CIVIL ENGINEERING					
III B. Tech – I Semester					
Course Code	**WATER RESOURCES ENGINEERING**	L	T	P	C
23CET08		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the fundamental concepts of hydrology, including precipitation, evaporation, infiltration, and runoff, and their significance in water resource management.
2. **Analyze** hydrographs, unit hydrographs, and groundwater characteristics for estimating water availability and flood management.
3. **Evaluate** the necessity, importance, and methods of irrigation, along with soil-water-plant relationships and irrigation efficiencies.
4. **Apply** silt theories and principles of canal design to ensure efficient water conveyance and management in irrigation systems.
5. **Assess** the principles of diversion head works, water logging, canal lining, and the stability of hydraulic structures on permeable foundations.

Course Outcomes (COs):

After successful completion of this course, students will be able to:

1. Explain the hydrologic cycle, precipitation types, and measurement techniques for rainfall, evaporation, infiltration, and runoff computation.
2. Analyze hydrographs, unit hydrographs, and groundwater flow parameters for flood estimation and water resource planning.
3. Evaluate irrigation requirements, soil-water-plant relationships, duty, delta, and irrigation efficiencies for sustainable agricultural productivity.
4. Apply silt theories and design principles of irrigation canals to ensure effective water conveyance and prevent water logging.
5. Assess the stability of diversion head works, including weirs and barrages, using Bligh ‘s and Khosla ‘s theories for hydraulic structure design.

UNIT - I

INTRODUCTION TO HYDROLOGY:

Engineering Hydrology and Its Applications; Hydrologic Cycle; Precipitation- Types and forms, Rainfall Measurement, Types of Rain Gauges, Computation of Average Rainfall Over a Basin, Presentation and Interpretation of Rainfall Data. Evaporation- Factors Affecting Evaporation, Measurement of Evaporation; Infiltration- Factors Affecting Infiltration, Measurement of Infiltration, Infiltration Indices; Run off- Factors Affecting Run- off, Computation of Run-Off; Design Flood; Estimation of Maximum Rate of Run-Off; Separation of Base Flow.

UNIT - II

HYDROGRAPH ANALYSIS:

Hydrograph; Unit Hydrograph- Construction and Limitations of Unit Hydrograph, Application of The Unit Hydrograph to The Construction of a Flood Hydrograph Resulting from Rainfall of Unit Duration; S-Hydrograph. GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; Aquifer Parameters Porosity, Specific Yield, Specific Retention; Divisions of Sub–Surface Water; Water Table; Types of Aquifers; Storage Coefficient-Coefficient of Permeability and Transmissibility

UNIT – III		
IRRIGATION: Introduction; Necessity and Importance of Irrigation; Advantages and Ill Effects of Irrigation; Types of Irrigation; Methods of Application of Irrigation Water; Quality for Irrigation Water. Duty and Delta; Duty at Various Places; Relation Between Duty and Delta; Factors Affecting Duty; Methods of Improving Duty. **WATER REQUIREMENT OF CROPS:** Types of Soils, Indian Agricultural Soils, Preparation of Land for Irrigation; Soil Fertility; Soil-Water-Plant Relationship; Vertical Distribution of Soil Moisture; Soil Moisture Tension; Soil Moisture Stress; Various Soil Moisture Constants; Limiting Soil Moisture Conditions; Depth and Frequency of Irrigation; Gross Command Area; Culturable Command Area; Culturable Cultivated and Uncultivated Area; Kor Depth anotopterid; Crop Seasons and Crop Rotation; Irrigation Efficiencies; Determination of Irrigation Requirements of Crops; Assessment of Irrigation Water. Consumptive Use of Water-Factors Affecting Consumptive Use, Direct Measurement and Determination by Use of Equations (Theory Only)		
UNIT – IV		
CHANNELS – SILT THEORIES: Classification; Canal Alignment; Inundation Canals; Cross–Section of An Irrigation Channel; Balancing Depth; Borrow Pit; Spoil Bank; Land Width; Silt Theories–Kennedy ‘s Theory, Kennedy ‘s Method of Channel Design; Drawbacks in Kennedy ‘s Theory; Lacey ‘s Regime Theory- Lacey ‘s Theory Applied to Channel Design; Defects in Lacey ‘s Theory; Comparison of Kennedy’s and Lacey’s Theory. **WATER LOGGING AND CANAL LINING:** Water Logging; Effects of Water Logging; Causes of Water Logging; Remedial Measures; Saline and Alkaline Soils and their Reclamation; Losses in Canal; Lining of Irrigation Channels – Necessity, Advantages and Disadvantages; Types of Lining; Design of Lined Canal.		
UNIT – V		
DIVERSION HEAD WORKS: Types of Diversion Head Works; Diversion and Storage Head Works; Weirs and Barrages; Layouts of Diversion Head Works; Components; Causes and Failure of Hydraulic Structures on Permeable Foundations; Bligh ‘s Creep Theory; Khosla ‘s Theory; Determination of Uplift Pressure, Impervious Floors Using Bligh ‘s and Khosla ‘s Theory; Exit Gradient.		
TEXT BOOKS:		
1. Irrigation and Water Power Engineering by Punmia&Lal, Laxmi Publications Pvt. Ltd., New Delhi 17th Edition 2021 2. Engineering Hydrology by K. Subramanya, The Tata McGraw Hill Company, Delhi 5th Edition 2020		
REFRENCE BOOKS:		
1. Irrigation Engineering and Hydraulic Structures by S. K. Garg; Khanna Publishers, Delhi 36th Edition 2. Engineering Hydrology by Jayarami Reddy, Laxmi Publications Pvt. Ltd., New Delhi 3rd Edition 2016 3. Irrigation and Water Resources & Water Power by P.N. Modi, Standard Book House 6th Edition 2020		
Online Learning Resources:		
https://nptel.ac.in/courses/105101214		

CIVIL ENGINEERING
III B. Tech – I Semester

Course Code		L	T	P	C
23CET09	DESIGN OF REINFORCED CONCRETE STRUCTURES	3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the fundamental methods of concrete structure design, including elastic, ultimate load, and limit state methods.
2. **Analyze** and **design** reinforced concrete beams, slabs, staircases, columns, and footings using the Limit State Method as per IS codes.
3. **Evaluate** the behavior of reinforced concrete members in terms of flexure, shear, torsion, bond, and anchorage.
4. **Apply** design principles to ensure serviceability and safety of concrete structures under various loading conditions.
5. **Develop** skills to use design aids and professional software for the analysis and design of RC structures.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Explain** the different methods of concrete structure design and their advantages.
2. **Analyze** and **design** singly and doubly reinforced beams, flanged beams, slabs, and staircases using the Limit State Method.
3. **Evaluate** the behavior of RC members under shear, torsion, and combined loading conditions.
4. **Design** short columns and footings considering axial and eccentric loading conditions.
5. **Utilize** IS code provisions and design aids for efficient structural design.

UNIT – I

METHODS of DESIGN OF CONCRETE STRUCTURES

Concept of Elastic Method, Ultimate Load Method and Limit State Method – Working Stress Method as Detailed in IS Code - Design of Singly Reinforced Beam by Working Stress Method - Limit State Philosophy as Detailed in IS Code - Advantages of Limit State Method Over Other Methods - Analysis and Design of Singly and Doubly Reinforced Rectangular Beams by Limit State Method.

UNIT – II

LIMIT STATE METHOD - FLANGED BEAM, SHEAR &TORSION

Analysis and Design of Flanged Beams – Use of Design Aids for Flexure - Behaviour of RC Members in Bond and Anchorage - Design Requirements as Per Current Code - Behaviour of RC Beams in Shear and torsion - Design of RC Members for Combined Bending, Shear and torsion - Serviceability.

UNIT – III		
LIMIT STATE DESIGN OF SLABS Analysis and Design of Cantilever, One Way, Two Way and Continuous Slabs Subjected to Uniformly Distributed Load for Various Boundary Conditions- –Introduction to Flat Slab.		
UNIT – IV		
LIMIT STATE DESIGN OF COLUMNS Types of Columns – Design of Short Rectangular and Circular Columns for Axial, Uniaxial and Biaxial Bending. **LIMIT STATE DESIGN OF FOOTING** Design of Wall Footing – Design of Axially and Eccentrically Loaded Rectangular Pad and Sloped Footings – Design of Combined Rectangular Footing for Two Columns Only.		
UNIT – V		
LIMIT STATE OF SERVICEABILITY AND STAIRCASE Aspects of Deflection, Cracking -Types of Staircases – Design of Dog-Legged Staircase.		
TEXT BOOKS:		
1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Limit State Design, Laxmi Publications Pvt. Ltd., New Delhi 2. P. C. Varghese, Limit State—Designed of Reinforced Concrete, Prentice Hall of India, New Delhi		
REFRENCE BOOKS:		
1. N. Krishnaraju, —Structural Design and Drawing, UniversitiesPressPvtltd, Hyderabad.4rdedition 2020. 1. N.C. Sinha and S.K. Roy, —Fundamentals of Reinforced Concrete, S. Chand Publishers 2. Subramanian, —Design of Reinforced Concrete Structures, Oxford University Press		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/105/105105105/		
Codes/Tables: IS 456-2000 and relevant sheets (Pertaining to columns) of SP 16 Code books to be permitted into the examinations Hall. **NOTE: Assignment on preparation of drawing sheets detailing various RC Elements** All the designs to be taught in Limit State Method Following plates should be prepared by the students. 1. Reinforcement particulars of T-beams and L-beams. 2. Reinforcement detailing of continuous beams. 3. Reinforcement particulars of columns and footings. 4. Detailing of One-way, Two way and continuous slabs **Exam Pattern:** The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part-B should consist of five questions on design out of which three are to be answered. Weightage for Part -A is 40% and Part-B is 60%.		

CIVIL ENGINEERING
III B. Tech – I Semester

Course Code	GEOTECHNICAL ENGINEERING	L	T	P	C
23CET10		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the classification and compaction characteristics of different soil types and their engineering significance.
2. **Analyze** the concepts of effective stress, permeability, and seepage in soils and their impact on soil behavior.
3. **Apply** stress distribution theories and settlement computations to evaluate soil response under loads.
4. **Evaluate** shear strength properties of soil using various testing methods and their applications in geotechnical engineering.
5. **Assess** the stability of slopes using different analytical methods and suggest suitable slope protection measures.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Classify** soils based on their physical and index properties as per BIS and Unified classification systems.
2. **Analyze** soil permeability and seepage problems using Darcy ‘s law and flow net concepts.
3. **Apply** stress distribution theories and settlement analysis to predict soil behavior under loading.
4. **Evaluate** shear strength of soils using experimental methods and interpret test results.
5. **Assess** slope stability and recommend suitable protection measures.

UNIT – I

SOIL CLASSIFICATION AND COMPACTION

Formation of Soil - Soil Description – Particle – Size Shape and Colour – Composition of Gravel, Sand, Silt, Clay Particles – Particle Behavior – Soil Structure – Phase Relationship – Index Properties – Significance – BIS Classification System – Unified Classification System – Compaction of Soils – Theory, Laboratory and Field Tests – Field Compaction Methods – Factors Influencing Compaction of Soils.

UNIT – II

EFFECTIVE STRESS AND PERMEABILITY

Soil - Water – Static Pressure in Water - Effective Stress Concepts in Soils – Capillary Phenomena– Permeability Interaction – Hydraulic Conductivity – Darcy ‘s Law – Determination of Hydraulic Conductivity – Laboratory Determination (Constant Head and Falling Head Methods) and Field Measurement Pumping Out in Unconfined and Confined Aquifer – Factors Influencing Permeability of Soils – Seepage - Two-Dimensional Flow – Laplace ‘s Equation – Introduction to Flow Nets – Simple Problems. (Sheet Pile and Weir).

UNIT – III		
STRESS DISTRIBUTION AND SETTLEMENT Stress Distribution in Homogeneous and Isotropic Medium – BoussinesqTheory – (Point Land, Line Land andUDL) Use of New Marks Influence Chart –Components of Settlement – – Immediate and Consolidation Settlement – Terzaghi's One Dimensional Consolidation Theory – Computation of Rate of Settlement. - √T and Log T Methods– E-Log P Relationship.		
UNIT – IV		
SHEAR STRENGTH Shear Strength of Cohesive and Cohesion Less Soils – Mohr-Coulomb Failure Theory – Measurement of Shear Strength - Direct Shear, Tri-axial Compression, UCC and Vane Shear Tests – Pore Pressure Parameters – Cyclic Mobility – Liquefaction.		
UNIT – V		
SLOPE STABILITY Stability Analysis - Infinite Slopes and Finite Slopes – total Stress Analysis for Saturated Clay – Friction Circle Method – Use of Stability Number – Method of Slices – Fellenious and Bishop 's Method - Slope Protection Measures.		
TEXT BOOKS:		
1. Soil Mechanics and Foundation Engg by K.R. Arora, Standard Publishers and DistributorsDelhi7thedition2009 2. Geotechnical Engineering by Venkatramaiah, New Age International Pvt. Ltd, (2002).		
REFRENCE BOOKS:		
1. Soil Mechanics and Foundation by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd., New Delhi17thedition 2017 2. Geotechnical Engineering by IqbalH.Khan, PHI Publishers, 4th edition. 3. Basic and Applied Soil Mechanics by Gopal Ranjan& ASR Rao, New age International Pvt.Ltd, New Delhi 3rdedition 2016		
Online Learning Resources:		
https://nptel.ac.in/courses/105101201 https://nptel.ac.in/courses/105105185		

CIVIL ENGINEERING
III B. Tech – I Semester

Course Code	Introduction to Quantum Technologies and Application	L	T	P	C
23CST30		3	0	0	3

Course Objectives: -

The objectives of this course are to make the student to:

1. Introduce fundamental quantum concepts like superposition and entanglement.
2. Understand theoretical structure of qubits and quantum information.
3. Explore conceptual challenges in building quantum computers.
4. Explain principles of quantum communication and computing.
5. Examine real-world applications and the future of quantum technologies.

Course Outcomes (COs):

After successful completion of this course, students will be able to:

1. Explain core quantum principles in a non-mathematical manner.
2. Compare classical and quantum information systems.
3. Identify theoretical issues in building quantum computers.
4. Discuss quantum communication and computing concepts.
5. Recognize applications, industry trends, and career paths in quantum technology.

UNIT – I

Introduction to Quantum Theory and Technologies:

The transition from classical to quantum physics, Fundamental principles explained conceptually: Superposition, Entanglement, Uncertainty Principle, Wave-particle duality, Classical vs Quantum mechanics – theoretical comparison, Quantum states and measurement: nature of observation, Overview of quantum systems: electrons, photons, atoms, The concept of quantization: discrete energy levels, Why quantum Strategic, scientific, and technological significance, A snapshot of quantum technologies: Computing, Communication, and Sensing, National and global quantum missions: India's Quantum Mission, EU, USA, China

UNIT – II

Theoretical Structure of Quantum Information Systems:

What is a qubit Conceptual understanding using spin and polarization, Comparison: classical bits vs quantum bits, Quantum systems: trapped ions, superconducting circuits, photons (non-engineering view),Quantum coherence and decoherence – intuitive explanation, Theoretical concepts: Hilbert spaces, quantum states, operators – only interpreted in abstract, The role of entanglement and non-locality in systems, Quantum information vs classical information: principles and differences, Philosophical implications: randomness, determinism, and observer role

UNIT – III

Building a Quantum Computer – Theoretical Challenges and Requirements:

What is required to build a quantum computer (conceptual overview)Fragility of quantum systems: decoherence, noise, and control, Conditions for a functional quantum system: Isolation, Error management, Scalability, Stability, Theoretical barriers: Why maintaining entanglement is difficult, Error correction as a theoretical necessity, Quantum hardware platforms (brief conceptual

comparison),Superconducting circuits, trapped ions, Photonics, Visionvs reality: what's working and what remains elusive, the role of quantum software in managing theoretical complexities

UNIT – IV		

Quantum Communication and Computing – Theoretical Perspective:

Quantum vs Classical Information, Basics of Quantum Communication, Quantum Key Distribution (QKD),Role of Entanglement in Communication, The Idea of the Quantum Internet – Secure Global Networking, Introduction to Quantum Computing, Quantum Parallelism (Many States at Once),Classical vs Quantum Gates, Challenges: Decoherence and Error Correction, Real-World Importance and Future Potential

UNIT – V		

Applications, Use Cases, and the Quantum Future:

Real-world application domains: Healthcare (drug discovery),Material science, Logistics and optimization, Quantum sensing and precision timing, Industrial case studies: IBM, Google, Microsoft, Psi Quantum, Ethical, societal, and policy considerations, Challenges to adoption: cost, skills, standardization, Emerging careers in quantum: roles, skillsets, and preparation pathways, Educational and research landscape – India's opportunity in the global quantum race

TEXT BOOKS:

1. Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 10th Anniversary Edition, 2010.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
3. Chris Bernhardt, Quantum Computing for Everyone, MIT Press, 2019.

REFRENCE BOOKS:

1. David McMahon, *Quantum Computing Explained*, Wiley, 2008.
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, *An Introduction to Quantum Computing*, Oxford University Press, 2007.
3. Scott Aaronson, *Quantum Computing Since Democritus*, Cambridge University Press, 2013.
4. **Alastair I.M. Rae**, *Quantum Physics: A Beginner's Guide*, Oneworld Publications, Revised Edition, 2005.
5. **Eleanor G. Rieffel, Wolfgang H. Polak**, *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.
6. **Leonard Susskind, Art Friedman**, *Quantum Mechanics: The Theoretical Minimum*, Basic Books, 2014.
7. **Bruce Rosenblum, Fred Kuttner**, *Quantum Enigma: Physics Encounters Consciousness*, Oxford University Press, 2nd Edition, 2011.
8. **GiulianoBenenti, GiulioCasati, GiulianoStrini**, *Principles of Quantum Computation and Information, Volume I: Basic Concepts*, World Scientific Publishing, 2004.
9. **K.B. Whaley et al.**, *Quantum Technologies and Industrial Applications: European Roadmap and Strategy Document*, Quantum Flagship, European Commission, 2020.
10. **Department of Science & Technology (DST), Government of India**, *National Mission on Quantum Technologies & Applications – Official Reports and Whitepapers*, MeitY/DST Publications, 2020 onward.

Online Learning Resources:

- IBM Quantum Experience and Qiskit Tutorials
- Coursera – Quantum Mechanics and Quantum Computation by UC Berkeley
- edX – The Quantum Internet and Quantum Computers
- YouTube – Quantum Computing for the Determined by Michael Nielsen
- Qiskit Textbook – IBM Quantum

CIVIL ENGINEERING
III B. Tech – I Semester

Course Code	PRESTRESSED CONCRETE (PE – I)	L	T	P	C
23CET11a		3	0	0	3

Course Objectives: -

The objectives of this course are to make the student to:

1. Understand the principles, methods, and materials used in prestressed concrete.
2. Analyze various losses of prestress in both pre-tensioned and post-tensioned members.
3. Design prestressed concrete beams considering flexure and shear forces.
4. Evaluate deflections in prestressed concrete structures and their controlling factors.
5. Analyze the behavior of composite beams under different loading conditions.

Course Outcomes (COs):

After successful completion of this course, students will be able to:

1. Explain the principles and methods of prestressing and the need for high-strength materials.
2. Analyze the different types of prestress losses and their impact on structural performance.
3. Design prestressed concrete beams considering flexural and shear stresses.
4. Evaluate deflections in prestressed beams and suggest control measures.
5. Analyze the stress distribution and differential shrinkage in composite beams.

UNIT – I

INTRODUCTION

Principles of Pre-Stressing – Prestressing Systems - Pre-Tensioning and Post Tensioning- Advantages and Limitations of Pre-Stressed Concrete- Need for High Strength Materials. Methods of Pre-Stressing: Pre-Tensioning (Hoyer System) and Post-Tensioning Methods (Freyssinet System and Gifford- Udall System)

UNIT – II

LOSSES OF PRE-STRESS

Loss of Pre-Stress in Pre-Tensioned and Post-Tensioned Members Due to Elastic Shortening, Shrinkage and Creep of Concrete, Relaxation of Stress in Steel, Anchorage Slip and Frictional Losses.

UNIT – III

FLEXURAL AND SHEAR

Analysis of Beams for Flexure and Shear - Beams Pre-Stressed with Straight, Concentric, Eccentric, Bent and Parabolic Tendons- Kern Line - Cable Profile - Design of PSC Beams (Rectangular and I Sections) Using IS 1343. Analysis and Design of Rectangular and I Beams for Shear. Introduction to Transmission Length and End Block (No Design and Analytical Problems).

UNIT – IV		
DEFLECTIONS Control of Deflections- Factors Influencing Deflections - Short Term Deflections of Uncracked Beams- Prediction of Long Time Deflections		
UNIT – V		
COMPOSITE BEAMS Different Types- Propped and Un-Propped- Stress Distribution- Differential Shrinkage- Analysis of Composite Beams.		
TEXT BOOKS:		
1. Prestressed Concrete by N. Krishna Raju, Tata McGraw Hill Publications 6th edition 2018 2. Prestressed concrete by Rajagopalan, Narosa Publishing House 2nd edition 2017		
REFRENCE BOOKS:		
1. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns, John Wiley & Sons 3rd edition 2010 2. Prestressed Concrete Design by Praveen Nagarajan, Pearson publications, 2013. 3. Prestressed Concrete by Ramamuratam, Dhanpatrai Publications 2020 edition 4. BIS code on ―prestressed concrete‖, IS: 1343 to be permitted into the examination Hall		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/106/105106118/ **https://nptel.ac.in/courses/105106117**		

CIVIL ENGINEERING
III B. Tech – I Semester

Course Code	AIR POLLUTION AND CONTROL (PE – I)	L	T	P	C
23CET11b		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. Understand the sources, classification, and effects of air pollution on humans and the environment.
2. Analyze meteorological factors influencing air pollution and dispersion modeling.
3. Design and evaluate control measures for particulate pollutants.
4. Apply techniques for controlling gaseous pollutants through chemical and physical processes.
5. Assess vehicular and indoor air pollution and propose control strategies.

Course Outcomes (COs):

After successful completion of this course, students will be able to:

1. Explain the sources, classification, and global effects of air pollution.
2. Analyze meteorological parameters affecting air pollution dispersion.
3. Design control systems for particulate matter using appropriate removal techniques.
4. Apply suitable technologies for gaseous pollutant removal through adsorption, absorption, and combustion.
5. Evaluate vehicular and indoor air pollution sources and suggest mitigation strategies.

UNIT – I

AIR POLLUTION:

Definition - Sources &Classification of Air Pollutants - Effects of Air Pollution on Humans, Plants and Materials- Global Effects - Air Quality and NAAQS - National Clean Air Programme- Sampling of Pollutants in Ambient Air - Stack Sampling

UNIT – II

METEOROLOGY AND AIR POLLUTION:

Factors Influencing Air Pollution, Wind Rose, Mixing Depths, Lapse Rates and Dispersion - Atmospheric Stability, Plume Rise and Dispersion, Prediction of Air Quality, Box Model - Gaussian Model - Dispersion Coefficient - Application of Tall Chimney for Pollutant Dispersion.

UNIT – III		
CONTROL OF PARTICULATE POLLUTANTS: Properties of Particulate Pollution - Particle Size Distribution - Control Mechanism - Dust Removal Equipment - Design and Operation of Settling Chambers, Cyclones, Wet Dust Scrubbers, Fabric Filters &ESP.		
UNIT – IV		
CONTROL OF GASEOUS POLLUTANTS: Process and Equipment for The Removal by Chemical Methods - Design and Operation of Absorption and Adsorption Equipment - Combustion and Condensation Equipment.		
UNIT – V		
AUTOMOBILE AND INDOOR POLLUTION: Vehicular Pollution – Sources and Types of Emission – Effect of Operating Conditions-Alternate Fuels and Emissions-Emission Controls and Standards, Strategies to Control Automobile Pollution– Causes of Indoor Air Pollution-Changes in Indoor Air Quality- Control and Air Cleaning Systems-Indoor Air Quality		

TEXT BOOKS:

1. Rao, M. N. and Rao H. V. N., Air Pollution, Tata McGraw-Hill, New Delhi, 2007
2. Khare M, Sharma P, Kota, S.H, Sumanth C, Air Pollution Science Engineering and Management Fundamentals, CRC Press, 2024.
3. Noel, D. N., Air Pollution Control Engineering, Tata McGraw Hill Publishers, 1999.

REFRENCE BOOKS:

1. Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford & I.B.H
2. Air Pollution Control Engineering by Nevers, McGraw-Hill, Inc., 2000.
3. Rao, C. S., Environmental Pollution Control Engineering, New Age International, New Delhi, 2006.
4. Mahajan S. P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company, New Delhi, 1991.
5. Peavy H. S., Rowe D. R. andTchobanoglous G., Environmental Engineering, McGraw Hill, New York, 1985.

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/107/105107213/

CIVIL ENGINEERING
III B. Tech – I Semester

Course Code	ENVIRONMENTAL IMPACT ASSESSMENT (PE – I)	L	T	P	C
23CET11c		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. Understand the principles, methodologies, and significance of Environmental Impact Assessment (EIA).
2. Analyze the impact of developmental activities on land use, soil, and water resources.
3. Evaluate the impact of development on vegetation, wildlife, and assess environmental risks.
4. Develop environmental audit procedures and assess compliance with environmental regulations.
5. Understand and apply environmental acts, notifications, and legal frameworks in EIA studies.

Course Outcomes (COs):

Upon successful completion of the course, students will be able to:

1. Apply various methodologies for conducting Environmental Impact Assessments.
2. Analyze the impact of land-use changes on soil, water, and air quality.
3. Evaluate the environmental impact on vegetation, wildlife, and conduct risk assessments.
4. Develop environmental audit reports and assess compliance with environmental policies.
5. Interpret and apply environmental acts and regulations related to EIA.

UNIT – I

Concepts and methodologies of EIA

Initial Environmental Examination, Elements of EIA, - Factors Affecting E-I-A Impact Evaluation and Analysis, Preparation of Environmental Base Map, Classification of Environmental Parameters- Criteria for The Selection of EIA Methodology, E I A Methods, Ad-Hoc Methods, Matrix Methods, Network Method Environmental Media Quality Index Method, Overlay Methods and Cost/Benefit Analysis.

UNIT – II

Impact of Developmental Activities and Land Use

Introduction and Methodology for The Assessment of Soil and Ground Water, Delineation of Study Area, Identification of Actives. Procurement of Relevant Soil Quality, Impact Prediction, Assessment of Impact Significance, Identification and Incorporation of Mitigation Measures. E I A in Surface Water, Air and Biological Environment: Methodology for The Assessment of Impacts on Surface Water Environment, Air Pollution Sources, Generalized Approach for Assessment of Air Pollution Impact.

UNIT – III		
Assessment of Impact on Vegetation, Wildlife and Risk Assessment Introduction - Assessment of Impact of Development Activities on Vegetation and Wildlife, Environmental Impact of Deforestation – Causes and Effects of Deforestation - Risk Assessment and Treatment of Uncertainty-Key Stages in Performing Environmental Risk Assessment-Advantages of Environmental Risk Assessment.		
UNIT – IV		
Environmental audit Introduction - Environmental Audit &Environmental Legislation Objectives of Environmental Audit, Types of Environmental Audit, Audit Protocol, Stages of Environmental Audit, Onsite Activities, Evaluation of Audit Data and Preparation of Audit Report		
UNIT – V		
Environmental Acts and Notifications The Environmental Protection Act, The Water Preservation Act, The Air (Prevention &Control of Pollution Act), Wild Life Act - Provisions in The EIA Notification, Procedure for Environmental Clearance, Procedure for Conducting Environmental Impact Assessment Report- Evaluation of EIA Report. Environmental Legislation Objectives, Evaluation of Audit Data and Preparation of Audit Report. Post Audit Activities, Concept of ISO and ISO 14000.		
TEXT BOOKS:		
1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B. S. Publication, Hyderabad 2nd edition 2011 2. Environmental Impact Assessment, by Canter Larry W., McGraw-Hill education Edi (1996)		
REFRENCE BOOKS:		
1. Environmental Engineering, by Peavy, H. S, Rowe, D. R, Tchobanoglous, G.Mc-Graw Hill International Editions, New York 1985. 2. Environmental Science and Engineering, by Suresh K. Dhaneja, S.K., Katania& Sons Publication, New Delhi 3. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke, Prentice Hall Publishers. 4. Environmental Pollution and Control, by H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/124/107/124107160/		

CIVIL ENGINEERING
III B. Tech – I Semester

Course Code	GREEN BUILDINGS (OPEN ELECTIVE - I)	L	T	P	C
23CET12		3	0	0	3

Course Objectives:
The objectives of this course are to make the student:

1. **To understand** the fundamental concepts of green buildings, their necessity, and sustainable features.
2. **To analyze** green building concepts, rating systems, and their benefits in India.
3. **To apply** green building design principles, energy efficiency measures, and renewable energy sources.
4. **To evaluate** air conditioning systems, HVAC designs, and energy modeling for sustainable buildings.
5. **To assess** material conservation strategies, waste management, and indoor environmental quality in green buildings.

Course Outcomes (COs)
Upon successful completion of the course, students will be able to:

1. **Understand** the importance of green buildings, their necessity, and sustainable features.
2. **Analyze** various green building practices, rating systems, and their impact on environmental sustainability.
3. **Apply** principles of green building design to enhance energy efficiency and incorporate renewable energy sources.
4. **Evaluate** HVAC systems, energy-efficient air conditioning techniques, and their role in sustainable building design.
5. **Assess** material conservation techniques, waste reduction strategies, and indoor air quality management in green buildings.

UNIT – I		

INTRODUCTION TO GREEN BUILDING :
Necessity of Green Buildings, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable Features for Green Buildings.

UNIT – II		
GREEN BUILDING CONCEPTS AND PRACTICES : Indian Green Building Council, Green Building Movement in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities and Benefits: Opportunities of Green Buildings, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy-Saving Approaches in Buildings, LEED India Rating System, and Energy Efficiency.		
UNIT – III		
GREEN BUILDING DESIGN: Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximizing System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources, Eco-Friendly Captive Power Generation for Factories, Building Requirements.		
UNIT – IV		
AIR CONDITIONING: Introduction, CII Godrej Green Business Centre, Design Philosophy, Design Interventions, Energy Modeling, HVAC System Design, Chiller Selection, Pump Selection, Selection of Cooling towers, Selection of Air Handling Units, Pre-Cooling of Fresh Air, Interior Lighting Systems, Key Features of The Building, Eco-Friendly Captive Power Generation for Factories, Building Requirements.		
UNIT – V		
MATERIAL CONSERVATION: Handling of Non-Process Waste, Waste Reduction During Construction, Materials with Recycled Content, Local Materials, Material Reuse, Certified Wood, Rapidly Renewable Building Materials and Furniture. Indoor Environment Quality and Occupational Health– Air Conditioning, Indoor Air Quality, Sick Building Syndrome, tobacco Smoke.		
TEXT BOOKS:		
1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009. 2. Green Building Hand Book by tom Woolley and Sam kimings, 2009.		
REFRENCE BOOKS:		
1. Complete Guide to Green Buildings by Trish riley **2.** Standard for the design for High Performance Green Buildings by Kent Peterson, 2009 3. Energy Conservation Building Code –ECBC-2020, published by BEE		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/102/105102195/		

CIVIL ENGINEERING					
III B. Tech – I Semester					
Course Code	**CONSTRUCTION TECHNOLOGY AND MANAGEMENT (OPEN ELECTIVE – I)**	L	T	P	C
23CET13		3	0	0	3

Course Objectives:

The objectives of this course are to make the student:

1. To understand project management fundamentals, organizational structures, and leadership principles in construction.
2. To analyze manpower planning, equipment management, and cost estimation in civil engineering projects.
3. To apply planning, scheduling, and project management techniques such as CPM and PERT.
4. To evaluate various contract types, contract formation, and legal aspects in construction management.
5. To assess safety management practices, accident prevention strategies, and quality management systems in construction.

Course Outcomes (COs):

Upon successful completion of the course, students will be able to:

1. Understand (Cos)project management fundamentals, organizational structures, and leadership principles in construction.
2. Analyze manpower planning, equipment management, and cost estimation in civil engineering projects.
3. Apply planning, scheduling, and project management techniques such as CPM and PERT.
4. Evaluate various contract types, contract formation, and legal aspects in construction management.
5. Assess safety management practices, accident prevention strategies, and quality management systems in construction.

UNIT – I

INTRODUCTION:

Project forms, Management Objectives and Functions; Organizational Chart of a Construction Company; Manager's Duties and Responsibilities; Public Relations; Leadership and Team - Work; Ethics, Morale, Delegation and Accountability.

UNIT – II		
MAN, AND MACHINE: Man-Power Planning, Training, Recruitment, Motivation, Welfare Measures and Safety Laws; Machinery for Civil Engineering., Earth Movers and Hauling Costs, Factors Affecting Purchase, Rent, and Lease of Equipment, and Cost Benefit Estimation.		
UNIT – III		
PLANNING, SCHEDULING AND PROJECT MANAGEMENT: Planning Stages, Construction Schedules and Project Specification, Monitoring and Evaluation; Bar-Chart, CPM, PERT, Network- formulation and Time Computation.		
UNIT – IV		
CONTRACTS: Types of Contracts, formation of Contract – Contract Conditions – Contract forLabour, Material, Design, Construction – Drafting of Contract Documents Based On IBRD/ MORTH Standard Bidding Documents – Construction Contracts – Contract Problems – Arbitration and Legal Requirements Computer Applications in Construction Management: Software for Project Planning, Scheduling and Control.		
UNIT – V		
SAFETY MANAGEMENT: Implementation and Application of QMS in Safety Programs, ISO 9000 Series, Accident Theories, Cost of Accidents, Problem Areas in Construction Safety, Fall Protection, Incentives, Zero Accident Concepts, Planning for Safety, Occupational Health and Ergonomics.		
TEXT BOOKS:		
1. Construction Project Management, SK. Sears, GA. Sears, RH. Clough, John Wiley and Sons, 6th Edition, 2016. 2. Construction Project Scheduling and Control by Saleh Mubarak, 4th Edition, 2019 3. Pandey, I.M (2021) Financial Management 12th edition. Pearson India Education Services Pvt. Ltd.		
REFRENCE BOOKS:		
1. Brien, J.O. and Plotnick, F.L., CPMin Construction Management, Mcgraw Hill, 2010. 2. Punmia, B.C., and Khandelwal, K.K., Project Planning and control with PERT and CPM, Laxmi Publications, 2002. 3. Construction Methods and Management: Pearson New International Edition 8 th Edition Stephens Nunnally. 4. Rhoden, M and Cato B, Construction Management andOrganisational Behaviour, Wiley-Blackwell, 2016.		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/104/105104161/ **https://archive.nptel.ac.in/courses/105/103/105103093/**		

CIVIL ENGINEERING

III B. Tech – I Semester

Course Code	**GEOTECHNICAL ENGINEERING LAB**	L	T	P	C
23CEP07		0	0	0	1.5

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the fundamental index properties of soils and their significance in geotechnical engineering.
2. **Perform** field and laboratory tests to determine in-situ density and compaction characteristics of soils.
3. **Evaluate** the engineering properties of soil, including permeability, shear strength, and consolidation.
4. **Analyze** the strength and deformation characteristics of soils through shear and compression tests.
5. Interpret test results and relate engineering properties of soils to real-world geotechnical problems and design considerations.

Upon successful completion of this course, students will be able to:

1. **Determine** index properties of soil, including specific gravity, grain size distribution, and consistency limits.
2. **Conduct** field and laboratory compaction tests to evaluate the moisture-density relationship of soil.
3. **Evaluate** permeability and consolidation characteristics of soil using appropriate laboratory techniques.
4. **Analyze** the shear strength and compressibility of soil through direct shear, unconfined compression, and tri-axial tests.
5. **Integrate test results and engineering judgment** to interpret soil behavior and make informed decisions in geotechnical engineering applications.

LIST OF EXPERIMENTS: -

1. Determination of Index Properties
    a. Specific Gravity of Soil
    b. Grain Size Distribution – Sieve Analysis
    c. Grain Size Distribution - Hydrometer Analysis
    d. Liquid Limit and Plastic Limit Tests
    e. Shrinkage Limit and Differential Free Swell Tests
2. Determination of In-Situ Density and Compaction Characteristics
    a. Field Density Test (Sand Replacement Method)
    b. Determination of Moisture–Density Relationship Using Standard Proctor Compaction Test.

3. Determination of Engineering Properties
    a. Permeability Determination (Constant Head Method)
    b. Permeability Determination (Falling Head Methods)
    c. Determination of Co-Efficient of Consolidation
    d. Direct Shear Test in Cohesion Less Soil
    e. Unconfined Compression Test in Cohesive Soil
    f. Laboratory Vane Shear Test in Cohesive Soil
    g. Tri-Axial Compression Test in Cohesion Less Soil
    h. California Bearing Ratio Test

Note: Any 10 of the above Experiments.

TEXT BOOKS:

1. Lambe T.W., ―Soil Testing for Engineers‖, John Wiley and Sons, New York, 1951. Digitized 2008.
2. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi.

REFRENCE BOOKS:

1. ―Saibaba Reddy, E. Ramasastri, K. ―Measurement of Engineering Properties of Soils‖, New age International (P) limited publishers, New Delhi, 2008.
2. G. Venkatappa Rao and Goutham. Potable, ―Geosynthetics Testing – A laboratory Manual‖, Sai Master Geoenvironmental Services Pvt. Ltd., 1st Edition 2008.
3. BrajaM.Das., ―Soil Mechanics: Laboratory Manual‖, Oxford University Press, eighth edition, 2012

Online Learning Resources:

https://nptel.ac.in/courses/105101160

CIVIL ENGINEERING
III B. Tech – I Semester

Course Code	FLUID MECHANICS HYDRAULIC MACHINES LAB	L	T	P	C
23CEP08		0	0	0	1.5

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the principles of fluid mechanics and validate fundamental concepts through experiments.
2. **Determine** discharge coefficients for various flow measurement devices and analyze flow behavior.
3. **Evaluate** energy losses in pipes, open channels, and hydraulic jumps to improve flow efficiency.
4. **Analyze** the impact of jet forces on vanes and their applications in hydraulic machinery.
5. **Assess** the performance characteristics of hydraulic turbines and pumps under different operating conditions.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Verify** Bernoulli ‘s equation and apply it to real-life fluid flow problems.
2. **Determine** the coefficient of discharge for orifices, notches, and flow meters.
3. **Evaluate** head losses due to friction and minor losses in pipe flow systems.
4. **Analyze** the impact of jets on vanes and its significance in hydraulic machinery.
5. **Assess** the performance of turbines and pumps under different conditions and recommend optimal operating parameters.

List of Experiments

1. Verification of Bernoulli ‘s Equation
2. Determination of Coefficient of Discharge for A Small Orifice by A Constant Head Method
3. Calibration of Venturimeter/ Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor Losses in Pipe Flow
6. Determination of Friction Factor of a Pipeline
7. Determination of Energy Loss in Hydraulic Jump
8. Determination of Manning ‘s and Chezy ‘s Constants for Open Channel Flow.
9. Impact of Jet On Vanes
10. Performance Characteristics of Pelton Wheel Turbine
11. Performance Characteristics of Francis Turbine
12. Performance Characteristics of Kaplan Turbine
13. Performance Characteristics of a Single Stage / Multistage Centrifugal Pump
14. **Note: Minimum 10 out of the above are to be conducted.**

TEXT BOOKS:
1. Deshmukh T. S., A lab manual on Fluid Mechanics and Hydraulic Machines, Laxmi Publications 2. Dr. S.K. Panigrahi, Ms. L. Mohanty, Fluid Mechanics and Hydraulic Machines Laboratory Manual, S.K. KATARIA & SONS, Educational Publisher.
REFRENCE BOOKS:
1. Dr. N. Kumara Swamy, Fluid Mechanics and Machinery Laboratory Manual, Chartor Publications 2. D. Sathish, Fluid Mechanics and Machinery Lab Manual, BP International Publications
Online Learning Resources:
https://archive.nptel.ac.in/courses/112/106/112106311/

CIVIL ENGINEERING
III B. Tech – I Semester

Course Code	ESTIMATION, SPECIFICATIONS, COSTING AND VALUATION	L	T	P	C
23CEP09		0	1	2	2

Course Objectives:
The objectives of this course are to make the student to:

1. **Understand** the various methods and types of estimates used in civil engineering projects.
2. **Develop** detailed estimates for single and multi-storey buildings using standard estimation methods.
3. **Analyze** rate analysis, abstract estimation, and bill preparation as per standard procedures.
4. **Prepare** detailed specifications and tender documents for construction works.
5. **Evaluate** the valuation, cost escalation, and value analysis of buildings.

Course Outcomes:
Upon successful completion of this course, students will be able to:

1. **Apply** estimation techniques to prepare detailed estimates for various construction projects.
2. **Develop** abstract estimates and rate analysis for different civil engineering works.
3. **Analyze** the preparation of measurement books and bill preparation as per AP State Government procedures.
4. **Create** detailed specifications and tender documents for construction projects.
5. **Assess** building valuation, cost escalation, and value analysis techniques.

List of Experiments

1. Activity Based on Learning Methods and Types of Estimates
2. Preparation of Detailed Estimate for A Single-Storied Residential Building Using Wall to Wall Method
3. Preparation of Detailed Estimate for A Single Storied Residential Building Using Centre Line Method for Earthwork, Foundations, Super Structure, Fittings Including Sanitary and Electrical Fittings &Paintings.

4. Preparation of Detailed Estimate for A Two Storied Residential Building Using Centre Line Method for Earthwork, Foundations, Super Structure, Fittings Including Sanitary and Electrical Fittings &Paintings.
5. Activity Based Learning of Estimate Data and Rate Analysis
6. Preparation of Abstract Estimate for The Detailed Estimate in Exercise No.3
7. Preparation of Abstract Estimate for The Detailed Estimate in Exercise No.4
8. Writing of Measurement Book and Bill Preparation as Per AP State Govt Procedure for Detailed Estimate in No. 3 and Abstract Estimate of No. 6
9. Writing of Detailed Specifications for Various Items of Estimate and Preparing a Model Tender Document for The Work Listed in No. 3 and 6
10. Activity Based Learning for Valuation of Buildings, Cost Escalation Procedures and Value Analysis for Any One Work

TEXT BOOKS:

1. B.N. Dutta - Estimating and Costing in Civil Engineering, CBS Publishers & Distributors, 28th Revised Edition (2020).
2. Rangwala - Estimating, Costing and Valuation, Charotar Publishing House, 2023.
3. D.D. Kohli& R.C. Kohli - A Textbook of Estimating and Costing (Civil), S. Chand Publishing, 2011.

REFRENCE BOOKS:

1. M. Chakraborti - Estimating, Costing, Specification &Valuation in Civil Engineering, 29th Edition (2021).
2. Gurcharan Singh - Estimating, Costing and Valuation, Standard Publishers, 2018.
3. V.N. Vazirani& S.P. Chandola - Civil Engineering Estimating & Costing, Khanna Publishers, 4th Edition (2001).

Online Learning Resources:

https://onlinecourses.swayam2.ac.in/nou20_cs11/preview
https://www.coursera.org/learn/construction-cost-estimating

III B. Tech – I semester

L	T	P	C
2	0	0	1

TINKERING LAB

The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

	Course objectives: The objectives of the course are to
1	Encourage Innovation and Creativity
2	Provide Hands-on Learning and Impart Skill Development
3	Foster Collaboration and Teamwork
4	Enable Interdisciplinary Learning, Prepare for Industry and Entrepreneurship
5	Impart Problem-Solving mind-set

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

List of experiments:

1) Make your own parallel and series circuits using breadboard for any application of your choice.
2) Demonstrate a traffic light circuit using breadboard.
3) Build and demonstrate automatic Street Light using LDR.
4) Simulate the Arduino LED blinking activity in Tinker cad.
5) Build and demonstrate an Arduino LED blinking activity using Arduino IDE.
6) Interfacing IR Sensor and Servo Motor with Arduino.
7) Blink LED using ESP32.
8) LDR Interfacing with ESP32.
9) Control an LED using Mobile App.
10) Design and 3D print a Walking Robot
11) Design and 3D Print a Rocket.
12) Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote plan in your computer dashboard.
13) Demonstrate all the steps in design thinking to redesign a motor bike.

Students need to refer to the following links:

Course Outcomes: The students will be able to experiment, innovate, and solve real-world challenges.

1) https://aim.gov.in/pdf/equipment-manual-pdf.pdf
2) https://atl.aim.gov.in/ATL-Equipment-Manual/
3) https://aim.gov.in/pdf/Level-1.pdf
4) https://aim.gov.in/pdf/Level-2.pdf
5) https://aim.gov.in/pdf/Level-3.pdf

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**DESIGN OF STEEL STRUCTURES**	L	T	P	C
23CET14		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the properties, types, and applications of structural steel in construction.
2. **Analyze** the behavior and design of bolted and welded connections for steel structures.
3. **Design** tension and compression members, including built-up members and column bases.
4. **Develop** steel structural elements such as beams, plate girders, roof trusses, and gantry girders.
5. **Apply** plastic analysis concepts to the design of continuous beams and portal frames.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Explain** the properties of structural steel, types of sections, and the concept of limit state design.
2. **Analyze and design** bolted and welded connections for structural steel members.
3. **Design** tension and compression members, including built-up sections and column bases.
4. **Develop** design solutions for beams, plate girders, roof trusses, and gantry girders.
5. **Perform** plastic analysis and design of continuous beams and portal frames.

UNIT – I

INTRODUCTION to STRUCTURAL STEEL and DESIGN of CONNECTIONS:

General -Types of Steel -Properties of Structural Steel - I.S. Rolled Sections - Concept of Limit State Design - Design of Simple and Eccentric Bolted and Welded Connections - Types of Failure and Efficiency of Joint – Prying Action - Introduction to HSFG bolts

UNIT – II

DESIGN of TENSION and COMPRESSION MEMBERS:

Behaviour and Design of Simple and Built-Up Members Subjected to Tension - Shear Lag Effect Design of Lug Angles - Tension Splice - Behaviour of Short and Long Columns - Euler's Column Theory Design of Simple and Built-Up Compression Members with Lacings and Battens - Design of Column Bases - Slab Base and Gusseted Base

UNIT – III

DESIGN of BEAMS:

Design of Laterally Supported and Unsupported Beams - Design of Built-Up Beams - Design of Plate Girders

UNIT – IV

INDUSTRIAL STRUCTURES:

Design of Roof Trusses – Loads on Trusses – Purlin Design Using Angle and Channel

Sections – Truss Design, Design of Joints and End Bearings–Design of Gantry Girder - Introduction to Pre-Engineered Buildings

UNIT – V

PLASTIC ANALYSIS and DESIGN:

Introduction to Plastic Analysis - Theory of Plastic Analysis - Design of Continuous Beams and Portal Frames Using Plastic Design Approach.

TEXT BOOKS:

1. Duggal S.K., Design of Steel Structures, Tata McGraw Hill, Publishing Co. Ltd., New Delhi, 2010
2. Bhavikatti S.S, Design of Steel Structures, Ik International Publishing House, New Delhi, 2017.

REFRENCE BOOKS:

1. Gambhir M L, Fundamentals of Structural Steel Design, McGraw Hill Education India Pvt Limited, 2013
2. Jack C. McCormac& Stephen F. Csernak - Structural Steel Design, Pearson, 7th Edition, 2023.
3. William T. Segui & Farid Soleimani - Steel Design, Cengage, 7th Edition, 2023.
4. SarwarAlamRaz, Structural Design in Steel, New Age International Publishers, 2014
5. Subramanian N, Design of Steel Structures, Oxford University Press, New Delhi, 2016

Online Learning Resources:

https://nptel.ac.in/courses/105105162

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**HIGHWAY ENGINEERING**	L	T	P	C
23CET15		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the history, importance, and planning aspects of highway development in India.
2. **Apply** geometric design principles for highway alignment, sight distance, and curves.
3. **Analyze** traffic characteristics, capacity, level of service, and road safety measures.
4. **Design** flexible and rigid pavements using IRC guidelines.
5. **Evaluate** highway construction materials, testing methods, and maintenance techniques.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Explain** the significance, planning, and alignment of highways.
2. **Design** geometric elements of highways, including curves, gradients, and sight distances.
3. **Analyze** traffic flow, capacity, level of service, and implement road safety measures.
4. **Design** flexible and rigid pavements as per IRC guidelines.
5. **Assess** construction practices, highway materials, and pavement maintenance techniques.

UNIT – I

PLANNED HIGHWAY DEVELOPMENT IN INDIA:

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.

UNIT – II

GEOMETRIC DESIGN OF HIGHWAYS:

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.

UNIT – III

TRAFFIC ENGINEERING STUDIES:

Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - Traffic Volume Studies- Data Collection and Presentation-Speed studies- Data Collection and Presentation- - Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.

UNIT – IV		
INTERSECTION DESIGN: Conflicts at Intersections- Channelization: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections – Types of Grade-Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersections.		
UNIT – V		
PAVEMENT DESIGN: Types of Pavements – Difference Between Flexible and Rigid Pavements – Pavement Components – Sub Grade, Sub Base, Base and Wearing Course – Functions of Pavement Components – Design Factors – Flexible Pavement Design Methods – G.I Method, CBR Method, (As Per IRC 37-2002) –Design of Rigid Pavements – Critical Load Positions - Westergard's Stress Equations – Computing Radius of Relative Stiffness and Equivalent Radius of Resisting Section – Stresses in Rigid Pavements – Design of Expansion and Contraction Joints in CC Pavements. Design of Dowel Bars and Tie Bars.		
TEXT BOOKS:		
1. Highway Engineering – S.K. Khanna & C.E. G. Justo, Nemchand& Bros., 9th edition (2011). 2. Transportation Engineering, Volume I, C Venkatramaiah, Universities Press, 2015		
REFRENCE BOOKS:		
1. Principles of Highway Engineering by L.R. Kadiyali, Khanna Publishers 2. Traffic Engineering and Transportation Planning by L.R. Kadiyali and Lal- Khanna Publications 9th edition 3. Highway Engineering – Dr. S.K. Sharma, S. Chand Publishers 2014 edition		
Online Learning Resources:		
https://nptel.ac.in/courses/105101087		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**ENVIRONMENTAL ENGINEERING**	L	T	P	C
23CET16		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the sources, demand estimation, and quality parameters of water.
2. **Apply** water treatment processes for purification and supply.
3. **Analyze** storage, distribution, and operation of water supply systems.
4. **Design** sewerage systems, stormwater drainage, and plumbing networks.
5. **Evaluate** sewage treatment, sludge management, and water reuse methods.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Explain** water sources, quality standards, and waterborne diseases.
2. **Design** unit processes of water treatment plants.
3. **Analyze** water distribution networks and pumping stations.
4. **Design** sewerage systems, including stormwater and sanitary sewers.
5. **Assess** sewage treatment methods and advanced wastewater management techniques.

UNIT – I

WATER SUPPLY:

Estimation of Surface and Subsurface Water Resources - Predicting Demand for Water- Impurities of Water and Their Significance - Physical, Chemical and Bacteriological Analysis - Waterborne Diseases - Standards for Potable Water. Intake of Water: Pumping and Gravity Schemes.

UNIT – II

WATER TREATMENT:

Objectives - Unit Operations and Processes - Principles, Functions, and Design of Water Treatment Plant Units, Aerators of Flash Mixers, Coagulation and Flocculation – Clarifloccuator- Plate and Tube Settlers – Pulsator Clarifier - Sand Filters - Disinfection - Softening, Removal of Iron and Manganese - Defluorination- Softening - Desalination Process - Residue Management - Construction, Operation and Maintenance Aspects

UNIT – III

WATER STORAGE and DISTRIBUTION:

Storage and Balancing Reservoirs - Types, Location and Capacity. Distribution System: Layout, Hydraulics of Pipe Lines, Pipe Fittings, Valves Including Check and Pressure Reducing Valves, Meters, Analysis of Distribution Systems, Leak Detection, Maintenance of Distribution Systems, Pumping Stations and Their Operations - House Service Connections.

UNIT – IV

PLANNING and DESIGN of THE SEWERAGE SYSTEM:

Characteristics and Composition of Sewage - Population Equivalent - Sanitary Sewage Flow Estimation - Sewer Materials - Hydraulics of Flow in Sanitary Sewers - Sewer Design - Storm Drainage-Storm Runoff Estimation - Sewer Appurtenances - Corrosion in Sewers - Prevention and Control – Sewage Pumping-Drainage in Buildings - Plumbing Systems for Drainage

UNIT – V		
SEWAGE TREATMENT and DISPOSAL: Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended Aeration Systems - Trickling Filters - Sequencing Batch Reactor (SBR) - UASB - Waste Stabilization Ponds - Other Treatment Methods - Reclamation and Reuse of Sewage - Recent Advances in Sewage Treatment - Construction, Operation and Maintenance Aspects. - Discharge Standards-Sludge Treatment -Disposal of Sludge		
TEXT BOOKS:		
1. Environmental Engineering by H. S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014 2. Environmental Engineering, I and II by BC Punmia, Std. Publications.		
REFRENCE BOOKS:		
1. Environmental Engineering, I and II by SK Garg, Khanna Publications. 2. Environmental Pollution and Control Engineering CS Rao, Wiley Publications 3. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015. 4. Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015. 5. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr. Wiley, 2007.		
Online Learning Resources:		
https://nptel.ac.in/courses/103107084		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**DESIGN OF EARTHQUAKE RESISTANT STRUCTURES (PE - II)**	L	T	P	C
23CET17a		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the fundamental concepts of engineering seismology, including earthquake phenomena, seismic waves, and measuring instruments.
2. **Analyze** the principles of structural vibrations, degrees of freedom, and dynamic response of structures to earthquake ground motions.
3. **Evaluate** conceptual design strategies, seismic design principles, and methods for improving earthquake resistance in structures.
4. **Apply** earthquake-resistant design principles to reinforced concrete and masonry buildings using IS codes and lateral force methods.
5. **Assess** the role of structural walls, non-structural elements, and ductility considerations in enhancing earthquake resistance.

Course Outcomes (COs):

After successful completion of this course, students will be able to:

1. **Explain** earthquake mechanisms, seismic waves, and seismic zones, including measuring techniques and instruments.
2. **Analyze** vibratory systems, single-degree-of-freedom (SDOF) models, damping effects, and earthquake-induced dynamic forces.
3. **Evaluate** conceptual design strategies, ductility factors, and seismic design methods for ensuring structural resilience.
4. **Apply** IS code provisions and lateral force methods for seismic design of reinforced concrete and masonry buildings.
5. **Assess** the significance of structural walls, non-structural elements, and ductile detailing in enhancing earthquake resistance.

UNIT – I

Engineering Seismology: Earthquake Phenomenon - Cause of Earthquakes-Faults- Plate Tectonics- Seismic Waves- Terms Associated with Earthquakes-Magnitude/Intensity of An Earthquake-Scales- Energy Released-Earthquake Measuring Instruments Seismogram - Seismoscope, Seismograph, - Strong Ground Motions- Seismic Zones of India.

Theory of Vibrations: Elements of A Vibratory System- Degrees of Freedom-Continuous System- Lumped Mass Idealization-Oscillatory Motion-Simple Harmonic Motion-Free Vibration of Single Degree of Freedom (SDOF) System- Undamped and Damped-Critical Damping-Logarithmic Decrement-Forced Vibrations-Harmonic Excitation-Dynamic Magnification Factor-Excitation by Rigid Based Translation for SDOF System-Earthquake Ground Motion.

UNIT – II		
Conceptual Design: Introduction-Functional Planning-Continuous Load Path-Overall form-Simplicity and Symmetry-Elongated Shapes-Stiffness and Strength-Horizontal and Vertical Members-Twisting of Buildings-Ductility-Ductility Relationships-Flexible Buildings-Framing Systems-Choice of Construction Materials-Unconfined Concrete-Confined Concrete-Masonry-Reinforcing Steel. **Introduction to Earthquake Resistant Design**: Seismic Design Requirements-Regular and Irregular Configurations-Basic Assumptions-Design Earthquake Loads-Basic Load Combinations-Permissible Stresses-Seismic Methods of Analysis-Factors in Seismic Analysis-Equivalent Lateral force Method.		
UNIT – III		
Reinforced Concrete Buildings: Principles of Earthquake Resistant Deign of RC Members-Structural Models for Frame Buildings - Seismic Methods of Analysis- Is Code Based Methods for Seismic Design - Vertical Irregularities - Plan Configuration Problems- Lateral Load Resisting Systems- Determination of Design Lateral forces as Per Is 1893 (Part-1):2016- Equivalent Lateral force Procedure- Lateral Distribution of Base Shear.		
UNIT – IV		
Masonry Buildings: Introduction- Elastic Properties of Masonry Assemblage- Categories of Masonry Buildings- Behaviour of Unreinforced and Reinforced Masonry Walls- Behavior of Walls- Box Action and Bands- Behaviour of Infill Walls- Improving Seismic Behaviour of Masonry Buildings-Load Combinations and Permissible Stresses-Seismic Design Requirements- Lateral Load Analysis of Masonry Buildings.		
UNIT – V		
Structural Walls and Non-Structural Elements: Strategies in The Location of Structural Walls- Sectional Shapes- Variations in Elevation- Cantilever Walls Without Openings – Failure Mechanism of Non-Structures- Effects of Non-Structural Elements On Structural System- Analysis of Non-Structural Elements- Prevention of Non-Structural Damage Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors Affecting Ductility-Ductile Detailing Considerations as Per Is 13920-2016 - Behaviour of Beams, Columns and Joints in RC Buildings During Earthquakes		
TEXT BOOKS:		
1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press 2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.		
REFRENCE BOOKS:		
1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons. 2. Earthquake Resistant Design overbuilding structures by Vinod Hosur, Wiley India Pvt. Ltd. 3. Elements of Mechanical Vibration by R.N. Iyengar, I.K. International Publishing House Pvt. Ltd. 4. Masonry and Timber structures including earthquake Resistant Design –Anand S. Arya, Nemchand& Bros 5. Earthquake Tips – Learning Earthquake Design and Construction, C.V.R. Murthy 6. BIS Codes: 1. IS 1893(Part-1):2016 or Latest codes; 2. IS 13920:2016. 3. IS 4326. 4. IS 456:2000 or latest.		
Online Learning Resources:		
https://nptel.ac.in/courses/105107204		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**OPEN CHANNEL FLOW (PE – II)**	L	T	P	C
23CET17b		3	0	0	3

Course Objectives (COs):

The objectives of this course are to make the student to:

1. Explain the principles governing fluid flow in pipelines and networks, including steady and unsteady flow conditions.
2. Apply fundamental concepts of uniform and varied flow in open channels for analyzing hydraulic structures and networks.
3. Analyze the behavior of unsteady flows in open channels, including wave motion and dam break scenarios.
4. Evaluate sediment transport mechanisms and their impact on hydraulic structures, reservoirs, and river morphology.
5. Design and assess hydraulic models, flow measurement devices, and physical models for hydraulic applications.

Course Outcomes (COs):

After successful completion of this course, students will be able to:

1. Describe the fundamental principles of fluid flow in pipelines and networks under steady and unsteady conditions.
2. Solve problems related to uniform and varied flow in open channels using theoretical and computational approaches.
3. Analyze the impact of unsteady flow phenomena such as surges and dam breaks in open channels.
4. Evaluate sediment transport processes and their influence on river morphology and hydraulic structures.
5. Develop and validate hydraulic models for flow measurement and physical modeling applications in fluid mechanics.

UNIT – I

HYDRAULICS of PIPELINES and PIPE NETWORKS:

Review of Fluid Mechanics. Reynolds Transport Theorem and Applications. Steady Flow Analysis of Pipe Network Systems. Unsteady Flows - Basic Equations of Water Hammer, Solution by Method of Characteristics. Network Analysis

UNIT – II

STEADY VARIED FLOWS in OPEN CHANNELS:

Basic Concepts of Uniform Flow. Specific Energy and Specific force Concepts. Dynamic Equation for Spatially Varied Flows. Flow Profile Computations. Introduction to Hec-Ras. Spatially Varied Flows and Rapidly Varied Flows – Applications.

UNIT – III

UNSTEADY FLOWS in OPEN CHANNELS:

Equations of Motion. Uniformly Progressive Wave. Rapidly Varied Unsteady Flow – Positive and Negative Surges. Dam Break Problem

UNIT – IV		
SEDIMENT TRANSPORT: Sediment Properties – Inception of Sediment Motion – Bed forms. Bed Load Suspended Load – total Sediment Transport. Design of Stable Channels and Regime Channels. Reservoir Sedimentation and Trap Efficiency.		
UNIT – V		
FLOW MEASUREMENTS and HYDRAULIC MODELING: Sharp-Crested Weirs, Broad-Crested Weirs, Critical Depth Flumes. Recent Advancement in Open Channel Flow Measurements. Physical Modeling in Hydraulics. Dimensional Analysis. Modeling Closed Flows and Free Surface Flows. Distorted Models. Design of Physical Models.		
TEXT BOOKS:		
1. Flow in Open Channels, Subramanya K., Tata McGraw Hill Pub., N Delhi2015 2. Flow through Open Channels, Rajesh Srivastava, Oxford Univ. Press. N Delhi, 2011 3. Open Channel Hydraulics, Chow, V.T., McGrawHillInc.NYork,1979		
REFRENCE BOOKS:		
1. Open Channel Hydraulics, French, R.H., McGraw Hill Pub Co., NYork,1986 2. Open Channel Hydraulics, Terry Sturm, Tata McGraw Hill Pub. N Delhi,2011		
Online Learning Resources:		
https://nptel.ac.in/courses/105/106/105106114/		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**FOUNDATION ENGINEERING (PE – II)**	L	T	P	C
23CET17c		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. Understand the need for soil exploration and various methods used in site investigations.
2. Analyze the stability of slopes under different conditions using various stability methods.
3. Apply earth pressure theories to analyze retaining walls and soil pressures.
4. Evaluate the bearing capacity and settlement characteristics of shallow foundations.
5. Assess the load-carrying capacity and settlement of deep foundations, including pile and well foundations.

Course Outcomes (COs):

After successful completion of this course, students will be able to:

1. Explain the principles of soil exploration, field testing, and soil investigation reporting.
2. Analyze slope stability using different failure theories and numerical methods.
3. Apply earth pressure theories to determine the stability of retaining walls.
4. Evaluate the bearing capacity and settlement of shallow foundations using theoretical and field methods.
5. Analyze deep foundations, including pile and well foundations, for their load-carrying capacity and settlement.

UNIT – I

SOIL EXPLORATION: Need – Methods of Soil Exploration – Boring and Sampling Methods – Field Tests – Penetration Tests – Plate Load Test – Pressure Meter – Planning of Programme and Preparation of Soil Investigation Report.

UNIT – II

SHALLOW FOUNDATIONS: Types – Choice of Foundation – Location of Depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff ‘s and Skempton`s Methods

ALLOWABLE BEARING PRESSURE: Safe Bearing Pressure Based On N- Value – Allowable Bearing Pressure; Safe Bearing Capacity and Settlement from Plate Load Test – Allowable Settlements of Structures – Settlement Analysis.

UNIT – III

PILE FOUNDATION: Types of Piles – Load Carrying Capacity of Piles Based on Static Pile formulae – Dynamic Pile formulae – Pile Load Tests – Load Carrying Capacity of Pile Groups in Sands and Clays – Settlement of Pile Groups

WELL FOUNDATIONS: Types – Different Shapes of Wells – Components of Wells – Functions and Design Criteria – Sinking of Wells – Tilts and Shifts

UNIT – IV		
EARTH SLOPE STABILITY: Infinite and Finite Earth Slopes – Types of Failures – Factor of Safety of Infinite Slopes – Stability Analysis by Swedish Arc Method, Standard Method of Slices, Bishop 's Simplified Method – Taylor 's Stability Number- Stability of Slopes of Earth Dams Under Different Conditions.		
UNIT – V		
EARTH PRESSURE THEORIES: Rankine 's Theory of Earth Pressure – Earth Pressures in Layered Soils – Coulomb 's Earth Pressure Theory – Rebmann's and Cullman 's Graphical Method **RETAINING WALLS:** Types of Retaining Walls – Stability of Retaining Walls		
TEXT BOOKS:		
1. Geotechnical Engineering by C. Venkatramaiah, New Age Publications (2002). 2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi 7th edition 2009 3. Soil Mechanics and Foundations by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi publications Pvt. Ltd., New Delhi 17th edition 2017.		
REFRENCE BOOKS:		
1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Publications 2nd edition 2013 2. Principles of Foundation Engineering by Das, B.M., - (1999)–6th edition (Indian edition) Thomson Engineering 3. Foundation Engineering by Varghese., Prentice Hall of India., New Delhi. 4. Foundation Engineering by V.N.S. Murthy, CRC Press, New Delhi.		
Online Learning Resources:		
https://nptel.ac.in/courses/105105176		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**COST EFFECTIVE HOUSING TECHNIQUES (PE – III)**	L	T	P	C
23CET18a		3	0	0	3

Course Objectives (COs):

The objectives of this course are to make the student to:

1. Analyze the housing scenario in urban and rural areas, including challenges in housing finance and urban planning.
2. Explore and evaluate innovative low-cost housing technologies for sustainable construction.
3. Investigate alternative building materials and infrastructure services for cost-effective housing solutions.
4. Assess rural housing techniques, including traditional mud housing, soil stabilization, and fire treatment for roofing.
5. Develop strategies for housing in disaster-prone areas, with a focus on earthquake, cyclone, and flood-resistant construction.

Course Outcomes (COs):

After successful completion of this course, students will be able to:

1. Examine the current status of urban and rural housing and analyze the role of finance and planning in housing development.
2. Evaluate and recommend cost-effective construction techniques, including prefabrication and innovative roofing/flooring systems.
3. Assess the feasibility of alternative building materials and infrastructure solutions for low-cost housing.
4. Analyze traditional rural housing methods and propose modern techniques for improving rural housing quality.
5. Design housing solutions for disaster-prone areas by incorporating earthquake, cyclone, and flood-resistant strategies.

UNIT – I

a) **Housing Scenario: Introducing** - Status of Urban Housing - Status of Rural Housing

b) **Housing Finance**: Introducing - Existing Finance System in India - Government Role as Facilitator - Status at Rural Housing Finance – Impedimently in Housing Finance and Related Issues

c) **Land Use and Physical Planning for Housing: Introduction** - Planning of Urban Land - Urban Land Ceiling and Regulation Act - Efficiency of Building Bye Lass - Residential Densities

d) **Housing The Urban Poor: Introduction** - Living Conditions in Slums - Approaches and Strategies for Housing Urban Poor.

UNIT – II		
DEVELOPMENT AND ADOPTION OF LOW-COST RESILIENT HOUSING TECHNOLOGY: Introduction - 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		
UNIT – III		
ALTERNATIVE BUILDING MATERIALS FOR LOW-COST HOUSING: Introduction - Substitute for Scarce Materials – Ferro-Cement - Gypsum Boards - Timber Substitutions - Industrial Wastes - Agricultural Wastes - Alternative Building Maintenance **LOW-COST INFRASTRUCTURE SERVICES:** Introduction - Present Status - Technological Options - Low-Cost Sanitation - Domestic Wall - Water Supply, Energy		
UNIT – IV		
RURAL HOUSING: Introduction Traditional Practice of Rural Housing Continuous - Mud Housing Technology Mud Roofs - Characteristics of Mud - Fire Treatment for Thatch Roof - Soil Stabilization - Rural Housing Program		
UNIT – V		
HOUSING IN DISASTER PRONE AREAS: Introduction – Earthquake - Damages to Houses - Traditional Prone Areas - Type of Damages and Railways of Non-Engineered Buildings - Repair and Restore Action of Earthquake Damaged Non-Engineered 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		
TEXT BOOKS:		
1. Building materials for low – income houses – International council for building research studies and documentation. 2. Hand book of low-cost housing by A.K. Lal – New age international publishers. 3. Low-cost Housing – G.C. Mathur by South Asia Books		
REFRENCE BOOKS:		
1. Properties of concrete – Neville A.m. Pitman Publishing Limited, London. 2. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963. 3. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Rama Chandra Murthy & G. Annamalai. E. & F. N. Spon Publishers		
Online Learning Resources:		
https://nptel.ac.in/courses/124107001		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**WATERSHED MANAGEMENT (PE – III)**	L	T	P	C
23CET18b		3	0	0	3

Course Objectives:
The objectives of this course are to make the student to:

1. **Understand** the concept of watershed management, stakeholder roles, pollution sources, and environmental guidelines for water quality.
2. **Analyze** soil erosion processes, sediment yield, and wetland hydrology, including the role of water in wetland ecosystems.
3. **Evaluate** surface water and groundwater interactions, wetland water quality, and hydrological models for effective watershed planning.
4. **Apply** principles of wetland hydrologic assessment, water harvesting, and watershed treatment system design to real-world scenarios.
5. **Assess** irrigation planning, participatory water management, and water footprint concepts to ensure sustainable water resource utilization.

Course Outcomes (COs):
After successful completion of this course, students will be able to:

1. **Explain** watershed management concepts, pollution control strategies, and environmental policies related to water quality.
2. **Analyze** erosion processes, wetland water budgets, and sediment transport models to assess land degradation and conservation needs.
3. **Evaluate** surface and groundwater interactions, wetland treatment efficiency, and hydrological models for integrated water resource management.
4. **Apply** water harvesting techniques, hydrologic modeling, and wetland design methods for sustainable watershed management.
5. **Assess** irrigation water management strategies, drought mitigation policies, and the role of water footprint in agricultural sustainability.

UNIT – I

CONCEPT OF WATERSHED: Introduction to Watershed Management, Different Stakeholders and Their Relative Importance, Watershed Management Policies and Decision Making, Watershed Management Practices in Arid and Semiarid Regions, Short Term and Long-Term Strategic Planning, Types and Sources of Pollution, Environmental Guidelines for Water
Quality, Perspective on Recycle and Reuse

UNIT – II

MORPHOMETRY: Soil Erosion - Erosion - Factors Affecting Erosion, Effects of Erosion on Land Fertility and Land Capability, Soil Erosion Modelling, Erosivity and Erodibility - Sediment Yield and Sedimentation- Wetland Definitions and The Role of Water in Wetland Structure and Function, Introduction to Wetland Water Budgets and Hydro-Period Components of The Water Budget: Inflows, Outflows, and Storage, Precipitation and Runoff, Evapotranspiration;

UNIT – III		
SURFACE WATER FLOWS: Structures and Channels, Groundwater-Surface Water Exchange in Wetlands, Surface Water Flows and Wetland Hydrology Case Studies, Flow and Mixing in Wetlands Wetland Water Quality Information: Nutrients, Organic/Inorganic Contaminants, Sediments and Colloids, Wetland Transport Models I: Plug Flow, Cstrs and Cstrs in Series; Intro to Method of Moments.		
UNIT – IV		
WETLAND HYDROLOGIC ASSESSMENT: Physical and Biological Processes, Anthropogenic and Climate Change Impacts on Wetland Hydrology, Modeling Wetland Hydrology, Hydraulics, and Hydrodynamics, Introduction to Wetland Treatment Systems Design - Water Harvesting: Rainwater Harvesting, Catchment Harvesting, Harvesting Structures - Model Watershed – Government and Ngo Projects.		
UNIT – V		
RAIN WATER MANAGEMENT: Planning and Operation of Irrigation Systems. Conjunctive Use of Water. Participatory Irrigation Management and Integrated Water Resources Management (IWRM), Water Management Policy During Droughts. Predicting Effect of Water Shortage on Crops. Introduction to Water Footprint of Crops and Its Applications. Blue, Green and Grey Water Foot Print.		
TEXT BOOKS:		
1. T. O. Randhir, Watershed Management: Issues and Approaches, IWA Publishing, 2006 2. J. V. S. Murty, Watershed Management, New Age International, 2013		
REFRENCE BOOKS:		
1. D. K. Majumdar, Irrigation Water Management, Prentice Hall, 2014 2. K. N. Brooks, P. F. Folliott, J. A. Magner, Hydrology and the Management of Watersheds, Wiley-Blackwell, Fourth edition, 2012 3. E. M. Tideman, Watershed Management: Guidelines for Indian Conditions, Omega Scientific Publishers, 1996 4. R. Rajora, Integrated Watershed Management: Field Manual for Equitable, Productive and Sustainable Development, Rawat Publications, 2019		
Online Learning Resources:		
https://nptel.ac.in/courses/105101010 **https://nptel.ac.in/courses/126105334**		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**ADVANCED STRUCTURAL ANALYSIS (PE – III)**	L	T	P	C
23CET18c		3	0	0	3

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the fundamental concepts of arches, including three-hinged and two-hinged arches, and analyze the effects of horizontal thrust, bending moment, normal thrust, and radial shear.
2. **Apply** the moment distribution method to analyze single-bay, single-story portal frames with and without side sway.
3. **Analyze** continuous beams and portal frames using Kani 's Method, including cases with and without settlement of supports.
4. **Solve** structural problems using the flexibility method for continuous beams and single-bay portal frames, considering support settlements and side sway effects.
5. **Evaluate** the stiffness method for analyzing continuous beams and single-bay portal frames with and without side sway, ensuring structural stability and performance.

Course Outcomes (COs):

After successful completion of this course, students will be able to:

1. **Explain** the behavior of three-hinged and two-hinged arches and **analyze** the effects of horizontal thrust, bending moment, normal thrust, and radial shear. (Bloom's Level: Understand - L2, Analyze - L4)
2. **Apply** the moment distribution method to **analyze** single-bay, single-story portal frames with and without side sway. (Bloom's Level: Apply - L3, Analyze - L4)
3. **Analyze** continuous beams and portal frames using Kani 's Method, including cases with and without settlement of supports.
4. **Solve** structural problems using the flexibility method for continuous beams and single-bay portal frames, considering support settlements and side sway effects.
5. **Evaluate** the stiffness method for analyzing continuous beams and single-bay portal frames with and without side sway, ensuring structural stability and performance.

UNIT – I

ARCHES: Three Hinged and Two Hinged Arches, Elastic Theory of Arches– Eddy's Theorem –Determination of Horizontal Thrust, Bending Moment, Normal Thrust and Radial Shear– Effect of Temperature-Determination of Horizontal Thrust Bending Moment, Normal Thrust and Radial Shear–Rib Shortening and Temperature Stresses.

UNIT – II

MOMENT DISTRIBUTION METHOD FOR FRAMES: -Analysis of Single Bay Single Storey Portal Frame Including Sides Way–Substitute Frame Analysis by Two Cycle Method.

UNIT – III

KANI`S METHOD: -

Analysis of Continuous Beams with and Without Settlement of Supports-Single Bay Single Storey Portal Frames with and Without Side Sway.

UNIT – IV		
FLEXIBILITY METHODS: - Flexibility Methods- Introduction-Application to Continuous Beams Including Support Settlements—Analysis of Single Bay Single Storey Portal Frames Without and With Side Sway.		
UNIT – V		
STIFFNESS METHODS: Stiffness Methods – Introduction – Application to Continuous Beams Including Support Settlements – Analysis of Single Bay Single Storey Portal Frames Without and With Side Sway.		
TEXT BOOKS:		
1. Analysis of structures by Vazrani & Ratwani– Khanna Publications. 2. Theory of structures by Ramamuratam, Jain book depot, New Delhi.		
REFRENCE BOOKS:		
1. Structural analysis by R.S. Khurmi, S. Chand Publications, New Delhi. 2. Basic Structural Analysis by K.U. Muthuetal., I.K. International Publishing House Pvt.Ltd 3. Theory of Structures by Gupta SP, GSPundit and R Gupta, Vol II, Tata McGraw Hill Publications Company td. 4. D. S. Prakash Rao, ―Structural Analysis: A Unified Approach‖, Universities Press		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/106/105106050/		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**DISASTER MANAGEM ENT (OE – II)**	L	T	P	C
23CET19		3	0	0	3

Course Objectives:

The objectives of this course are to make the student:

1. To understand the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies.
2. To analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.
3. To apply wind engineering principles and computational techniques in designing wind-resistant structures.
4. To evaluate earthquake effects on buildings and develop strategies for seismic retrofitting.
5. To assess seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures.

Course Outcomes:

After successful completion of this course, students will be able to:

1. Understand the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies.
2. Analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.
3. Apply wind engineering principles and computational techniques in designing wind-resistant structures.
4. Evaluate earthquake effects on buildings and develop strategies for seismic retrofitting.
5. Assess seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures.

UNIT – I

INTRODUCTION TO NATURAL DISASTERS: Brief Introduction to Different Types of Natural Disasters, Occurrence of Disasters in Different Climatic and Geographical Regions, Hazard Maps (Earthquake and Cyclone) of The World and India, Regulations for Disaster Risk Reduction, Post-Disaster Recovery and Rehabilitation (Socioeconomic Consequences).

UNIT – II		
CYCLONES AND THEIR IMPACT: Climate Change and Its Impact on Tropical Cyclones, Nature of Cyclonic Wind, Velocities and Pressure, Cyclone Effects, Storm Surges, Floods, and Landslides. Behavior of Structures in Past Cyclones and Windstorms, Case Studies. Cyclonic Retrofitting, Strengthening of Structures, and Adaptive Sustainable Reconstruction. Life-Line Structures Such as Temporary Cyclone Shelters.		
UNIT – III		
WIND ENGINEERING AND STRUCTURAL RESPONSE: Basic Wind Engineering, Aerodynamics of Bluff Bodies, Vortex Shedding, and Associated Unsteadiness Along and Across Wind forces. Lab: Wind Tunnel Testing and Its Salient Features. Introduction to Computational Fluid Dynamics (CFD). General Planning and Design Considerations Under Windstorms and Cyclones. Wind Effects on Buildings, towers, Glass Panels, Etc., and Wind-Resistant Features in Design. Codal Provisions, Design Wind Speed, Pressure Coefficients. Coastal Zoning Regulations for Construction and Reconstruction in Coastal Areas. Innovative Construction Materials and Techniques, Traditional Construction Techniques in Coastal Areas.		
UNIT – IV		
SEISMOLOGY AND EARTHQUAKE EFFECTS: Causes of Earthquakes, Plate Tectonics, Faults, Seismic Waves; Magnitude, Intensity, Epicenter, Energy Release, and Ground Motions. Earthquake Effects– On Ground, Soil Rupture, Liquefaction, Landslides. Performance of Ground and Buildings in Past Earthquakes– Behavior of Various Types of Buildings and Structures, Collapse Patterns; Behavior of Non-Structural Elements Such as Services, Fixtures, and Mountings – Case Studies. Seismic Retrofitting– Weakness in Existing Buildings, Aging, Concepts in Repair, Restoration, and Seismic Strengthening.		
UNIT – V		
PLANNING AND DESIGN CONSIDERATIONS FOR SEISMIC SAFETY: General Planning and Design Considerations; Building forms, Horizontal and Vertical Eccentricities, Mass and Stiffness Distribution, Soft Storey Effects, etc.; Seismic Effects Related to Building Configuration. Plan and Vertical Irregularities, Redundancy, and Setbacks. Construction Details– Various Types of Foundations, Soil Stabilization, Retaining Walls, Plinth Fill, Flooring, Walls, Openings, Roofs, Terraces, Parapets, Boundary Walls, Underground and Overhead Tanks, Staircases, and Isolation of Structures. Innovative Construction Materials and Techniques. Local Practices– Traditional Regional Responses. Computational Investigation Techniques.		
TEXT BOOKS:		
1. David Alexander, *Natural Disasters*, 1st Edition, CRC Press, 2017. 2. Edward A. Keller and Duane E. DeVecchio, *Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes*, 5th Edition, Routledge, 2019.		
REFRENCE BOOKS:		
1. Ben Wisner, J.C. Gaillard, and Ilan Kelman (Editors), *Handbook of Hazards and Disaster Risk Reduction and Management*, 2nd Edition, Routledge, 2012. 2. Damon P. Coppola, *Introduction to International Disaster Management*, 4th Edition, Butterworth-Heinemann, 2020. 3. Bimal Kanti Paul, *Environmental Hazards and Disasters: Contexts, Perspectives and Management*, 2nd Edition, Wiley-Blackwell, 2020.		
Online Learning Resources:		
https://nptel.ac.in/courses/124107010 **https://onlinecourses.swayam2.ac.in/cec19_hs20/preview**		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**SUSTAINABILITY IN ENGINEERING PRACTICES (OE – II)**	L	T	P	C
23CET20		3	0	0	3

Course Objectives:

The objectives of this course are to make the student:

1. To understand the fundamentals of sustainability, the carbon cycle, and the environmental impact of construction materials.
2. To analyze sustainable construction materials, their durability, and life cycle assessment.
3. To apply energy calculations in construction materials and assess their embodied energy.
4. To evaluate green building standards, energy codes, and performance ratings.
5. To assess the environmental effects of energy use, climate change, and global warming.

Course Outcomes:

After successful completion of this course, students will be able to:

1. Understand the fundamentals of sustainability, the carbon cycle, and the environmental impact of construction materials.
2. Analyze sustainable construction materials, their durability, and life cycle assessment.
3. Apply energy calculations in construction materials and assess their embodied energy.
4. Evaluate green building standards, energy codes, and performance ratings.
5. Assess the environmental effects of energy use, climate change, and global warming.

UNIT – I

INTRODUCTION:

Introduction and Definition of Sustainability - Carbon Cycle - Role of Construction Material: Concrete and Steel, Etc. - CO_2Contribution From Cement and Other Construction Materials.

UNIT – II

MATERIALS USED IN SUSTAINABLE CONSTRUCTION:

Construction Materials and Indoor Air Quality - No/Low Cement Concrete - Recycled and Manufactured Aggregate - Role of QC and Durability - Life Cycle and Sustainability.

UNIT – III

ENERGY CALCULATIONS:

Components of Embodied Energy - Calculation of Embodied Energy for Construction Materials - Energy Concept and Primary Energy - Embodied Energy Via-A-Vis Operational Energy in Conditioned Building - Life Cycle Energy Use

UNIT – IV		
GREEN BUILDINGS: Control of Energy Use in Building - ECBC Code, Codes in Neighboring Tropical Countries - OTTV Concepts and Calculations – Features of LEED and TERI – GRIHA Ratings - Role of Insulation and Thermal Properties of Construction Materials - Influence of Moisture Content and Modeling - Performance Ratings of Green Buildings - Zero Energy Building		
UNIT – V		
ENVIRONMENTAL EFFECTS: Non-Renewable Sources of Energy and Environmental Impact– Energy Norm, Coal, Oil, Natural Gas - Nuclear Energy - Global Temperature, Green House Effects, Global Warming - Acid Rain: Causes, Effects and Control Methods - Regional Impacts of Temperature Change.		
TEXT BOOKS:		
1. Charles J Kibert, Sustainable Construction: Green Building Design & Delivery, 4th Edition, Wiley Publishers 2016. 2. Steve Goodhew, Sustainable Construction Process, Wiley Blackwell, UK, 2016.		
REFRENCE BOOKS:		
1. Craig A. Langston & Grace K.C. Ding, Sustainable Practices in the Built Environment, Butterworth Heinemann Publishers, 2011. 2. William P Spence, Construction Materials, Methods & Techniques (3e), Yesdee Publication Pvt. Ltd, 2012.		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/105/105105157/		

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**HIGHWAY ENGINEERINGLAB**	L	T	P	C
23CEP10		0	0	3	1.5

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the properties and behavior of aggregates and bitumen used in highway construction.
2. **Perform** standard laboratory tests on aggregates and bitumen to evaluate their suitability for road construction.
3. **Analyze** the strength, durability, and performance characteristics of pavement materials.
4. **Assess** the quality and compliance of highway materials with standard specifications.
5. **Develop** hands-on skills for material testing and interpretation of test results.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Determine** the physical properties of coarse aggregates, such as specific gravity, water absorption, and shape characteristics.
2. **Evaluate** the mechanical properties of aggregates, including abrasion resistance, impact strength, and crushing value.
3. **Analyze** the physical and chemical properties of bituminous materials through standard tests.
4. **Perform** Marshall stability tests and assess the optimum binder content for bituminous mixes.
5. **Interpret** test results to assess the suitability of aggregates and bitumen for pavement construction.

List of Experiments: -

I. **TEST ON AGGREGATES**

1. Specific Gravity Determination of the Coarse Aggregate Sample
2. Determination of Abrasion Value of the Coarse Aggregate Sample.
3. Determination of Impact Value of Coarse Aggregate
4. Determination of Elongation Index of Coarse Aggregate
5. Determination of Flakiness Index of Coarse Aggregate
1. Determination of Aggregate Crushing Value of Coarse Aggregate
2. Determination of Water Absorption Capacity of the Coarse Aggregate Sample.

II. **TEST ON BITUMEN**

1. Specific Gravity Determination of The Bitumen/Asphalt Sample.
2. Penetration Test on Bitumen.
3. Viscosity Determination of Bituminous Binder.
4. Determination of Softening Point of The Asphalt/Bitumen Sample
5. Determination of Ductility Value of The Bitumen Sample
6. Estimation of Loss of Bitumen on Heating
7. Bitumen Extraction Test

TEXT BOOKS:

1. Highway Material Testing Manual, Khanna, Justo and Veera Raghavan, Nemchand Brothers

REFRENCE BOOKS:

1. IS 383 :1993 —Specification for Coarse and Fine Aggregates from Natural Sources for Concrete‖
2. 1S 1201 -1220 (1978) —Methods for testing tars and bituminous materials‖
3. IRC SP 53 -2010 —Guidelines on use of modified bitumen‖
4. MS-2 Manual for Marshalls Mix design 2002

Online Learning Resources:

https://ts-nitk.vlabs.ac.in/

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**ENVIRONMENTAL**	L	T	P	C
23CEP11	**ENGINEERING LAB**	0	0	3	1.5

Course Objectives:
The objectives of this course are to make the student to:

1. **Understand** the principles and methods of water and wastewater sampling and preservation.
2. **Perform** standard laboratory tests to determine water quality parameters.
3. **Analyze** wastewater characteristics and assess pollution levels.
4. **Evaluate** the effectiveness of treatment processes using chemical and biological tests.
5. **Develop** hands-on skills in advanced laboratory techniques for environmental monitoring.

Course Outcomes:
Upon successful completion of this course, students will be able to:

2. **Apply** appropriate sampling and preservation techniques for water and wastewater.
3. **Measure** physical and chemical parameters such as turbidity, conductivity, and chlorine content.
4. **Analyze** key water and wastewater quality indicators like BOD, COD, and TKN.
5. **Assess** the efficiency of water treatment processes through laboratory tests.
6. **Perform** microbiological analysis for coli form detection and sludge characterization.

LIST OF EXPERIEMENTS: -

I. **ANALYSIS of WATER SAMPLE**
   1. Sampling and preservation methods for water and wastewater (Demonstration only)
   2. Measurement of Electrical conductivity and turbidity
   3. Determination of fluoride in water by spectrophotometric method /ISE
   4. Determination of iron in water (Demo)
   5. Determination of Sulphate in water
   6. Determination of Optimum Coagulant Dosage by Jar test apparatus
   7. Determination of available Chlorine in Bleaching powder and residual chlorine in water

II. **ANALYSIS of WASTEWATER SAMPLE**
   1. Estimation of suspended, volatile and fixed solids
   2. Determination of Sludge Volume Index in waste water
   3. Determination of Dissolved Oxygen
   4. Estimation of B.O.D.
   5. Estimation of C.O.D.
   6. Determination of TKN and Ammonia Nitrogen in wastewater
   7. Determination of total and faecal coliform (Demonstration only)

Note: Minimum 10 out of the above experiments are to be carried out.

TEXT BOOKS:
1. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi. 2. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.
REFRENCE BOOKS:
1. Environmental Engineering Laboratory Manual by Dr. S.K. Panigrahi, L. Mohanty, S.K. Kataria& Sons
Online Learning Resources:
https://ee1-nitk.vlabs.ac.in/ **https://ee2-nitk.vlabs.ac.in/**

CIVIL ENGINEERING					
III B. Tech – II Semester					
Course Code	**BUILDING INFORMATION MODELING**	L	T	P	C
23CEP12		0	1	2	2

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the fundamentals of Building Information Modeling (BIM) and Autodesk Revit.
2. **Develop** proficiency in Revit 's basic drawing and editing tools for structural and architectural modeling.
3. **Create** 3D models of buildings, including walls, floors, ceilings, roofs, stairs, and railings.
4. **Analyze** different components such as curtain walls, doors, windows, and structural elements.
5. **Apply** various visualization and detailing techniques to generate callouts, elevations, and sections.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Explain** the fundamentals of BIM and Autodesk Revit 's interface and workflow.
2. **Use** basic drawing, editing, and modification tools in Revit for creating and modifying models.
3. **Model** various architectural elements such as walls, doors, windows, floors, ceilings, and roofs.
4. **Construct** structural elements including grids, columns, stairs, railings, and ramps.
5. **Generate** 3D views, sections, and elevations for visualization and detailing purposes.

List of Experiments: -

1. INTRODUCTION to BIM & AUTODESK REVIT - About Autodesk and AutoCAD, Workflow and BIM, Revit Terms, Overview of The Interface, Starting Projects, Viewing Commands.
2. BASIC DRAWING and EDITING tools - Using General Drawing tools, Editing Elements, Working with Modification tools.
3. SETTING UP LEVELS and GRIDS - Setting up Levels and Grids, Creating Structural Grids, Adding Columns, Linking and Importing CAD files.
4. MODELING WALLS Modelling Walls, Modifying Walls, Model Exterior Shell, Add Interior Walls.
5. WORKING WITH DOORS and WINDOWS Inserting Doors and Windows, Loading Door and Window Types from Library, Creating Additional Door and Window Sizes.
6. WORKING WITH CURTAIN WALLS Creating Curtain Walls, Adding Curtain Grids, Working with Curtain Wall Panels, Attaching Mullions to Curtain Grids.

7. WORKING WITH VIEWS Setting the View Display, Duplicating Views, Adding Callout Views, Elevations and Sections.
8. ADDING COMPONENTS Adding Component, Modifying Component, Working with Elements.
9. MODELING FLOORS Modelling& Modifying Floors, Joining Geometry, Creating Shaft Openings, Creating Sloped Floors
10. MODELING CEILINGS & ROOFS Modelling Ceilings, Adding Ceiling Fixtures, Creating Ceiling Soffits, Modelling Roofs
11. MODELING STAIRS and RAILING Creating Component Stairs, Modifying Component Stairs, Working with Railings, Sketching Custom Stairs, Creating Ramps.

TEXT BOOKS:

1. Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston ―BIM HANDBOOK, Wiley, 2nd Edition, 2011
2. Wing, Eric. Autodesk Revit Architecture 2017: No Experience Required. Indianapolis: John Wiley & Sons, 2016

REFRENCE BOOKS:

1. Kim, Marcus, Lance Kirby, and Eddy Krygiel. Mastering Autodesk Revit 2017 for architecture. 1st ed. IN polis, IN: John Wiley & Sons, 2016.
2. Garber, Richard. BIM Design: Realizing the Creative Potential of Building Information Modeling. AD Smart 02. Chichester, U.K.: Wiley, 2004
3. Peter B. and Nigel D., ―BIM in Principle and in Practice‖, 1 st Edition, ICE Publishing, 2014.
4. BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors,
5. Chuck Eastman, Paul Teicholz, Rafael Sacks and Kathleen Liston, John Wiley & Sons, 2008.
6. BIM and Construction Management: Proven tools, Methods, and Workflows, Brad Hardin, Sybex, 2009.
7. Building Information Modeling: BIM in Current and Future Practice, Karen Kensek and Douglas Noble, Wiley, 2014, First Edition.

Online Learning Resources:

https://minnodillc.com/building-information-modeling-bim/
https://www.skyfilabs.com/online-courses/building-information-modelling-course

TECHNICAL PAPER WRITING AND INTELLECTUAL PROPER RIGHTS

Course Code: **Semester V** **L T P C :2 0 0 0**

Course Objectives: ·

1. To enable the students to practice the basic skills of research paper writing
2. To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.
3. To practice the basic skills of performing quality literature review
4. To help them in knowing the significance of real-life practice and procedure of Patents.
5. To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks

Course Outcomes: On successful completion of this course, the students will be able to:

COURSE OUTCOMES: At the end of the course, students will be able to		**Blooms Level**
CO1	identify key secondary literature related to their proposed technica paper writing	L1, L2
CO2	Explain various principles and styles in technical writing	L1, L2
CO3	Use the acquired knowledge in writing a research/technical paper	L3
CO4	analyse rights and responsibilities of holder of Patent, Copyright, trademark, International Trademark etc.	L4
CO5	Evaluate different forms of IPR available at national & international level	L5
CO6	Develop skill of making search of variousforms of IPR by using modern tools and techniques.	L3, L6

SYLLABUS

UNIT – I:

PRINCIPLES OF TECHNICAL WRITING: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language - highlighting your findings-discussing your limitations -hedging and criticizing -plagiarism and paraphrasing.

UNIT – II:

TECHNICAL RESEARCH PAPER WRITING: Abstract- Objectives-

Limitations-Review of Literature- Problem sand Framing Research Questions-

Synopsis

UNIT – III:

PROCESS OF RESEARCH: publication mechanism: types of journals- indexing-

seminars- conferences- proof reading –plagiarism style; seminar & conference

paper writing; Methodology-discussion-results- citation rules

UNIT – IV:

PRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights

de Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting evaluating trade mark, trade mark registration processes.

UNIT – V:

LAW OF COPY RIGHTS: Fundamentals of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer. Patent law, intellectual property audits.

Textbooks:

1. Deborah. E. Bouchoux, *Intellectual Property Rights*, Cengage Learning India, 2013
2. Meenakshi Raman, Sangeeta Sharma. *Technical Communication: Principles and practices.* Oxford.

Reference Books:

1. R. Myneni, *Law of Intellectual Property*, 9th Ed, Asia law House, 2019.
2. Prabuddha Ganguli, *Intellectual Property Rights* Tata Mcgraw Hill, 2001
3. P. Naryan, *Intellectual Property Law*, 3rd Ed, Eastern Law House, 2007.
4. Adrian Wallwork. *English for Writing Research Papers* Second Edition. Springer Cham Heidelberg New York ,2016
5. Dan Jones, Sam Dragga, *Technical Writing Style*

Online Resources

1. https://theconceptwriters.com.pk/principles-of-technical-writing/
2. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html
3. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html
4. https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/
5. https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf
6. https://lawbhoomi.com/intellectual-property-rights-notes/
7. https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf