewski, Modern Pavement Management, Krieger, Malabar, (1994).
3. Hudson, Haas, Uddin, Infrastructure management: integrating design, construction, maintenance, rehabilitation, and renovation, McGraw Hill, (1997). 15
4. Munnell, Alicia, Editor, Is There a Shortfall in Public Capital Investment? Proceedings of a Conference Held in June (1990).
5. World Development Report 1994: Infrastructure for Development (1994).
6. Zimmerman, K. and F. Botelho, "Pavement Management Trends in the United States," 1st European Pavement Management Systems Conference, Budapest, September (2000).

CODE: CE 314/4

URBAN PLANNING

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT- I

Basic Issues

Definition of Human settlement, Urban area, Town, City, Urbanization, Suburbanization, Urban sprawl, Peri - urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanization at International, National, Regional and State level.

UNIT- II

Planning Process

Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Surveys and Questionnaire Design.

UNIT- III

Development Plans, Plan Formulation And Evaluation

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights , Special Economic Zones- Development of small town and smart cities-case studies.

UNIT- IV

Planning And Design Of Urban Development Projects

Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.

UNIT -V

Legislation, Development and Management Of Urban System

Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXTBOOKS:

1. Goel, S.L Urban Development and Management, Deep and Deep publications, New Delhi 2002
2. George Chadwick, A Systems view of planning, Pergamon press, Oxford 1978
3. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi, 2001
4. Edwin S.Mills and Charles M.Becker, Studies in Urban development, A World Bank publication, 1986.

CODE: CE 315/1

GEO-TECHNICAL ENGINEERING –I

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT – I

Introduction

Soil formation and soil types; Regional soil deposits of India.

Basic Definitions And Relations

Phase diagrams; Simple definitions; some important relationships;

Index Properties; Grain size distribution ;Atterberg Limits ; Significance of other Soil Aggregate properties

UNIT – II

Soil Classification

Introduction; Particle size classification as per IS-code; Unified soil classification system; Indian standard soil classification system

Permeability

Capillary rise; Darcy's law and its Validity; Determination of coefficient of permeability - constant and variable head methods, indirect methods, Factors affecting permeability; Permeability of stratified soil deposits.

UNIT – III

Compaction Of Soils

Introduction; Laboratory tests; Factors affecting compaction; Structure and engineering behaviour of compacted cohesive soils; Compaction in the field; Compaction specifications and field control.

Vertical Stresses Below Applied Loads

Introduction; Boussinesq's equation; vertical stress distribution diagrams; vertical stress beneath loaded areas; Newmark's influence chart; Approximate stress distribution methods for loaded areas; Westergaard's equation

UNIT – IV

Seepage Through Soils

Principle of effective stress; physical meaning of effective stress; Types of head, seepage forces and quicksand condition;

Compressibility Of Soil And Consolidation

Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of settlement; extrapolation of field consolidation curve; Settlement analysis.

UNIT-V

Shear Strength Of Soils

Introduction; Stress at a point- Mohr Circle of stress; Mohr–coulomb Failure Criterion; Measurement of Shear Strength; Shear strength of Clayey soils; Shear Strength of Sands; Drainage conditions and Strength parameters.

Lateral Earth Pressure & Retaining Walls

Introduction; effect of wall movement on earth pressure; Earth pressure at rest; Rankine’s theory of Earth pressure; Coulomb’s theory of earth pressure; Culmann’s graphical method for active earth pressure; Design considerations for retaining walls.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Basic and Applied Soil Mechanics – GopalRanjan and A.S.R.Rao, New Age International Publishers

REFERENCES

1. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Co.
2. A Text book of Soil Mechanics and Foundation Engineering – B.C.PunmiaLaxmi Publications
3. A Text book of Soil Mechanics and Foundation Engineering – K.R.Arora, Standard Publishers & Distributors, New Delhi
4. A Text book of Soil Mechanics and Foundation Engineering – P.Purushothama Raj, Pearson Education

CODE: CE 315/2 REPAIR & REHABILITATION OF STRUCTURES

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT-I

Introduction

Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures.

Cracks in R.C. buildings

Various cracks in R.C. buildings, causes and effects

Maintenance

Maintenance importance of maintenance, routine and preventive maintenance.

Damages to masonry structures

Various damages to masonry structures and causes

UNIT-II**Repair materials**

Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials

Special mortars and concretes

Polymer Concrete and Mortar, Quick setting compounds

Grouting materials

Gas forming grouts, Salfoalumate grouts, Polymer grouts, Acrylate and Urethane grouts.

Bonding agents

Latex emulsions, Epoxy bonding agents.

Protective coatings

Protective coatings for Concrete and Steel

FRP sheets**UNIT-III****Damage diagnosis and assessment**

Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement

Substrate preparation

Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning.

UNIT-IV**Crack repair**

Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks.

Corrosion of embedded steel in concrete

Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns)

UNIT-V**Jacketing**

Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing.

Strengthening

Strengthening, Beam shear strengthening, Flexural strengthening

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. "Repair and protection of concrete structures" by Noel P.Mailvaganam, CRC press London.

2. "Concrete repair and maintenance Illustrated" by Peter.H.Emmons, Galgotia publishers.
3. "Earthquake resistant design of structures" by Pankaj agarwal, Manish shrikande, PHI.

REFERENCES

1. "Failures and repair of concrete structures" by S.Champion, John wiley and sons.
2. "Diagnosis and treatment of structures in distress" by R.N.Raikar Published by R & D centre of structural designers and consultants pvt.ltd, Mumbai.
3. "Handbook on repair and rehabilitation of RCC buildings", CPWD, Government of India.
4. "Handbook on seismic retrofit of buildings", CPWD, Indian buildings congress, IIT Madras, Narosa Publishing House.

CODE: CE 315/3

STRUCTURAL SYSTEMS -I

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT – I

Construction and form, Structure and Form Equilibrium under simple tension or compression, the catenary and the arch, the simply supported beam, the domical shell.

UNIT – II

Structural elements: Beams and slabs Arches and catenaries; vaults, domes and curved membranes; Trusses, Portal frames and space frames.Relation between structure and architecture.

UNIT – III

Structural Systems: single and double layer grids; braced domes, ribbed domes, plate type domes, Network domes, Lamella domes, Geodesic domes, Grid domes. Braced and folded structures.

UNIT – IV

Space frames: Folded plates, shells, cyclonical shells, Hyperbolic paraboloids, free forms.
Cable structures: Simply curved suspended roofs, combination of cables and struts.

UNIT –V

Curtain Walls: Types of Curtain Walls and their Components Structural problems, construction and erection.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS:

1. Architecture and Structuralism by Candela, Felix. 1963.
2. Developments in Structural Form by Lane, Allen.. Penguin Books Ltd, London, 1975.
3. Structure and Architecture, by Macdonald, J. Angus 2nd ed. Architectural Press, Oxford, 2003.
4. Contemporary Structures in Architecture by Michaels, Leonard.. 1950.
5. Curtain Walls: Design Manual by Schall, Rolf.. Reinhold Pub., New York, 1962.
6. Structure and Form in Modern Architecture by Siegel, Curt. Crosby Lockwood and son Ltd., London, 1962.
7. Principles of Space structures by Subramanian, N.. Wheeler and Co., Allahabad, 1983

CODE: CE 315/4

DISASTER MANAGEMENT

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT-I

Concept of Disaster

Terminology of Disaster Management (DM), Definition, Factors and Significance; Difference between Hazard and Disaster; Classification of Disasters: Natural and Manmade Disasters, Difference, Nature, Types and Magnitude.

Natural Disaster

Vegetal Cover floods, droughts – Earthquakes – landslides, Avalanches – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast.

UNIT-II

Man Made Disaster

Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism - threat in mega cities, rail and aircraft accidents, ground water, industries - Emerging infectious diseases and Aids and their management. Nuclear reactor, Meltdown, War and Conflicts.

UNIT-III

Risk and Vulnerability

Overview of disaster scenario in India: Vulnerability of profile of India with respect to various disasters, vulnerability mapping including disaster – prone areas, communities, places. Building codes and land use planning – Social Vulnerability – Environmental vulnerability – Macro-economic management and sustainable development, Climate change risk rendition .

Climate change adaptation and human health - Exposure, health hazards and environmental risk- Forest management and disaster risk reduction -The Red cross and red crescent movement - Corporate sector and disaster risk reduction

UNIT-IV

Components of Disaster Management Cycle

Disaster Management cycle – Five priorities for action; Disaster prevention, mitigation - Pre-Disaster Mitigation Efforts, preparedness - Education, Outreach and Training, Business Continuity & Emergency Management Planning, disaster response - Immediate Response to Stakeholders Establish Business Recovery Center and relief, recovery - Post-Disaster Economic Recovery Plan.

Role of Technology in Disaster Managements

Geospatial information in agriculture drought assessment - Multimedia Technology in disaster risk management and training - Transformable Indigenous Knowledge in disaster reduction – Role of RS & GIS. Application of Remote Sensing, Data from Meteorological and Other Agencies, media reports: governmental and Community Preparedness.

UNIT-V

Multi-sectional Issues, Education and Community Preparedness

Regulations of Disaster Management: Disaster Management Act 2005, National Policy on Disaster Management 2009, National Disaster Management Plan 2016, Organizational structure of disaster mitigation agencies at various levels.

Impact of disaster on poverty and deprivation - - Education in disaster risk reduction Essentials of school disaster education - Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Publishers & Distributors Pvt. Ltd.
2. Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh- Rawat Publications
3. ‘Disaster Science & Management’ by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
4. ‘Disaster Management – Future Challenges and Opportunities’ by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

REFERENCE BOOKS

1. ‘Disaster Management’ edited by H K Gupta (2003), Universities press.
2. ‘Disaster Management – Global Challenges and Local Solutions’ by Rajib shah & R R Krishnamurthy (2009), Universities press.
3. R. Nishith , Singh AK, “ Disaster Management in India : Perspectives, Issues and strategies” New Royal Book Company.”
4. N. G. Dhawan and A. S. Khan, Disaster Management and Preparedness, 1/e, CBS Publication, 2014.
5. R. K. Dave, Disaster Management in India: Challenges and Strategies, Prowess Publishing, 2018.

CODE: CE 351 ENVIRONMENTAL ENGINEERING LAB

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits:1.5

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of total suspended and dissolved solids in water / sewage sample.
2. Determination of fixed and volatile solids in water / sewage sample.
3. Determination of Settle able Solids.
4. Determination of turbidity of water / sewage sample.
5. Determination of pH value of water / sewage sample.
6. Determination of optimum dose of coagulant.
7. Determination of residual chlorine.
8. Determination of temporary and permanent hardness of water sample.
9. Determination of chloride concentration of water / sewage sample.
10. Determination of acidity of water sample.
11. Determination of alkalinity of water sample.
12. Determination of fluorides in water sample.
13. Determination of Dissolved Oxygen of water / sewage sample.
14. Determination of Biochemical Oxygen Demand (BOD) of waste water.
15. Determination of Chemical Oxygen Demand (COD) of waste water.

CODE: CE 352

CONCRETE TECHNOLOGY LAB

Lectures : 3 Periods/Week

Sessional marks : 40

University : 3 Hours

University Exam. Marks : 60

Exam

Credits:1.5

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of
 - a) Normal consistency of Cement
 - b) Fineness of Cement using 90 microns IS sieve.
2. Determination of
 - a) Initial Setting Time and
 - b) Final Setting Time of Cement.
3. Determination of
 - a) Specific Gravity of Cement
 - b) Soundness of Cement.
4. Determination of Fineness modulus of
 - a) Fine Aggregate
 - b) Coarse Aggregate.
5. Determination of workability of concrete by conducting Slump cone Test.
6. Determination of workability of concrete by conducting Compaction Factor/ Vee-Bee consistometer Test.
7. Determination of
 - a) Cube compressive strength
 - b) Split Tensile strength of concrete.
8. Determination of Modulus of Elasticity of concrete by conducting compression test on Concrete Cylinder.
9. Bulk density & Specific Gravity of
 - a) Fine Aggregate
 - b) Coarse Aggregate.
10. Determination of Bulking of Fine Aggregate.
11. Determine the homogeneity of concrete by Ultrasonic Pulse Velocity test.
12. Schmidt Rebound Hammer Test.
13. Permeability Test

CODE: CE 353 COMPUTER APPLICATION IN CIVIL ENGINEERING LAB

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits:1.5

Note: A minimum of twelve (12No) shall be done and recorded

Students are required to write and execute programmes to solve the following problems. Programmes shall be in C or C++ language or MATLAB/JAVA. or MS-Office Software's.

CYCLE-1

(Write any SIX Programmes)

1. Design of Reinforced Beam for flexure by limit state method.
2. Design of T- Beam for flexure by limit state method.
3. Design of Reinforced beam for Shear by limit state method.
4. Design of simply supported one-way slab.
5. Design of steel tension member
6. Design of steel compression member
7. Design of slab base for a steel column
8. Design of laterally supported steel beam
9. Design of beam to column framed connection using bolts

CYCLE-2

(Write any THREE programmes)

1. Classification of soil by Indian standard classification system.
2. Stresses due to applied loads both Boussinesq and Westerguard analysis
 - a) Concentrated load
 - b) circular loaded area
 - c) Rectangular loaded area
3. Determination of permeability coefficient by constant head and falling permeability tests.
4. Determination of index properties of soil.

CYCLE-3

(Write any THREE programmes)

1. Design of an open channel
2. Analysis of water distribution networks (Hardy cross method).
3. Determination of the height of the building when base is accessible.
4. Determination of included angles from the given bearing and check for local attraction.

CODE: CE 354

ADVANCED SURVEYING LAB

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits:2

Total Station

1. Study of Instrument – Determination of Distances, Directions and Elevations
2. Determination of Boundaries of a Field and computation of area.
3. Determination of Heights of objects.

Setting Out

1. Setting of simple circular curve using tape and chain.
2. Setting of simple circular curve using tape or/and theodolite
3. Setting of a simple circular curve using Total Station.
4. Setting out for Building.

Survey Camp is to be conducted for a minimum period of seven days to train in one of the following areas:

- i. Preparation of a contour Plan/ Map.
- ii. Earth work Computations for a high way / canal projects
- iii. Marking of a Sewer line/ Water supply line.
- iv. Any type of Execution works.

NOTE

50% Weight- age of total marks of this laboratory is to be given for total survey camp work including for Report submission by each batch.

CODE: CE 321

STRUCTURAL ANALYSIS – II

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I

Multi Storey Frames (Approximate Methods)

Substitute frame method for gravity loads; Portal method and cantilever method for lateral loads.

Kani's Method

Principles of the method; Application to continuous beams and portal frames (single bay, single storey with vertical legs only) without and with side-sway.

UNIT – II

Arches

Eddy's Theorem; Analysis of three hinged and two hinged Parabolic and Circular arches for Static and moving loads.

Cables

Analysis of cables under uniformly distributed and concentrated loads; Shape of the cable under self weight; Effect of temperature changes in suspension cables; Anchor cables.

UNIT – III

Plastic Behaviour Of Structures

Idealized stress - strain curve for mild steel; Ultimate load carrying capacity of members carrying axial forces; Moment - Curvature relationship for flexural members; Evaluation of fully plastic moment; Shape factor; Collapse load factor; Upper and lower bound theorems; Collapse load analysis of indeterminate beams and single bay, single storied portal frames.

UNIT – IV

Flexibility And Stiffness Matrices

Flexibility and stiffness; Flexibility matrix; Stiffness matrix; Relationship between flexibility matrix and stiffness matrix.

Flexibility Method (Matrix Approach)

Analysis of continuous beams and rigid jointed plane frames (Single bay, single storey with vertical legs only) by flexibility method with matrix approach.

UNIT – V

Stiffness Method (Matrix Approach)

Analysis of continuous beams, rigid jointed plane frames (Single bay, single storey with vertical legs only) and pin jointed plane frames by stiffness method with matrix approach.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Analysis of Structures vols. 1 & 2 by Vazirani & Ratwani; Khanna Publishers; Delhi.

REFERENCES

1. Structural Analysis by Devdas Menon, Narosa Publishinh House.
2. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications
3. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House
4. Structural analysis by R. C. Hibbeler, Pearson Education.
5. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill.

CODE: CE 322

DESIGN OF CONCRETE STRUCTURES - II

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

UNIT – I

Flat Slabs (Limit State Method)

Design and detailing of flat slabs by direct design method.

Retaining Walls (Limit State Method)

Types of retaining walls, Forces on retaining walls; Stability requirements; Design and detailing of cantilever type retaining wall.

UNIT-II

Columns (Limit State Method)

Assumptions; Design of axially loaded columns ;Design of rectangular columns (short and Long) subjected to axial load and bending moment using Interaction diagrams (SP-16 Charts)

UNIT-III

Foundations (Limit State Method)

Design and detailing of rectangular Isolated footing and Combined footing.

Introduction Of Prestressed Concrete

Basic concepts of prestressing; Historical development; Need for High strength steel and High strength concrete; Advantages of prestressed concrete.

Materials For Prestressed Concrete

High strength concrete; High tensile steel

Prestressing Systems

Tensioning devices; Hoyer's long line system of pretensioning; Post tensioning systems; Detailed study of Freyssinet system , Lee-McCall System and Gifford – Udall system

UNIT-IV

Analysis of Prestress And Bending Stresses

Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing; Stresses in tendons; Cracking moment.

Losses Of Prestress

Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

UNIT-V

Deflections Of Prestressed Concrete Members

Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members.

Flexural strength of prestressed concrete sections:

Types of flexural failure; Flexural strength of prestressed concrete sections as per IS1343: 2012.

Design of sections for flexure as per IS1343 : 2012

Introduction ; Design loads and strengths; Strength and serviceability limit states; Minimum section modulus; Prestressing force ; Limiting zone for the prestressing force; Design of rectangular and I sections sections for the limit state of collapse in flexure.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Reinforced concrete , Vol.1 & 2 by H. J. Shah, Charotar publishing house Pvt. Ltd.
2. Prestressed Concrete by N. Krishna Raju; Tata Mc Graw - Hill Publishing Company Limited, New Delhi.

REFERENCES

1. Reinforced Concrete (limit state design) by Ashok K. Jain; NemChand& Bros., Roorkee
2. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hill .
3. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons
4. Prestressed Concrete by Pandit & Gupta , CBS Publishers
5. Pre-stressed concrete by P. Dayaratnam , Oxford & IBH.

CODE: CE 323

DESIGN OF STEEL STRUCTURES - II

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

UNIT – I

Gantry girder

Introduction; Loads on gantry girder ; Web buckling and Crippling ; Deflection Check ; Design of gantry girder.

UNIT - II

Welded Plate girder

Introduction ; Behaviour of transversely stiffened plate girder panels in shear ; Design methods for transversely stiffened web panels ; Design of end panels ; Other design specifications ; Design of stiffeners ; Design of welded plate girder

UNIT - III

Welded connections

Introduction; Bracket connections ; Simple beam end connections ; Moment resistant beam end connection

Bolted connections

Introduction; Bracket connections; Simple beam end connections; Moment resistant beam end connection; Splicing of beams /girders

UNIT - IV**Light-gauge steel sections**

Introduction; Types of sections; Design of light gauge sections; Design specifications.

Composite Construction

Introduction; Composite beam; Method of construction; Limit states of collapse; Limit states of serviceability – Deflection

UNIT - V**Roof Trusses**

Components of a trussed roof; Types of trusses; Dead, Live and wind loads on trussed roof; Design of Purlins ; Design of members of a roof truss ; Design of connections ; Design of end bearings

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Design of steel structures by K.S.Sai Ram, Pearson Education, 2010.
2. Limit State Design of Steel Structures by S.K.Duggal, Tata McGraw Hill Education Pvt.Ltd.

REFERENCE BOOKS

1. Steel Structures - Design and Practice by N. Subramanian, Oxford University Press.
2. Limit state design of steel structures by M.R.Shiyekar , PHI Learning.

CODE: CE 324/1**TRANSPORTATION ENGINEERING**

Lectures	: 3 Periods/Week	Sessional marks	: 40
-University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

HIGHWAY ENGINEERING**UNIT-I****Highway Development and Planning**

Brief Introduction; necessity of highway planning surveys preparation of master plan highway planning in India.

Highway alignment

Factors controlling alignment; Engineering surveys, Drawing & report.

UNIT-II**Highway Geometric Design**

Highway cross section elements; Sight distance; Design of horizontal alignment; Design of vertical alignment.

Highway materials

Sub grade soils- CBR tests; Stone aggregates; Bitumen materials; Paving mixes.

UNIT-III**Design Of Highway Pavements**

Design factors; Design of flexible pavements – IRC method, IRC recommendations; Design of Rigid pavements - Westergard's stress equation for wheel loads and temperatures stress; IRC recommendations.

Highway construction and maintenance:

Construction of water bound macadam roads; Bituminous pavements and cement concrete pavements; Construction of joints in cement concrete pavements; Maintenance of highways-Water bound macadam roads, Bituminous pavements, Cement concrete pavements.

RAILWAY ENGINEERING

UNIT -IV

Introduction

Role of railways in transportation, Comparison of railway and highway transportation: Development of railway systems with particular reference to India, Classification of railways.

Railway Track

Permanent way: Gauges in Railway track, railway track cross- sections; Coning of wheels.

Rails & Rail Joints

Functions of rails; Requirements of rails; types of rails sections; standard rail sections; length of rails; Rail failures; Wear on Rails Welding of rails,.

Sleepers

Function of sleepers; Requirements of sleepers, Classification of sleepers – Timber sleepers. Metal sleepers & Concrete sleepers, Comparison of different types of sleepers.

Fish Plates

Fish plates, section of fish plates, and failure of fish plates.

Ballast

Functions and requirements of ballast, Types of ballast, Renewal of ballast.

UNIT-V

Geometric Design of Track

Necessity; Gradients & Gradient Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and cant excess; Negative Super elevation; Length of Transition Curve, Length of vertical curve.

Points and Crossings

Functions of components of turnout; Crossings.

Stations and Yards

Site selection for railway station; Requirements of railway station; Classifications; Station Yards; Level crossing.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

UNIT I ,II & III: Highway Engineering by S. K. Khanna & C. E. G. Justo; Nemchand & Brothers, Roorke.

UNIT IV & V: Railway Engineering by S.C.Saxena and S.Arora Dhanpat Rai & sons.

REFERENCE BOOKS

1. Principles of Transportation Engineering by Partha Chakroborty & Animesh Das, Prentice Hall of India, New Delhi.
2. Principles of Transportation Engineering and highway engineering by G. Venkatappa Rao, Tata Mc Graw-hill publishing company limited New Delhi.
3. Railway Engineering by M.M.Agarwal; Prabha & Co, New Delhi.

CODE: CE 324/2

GROUND WATER DEVELOPMENT & MANAGEMENT

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT-I

Introduction

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

Ground Water Movement

Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, Ground water flow contours their applications.

UNIT-II

Analysis Of Pumping Test Data

Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well interface and well tests. Unsteady flow towards a well – Non equilibrium equations – Theis solution – Jacob and Chow's simplifications, Leaky aquifers.

UNIT-III

Surface And Subsurface Investigation

Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

UNIT-IV

Artificial Recharge of Ground Water

Concept of artificial recharge – recharge methods, relative merits. Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

UNIT-V

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion. Groundwater Basin Management: Concepts of conjunction use, Case studies.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Groundwater by H.M. Raghunath, Wiley Eastern Ltd.
2. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.

REFERENCES

1. Groundwater by Bawvr, John Wiley & sons.
2. Groundwater Syatem Planning & Managemnet – R. Willes & W.W.G. Yeh, Printice Hall.

CODE:CE324/3

LOW COST HOUSING

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

UNIT – I

Housing Scenario Status of urban housing- Status of Rural Housing, Housing Finance: Introducing- Existing finance system in India- Government role as facilitator Status at Rural Housing Finance- Impedimently in housing finance and related issues.

UNIT- II

Land Use and Physical Planning for Housing:

Planning of urban land- Urban land ceiling and regulation act- Efficiency of building bye laws - Residential Densities.

Housing the Urban Poor: Living conditions in slums- Approaches and strategies for housing urban poor.

UNIT-III

Development and Adopt on of Low-Cost Housing Technology:

Adoption of innovative cost effective construction techniques- Adoption of precast elements in partial prefabrication- Adopting of total prefabrication of mass housing in India- General remarks on pre cast rooting/flooring systems- Economical wall system- Single Brick thick loading bearing wall- 19cm thick load bearing masonry walls- Half brick thick load bearing wall-Fly ash, gypsum thick for masonry- Stone Block masonry- Adoption of precast R.C. plank and join system for roof/floor in the building.

Alternative Building Materials for Low Cost Housing:

Substitute for scarce materials- Ferro cement- Gypsum boards- Timber substitutions- Industrial wastes- Agricultural wastes.

UNIT- IV

Low Cost Infrastructure Services:

Present status- Technological options- Low cost sanitation's- Domestic wall- Water supply energy.

Rural Housing

Introduction- traditional practice of rural housing continuous- Mud Housing technology- Mud roofs- Characteristics of mud- Fire resistant treatment for thatched roof- Soil stabilization- Rural Housing programs.

UNIT-V

Housing in Disaster Prone Areas:

Earthquake- Damages to houses- Traditional Houses in disaster prone areas Type of Damages and Railways of non-engineered buildings- Repair and restore action of earthquake Damaged nonengineered buildings recommendations for future constructions- Requirements of structural safety of thin precast roofing units against - Earthquake forces- Status of R&D in earthquake strengthening measures- Floods- cyclone- future safety.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Building materials for low –income houses – International council for building research studies and documentation.
2. Modern trends in housing in development countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G. Annamalai
3. Light weight concrete- Academic Kiado- Rudhai. G – Publishing home of Hungarian Academy of Sciences 1963.

REFERENCE BOOKS:

1. Building Systems for Low Income Housing, Ashok Kumar Jain; Management Publishing House, 1992
2. Hand book of low-cost housing - by A. K. Lal – Newage international publishers.
3. Low Cost Housing in Developing Countries, Guru Charan Mathur; For Centre for Science & Technology of the Non-Aligned and Other Developing Countries, Oxford & IBH Publishing Company, 1993.

CODE:CE324/4

BASICS OF INTERIOR DESIGN

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT - I

The profession of Interior Design; Role of an Interior Designer- past and present; Scope of services; Interior Design Process. Interior Design and Concepts: Elements and Principles of design- an overview and their applications in interior designing.

UNIT - II

Introduction to the fundamentals of Interior Design such as Lighting, Furniture, Space, Materials, Furnishings, Art etc.

UNIT - III

Colours in interiors – Colour Theory, Effect of light on colour, various colour schemes like analogues, complementary, triadic etc. Colour symbolism. Psychology of colour, Industrial colour codes. International standards.

UNIT – IV

Introduction to Furniture and Accessories: An overview of historical perspective of furniture and styles, accent pieces and accessories from Egyptian period to the present. Basic Furniture vocabulary. Styles of Interiors – Italian, English, French, Japanese styles etc

UNIT – V

Interior lighting – direct and indirect lighting, location and light grid systems, types of luminaries, quality of lighting. Ambient, task and accent lighting. Exposure to eminent interior designers' works- Indian and international

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Archi World. Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.
2. Friedmann, Arnold and Others. Interior Design: An Int. to Architectural Interiors. Elsevier, New York, 1979.
3. Miller, E. William. Basic Drafting for Interior Designers. Van Nostrand Reinhold, New York, 1981.

CODE: CE 325/1

GEOTECHNICAL ENGINEERING - II

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT-I

Sub–Soil Investigation And Sampling

Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samplers and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Field tests vis-à-vis Laboratory tests; Plate load test; Penetrometer tests; Geophysical methods; Borehole logs; Site investigation report.

Lateral Earth Pressure & Retaining Walls

Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Design considerations for retaining walls.

UNIT-II

Stability of Slopes

Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes forms of slip surface; Total stress and Effective stress methods of analysis; $\phi_u=0$ Analysis (Total Stress Analysis) ; $c-\phi$ Analysis- Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number.

UNIT-III

Shallow Foundations

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation.

Bearing Capacity Of Shallow Foundation

Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations – Terzaghi's Bearing Capacity theory; Skempton's Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity.

UNIT-IV

Settlement Analysis

Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlement –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi and IS methods.

Pile Foundations

Introduction; Uses of Piles; Types of Piles; Cast- in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carrying capacity in compression – Static Pile Load formula, Load tests, Dynamic Pile formulae; Correlations with Penetration test data; Group action of Piles – load carrying capacity and settlement; Negative skin friction.

UNIT-V

Well Foundations

Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sinking of wells.

Foundations In Expansive Soils

Identification of expansive soil; Field conditions that favour swelling; consequences of swelling; Different alternative foundation practices in swelling soils; Construction practice of UR piles in swelling soils.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers .

REFERENCES

1. Foundation Engineering by B. J. Kasmalkar; Pune Vidyarthi Griha Prakashan, Pune.
2. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
3. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.

4. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company Limited.
5. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore.
6. Geotechnical Engineering, - Codutu, Pearson Education.

CODE: CE 325/2

GROUND IMPROVEMENT TECHNIQUES

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT-I

Introduction to Engineering ground modification:

Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.

UNIT-II

Mechanical Modification:

Terminology and aims of mechanical modification, compaction purposes and strategies, Methods of compaction: Laboratory procedures-Dynamic compaction, kneading compaction, static compaction; shallow surface compaction-static rollers, impact and vibratory equipment, operational aspects of shallow compaction; Deep compaction techniques: precompression, explosion, heavy tamping, vibration, compaction grouting; Hydromechanical compaction-hydraulic fill, dry fill with subsequent spraying or flooding, compaction of rock fill with water jets.

UNIT-III

Hydraulic Modification:

Objectives and techniques, traditional dewatering methods-open sumps and ditches, vacuum dewatering wells; Filtration, drainage and seepage control with geosynthetics-Geotextiles definition and types, geotextile applications, Basic functions of geotextiles; Preloading and use of vertical drains- Purpose of preloading and vertical drains, Methods of providing vertical drains-cylindrical sand drains, geosynthetic drains, Pre loading with vertical drains-radial consolidation, combined radial and vertical consolidation.

UNIT-IV

Physical and chemical modification:

Terminology, construction techniques, and typical uses; Types of admixtures and their effect on soil properties-Granular admixtures, Cement stabilization and cement columns, Lime stabilization and lime columns, Stabilization using bitumen and emulsions, Stabilization using industrial wastes.

UNIT-V

Modification by inclusions and confinement:

Concept of soil reinforcement; Reinforced soil as a homogeneous composite material-Elastic theory, strength theories; Discrete soil-reinforcement action; Reinforced earth and other strip reinforcing methods-standard materials and dimensions, failure modes; Development of design procedures-Original standard analysis, Tieback analysis-Rankine type analysis, Coulomb type analysis.

Retaining walls with metallic strip reinforcement; step-by-step-design procedure using metallic strip reinforcement; Retaining walls with geotextile reinforcement; Retaining walls with Geogrid reinforcement-General, design procedure for geogrid-reinforced retaining wall.

Insitu Ground reinforcement: Ground Anchors-Typical applications,types and components;Rock bolts- Typical applications,types and components; Soil nailing-Different soil nailing systems and applications,The importance of construction sequence, Analysis of nailed soil,Special considerations for slope stabilization.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Hausmann M.R(1990) Engineering Principles of ground modification, McGraw-Hill Education(India) Private Limited,New Delhi.
2. Ground improvement Techniques, P.Purushothama Raju, Laxmi Publications Pvt. Ltd.,New Delhi.

CODE: CE 325/3

ADVANCED ENVIRONMENTAL ENGINEERING

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

UNIT – I

Stream Sanitation

Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen Model; Zones of Self-purification; Impact of pollutants on stream waters and usage of stream water with special reference to flora and fauna.

New Concepts in Biological Waste Treatment

Introduction; Nitrogen removal by biological nitrification and de-nitrification; Phosphate removal from the activated sludge process; Rotating Disc Biological Contactor; Anaerobic filters; U-Tube aeration systems.

UNIT – II

Industrial Wastewater Treatment

Introduction to Industrial Wastewater treatment.

Sugar Plant Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

Dairy Industry

Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

Pulp and Paper Industry Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

UNIT – III

Sources and Classification of Air Pollution

Stationary and mobile sources; Primary and secondary pollutants; Natural contaminants; Particulate matter; Aerosols; Gaseous pollutants.

Effects Of Air Pollution

Global Effects: Global warming; Ozone depletion; Acid rains; Effects of air pollutants on human health; Effects on plants; Economical effects.

UNIT – IV

Meteorology And Air Pollution

Atmospheric stability and temperature inversions; Maximum Mixing Depth; Wind direction and speed; Plume behaviour; Gaussian Dispersion Model; Plume rise; Wind rose.

Control of Air Pollution

Objectives; Types of collection equipment: Settling chamber; Inertial separators; Cyclones; Filters; Electrostatic Precipitators; Scrubbers.

UNIT – V

Noise Pollution

Introduction

Levels of noise; Noise rating systems; Measurement of noise; Sources of noise and their noise levels; Acceptable noise levels; Effects of noise; Control of noise.

Urban Solid Waste Management

Sources, Quantities and characteristics; Classification; Collection and transportation; Recovery and reuse; Treatment methods such as composting, incineration, sanitary landfill and pyrolysis.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Wastewater Treatment by M.N. Rao and A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
3. Air Pollution by M.N. Rao and H.V.N. Rao; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.

REFERENCES

1. Wastewater Engineering, Treatment, Disposal and Reuse by Metcalf & Eddy Inc.; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.
2. Water Supply and Wastewater Disposal by G.M. Fair et al; John Wiley & Sons.
3. Sewage Disposal and Air Pollution Engineering by S.K. Garg; Khanna Publications, Delhi.
4. Sewage and Sewage Treatment by S.K. Kshirasagar; Roorkee Publishing House, Roorkee.

CODE: CE 325/4

STRUCTURAL HEALTH MONITORING

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

UNIT – I

Introduction of Structural Health Monitoring:

Need of Structural Health Monitoring, Definition & Concept of SHM, SHM & Biomimetic Comparison of SHM with NDT, Types & Components of SHM, Procedure of SHM, Objectives & Operational Evaluations of SHM, Advantages of SHM.

UNIT – II

Instrumentations & Sensors for SHM:

Basics of Instrumentations & Measurements, Classifications, Input-Output Configurations of Instruments, Static & Dynamic Characteristics, Functions. Various Types of Electromechanical, Electronics & Digital Instruments for SHM. Data Acquisition Systems-Types, Hardware & Its Components. Basics of Sensors, Transducers & Actuators, Classification of Sensors, Characteristics & Working Principles of Various Types of Sensors like Strain Gauges, LVDT, Accelerometers etc. Concept of Smart Materials & Smart Structures with SHM, Basics of Smart Materials like Piezoelectric, Shape Memory Alloys, ER & MR Fluids.

UNIT - III

Methods of SHM:

Methodologies and Monitoring Principles, Local & Global Techniques for SHM, Static & Dynamic Field Testing, Short & Long-Term Monitoring, Active & Passive Monitoring. Vibration Based SHM Techniques - Use & Demonstration of Dynamic Properties of Structures for Damage Detection & SHM, Ambient Vibration Test, Acoustic Emission Technique, Electromechanical Impedance Technique, Wave Propagation Based Techniques, Fibre Optics Based Techniques, Remote & Wireless SHM Techniques, IoT Application in SHM, Artificial Intelligence & Machine Learning in SHM.

UNIT – IV

Structural Assessment:

Structural Assessment & Need for retrofitting: Introduction to health assessment of structures, structural damages & failures, Principles of structural assessment, Classification & levels of assessment, Current scenario of infrastructure through case studies.

UNIT – V

Retrofitting of Structures:

Concept of repair & retrofitting of structures: Case studies of structural & foundation failure, performance problems, responsibility & accountability, causes of distress in structural members, design and material deficiencies, factors causing extensive Deterioration. Retrofitting of structures: Fundamental of retrofitting, Flow of retrofitting process, Methods of retrofitting, Materials for retrofitting (conventional and smart materials), selection of retrofitting methods.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Structural Health Monitoring, Daniel Balageas, Peter Fritzen, Alfredo Guemes, John Wiley & Sons, 2006.
2. Health Monitoring of Structural Materials and Components Methods with Applications by Douglas E.

REFERENCE BOOKS

1. Adams, John Wiley and Sons, 2007. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan.
2. Taylor and Francis Group, London, UK, 2006.

3. Structural Health Monitoring with Wafer Active Sensors, Victor Giurgutiu, Academic• Press Inc,2007.

CODE:CE361

GEOTECHNICAL ENGINEERING LAB

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 1.5

Note: A minimum of twelve (12 No) shall be done and recorded.

1. Determination of water content by oven drying method.
2. Determination of specific gravity by
 - a. Density bottle method
 - b. Pycnometer method.
3. Gradation analysis
 - a. Mechanical Sieve analysis
 - b. Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index
6. Determination of field unit weight by
 - a. Core cutter method.
 - b. Sand replacement method.
7. Determination of permeability by
 - a. Constant head permeameter.
 - b. Variable head permeameter.
8. Direct shear test.
9. Vane shear test.
10. Unconfined compression test
11. IS - Light compaction test
12. IS - Heavy compaction test
13. Triaxial shear test.
14. Consolidation test

CODE:CE362

TRANSPORTATION ENGINEERING LAB

Lectures : 3 Periods/Week

Sessional marks : 40

University Exam : 3 Hours

University Exam. Marks : 60

Exam

Credits: 1.5

Note: A minimum of twelve (12No) shall be done and recorded

Tests On Aggregates

1. Aggregate Crushing value test.
2. Aggregate impact value test.
3. Los Angele's abrasion test.
4. Deval's attrition value test.
5. Shape test a) Flakiness index test b) Elongation index test c) Angularity number test. .
6. Specific gravity Test.

Tests On Bituminous Materials

1. Penetration test.
2. Softening point test.
3. Flash and fire point test.
4. Ductility test.
5. Viscosity test.
6. Bitumen Extractions Test.
7. Specific gravity of Bitumen.

Test On Bituminous Mixes

1. Marshall stability test.

Test On Soil Subgrade

1. California bearing ratio test.

CODE:CE363

DETAILING & DRAWING OF CIVIL STRUCTURES

Lectures : 3 Periods/Week

Sessional marks : 40

University : 3 Hours

University Exam. Marks : 60

Exam

Credits: 1.5

Note: A minimum of twelve (12 No) shall be done and recorded.

1. Detailing of Simply Supported Beam & Cantilever Beam.
2. Detailing of continuous beam with one end overhang.
3. Detailing of two way and one way slab.
4. Detailing of isolated footing.
5. Detailing of pile cap
6. Detailing of Flat slab interior panel.
7. Detailing of cantilever Retaining wall.
8. Typical detailing of R.C.C footing with steel column.
9. Detailing of beam to column framed connection (using bolts).
10. Detailing of beam to column moment resistant connection (using bolts).
11. Detailing of welded plate girder.
12. Detailing of gantry girder.
13. Detailing of welded column base.

CODE:CE364

COMPUTER AIDED ANALYSIS AND DESIGN

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 2

Note: A minimum of twelve (12No) shall be done and recorded

Students are required to analyze and design the following structures using software package like STAAD Pro/STRUDS/GTSTRUDL/STRAP etc.

CYCLE-1

(At least SIX of the following)

1. Analysis and design of continuous beam with simple supports on either ends.
2. Analysis and design of continuous beam with a fixed end support.
3. Analysis of single storey unsymmetrical portal frame
4. Analysis and design of plane frame subjected to gravity loading.
5. Analysis and design of plane frame subjected to gravity loads and lateral load (wind load)
6. Analysis and design of plane roof truss (DL+LL).
7. Analysis and design of plane roof truss (DL+WL).

CYCLE-2

(At least FIVE of the following)

1. Design of one-way slab
2. Design of two way slab
3. Design of Cantilever Retaining wall
4. Design of Counterfort Retaining wall
5. Design of Isolated footing.
6. Design of Pile foundation.

CYCLE-3

(At least one of the following)

1. Analysis and design of two-storied R.C.C.Framed building.
2. Analysis and design of Industrial steel building.