B. TECH CIVIL ENGINEERING – R20

SEMESTER V

S.No	Class	Course Code	Name of the Subject	L	T	P	C
1	HS	CHSM2	Fundamentals of Management	3	0	0	3
2	PC	C15PC1	Structural Analysis - II	3	0	0	3
3	PC	C15PC2	Design of Reinforced Cement Concrete Structures	3	0	0	3
4	PC	C15PC3	Soil Mechanics	3	0	0	3
5	PE-I	C15PE4	1. Transportation Engineering 2. Construction Equipment & Materials 3. Railway Engineering	3	0	0	3
6	ES	CESEA1	Environmental Impact Assessment	3	0	0	3
7	PC	C15PC5	Fluid Mechanics & Hydraulic Machinery Lab	0	0	3	1.5
8	PC	C15PC6	Soil Mechanics Lab	0	0	3	1.5
9	MC	MC005	Moocs/ online Course	0	0	0	S
Total Credits							**21**

S - Satisfactory

SEMESTER VI

S.No	Class	Course Code	Name of the Subject	L	T	P	C
1	HS	CHSM1	Business Economics & Financial Analysis	3	0	0	3
2	PC	C16PC1	Environmental Engineering	3	0	0	3
3	PC	C16PC2	Design of Steel Structures	3	0	0	3
4	PC	C16PC3	Water Resource Engineering - I	3	0	0	3
5	PE-II	C16PE4	Infrastructure Planning and Management Remote Sensing & Geographic Information System Solid and Hazardous Waste Management	3	0	0	3
6	OE-I	C16OE5	**Open Elective - I**	3	0	0	3
7	HS	CHSE3	Advanced English Communication Skills Lab	0	0	4	2
8	PC	C16PC6	Computer Aided Design and Drawing Lab	0	0	2	1
9	MC	MC006	1. Personality Development/ Skill Development 2. Technical Events 3. Internships	0	0	0	S
Total Credits							**21**

S – Satisfactory

B.TECH CIVIL ENGINEERING – R20

FUNDAMENTALS OF MANAGEMENT – CHSM2

SEMESTER V

L/T/P/C
3/0/0/3

COURSE OUTCOME: After completing the course the students able to

1. Understand the Significance of Management in their Profession.
2. Understand the Various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects.
3. Can explore the Management Practices in their domain area.

UNIT-I

Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management - Classical Approach - Scientific and Administrative Management; The Behavioral approach.

UNIT-II

Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans. Decision making and Problem Solving - Programmed and Non-programmed Decisions, Steps in Problem Solving and Decision Making.

UNIT-III

Organization and HRM: Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization. Stress management and Counseling, Management of change.

Human Resource Management & Business Strategy: Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

UNIT-IV

Leading and Motivation: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership during adversity and Crisis.

Motivation - Types of Motivation, Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT-V

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non-Budgetary Controls. Characteristics of Effective Controls.

TEXT BOOKS:

1. Fundamentals of Management by A.R. Aryasri, McGraw-Hill Publishers.
2. Management Fundamentals by Robert N Lussier, Cengage Learning (India).

3. Fundamentals of Management by Stephen P. Robbins, Pearson Education.

REFERENCE BOOKS:

1. Essentials of Management by Koontz Kleihrich, Tata McGraw Hill.
2. Management Essentials by Andrew Du Brin, Cengage Learning (India).
3. Essentials of Management by Harold Koontz and Heinz Weihrich, Tata McGraw Hill.

B.TECH CIVIL ENGINEERING – R20

STRUCTURAL ANALYSIS-II – C15PC1

SEMESTER V

L/T/P/C
3/0/0/3

PRE-REQUISITES: Structural Analysis - I

COURSE OUTCOMES:

1. Apply the Methods of Indeterminate Truss Analysis.
2. Demonstrate the Behavior of Arches and their Methods of Analysis.
3. Analyze the Frames by Slope Deflection and Moment Distribution Methods.
4. Analyze Multi-storey Frames subjected to Gravity Loads and Lateral Loads.
5. Demonstrate the Concepts of Qualitative Influence Line Diagram (ILD) for Continuous Beams and Frames.

UNIT-I

Analysis of Frames: Castigliano's Second Theorem.

Indeterminate Trusses: Determination of Static and Kinematic Indeterminacies - Analysis of Trusses having Single Degree of Internal and External Indeterminacies.

Two Hinged Arches: Introduction - Classification of Two Hinged Arches - Analysis of Two Hinged Parabolic Arches - Secondary Stresses in Two Hinged Arches due to Temperature and Elastic Shortening of Rib.

UNIT-II

Slope Deflection Method: Analysis of Single Bay - Single Storey Portal Frames by Slope Deflection Method Including Side Sway. Shear force and Bending Moment Diagrams. Elastic Curve, Analysis of Inclined frames - Elastic Curve.

Moment Distribution Method - Analysis of Single Bay Single Storey Portal Frames including Side Sway Analysis of Inclined frames.

UNIT-III

Kani's Method: Analysis of Continuous Beams including Settlement of Supports. Analysis of Single Bay Single Storey and Single Bay Two Storey Frames by Kani's Method Including Side Sway, Shear Force and Bending Moment Diagrams - Elastic Curve.

UNIT-IV

Matrix Methods of Analysis (System Approach): Introduction - Static and Kinematic Indeterminacy - Analysis of Continuous Beams including Settlement of Supports, using Stiffness Method. Analysis of Pin-jointed Plane Frames using Stiffness Method - Analysis of Continuous Beams up to Three degrees of Indeterminacy using Flexibility Method - Shear Force and Bending Moment Diagrams.

UNIT-V

Approximate Methods of Analysis: Introduction - Analysis of Multi-Storey Frames for Lateral Loads: Portal Method, Cantilever Method and Factor Method. Analysis of Multi-storey Frames for Gravity (Vertical) Loads. Substitute Frame method.

Influence Lines for Indeterminate Beams: Introduction - Influence Line Diagram (ILD) for two Span Continuous Beams with Constant and Variable Moments of Inertia. ILD for Propped Cantilever Beams. Muller Breslau's Principle.

TEXT BOOKS:

1. Theory of Structures by S. Ramamrutham and R. Narayan, Dhanpat Rai Publications (P) Ltd.
2. Structural Analysis - II by S.S. Bhavikatti, Vikas Publishers.
3. Structural Analysis I & II by R. Vidyanathan, P. Perumal, Laxmi Publications Pvt. Ltd.
4. Structural Analysis by R. C. Hibbeler, Pearson Education.
5. Analysis of Structures (Vol. I) by Prof. VN. Vazirani, Dr. MM. Ratwani and Dr. SK Duggal, Khanna Publishers.

REFERENCE BOOKS:

1. Structural Analysis: A Matrix Approach by Pandit & Gupta, McGraw Hill.
2. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill.
3. Advanced Structural Analysis by A. K. Jain, Nemchand & Bros.
4. Structural Analysis SI edition by Aslam Kassimali, Cengage Learning (India).
5. Indeterminate Structural Analysis by K.U.Muttu et al., I.K. Publishing.

B.TECH CIVIL ENGINEERING – R20

DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES – C15PC2

SEMESTER V

L/T/P/C
3/0/0/3

PRE-REQUISITES: Strength of Materials, Structural Analysis.

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Design the Reinforced Concrete L and T beam sections using Limit State Design.
2. Design of Reinforced Concrete Canopy and Simply Supported, Continuous Beams.
3. Design the Reinforced Concrete Columns.
4. Design of One way, two way Slab and Continuous Slab.
5. Design Footings: Isolated, Square, Rectangular and Circular, Combined.

UNIT-I

Concepts of RC Design - Working Stress Method - Limit State Method - Material Stress - Strain Curves - Safety factors - Characteristic Strength and Load. Stress Block Parameters - IS 456.
Beams: Limit State Analysis and Design of Singly Reinforced, Doubly Reinforced, T and L beam sections - Sketch Showing Reinforcement Details.

UNIT-II

Limit State Analysis and Design of Section for Shear and Torsion - Concept of Bond, Anchorage and Development Length, I.S. Code Provisions. Design Examples in Simply Supported and Continuous Beams, Detailing; Design of Canopy - Sketch Showing Reinforcement Details.

UNIT-III

Short and Long Columns - Under Axial Loads, Uniaxial Bending and Biaxial Bending - Interaction Diagrams - IS Code Provisions - Sketch Showing Reinforcement Details.

UNIT-IV

Design of One Way Slab, Two way Slabs for different Edge Conditions and Continuous Slab using IS Coefficients - Limit State Design for Serviceability for Deflection, Cracking - IS Code Provisions. Design of Doglegged Staircase - Sketch Showing Reinforcement Details.

UNIT-V

Footings: Different types of Footings - Design of Isolated, Square, Rectangular, Circular Footings and Combined Footings - Design of Pile Cap - Sketch Showing Reinforcement Details.

TEXT BOOKS:

1. Design of Reinforced Concrete Structures by S. Ramamrutham, Dhanpat Rai Publications.
2. Design Reinforced Concrete Structures by N. Krishna Raju, CBS Publications.
3. Design Reinforced Concrete Structures by V.N. Vazrani & M.M. Ratwani, Khanna Publishers.

REFERENCE BOOKS:

1. Reinforced Concrete Design by S. Unnikrishna Pillai & Devdas Menon, Tata McGraw Hill.
2. Design of Reinforced Concrete Structures by N. Subramanian, McGraw Hill.
3. Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & Company.
4. Fundamentals of Reinforced Concrete by N.C. Sinha and S.K Roy, S. Chand Publishers.
5. Design of Concrete Structures by Arthus H. Nilson, David Darwin, and Chorles W. Dolar, Tata McGraw Hill.
6. Reinforced Concrete Structures by Robert Park, Thomas Paulay.
7. IS 456-2000: Plain and Reinforced Concrete Code of Practice.
8. SP 16: Design Aids for Reinforced Concrete Design to IS 456-2000.
9. SP 34: Hand Book on Concrete Reinforcement and Detailing.

B.TECH. CIVIL ENGINEERING – R20

SOIL MECHANICS – C15PC3

SEMESTER V

L/T/P/C
3/0/0/3

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. To understand the Mechanism of Behavior of Soil for different loads.
2. Determine Properties of Soil.
3. Understand Various Stresses and their Distribution in Soil and Other Engineering Properties of Soil.
4. Understand Shear Strength of Soil and Various Techniques for Improving the Shear Strength.

UNIT-I

Introduction: Soil formation, Clay Mineralogy and Soil Structure - Moisture Content - Mass-Volume Relationship - Relative Density.

Index Properties of Soils: Grain Size Analysis - Sieve Analysis - Hydrometer Method - Consistency Limits and Indices - IS Classification of Soils.

UNIT-II

Permeability: Soil Water - Capillary Rise - Flow of Water through Soils - Darcy's Law of Permeability - Factors Affecting Permeability - Laboratory Determination of Coefficient of Permeability - Permeability of Layered Soils - In-situ Permeability Tests (Pumping in & Pumping out test).

Effective Stress & Seepage Through Soils: Total, Neutral and Effective Stress - Principle of Effective Stress - Quick Sand Condition - Seepage through Soils - Flow Nets: Characteristics and Uses.

UNIT-III

Stress Distribution In Soils: Boussinesq's and Westergaard's theories for Point Load, Uniformly Loaded Circular and Rectangular Areas, Pressure Bulb, Variation of Vertical Stress under Point Load along the Vertical and Horizontal Plane, and Newmark's Influence Chart for Irregular Areas.

Compaction: Mechanism of Compaction - factors affecting Compaction, Effects of Compaction on Soil Properties - Field Compaction Equipment - Compaction Quality Control.

UNIT-IV

Consolidation: Types of compressibility - Immediate Settlement, Primary Consolidation and Secondary Consolidation - Stress History of Clay; e-p and e-log (p) curves - Normally Consolidated Soil, Over-Consolidated Soil and Under-Consolidated Soil - Pre-consolidate Pressure and its Determination - Terzaghi's 1-D Consolidation Theory - Coefficient of Consolidation: Square Root Time and Logarithm of Time Fitting Methods - Computation of Total Settlement and Time Rate of Settlement.

UNIT-V

Shear Strength of Soils: Importance of Shear Strength - Mohr's, Coulomb Failure Theories - Types of Laboratory Tests for Strength Parameters - Strength Tests based on Drainage Conditions - Strength Envelops - Shear Strength of Sands - Dilatancy - Critical Void Ratio.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engineering By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd.
3. Soil Mechanics and Foundation by B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications Pvt. Ltd.
4. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning (India).

REFERENCE BOOKS:

1. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
2. Geotechnical Engineering by C. Venkataramaiah, New Age International Pvt. Ltd.
3. Geotechnical Engineering by Manoj Dutta & Gulati S.K, Tata McGraw Hill.
4. Geotechnical Engineering Principles and Practices by Donald Coduto, Man-chu Ronald Yeung, William Kitch, Pearson Education.

B.TECH CIVIL ENGINEERING – R20

TRANSPORTATION ENGINEERING – C15PE4

SEMESTER V

L/T/P/C
3/0/0/3

PRE-REQUISITE: Surveying and Geomatics

COURSE OUTCOMES: On Completion of the Course, the Students will be able to:

1. Carry out Surveys involved in Planning and Highway alignment.
2. Design the Geometric Elements of Highways and Expressways.
3. Carryout Traffic Studies and implements Traffic Regulation and Control Measures and Intersection Design.
4. Characterize Pavement Materials.
5. Design Flexible and Rigid Pavements as per IRC.

UNIT-I

Highway Development and Planning: Highway development in India - Necessity for Highway Planning Different Road Development Plans. Classification of Roads - Road Network Patterns - Highway Alignment - Factors affecting Alignment - Engineering Surveys - Drawings and Reports, Road Projects Initiation need based Planning.

UNIT-II

Highway Geometric Design: Importance of Geometric Design - Design Controls and Criteria - Highway Cross Section Elements - Sight Distance Elements - Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance - Design of Horizontal Alignment - Design of Super elevation and Extra Widening - Design of Transition Curves - Design of Vertical Alignment - Gradients Vertical Curves. Typical Cross Sections for different types of Roads - Problems.

UNIT-III

Traffic Engineering: Basic Parameters of Traffic, Volume, Speed and Density Road Accidents, Causes and Preventive measures - Accident Data Recording - Condition Diagram and Collision Diagrams. Road Traffic Signs - Types and Specifications - Road markings - Types of Road Markings - Design of Traffic Signals - Webster Method - IRC Method, Intelligent Transportation Systems Typical Architectures, Highway Lighting.

UNIT-IV

Intersection Design: Types of Intersections - Conflicts at Intersections - Types of Grade Intersections.

Channelization: Objectives - Traffic Islands and Design Criteria - Types of Grade Separated Intersections - Rotary Intersection - Concept of Rotary and Design Criteria - Impacts of Geometrics on Intersection with reference to Safety, Operational Capacity.

UNIT-V

Introduction to Highway Materials - Design of Pavements: Introduction to Flexible Pavements, Rigid Pavement - Pavement Components and Functions - Design of Flexible Pavements, Rigid Pavements, CC Pavements as per IRC - Stresses in Rigid & Flexible Pavements.

TEXT BOOKS:

1. Highway Engineering by S.K. Khanna & C.E.G. Justo, Nemchand & Bros.
2. Highway Engineering Design by L.R. Kadiyali and Dr. NB Lal, Khanna Publications.
3. Text Book of Highway Engineering by R. Srinivasa Kumar, Orient Blackswan Pvt. Ltd.

REFERENCE BOOKS:

1. Highway Engineering - S.P. Bindra by Dhanpat Rai Publications (P) Ltd.
2. Traffic Engineering & Transportation Planning by Dr.L.R. Kadyali, Khanna Publications.
3. Principles of Traffic Engineering by Nicholas J. Garber & Lester A. Hoel, Cengage Learning (India).
4. IRC 37-2018: Guidelines for the Design of Flexible Pavements.
5. IRC 58-2015: Guidelines for the Design of Plain Jointed Rigid Pavements for Highways.
6. IRC 35-2015: Code of Practice for Road Markings.
7. IRC 67-2012: Code of Practice for Road Signs.
8. MoRTH Specifications/ Standards.

B.TECH CIVIL ENGINEERING – R20

CONSTRUCTION EQUIPMENT & MATERIALS – C15PE4

SEMESTER V

L/T/P/C
3/0/0/3

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Manage the equipment, Cost Control and Maintenance of a Project.
2. Identify and Understand the Working Principle of Earthwork Equipment.
3. Identify and understand the working of Various Equipment for Different Construction Processes.
4. Identify and understand the Working Principle of Material Handling Equipment.
5. Understand the Working of Aggregate Production and Concreting Equipment.

UNIT-I

Large and Heavy Engineering Projects - Characteristics and Complexities, Methods of Statement for Major Activities like Excavation, Concreting, Steel Fabrication and Erection for Projects like Earthen Dams, Hydropower Projects, Nuclear Power Plant, Refineries and other Industrial Projects.

UNIT-II

Excavation for heavy engineering projects - Excavation in Various types of Soils, Selection of Equipment, Safety Measures in Excavation, Drainage in Excavation.
Concrete Construction for Heavy Engineering Projects - Selection of Equipment for Batching, Mixing, Transporting, Placing and Compacting for Various types of Jobs, Safety Measures During Concreting, Special Concretes and Mortars - Preplaced Aggregate Concrete, Roller Compacted Concrete, Grouting.

UNIT-III

Prefabricated Construction - Planning for Pre-casting, Selection of Equipment for Fabrication, Transport and Erection, Quality Measures, Safety Measures during Erection.
Steel construction - Planning for Field Operations, Selection of Equipment and Erection Tools, Tools and Methods of Welding, Tools and Methods of Cutting and Joining, Bridge Erection, Quality Measures, Safety Measures during Fabrication and Erection.

UNIT-IV

Specific issues related to Planning, Site Layouts, Equipment Selection and Pre-project Activities for Large Size Construction Projects like Earthen Dams, Concrete Dams, Thermal Power Stations, Nuclear Power Stations, Light Houses, Airports and Ports, Bridges.

UNIT-V

Information related to Special Equipment and their Applications to Off-shore Construction, Underground Utility Construction. New Materials and Equipment for Construction; Case Studies of Heavy Construction Projects.

TEXT BOOKS:

1. Construction Planning, Equipment and Methods by Purifoy, Schexnayder, Tata McGraw Hill.
2. Construction Equipment and Management by SC Sharma, Khanna Publishers.
3. Construction Equipment and Management for Engineers, Estimators & Owners by Douglas D. Gransberg, Callin M. Popescu, Richard C. Ryan, Taylor & Francis.
4. Erection of Constructional Steel Work by Thomas Baron.

REFERENCE BOOKS:

1. Handbook of Heavy Construction by Stubbs.
2. Journals of Civil Engineering and Construction Engineering.
3. Construction Equipment and Job Planning by Deodhar, Khanna Publication.

B.TECH. CIVIL ENGINEERING – R20

RAILWAY ENGINEERING – C15PE4

SEMESTER V

L/T/P/C
3/0/0/3

COURSE OUTCOMES: At the end of the course, students will be able to

1. Understand the Importance of Railway Infrastructure Planning and Design.
2. Identify the factors Governing Design of Railway Infrastructures.
3. Maintenance of the Railway Track and Signal System for Safe Operations of Railways.
4. Safe Installation and Operations of Railway Track and Signaling System.
5. Maintenance of the Railway Track and Infrastructure.

UNIT-I

Introduction to Railways:

Planning of Railway Lines, Network Railway Operational System, Historical Background of Indian Railways, Plans and Developments, Traffic Forecast and Surveys, Railway Alignment, Project Appraisal and Organization Setup.

UNIT-II

Component of Railway:

Permanent Way, Forces Acting, Rails, Function of Rails, Rail Fixtures and Fastenings, Sleepers and Ballast, Rail Joints, Elements of Junctions and Layouts, Types of Traction, Locomotives and other Rolling Stock, Brake Systems, Resistance due to Friction, Wave Action, Wind, Gradient, Curvature, Tractive Effort of a Locomotive, Hauling Power of a Locomotive.

UNIT-III

Geometric Design of Railway Track:

Right of Way and Formation, Field Investigation, Geometric Design Elements, Safe Speed on Curves, Speed Computation, String Lining of Curves, Gradients, Grade Compensation, Railway Cant and Cant Deficiency, Traction.

Track Construction and Maintenance: Special Considerations and Construction Practices, Track Laying, Inspection and Maintenance, Maintenance Tools, Maintenance of Rail Surface, Track Drainage, Track Circuited Lengths, Track Tolerances, Mechanized Method, off-Track Tampers, Shovel Packing, Ballast Confinement and Directed Track Maintenance, Bridge Maintenance, Renewal, Classification of Renewal Works, through Sleeper Renewals, Mechanized Relaying, Track Renewal Trains.

UNIT-IV

Signaling and interlocking:

Objectives, Classification, Fixed Signals, Stop Signals, Signaling Systems, Mechanical Signaling System, Electrical Signaling System, Systems for Controlling Train Movement, Interlocking, Modern Signaling Installations.

UNIT-V

Railway Accidents and Safety:

Train Accidents, Collision and Derailments and their Causes, Restoration of Traffic, Safety Measures, Disaster Management, Classification of Level Crossings, Accidents at Level Crossings, Remedial Measures, Maintenance of Level Crossings.

TEXT BOOKS:

1. Railway Engineering by Satish Chandra and M. Agrawal, Oxford University Press.
2. A Textbook of Railway Engineering by S.C.Saxena and S.P. Arora, Dhanpat Rai Publications (P) Ltd.
3. Railway Track Engineering by J.S. Mundrey, Tata McGraw Hill Education.

REFERENCE BOOKS:

1. Practical Railway Engineering by Clifford F. Bonnett, Imperial College Press, London.
2. Railway Engineering by Gupta, B.L. and Amit Gupta, Standard Publishers and Distributors, Delhi.
3. Railway Engineering by S.C. Rangwala, Charotar Publishing House, Anand.

B.TECH CIVIL ENGINEERING – R20

ENVIRONMENTAL IMPACT ASSESSMENT – CESEA1

SEMESTER V

L/T/P/C
3/0/0/3

COURSE OUTCOMES:

1. To Understand Environmental Problems arising due to Engineering and Technological Activities and the Science behind those Problems.
2. To Analyze and Mitigate the Environmental and Social Impacts of Developmental Projects.
3. To Apply EIA Standards for Social Impacts of Developmental Projects.
4. To Evaluate a Suitable Method for Mathematical Models for Impact Prediction.

UNIT-I
Introduction:
Impacts of Development on Environment - Rio Principles of Sustainable Development - Environmental Impact Assessment (EIA) - Need for EIA Studies - EIA Types - EIA in Project cycle - EIA Notification and Legal Framework - Stakeholders and their Role in EIA - Selection & Registration Criteria for EIA Consultants - Screening and Scoping in EIA - Development Activity and Ecological Factors EIA, Rapid and Comprehensive EIA, EIS, FONSI .

UNIT-II
Environmental Impact Assessment:
Frame work of Impact Assessment - Baseline monitoring - Prediction and Assessment of Impact on Land, Water, Air, Noise and Energy, Flora and Fauna - Matrices - Networks - Checklist Methods Mathematical Models for Impact Prediction - Analysis of Alternatives

UNIT-III
Environmental Management Plan:
Plan for Mitigation of Adverse Impact on Water, Air and Land, Water, Energy, Flora and Fauna - Environmental Monitoring Plan - EIA Report Preparation - Review of EIA. Reports - Environmental Clearance - Environmental Audit.

UNIT-IV
Socio Economic Assessment:
Baseline monitoring of Socio Economic Environment - Identification of Project Affected Personal - Rehabilitation and Resettlement Plan - Economic Valuation of Environmental Impact Cost Benefit Analysis - Public Consultation.

UNIT-V
Case Studies:
EIA Case Studies Pertaining to Infrastructure Projects - Real Estate Development Highway Projects - Mass Rapid Transport Systems - Dams and Irrigation Projects - Hydro Power Plants - Wastewater Treatment Plants - Waste Processing and Disposal Facilities - Thermal Power Plant Construction Activities.

TEXT BOOKS:

1. Environmental Impact Analysis: A New Dimension in Decision Making by R.K. Jain, Van Nostrand Reinhold Co.
2. Environment Impact Assessment Methodologies by Y. Anjaneyulu, Valli Manickam.
3. Environment Impact Assessment by Larry W. Canter, McGraw Hill Publication.

REFERENCE BOOKS:

1. Environmental Science and Engineering by Dr. Suresh K. Dhameja, S.K. Kataria & Sons Publication, New Delhi.
2. Environmental Pollution and Control by Dr. H.S. Bhatia, Galgotia Publication (P) Ltd.
3. Guidelines for EIA of Environmental Clearance, GoI. [http://environmentclearance.nic.in]
4. Environmental Science and Engineering by J. Glynn Henry and Gary W. Heinke, Prentice Hall (India).
5. EIA Notification, 2006 and Subsequent Amendments, GoI. [http://environmentclearance.nic.in/report/EIA_Notifications.aspx]
6. EIA Manuals Prepared by Infrastructure Leasing & Financial Services Limited (IL & FS) [https://www.ilfsindia.com/]

B.TECH CIVIL ENGINEERING – R20

FLUID MECHANICS & HYDRAULIC MACHINERY LAB – C15PC5

SEMESTER V

L/T/P/C
0/0/3/1.5

PRE-REQUISITES: Fluid Mechanics and Hydraulic Machinery

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

1. Determine for Orifice meter and Venturimeter.
2. Test the Performance of Pumps and Turbines.
3. Determine Energy Loss in Hydraulic Jump.

LIST OF EXPERIMENTS:

1. Calibration of Venturimeter/ Orifice meter.
2. Calibration of Contracted Rectangular Notch/ Triangular Notch.
3. Determination of Major and Minor Losses.
4. Verification of Bernoulli's Equation.
5. Impact of Jet on Vanes (Flat Bed/ Curved Bed/ Inclined)
6. Performance Test on Pelton Wheel Turbine.
7. Performance Test on Francis Turbine at Constant Speed and Constant Head.
8. Performance Characteristics of a Single Stage/ Multi-stage Centrifugal Pump.
9. Performance Characteristics of a Reciprocating Pump.
10. Study of Hydraulic Jump in Open Channel by Mannings and Chezy.
11. Demonstration on Kaplan Turbine Constant Head and Constant Speed.
12. Demonstration on Reynold's Experiment.

REFERENCES:

1. Laboratory Manual of Fluid Mechanics and Machines, V. P. Gupta, J. Chandra, K. S. Gupta, CBS Publishers & Distributors Pvt. Ltd.
2. Hydraulics Laboratory Manual by S.K Likhi, New Age International (P) Limited.

B.TECH CIVIL ENGINEERING – R20

SOIL MECHANICS LAB – C15PC6

SEMESTER V

L/T/P/C
0/0/3/1.5

PRE-REQUISITES: Soil Mechanics.

COURSE OUTCOMES: Upon successful completion of this course, student will be able to

1. Determine the Various Properties of Soils by using Different Lab Tests.
2. Determine the Index Properties of Soil and classify them.
3. Determine Compaction & Consolidation of Soils.
4. Determine Permeability and Shear Strength Characteristics of Soil

LIST OF EXPERIMENTS:

1. Determination of OMC by Oven Drying Method, Specific Gravity by Pycnometer.
2. Determination of Field Density by Core Cutter and Sand Replacement Methods.
3. Grain Size Distribution by Sieve Analysis.
4. Determination of Atterberg's Limits.
5. Permeability of Soil by Constant Head Test Method.
6. Permeability of Soil by Variable Head Test Method.
7. Determination of Compaction by Standard Proctor's Test.
8. Direct Shear Test for Cohesive Soils.
9. Vane Shear Test for Cohesive Soils.
10. Demonstration on Unconfined Compression Test for Clayey Soils.
11. Demonstration on Differential Free Swell Index (DFSI) Test.
12. Demonstration on Determination of Coefficient of Consolidation.

REFERENCE BOOKS:

1. Laboratory Manual on Soil Mechanics (Testing and Interpretation) by Ravi Kumar Sharma.
2. IS 2720: Code for Geotechnical Engineering Lab Manual by William K. Kitch, Kendall/Hunt Publishing Co, U.S.

B.TECH CIVIL EGNGINEERING – R20

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS – CHSM1

SEMESTER VI

L/T/P/C
3/0/0/3

UNIT-I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance. Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT-II

Demand and Supply Analysis:

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT-III

Production, Cost, Market Structures & Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost Analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

UNIT-IV

Financial Accounting:

Accounting Concepts and Conventions, Accounting Equation, Double-Entry System of Accounting, Rules for Maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT-V

Financial Analysis through Ratios:

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (Simple Problems). Introduction to Fund Flow and Cash Flow Analysis (Simple Problems).

TEXT BOOKS:

1. Business Economics - Theory and Applications by D. D. Chaturvedi, S. L. Gupta, International Book House Pvt. Ltd.
2. Financial Accounting by Dhanesh K Khatri, Tata McGraw Hill.
3. Managerial Economics by Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Tata McGraw Hill.

REFERENCE BOOKS:

1. Financial Accounting for Management by Paresh Shah, Oxford University Press.
2. Financial Accounting by S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Vikas Publications.

B.TECH. CIVIL ENGINEERING – R20

ENVIRONMENTAL ENGINEERING – C16PC1

SEMESTER VI

L/T/P/C
3/0/0/3

COURSE OUTCOMES: The students completing the course will

1. Assess Characteristics of Water and Wastewater and their Impacts.
2. To know about the Layouts, Principles of Treatment Nits and Filters
3. Estimate Quantities of Water and Waste Water and Plan Conveyance Components.
4. Design Components of Water and Wastewater Treatment Plants.
5. Be Conversant with issues of Air Pollution and Control.

UNIT-I

Introduction: Waterborne Diseases - Protected Water Supply - Population Forecasts, Design Period - Types of Water Demand - Factors Affecting - Fluctuations - Fire Demand - Water Quality and Testing - Drinking Water Standards: Sources of Water - Comparison from Quality and Quantity and other Considerations - Intakes - Infiltration Galleries.
Sources: Surface and Subsurface Sources - Suitability with regard to Quality and Quantity.

UNIT-II

Layout and General Outline of Water Treatment Units - Sedimentation - Principles - Design Factors - Coagulation - Flocculation Clarifier Design - Coagulants - Feeding Arrangements. Filtration - Theory - Working of Slow and Rapid Gravity Filters - Multimedia Filters - Design of Filters - Troubles in Operation - Comparison of Filters - Disinfection - Theory of Chlorination, Chlorine Demand - other Disinfection Practices - Design of Distribution Systems - Pipe Appurtenances.

UNIT-III

Characteristics of Sewage - Wastewater Collection - Estimation of Wastewater and Storm Water Decomposition of Sewage, Examination of Sewage - B.O.D. Equation - C.O.D. Design of Sewers -Shapes and Materials - Sewer Appurtenances, Manholes - Inverted Siphon - Catch Basins - Flushing Tanks - Ejectors, Pumps and Pump Houses - House Drainage - Plumbing Requirements - Sanitary Fittings - Traps - One Pipe and Two Pipe Systems of Plumbing - Ultimate Disposal of Sewage - Sewage Farming - Self-Purification of Rivers.

UNIT-IV

Wastewater Treatment Plant - Flow Diagram - Primary Treatment Design of Screens - Grit Chambers - Skimming Tanks - Sedimentation Tanks - Principles of Design - Biological Treatment Trickling Filters - ASP - Construction and Design of Oxidation Ponds. Sludge Digestion - Design of Digestion Tank - Sludge Disposal by Drying - Septic Tanks - Working Principles and Design - Soak Pits.

UNIT-V

Air Pollution - Classification of Air Pollution - Effects Air Pollution - Global Effects - Meteorological Parameters Affecting Air Pollution - Atmospheric Stability - Plume Behavior - Control of Particulates - Gravity Settlers, Cyclone Filters, ESPs - Control of Gaseous Pollutants Automobile Pollution and Control.

Global Effects of Air Pollution - Green House Effect, Heat Islands, Acid Rains, Ozone Holes etc.

TEXT BOOKS:

1. Water Supply and Sanitary Engineering by G.S. Birdie, Dhanpat Rai Publications (P) Ltd.
2. Environmental Engineering Vol - I and II by BC Punmia, Standard Publications.
3. Water Supply Engineering by S.K. Garg, Khanna Publishers.
4. Environmental Engineering Vol - I by S.K.Garg, Khanna Publishers.

REFERENCE BOOKS:

1. Water Supply Engineering Vol - I & II by P.N. Modi, Standard Book House, New Delhi.
2. Water Supply Engineering by B.C. Punmia, Ashok K Jain and Arun K Jain, Laxmi Publications Pvt. Ltd.
3. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi.
4. Water Works Engineering Planning - Design and Operation by Syed R. Qasim and Edward M. Motley Guang Zhu, Prentice Hall (India), New Delhi.
5. Environmental Engineering by H.S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill.
6. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.Wiley.
7. Environmental Pollution and Control Engineering by CS Rao, Wiley Publications.
8. Environmental Engineering by P. Venugopal Rao, Prentice Hall (India).

B.TECH. CIVIL ENGINEERING – R20

DESIGN OF STEEL STRUCTURES – C16PC2

SEMESTER VI

L/T/P/C
3/0/0/3

PRE-REQUISITES: Strength of Materials, Structural Analysis.

COURSE OUTCOMES: At the end of the course, the student will be able to

1. Design Bolt and Weld Connections.
2. Design Tension and Compression Members.
3. Design Beams and Built-up Sections.
4. Design of Roof Trusses.
5. Design of Plate Girders and Roof Trusses.

UNIT-I

Materials - Types of Structural Steel - Mechanical Properties of Steel - Concept of Plasticity - Yield strength. Loads and Combinations, Local Buckling Behavior of Steel. Concept of Limit State Design - Limit States - Design Strengths - Deflections Limits - Serviceability - Stability Check. Bolted Connections - IS 800-2007 - Specifications - Design Strength - Efficiency of Joint - Prying Actions - Welded Connections - Types of Welded Joints - Specifications - Design Requirements.

UNIT-II

Design of Tension Members - Net Area - Shear Lag - Design Procedure Splice - Lug Angle. Design of Compression Members - Buckling Class - Slenderness Ratio/ Strength design - Laced - Battend Columns - Splices - Column Bases. Detailing of Structural Members.

UNIT-III

Flexural Members - Plastic Theory - Theorems of Plastic Analysis - Classifications of Beams as per IS 800-2007 - Design of Beams - Plastic Moment - Bending and Shear Strength/ Buckling – Built-up Sections - Laterally Supported Beams - Design of Eccentric Connections - Framed - Stiffened/Seated Connections- Detailing of Structural Members.

UNIT-IV

Roof Trusses - Components of a Trussed Roof - Types of Roof Trusses - Purlin Design - Wind Ties, Tie Rods - Loads on Trusses - Truss Design, Design of Joints and End Bearing - Detailing of Structural Members.

UNIT-V

Design of Plate Girders - Elements - Economical Depth - Design of Main Sections - Connections between Web and Flange - Design of Stiffness Bearing - Intermediate Stiffeners - Design of Flange Splices - Detailing of Structural Members.

TEXT BOOKS:

1. Limit State Design of Steel Structures, S.K Duggal, Tata McGraw Hill.
2. Design of Steel Structures by S.S. Bhavikatti, IK International Publication House, New Delhi.
3. Design of Steel Structures by N. Subramanian, Oxford University Press.

REFERENCE BOOKS:

1. Design of Steel Structures by K.S. Sai Ram, Pearson Education.
2. Design of Steel Structures by Edwin H. Gaylord, Jr. Charles N. Gaylord and James Stallmeyer, Tata McGraw Hill Education.
3. Fundamental of Structural Steel Design by M.L. Gambhir McGraw Hill Pvt. Ltd.
4. IS 800-2007 General Construction in Steel - Code of Practice.
5. IS 875-Part-III for Wind Loads.
6. Steel Tables in SI Units.

B.TECH. CIVIL ENGINEERING – R20

WATER RESOURCE ENGINEERING-I – C16PC3

Semester VI

L/T/P/C
3/0/0/3

PRE-REQUISITES: Fluid Mechanics and Hydraulics.

COURSE OUTCOMES: At the End of the Course, the Student will be able to:

1. Analyze Hydro-Meteorological Data.
2. Estimate Abstractions from Precipitation.
3. Compute Yield from Surface and Subsurface Basins.
4. Develop Rainfall-Runoff Models.
5. Formulate and Solve Hydrologic Flood Routing Models.
6. Estimate Runoff, Design Discharge from Catchment.

UNIT-I

Introduction to Engineering Hydrology and its Applications, Hydrologic Cycle, Types and Forms of Precipitation, Rainfall Measurement, Types of Rain Gauges, Computation of Average Rainfall over a Basin, Processing of Rainfall Data - Adjustment of Record - Rainfall Double Mass Curve. Runoff - Factors Affecting Runoff - Runoff over a Catchment - Empirical and Rational Formulae.

Abstraction from Rainfall - Evaporation, factors affecting Evaporation, Measurement of Evaporation – Evapo-transpiration - Penman and Blaney & Criddle Methods - Infiltration, factors Affecting Infiltration, Measurement of Infiltration, Infiltration Indices.

UNIT-II

Distribution of Runoff - Hydrograph Analysis Flood Hydrograph - Effective Rainfall - Base Flow - Base Flow Separation - Direct Runoff Hydrograph - Unit Hydrograph, Definition, Limitations and Applications of Unit Hydrograph, Derivation of Unit Hydrograph from Direct Runoff Hydrograph and Vice versa - S-hydrograph - Uses.

UNIT-III

Ground Water Occurrence, Types of Aquifers, Aquifer Parameters, Porosity, Specific Yield, Permeability, Transmissivity and Storage Coefficient, Darcy's law, Radial Flow to Wells in Confined and Unconfined Aquifers. Types of Wells - Well Construction - Well Development.

UNIT-IV

Necessity and Importance of Irrigation, Advantages and Ill Effects of Irrigation, types of Irrigation, Methods of Application of Irrigation Water, Indian Agricultural Soils, Methods of Improving Soil Fertility - Crop Rotation, Preparation of Land for Irrigation, Standards of Quality for Irrigation Water.

Soil-Water-Plant Relationship, Vertical Distribution of Soil Moisture, Soil Moisture Constants, Soil Moisture Tension, Consumptive Use, Duty and Delta, Factors Affecting Duty - Design Discharge for a Water Course.

Depth and Frequency of Irrigation, Irrigation Efficiencies - Water Logging.

UNIT-V

Classification of Canals, Design of Irrigation Canals by Kennedy's and Lacey's Theories, Balancing Depth of Cutting, IS Standards for a Canal Design, Canal Lining.

TEXT BOOKS:

1. Engineering Hydrology by K. Subramanya McGraw Hill Pvt. Ltd.
2. Irrigation and Water Power Engineering by Punmia & Lal, Laxmi Publications Pvt. Ltd.
3. Engineering Hydrology by Jayarami Reddy, Laxmi Publications Pvt. Ltd.

REFERENCE BOOKS:

1. Engineering Hydrology by CSP Ojha, R. Brendtsson and P. Bhunya, Oxford University Press.
2. Irrigation and Water Resources & Water Power by P. N. Modi, Standard Book House.
3. Applied Hydrology by V.T. Chow, D.R. Maidment and L.W. Mays, McGraw Hill Pvt. Ltd.
4. Hydrology in Practice by E. M. Shaw, K. J. Beven, CRC Press.

B.TECH CIVIL ENGINEERING – R20

INFRASTRUCTURE PLANNING AND MANAGEMENT – C16PE4

Semester VI

L/T/P/C
3/0/0/3

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Recognize the need to Plan, Manage and Maintain Infrastructure Projects at a High Level.
2. Demonstrate an Understanding of Reliability Theory.
3. Explain the Principles of Reliability Engineering and Reliability Engineering Processes.
4. Identify and be able to use Mathematical Tools and Techniques Commonly used in Systems Analysis.
5. Develop a System Engineering Management Plan for Practical Applications.

UNIT-I

Introduction: Definition of Basic Terminologies, Role of Infrastructure in Economic Development, types of Infrastructure, Measurement of Infrastructure Capacity, Bases for Quantification of Demand and Supply of Various types of Infrastructure, Indian Scenario in respect of Adequacy and Quality.

UNIT-II

Infrastructure Planning: Goals and Objectives of Infrastructure Planning; Identification and Quantification of the Casual Factors Influencing the Demand for Infrastructure; Review and Application of Techniques to Estimate Supply and Demand for Infrastructure; use of Econometric, Social and Land Use Indicators and Models to Forecast the Demand and Level of Service of Infrastructure and its Impact on Land Use; Critical Review of the Relevant Forecasting Techniques; Infrastructure Planning to Identify and Prioritize Preferred Areas for Development; Integration of Strategic Planning for Infrastructure at Urban, Regional and National Levels; Case Studies in Infrastructure Planning.

UNIT-III

Infrastructure Management: Concepts, Common aspects of Urban and Rural Infrastructure Management systems; Pavement and Bridge Management Systems, Integrated Infrastructure Management, Case Studies.

UNIT-IV

Emerging Trends in Infrastructure: Overview of Public-Private Sector Participation in Infra-structure Projects, Understanding Stakeholder's Concerns, Regulatory Framework, Risk Management in Infrastructure Projects.

UNIT-V

Public Policy for Infrastructure Sectorial Overview: Highways, Railways, Waterways, Airports, Urban and Rural Infrastructure: Roads, Housing, Water Supply, Sanitation - Case Study Examples.

TEXT BOOKS:

1. Infrastructure Engineering and Construction Techniques by M. R. Apte, R. K. Lad, V. R. Phadke, U. S. Patil, Nirali Prakashan Publishers.
2. Infrastructure Planning, Engineering and Economics by Alvin S. Goodman and Makarand Hastak, McGraw Hill.
3. Infrastructure Planning by James Parkin and Deepak Sharma, Thomas Telford Ltd.

REFERENCE BOOKS:

1. Projects: Planning, Analysis, Selection, Financing, Implementation and Review by P. Chandra, Tata McGraw Hill, New Delhi.
2. Project Financing - Asset Based Financial Engineering by J. D. Finnerty, Wiley, New York.
3. Economic Analysis of Projects by Lyn Squire and H. G. van der Tak, John Hopkins University Press, London.
4. Managerial Economics: Theory and Practices by T. J. Webster, Elsevier, New Delhi.

B.TECH CIVIL ENGINEERING – R20

REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEM – C16PE4

SEMESTER VI

L/T/P/C
3/0/0/3

PRE-REQUISITE: Surveying & Geomatics

COURSE OUTCOMES: After completing this course the student will be able to

1. Understand the Concepts and Principles of Aerial Photogrammetry and Compute Heights of the Objects using Relief Displacement and Parallax.
2. Understand the Principles and Basic Concept of Remote Sensing and GIS and its Applications; know different types of Data Representations in GIS.
3. Understand the Map Projections and Coordinates Systems.
4. Understand the Application of Vector and Raster Data structures to the Real World.
5. Understand the Importance of Source Map and On-screen Digitization.

UNIT-I

Introduction to Photogrammetry: Principles & Types of Aerial Photographs, Geometry of Vertical Aerial Photograph, Scale & Height Measurement on Single Vertical Aerial Photograph, Height Measurement Based on Relief Displacement, Fundamentals of Stereoscopy, Fiducial Points, Parallax Measurement using Fiducial Line.

UNIT-II

Remote Sensing: Basic Concept of Remote Sensing, Data and Information, Remote Sensing Data Collection, Remote Sensing Advantages & Limitations, Remote Sensing Process.
Electro-magnetic Spectrum, Energy Interactions with Atmosphere and with Earth Surface Features (Soil, Water, Vegetation), Indian Satellites and Sensors, IKONOS Satellite Sensor, Blue Bird Satellites - Their Characteristics, Resolution, Map and Image and False Color Composite, Introduction to Digital Data, Elements of Visual Interpretation Techniques.

UNIT-III

Geographic Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data, Attribute data - Joining Spatial and Attribute data; GIS Operations: Spatial Data Input - Attribute data Management - Data display - Data Exploration - Data Analysis. Coordinate Systems: Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections - Map Projection Parameters - Commonly used Map Projections - Projected Coordinate Systems.

UNIT-IV

Vector Data Model: Representation of Simple Features - Topology and its Importance; Coverage and its Data Structure, Shape File; Data Models for Composite Features; Object Based Vector Data Model; Classes and their Relationships; The Geobase Data Model; Geometric Representation of Spatial Feature and Data Structure, Topology Rules.

UNIT-V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

Data Input: Metadata, Conversion of Existing data, Creating new data; Remote Sensing data, Field Data; Text Data; Digitizing, Scanning, On-screen Digitizing, Importance of Source Map, Data Editing. Demonstration of GIS Software - GIS Applications: Environment, Water Resources and Agriculture.

TEXT BOOKS:

1. Elements of Photogrammetry with Applications in GIS, Paul R. Wolf - Bon A. Dewitt - Benjamin E. Wilkinson.
2. Geographic Information Systems: A Management Perspective by Stan Aronoff, WDL Publications.
3. Remote Sensing of the Environment - An Earth Resource Perspective by John R. Jensen, Pearson Education.
4. Introduction to Geographic Information System by Kang-Tsung Chang, Tata McGraw Hill.

REFERENCE BOOKS:

1. Concepts& Techniques of GIS by C.P. Lo Albert, K.W. Young, Prentice Hall (India).
2. Remote Sensing and Geographical Information systems by M. Anji Reddy.
3. Principals of Geo physical Information Systems by Peter A Burrough and Rachael A. Mc Donnell, Oxford University Press.
4. Basics of Remote Sensing & GIS by S. Kumar, Laxmi Publications Pvt. Ltd.
5. www.iirs.gov.in
6. www.easyengineering.net

B.TECH CIVIL ENGINEERING – R20

SOLID AND HAZARDOUS WASTE MANAGEMENT – C16PE4

SEMESTER VI

L/T/P/C
3/0/0/3

PRE-REQUISITES: Environmental Engineering

COURSE OUTCOMES:

1. To Understand Environmental Problems Arising due to Improper Disposal of Solid Waste.
2. To Analyse and Mitigate the Environmental Issues due to Hazardous Waste Management.
3. To Apply Standard Methods for Collecting, Handling and Safe Disposal of Biomedical and E-Waste.
4. To Know the Appropriate Method for Solid Waste Collection, Transportation, Redistribution and Disposal.
5. To Evaluate an Alternate Technology to Reduce the Impact of Solid Waste in the Environment.

UNIT-I

Introduction:

Definition of Solid Waste - Type of Solid Wastes - Sources of Solid Wastes - Generation of Solid Waste; Characteristics - Methods of Sampling and Characterization - Impact on Environmental Health - Elements of Solid Waste Management - Municipal Solid Waste (M&H) Rules - Public Awareness. On-site Storage Methods - Materials used for Containers - On-site Segregation of Solid Wastes - Public Health & Economic Aspects of Storage.

UNIT-II

Municipal Solid Waste Management:

Source Types - Composition - Estimation of Physical, Chemical Characteristics - Conditions - Collection of Solid Wastes - Analysis of Collection System - Alternative Collection System - Separation of Solid Waste - Material Recovery - Type of Vehicles - Collection Route - Transfer and Transport - Transfer Station - Selection of Location Dumping of Solid Waste, Landfills and Sanitary Landfills - Leachate collection & treatment - Site Selection and Design Operation. Energy Recovery - Incineration, Composting, Pyrolysis.

UNIT-III

Hazardous Waste Management:

Definition of Hazardous Waste (HW) - Characteristics of HW - Different Type of Hazardous Wastes - TCLP Tests - Storage, Labeling and Handling of Hazardous Wastes - Effects of Improper Management Hazardous Wastes Regulation - Hazardous Wastes Minimization - Labeling and Handling of Hazardous Wastes - Treatment and disposal of Hazardous wastes - Hazardous Waste Management in India - Remediation of Hazardous Landfill Sites.

UNIT-IV

Biomedical and Radioactive Wastes Management:

Biomedical Waste Classification, Collection, Segregation Treatment and Disposal - Radioactive Wastes - Definition - Low Level and High Level Radioactive Wastes and their Management, Radiation Standards.

UNIT-V

E-Waste and Plastic Waste Management:

Waste Characteristics, Generation, Collection, Transport and Disposal, Regulatory aspects of E-Waste, Global Strategy, Recycling - Plastic Waste, its Disposal and Utilization - Environmental Issues and Challenges - Novel Idea to Utilize Thick Plastic Bags.

TEXT BOOKS:

1. Solid & Hazardous Waste Management by M.N. Rao, Razia Sultana, Sri Harsha Kota, B.S. Publications.
2. Handbook of Solid Waste Management by George tchobanoglous and Frank Kreith, McGraw Hill, New York.

REFERENCE BOOKS:

1. Manual on Municipal Solid Waste Management - 2016, Central Public Health & Environmental Engineering Organization (CPHEEO), Ministry of Housing and Urban Affairs, Government of India.
   [http://cpheeo.gov.in/cms/manual-on-municipal-solid-waste-management-2016.php]
2. Design of Landfills and Integrated Solid Waste Management by Amalendu Bagchi, Wiley.
3. Information on Common Hazardous Waste Treatment, Storage and Disposal Facilities from CPCB, Government of India.
   [https://cpcb.nic.in/common-hw-tsdfs/]

B.TECH CIVIL ENGINEERING – R20

ADVANCED ENGLISH COMMUNICATION SKILLS LAB – CHSE3

SEMESTER VI

L/T/P/C
0/0/4/2

COURSE OUTCOMES: Students will be able to

1. Acquire Vocabulary and use it contextually.
2. Listen and Speak Effectively.
3. Develop Proficiency in Academic Reading and Writing.
4. Increase Possibilities of Job Prospects.
5. Communicate Confidently in Formal and Informal Contexts.
6. Develop Interpersonal Communication Skills.

The Following Course Activities will be conducted as part of the Advanced English Communication Skills Lab:

UNIT-I
Inter-Personal Communication and Building Vocabulary - Starting a Conversation - Responding Appropriately and Relevantly - Using Appropriate Body Language - Role Play in Different Situations - Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.

UNIT-II
Reading Skills and Group Discussion - General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, Skimming, Scanning, Inferring Meaning and Practice with Different Texts.

UNIT-III
Writing Skills - Structure and Presentation of Different Types of Writing - Letter Writing/ Resume Writing/ e-correspondence/ Statement of Purpose/ Technical Report Writing/ Styles, Types, Report in Manuscript Format.

UNIT-IV
Group Discussion and Presentation Skills: Group Discussions - Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation - Concepts and Process.
Presentation Skills: Oral Presentations (Individual or Group) through JAM Sessions/ Seminars/ PPTs and Written Presentations through Posters/ Projects/ Reports/ emails/ Assignments.

UNIT-V
Interview Skills: Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-Conference & Video-Conference and Mock Interviews.

TEXT BOOKS:

1. Oxford Advanced Learner's Compass by A.S. Hornby, Oxford University Press.
2. Delta's Key to the Next Generation TOEFL Test: Advanced Skill Practice, Nancy Gallagher, Delta Systems Co. Inc.

REFERENCE BOOKS:

1. Effective Technical Communication by M Ashraf Rizvi, McGraw Hill Education.
2. English for Effective Communication by Sanjay Kumar and Pushpa Lata, Oxford University Press.
3. English Language Laboratories - A Comprehensive Manual by Nira Konar, Prentice Hall (India).
4. You Can Win by Shiv Khera, Bloomsbury.
5. Soft Skills for Everyone by Jeff Butterfield, Cengage Learning (India).

B.TECH CIVIL EGNGINEERING – R20

COMPUTER AIDED DESIGN AND DRAWING LAB – C16PC6

Semester VI

L/T/P/C
0/0/2/1

COURSE OUTCOMES: At the end of the Course, the Student will be able to draft the Various Structures.

1. Detailing of Reinforcement in Beams.
   [i] Cantilever [ii] Simply supported [iii] Continuous
2. Detailing of Reinforcement in Columns
   [i] Square [ii] Rectangular [iii] Circular
3. Detailing of Reinforcement in RCC Isolated Footings.
   [i] Square [ii] Rectangular [iii] Combined Footing
4. Detailing of Reinforcement in RC One-way and Two-way Slabs.
5. Detailing of Reinforcement in RC Dog-legged Staircases / Open Well Staircases.
6. Draw a Layout of Structural Details for a Building - Columns Layout & Center Line Drawing.
7. Draw a Layout of Structural Details for a Building - Footings Layout.
8. Draw a Layout of Structural Details for a Building - Beams Layout.
9. Draw a Layout of Structural Details for a Building - Slab Layout.
10. Detailing of Reinforcement in RC Retaining Wall.
11. Detailing of Reinforcement in RC Irrigation Canal.
12. Draw Water Supply Network Diagram / Pipe Layout in Discrete Areas.

TEXT BOOKS:

1. Civil Engineering Drawings (Including Computer Aided Building Drawing), Third Edition by Rangwala, Charotar Publishers.
2. Computer Aided Design Laboratory by M. N. Shesha Prakash, G. S. Suresh, Laxmi Publications Pvt. Ltd.
3. Computer Aided Drafting Lab by V. Ramesh Babu, R. Samyukta, M. Muniratnam, VRB Publishers Pvt. Ltd.
4. SP 34, Handbook on Concrete Reinforcement and Detailing.
5. IS 456-2000: Plain and Reinforced Concrete Code of Practice.

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