B.Tech & B.Tech. +M.TechII
Year - II Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
CV2201	ES	Water Supply Engineering	4	0	30	70	100	3
CV2202	BS/PC	Fluid Mechanics-II	4	0	30	70	100	3
CV2203	PC	Hydrology and Water Resources Engineering	4	0	30	70	100	3
CV2204	PC	Geotechnical Engineering-I	4	0	30	70	100	3
CV2205	PC	Concrete Technology	4	0	30	70	100	3
CV2206	PC	Geotechnical Engineering-I Lab	0	3	50	50	100	1.5
CV2207	PC	Building Materials Lab	0	3	50	50	100	1.5
CV2208	SC	Building Planning and Computer Aided Drawing	1	2	50	50	100	2
CV2209	MC	Environmental Science	0	0	00	100	100	0
Total credits								20
Internship - I								

B.Tech & B.Tech. +M.TechII
Year - II Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
CV2201	ES	Water Supply Engineering	4	0	30	70	100	3
CV2202	BS/PC	Fluid Mechanics-II	4	0	30	70	100	3
CV2203	PC	Hydrology and Water Resources Engineering	4	0	30	70	100	3
CV2204	PC	Geotechnical Engineering-I	4	0	30	70	100	3
CV2205	PC	Concrete Technology	4	0	30	70	100	3
CV2206	PC	Geotechnical Engineering-I Lab	0	3	50	50	100	1.5
CV2207	PC	Building Materials Lab	0	3	50	50	100	1.5
CV2208	SC	Building Planning and Computer Aided Drawing	1	2	50	50	100	2
CV2209	MC	Environmental Science	0	0	00	100	100	0
Total credits								20
Internship - I								

B.Tech & B.Tech. +M.TechII
Year - II Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
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CV2205	PC	Concrete Technology	4	0	30	70	100	3
CV2206	PC	Geotechnical Engineering-I Lab	0	3	50	50	100	1.5
CV2207	PC	Building Materials Lab	0	3	50	50	100	1.5
CV2208	SC	Building Planning and Computer Aided Drawing	1	2	50	50	100	2
CV2209	MC	Environmental Science	0	0	00	100	100	0
Total credits								20
Internship - I								

B.Tech & B.Tech. +M.TechII
Year - II Semester

Course code	Category	Course Title	Hours per week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
CV2201	ES	Water Supply Engineering	4	0	30	70	100	3
CV2202	BS/PC	Fluid Mechanics-II	4	0	30	70	100	3
CV2203	PC	Hydrology and Water Resources Engineering	4	0	30	70	100	3
CV2204	PC	Geotechnical Engineering-I	4	0	30	70	100	3
CV2205	PC	Concrete Technology	4	0	30	70	100	3
CV2206	PC	Geotechnical Engineering-I Lab	0	3	50	50	100	1.5
CV2207	PC	Building Materials Lab	0	3	50	50	100	1.5
CV2208	SC	Building Planning and Computer Aided Drawing	1	2	50	50	100	2
CV2209	MC	Environmental Science	0	0	00	100	100	0
Total credits								20
Internship - I								

B.Tech &B.Tech. +M.Tech II Year - II Semester

CV2201 WATER SUPPLY ENGINEERING

Course Objectives:

- Outline planning and the design of water supply systems for a community/town/city.
- Provide knowledge of water quality requirements for domestic usage.
- Understanding the importance of protection of water source quality and enlightening the efforts involved in converting raw water into clean potable water.
- Selection of valves fixture stored in water distribution systems.
- Impart knowledge on design of water distribution network.
- Visit at least one Water Treatment Plant and supply system.

Course Outcomes:

The student will be able to

- Plan and design the water and distribution networks and sewerage systems.
- Identify the water source and select the proper intake structure.
- Design & estimation of the water supply system of an apartment.
- Select the appropriate appurtenances in the water supply.
- Selection of suitable treatment flow for raw water treatments.

SYLLABUS

Introduction: Importance and Necessity of Protected Water Supply systems, Waterborne diseases, Planning of public water supply system, components of public water supply systems. Per capita demand and factors influencing it, types of water demands and their variations, factors affecting water demand, Design Period, Factors affecting the Design period, estimation of water demand for a town or city, Population Forecasting.

Sources of Water: Various surface and subsurface sources are considered for water supply and their comparison- Capacity of storage reservoirs, Types of subsurface water bearing formations, Yields from wells and infiltration galleries. Conveyance of Water from the source to the point of interest: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, selection of pipe materials, Pipe joints.

Quality and Analysis of Water: Characteristics of water and their measurement or estimation or analysis: Physical, Chemical and Biological characteristics. Water quality criteria for different uses- Rural, Municipal, Industrial and Agricultural uses. Drinking water quality standards: IS and WHO guidelines.

Treatment of Water: Typical treatment flow of a municipal water treatment plant, Unit operations of water treatment: Theory and Design of Sedimentation, Coagulation, flocculation, Filtration, Water conditioning and softening, Disinfection, Removal of color and

odors – Removal of Iron and manganese – Fluoridation and deflouridation –Ion Exchange - Ultra filtration- Reverse Osmosis.

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods – Appurtenances of water distribution system–Laying and testing of pipe lines. Ideal water supply system.

Text Books

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985.
2. Water Supply Engineering. Dr. P.N. Modi, Standard Book House, Delhi.
3. Rural, Municipal and Industrial Water management, KVSG Murali Krishna, Reem Publications, New Delhi, 2012

Reference Books

1. Elements of Environmental Engineering – K.N. Duggal, S. Chand & Company Ltd., New Delhi.
2. Water Supply Engineering.– Dr. B.C. Punmia, A.K. Jain and A.K. Jain. LaxmiPublicatgins(P) Ltd., NewDelhi.
3. Water Supply and Sanitary Engineering – G.S.Birdie and J.S.Birdie

CV2202 FLUID MECHANICS-II

Course Objectives:

- To classify the types of flows in open channel and also design most economical open channel sections andlearns about critical flows.
- To study about non-uniform flows in open channels and also to learn about the characteristics of hydraulic jump in rectangular channels.
- To impart knowledge on impact of jets, working principle, selection and designing of impulse and reaction turbines.
- To explain governing of turbines and performance characteristics of pumps and turbines working under different conditions.
- To explain various components and working principles of centrifugal pump and reciprocating pumps. Also, to teach the criteria of selection of the pumps.

Course Outcomes:

Students will be able to

- To calculate discharge carrying capacity of open channel sections and design of most economical channel sections.
- To calculate water surface profiles in open channels, hydraulic jump analysis.

- Select appropriate hydraulic turbines for given conditions and study their performance characteristics.
- Understand the operation of pumps and study their characteristics.

SYLLABUS

Open Channel Flows: Basic Concepts – Introduction, Classification of Open Channels – Classification of Flow; Geometric Elements of a Channel Section; Velocity Distribution in a Channel Section; Wide Open Channel; Measurement of Velocity; Velocity Distribution Coefficients; Pressure Distribution in a Channel Section – Effect of Slope on Pressure Distribution; Basic Equations – Chezy's Equation, Manning's Equation.
Uniform Flow Computation; Most Economical Channel Sections – Rectangular, Trapezoidal, Circular and Triangular Channel Sections; Critical Flow – Computation of Critical Flow, Section Factor for Critical Flow.

Application of Energy Principle in Open channels – Definition of Specific Energy, Specific Energy Diagram, Critical depth, Critical Velocity, Conjugate or Alternate Depths, Sub-critical, Critical and Super-critical Flows, Froude Number, Relationship between Critical depth and Specific Energy for Rectangular, Trapezoidal Sections; Application of Momentum Principle in Open channels – Specific Force; Canal Transitions – Change of Depth in Channels with Change in Cross-section and Hump in the Bed; Control Sections; Venturi Flume and Parshall Flume.

Varied Flow in Open Channels: Analysis &Computation of G.V.F: Definition of G.V.F. and Derivation of Governing Equation – Mild, Steep, Critical, Horizontal and Adverse Slopes – Backwater and Drawdown Curves –Computation of G.V.F. Profiles in rectangular channels using Direct and Single Step methods (Simple Slope cases only).
Rapidly Varied Flow – Hydraulic Jump, Types of Jumps, Hydraulic Jump in Horizontal Rectangular Channels.

Impact of Jets: Force Exerted by Fluid Jet on Stationary and Moving Flat and Curved Vanes, Torque and Work Done by Series of Moving Vanes.
Hydraulic Machines-Turbines: Introduction and Classification of Turbines –Working of Impulse Turbines and Design Principles – Components and Working Principles of Pelton Turbine – Work Done; Hydraulic and overall Efficiencies; Design of Pelton Turbine – Working Proportions.

Working of Reaction Turbines and Design Principles – Components and Working Principles of a Francis Turbine – Work Done; Hydraulic and overall Efficiencies; Design of Francis Turbine – Working Proportions; Draft Tube Theory; Kaplan Turbine and Working Proportions of Kaplan Turbine.
Performance and Characteristics of Turbines: Unit Quantities, Specific Speed and its Importance; Model Relationships; Operating Characteristic Curves; Cavitation Problem in Turbines.

Hydraulic Machines – Centrifugal Pumps; Functions of a Pump– Selection Criterion – Rotodynamic and Positive Displacement Pumps – Comparison between Centrifugal & Reciprocating Pumps; Components & Working principles of Centrifugal Pumps; Classification of Centrifugal Pumps; Working Head and Number of Stages, Single & Double Suction. Work done by Centrifugal Pumps – Pressure Change in a Pump, Manometric and Static Head – Velocity triangles– Minimum Starting Speed of pump – Multistage Pumps; Pumps in Parallel and Series; Cavitation – Limitation of Suction Lift, NPSH and its importance in Selection of Pumps. Performance Characteristics of Pumps – Similarity Relations and Specific speed of Pumps – Dimensionless characteristics – Constant Efficiency Curves of Centrifugal Pumps.

Hydraulic Machines – Reciprocating Pump: Reciprocating Pumps – Fundamental concepts, Component Parts and Working principle of Single Acting and Double Acting Reciprocating Pumps – Discharge Coefficient, Volumetric Efficiency and Slip; Work done by Reciprocating pumps.

Text Books

1. Fluid Mechanics and Hydraulic Machinery by P.N.Modi and S.M. Seth, Standard Book House.
2. Flow in Open Channels by K.Subramanya, Tata McGraw-Hill Publishing Co. Ltd.

Reference Books

1. Fluid Mechanics by A.K.Jain, Khanna Publishers.
2. Engineering Fluid Mechanics by K.L.Kumar, S. Chand &Co.Ltd.
3. Flow through Open Channels by K.G.Ranga Raju, Tata McGraw-Hill Publishing Co. Ltd.
4. Open Channel Hydraulics by V.T.Chow, McGraw-Hill Ltd.

CV2203 HYDROLOGY AND WATER RESOURCES ENGINEERING

Course Objectives:

- To build knowledge in hydrology and hydraulics and understanding of water resources systems.
- To develop skills in the groundwater flow, type of aquifer, and yield from the well.
- To provide the knowledge of the design of reservoir operation, sedimentation, and flood routing techniques.
- To develop skills in modeling flood flows and flood routing.
- To study the effect, causes, and remedial measures of waterlogging and canal systems.

Course Outcomes:
The students will be able to

- Demonstrate the concepts of the hydrograph, S-hydrograph, Unit hydrograph, and IUH
- Analysis of groundwater flow hydraulics along with rainwater harvesting methods.
- Demonstrate the basic types of irrigation, irrigation standards, and crop water assessment.
- Identify various types of reservoirs and their design aspects along with flood routing techniques.
- Design aspects of canal systems and waterlogging remedies.

SYLLABUS

Introduction to Hydrological Aspects: Water Resources in India, Hydrology in Water Resources Planning – Hydrologic Planning –Water Budget Equation;

Climate and Weather – Importance of Monsoon Rains, Clouds, Storms, and Precipitation – Precipitation – Types, Measurement of Rainfall; Influence and Feedbacks of Hydrological Changes Due to Climate Change; Average Depth of Rainfall over an Area, Mean Annual Rainfall, Analysis of Rainfall Data – Consistency of Rainfall Record, Double Mass Curve, Depth –Intensity, Depth-Area-Duration Curves, Frequency of Point Rainfall – Intensity-Duration-Frequency (IDF) Curves, Probable Maximum Precipitation (PMP) Curves; Infiltration – Factors affecting and its Determination, Evaporation and Evapo-Transpiration – Pan Evaporation; Runoff – Factors Affecting Runoff, Methods of Determination of Runoff, Hydrograph Analysis, Base Flow Separation, Unit Hydrographs, Hydrograph of Different Durations, Applications of Unit Hydrograph; S-Hydrograph, Synthetic Unit Hydrograph; Stream Flow Measurement methods.

Groundwater Flow: Mechanics of Interstitial Flow, Definitions, Subsurface Distribution of Water, Ground Water Movement; Darcy's Law; Permeability – Intrinsic Permeability; Well Hydraulics – Steady Flow in Different Types of Aquifers and Wells; Determination of Hydraulic Properties of Aquifer; Well Losses; Specific Capacity of Well; Well Efficiency – Pumping Tests – Recuperation Test Method for Determination of Well Yield.
Rain Water Harvesting and Recharging of Underground Storage – Methods of Recharging – Infiltration Galleries, Infiltration Wells, Springs.
Methods of Construction of Open Well–Yield of an Open Well – Methods of Construction of Tube Wells, Well Shrouding and Well Development, Spacing of Tube Wells, Design of Tube Well; Pumping Requirements.

Reservoir Planning and Flood Routing: Types of Reservoir – Investigations for Reservoir Planning, Selection of Site for a Reservoir, Zones of Storage in a Reservoir; Purpose of Reservoir, Design Studies, Reservoir Regulation, Reservoir Yield, Mass Curve and Demand Curve, Determination of Reservoir Capacity, Yield From a Reservoir of given Capacity;

Reservoir Losses – Measures To Reduce Evaporation Loss in Reservoirs, Control of Reservoir Sedimentation.
Flood Routing – Hydrologic Reservoir Routing by Pulse Method of Routing, Channel Routing by Muskingum Method.

Irrigation: Definition of Irrigation, Types of Irrigation Systems – Direct and Indirect, Lift and Inundation Irrigation Systems, Methods of Irrigation – Surface and Sprinkler Methods, Trickle or Drip Irrigation, Soil Moisture Constants, Depth of Water Held By Soil In Different Zones, Water Extraction – Quality of Irrigation Water, Irrigation Efficiencies – Soil Moisture – Irrigation Relationship – Estimating Depth and Frequency of Irrigation on the Basis of Soil Moisture Regime Concept; Water Requirements of Crops, Duty, Delta and Base Period – Their Relationship, Crops – Seasons, Factors Affecting Duty and Methods of Improving Duty, Consumptive Use of Water –Determination of Evapotranspiration – Blaney-Criddle and Penman Equations and Hargreaves Method(concepts only); Assessment of Irrigation Water Charges.

Canal Systems: Classification of Irrigation Canals – Canal Alignment, Design of Unlined Canals, Regime Theories – Kennedy's and Lacey's Theories, Critical Tractive Force Method, Design Problems – Balancing Depth; Regulation of Channel System – Canal Outlets, Requirements of a Good Outlet – Types of Outlets; Water Logging – Causes and Control – Land Drainage; Canal Lining – Methods, Design of Lined Canals, Canal Navigation – Requirements, Methods to make Navigability Feasible.

Text Books

1. Irrigation and Water Power Engineering by B.C.Punmia and P.B.B. Lal, Laxmi Publications Pvt. Ltd.
2. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.

Reference Books

1. Irrigation and Hydraulic Structures by S.K.Garg, Khanna Publishers.
2. Engineering Hydrology by K.Subramanya, Tata McGraw-Hill Education Private Limited.
3. Hand Book of Applied Hydrology by V.T.Chow, McGraw-Hill Book Co.
4. Impacts of Climate Change and Climate Variability on Hydrological Regimes by Jan C. van Dam, Cambridge University Press.
5. Hydrology: Principles, Analysis and Design by H.M.Raghunath, New Age International.
6. Ground Water by H.M.Raghunath, New Age International.

CV 2204 GEOTECHNICAL ENGINEERING I

Course Objectives:

- To impart knowledge in analysing the composition of the soil matrix and proportioning in developing fundamental relations.
- To understand concepts like plasticity, compressibility, Shear strength, compaction, settlement, etc.
- To identify and classify soils based on their properties.
- To develop skills in the identification of soil characterization when it interacts with water.
- To estimate the magnitude and time rate of settlement due to consolidation.

Course Outcomes:

The student will be able to

- Analyse soil and identify its nomenclature which helps in deriving its behaviour at various in situ conditions.
- Apply basic concepts of soil to compute settlements and the bearing capacity of soils.
- Prediction of seepage characterization under various hydraulic structures.
- Apply the knowledge of compaction during the construction of roads, embankments, canals etc, on weak soils.
- Solve practical problems related to consolidation settlement and the time rate of settlement.

SYLLABUS

Introduction: Soil Formation, Minerals in Clays and Sand, Soil Structure, Physical properties of Soil: Void Ratio, Porosity, Degree of Saturation, Water Content, Unit Weights, Specific Gravity, Weight - Volume Relationships, Relative Density, Consistency Limits and Consistency Indices, Activity.

Mechanical Analysis and Soil Classification: Sieve Analysis, Stoke's Law, Hydrometer and Pipette Analysis, Textural Classification, Classification based on size, Unified Soil Classification and Indian Standard Soil classification systems, Field Identification of Soils.

Soil Hydraulics: Types of Soil Water, Capillary Rise and Surface Tension, Darcy's Law and its Limitations, Constant Head and Variable Head Permeability Tests, Factors effecting coefficient of permeability, Permeability of Stratified Soils. Total, Neutral and Effective Stresses, Effective stress principle, Upward flow conditions, Quick Sand Conditions, Critical Hydraulic Gradient.

Stress Distribution in Soils: Boussinesq's Theory for Determination of vertical stress, Assumptions and validity, Extension to line, strip, Rectangular and Circular loaded areas, Pressure Bulb and Influence Diagrams, Newmark's Influence Chart- Construction and Use,

Westergaards's Theory, 2:1 Load Dispersion Method , Contact Pressure Distribution beneath Footings.

Compaction: Mechanism of Compaction, Factors Effecting Compaction, Laboratory Compaction Tests, Effect of Compaction on Soil Properties, Field Compaction: Compaction Equipment and Evaluation of Field Compaction.

Consolidation: Basic Definitions: Compression Index, Coefficient of Compressibility and Coefficient of volume decrease: Spring Analogy for Primary Consolidation: Initial compression, Primary compression and secondary compression, Generation of Effective Stress- Void Ratio relationship from consolidation test: Height of Solids Method and change in Void Ratio method: Determination of Preconsolidation Pressure, Normally consolidated, Over consolidated and under consolidated clays, Terzaghi's One Dimensional Consolidation Theory - Assumptions, Derivation of differential equation and Solution, Laboratory Determination of coefficient of consolidation by time fitting methods.

Shear Strength of Soils: Stress at Point, Mohr circle of stress, Mohr-Coulomb Failure Theory, Shear Parameters, Laboratory Shear Tests- Shear Box, Triaxial and Unconfined Compression Tests, Laboratory and Field Vane Shear Tests, Sensitivity of Clays, Types of Shear Tests based on Drainage Conditions, Total stress analysis and effective stress analysis, Shear Strength of Sands, Critical Void Ratio and Dilatancy, Liquefaction of Soils, Factors affecting Shear Strength of Clays and Sands.

Text Books:

1. Soil Mechanics and Foundation Engineering by K.R.Arora, Standard Publishers
2. Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R Rao, New Age International
   Publishers.
3. Geotechnical Engineering by P.Purushothama Raj, Pearson Publishers.
4. Principals of Geotechnical Engineering by Braja.M.Das, Cengage Learning Publishers.

Reference Books:

1. Gopal Ranjan and Rao, P. Basic and Applied Soil Mechanics, New Age International Pvt. Limited, New Delhi, 2002.
2. Murthy, V.N.S., A **Text Books** of Soil Mechanics and Foundation Engineering, UBS PublishersDistributors Ltd., New Delhi, 1999
3. Punmia, B.C. Soil Mechanics and Foundation Engineering, Laxmi Publications Pvt. Ltd., New Delhi,1995.
4. Braja M. Das, Fundamentals of Geotechnical Engineering, Thomson Asia Pvt. Ltd., Singapore,2005.

CV2205 CONCRETE TECHNOLOGY

Course Objectives:

- To understand the concepts of application of chemical and mineral admixtures in concrete.
- To understand the concepts of dimensional stability due to creep and Shrinkage of concrete.
- To impart knowledge about the durability of concrete.
- To understand the mix design of concrete using different Standards.
- To understand the properties and application of special concretes.

Course Outcomes:

The student will be able to:

- Understand the effect of chemical and mineral admixtures on the properties of concrete.
- Understand the creep, relaxation and shrinkage of concrete.
- Understand the relation between durability and permeability of concrete
- Design the concrete mix as per IS, BS and ACI standards.
- Understand in detail about the properties and application of special concretes.

SYLLABUS

Chemical and Mineral Admixtures: Water Reducers, Air Entrainers, Set Controllers, Special Admixtures – Structure, Properties and effects on Concrete Properties. Introduction to Supplementary Cementing Materials and Pozzolans – Fly ash, Blast Furnace Slag, Silica Fume, and Metakaolin– their Production, Properties, and Effects on Concrete Properties; Other Mineral Additives –Reactive and Inert.

Dimensional Stability and Durability: Creep and Relaxation –Parameters Affecting; Shrinkage of Concrete –Types and Significance. Parameters affecting Shrinkage; Measurement of Creep and Shrinkage.

Durability of Concrete: Introduction to Durability; Relation between Durability and Permeability – Chemical Attack of Concrete; Corrosion of Steel Rebars; other Durability Issues.

Mix Design: Review of Methods and Philosophies of IS, BS and ACI Methods, Mix Design for Special Purposes. Acceptance Criteria for Compressive Strength of Concrete

Special Concretes: Properties and Applications of High Strength –High Performance Concrete, Reactive Powder Concrete, Lightweight, Heavyweight and Mass concrete; Fib rereinforced Concrete; Self-compacting Concrete; Shotcrete.

Text Books

1. Concrete Technology Theory and Practice by M.S.Shetty, S.Chand& Company Ltd, New Delhi.

Reference Books

1. Properties of Concrete by A.M.Neville, Longman 1995.
2. Concrete micro-structure, Properties and Materials by P.K.Mehta, J.M.Monteiro, Printice Hall INC & McGraw-Hill, USA.

CV2206 GEOTECHNICAL ENGINEERING – I LAB

Course Objectives

- To develop skills to identify and classify different types of soils
- To impart knowledge about different methods of determination of insitu density of soils
- To study the necessity of sedimentation analysis for classifying fine grained soils
- To assess the drainage capacity of different soils
- To understand laboratory methods used for determining density of soil.

Course Outcomes:

The student will be able to

- Perform suitable tests for assessing grain size distribution and classify the soil accordinglySelect appropriate method for determining field density of soil for a given soil
- Determine specific gravity of coarse and fine grained soils3
- Evaluate Permeability of given soil
- Estimate compaction characteristics of soil

LIST OF EXPERIMENTS

1. Atterberg limits
2. Field density by Core Cutter and Sand replacement method
3. Grain size analysis
4. Hydrometer/pipette analysis
5. Specific gravity by pycnometer/density bottle method
6. Permeability of soil – Constant and variable head tests
7. IS light compaction

DEMONSTRATION EXPERIMENTS:

1. Consolidation test.
2. Quicksand model and others if any.

CV2207 BUILDING MATERIALS LAB

Course Objectives:

- To impart knowledge about various tests used at construction sites.
- To understand the concepts of physical properties of tiles, different bricks, and paver blocks.
- To familiarize the basic properties of fresh and hardened concrete.
- To develop skills to design mix proportions of concrete to arrive at the required strength of concrete with a specific ratio of its ingredients.

Course Outcomes:

The student will be able to

- Understand the concept of the physical properties of concrete ingredients.
- Understand the concepts of physical properties of tiles, different bricks, and paver blocks.
- Conduct various tests on cement, fine aggregate, and coarse aggregate.
- Analyse the properties of fresh and hardened concrete.
- Design mix proportions of concrete.

LIST OF EXPERIMENTS

1. Determination of Specific Gravity and Unit Weight of Cement
2. Determination of Specific Gravity and Unit Weight of Coarse and Fine Aggregates
3. Determination of Normal Consistency of Cement
4. Determination of Initial and Final Setting Time
5. Determination of Fineness of Cement.
6. Determination of Compressive Strength of Cement (for different grades of cement).
7. Determination of flexural strength and water absorption for different tiles.
8. Determination of compressive strength and water absorption for burnt clay and fly ash bricks.
9. Determination of crushing strength and water absorption for different paver blocks.
10. Determination of Bulking Characteristics of Sand.
11. Sieve Analysis of Coarse and Fine Aggregates and Classification as per IS 383.
12. Workability Tests on Green Concrete by using: Slump Cone, Compaction Factor Apparatus, Flow Table, Vee-Bee Consistometer.
13. Tests on Hardened Concrete.
    a. Determination of Compressive Strength
    b. Determination of Split tensile strength
    c. Determination of Modulus of rupture.
14. Design of Concrete Mix by using IS Code Method (for classwork only)

CV2208 BUILDING PLANNING AND COMPUTER AIDED DRAWING

Course Objectives:

- To familiarize building components, principles, methods, software, and codes of practices for planning and design of the building
- To impart knowledge about the elements of climate to the design and construction of buildings.
- Prepare constructional detailed representation drawing of a building.
- Analyze the planning laws and recommendations involved in planning, and building drawings concepts of buildings.
- Design plan and elevation of different types of building with their functional and furniture requirements.

Course Outcomes:

The students will be able to

- Analyse the various types of residential buildings.
- Assess different climatic elements to decide the orientation of the building for ventilation
- Draw the complete drawing of plan of a residential building
- Draw the plan, elevation, and sectional view of the building with functional requirements.
- Draw the plan using computer drafting tools.

SYLLABUS

Residential Building: Different types of Residential Buildings

Climatology: Elements of Climate: Sun, Wind, Relative Humidity, Temperature effects, Comfort Conditions for House, Various types of Macro Climatic Zones. Orientation of Buildings, Solar Charts, Ventilation.

Principles of Planning

Preliminary Drawing: (a) Conventional Signs of Materials, Various equipment used in a Residential Building (copying exercise) (b) Plan, Section, and Elevation of a Small House (one room and Verandah) (copying exercise) (c) Plan, Section and Elevation of Two Bed Room House (copying exercise) (d) Plan Section and Elevation of Three Bed Room House in Hot and Humid Zone. (copying exercise).

Design of individual Rooms with Particular Attention to Functional and Furniture requirements. Building Regulations and Bye-laws of Residential Buildings;

Drawing the plan, Elevation of Houses with given Functional Requirements and Climatic Data. (emphasis may be given to Hot and Humid zones.)

AUTOCAD Drawing of Residential Building.

Text Bookss

1. Building Planning and Drawing by N. Kumar Swamy and A. Kameswara Rao, Charotar Publication House.
2. Building planning Drawing and Scheduling by Gurucharansingh and Jagadish Singh, Standard Publishers Distributors

Reference Books

1. Civil Engineering Drawing by Sharma and Gurucharan Singh, Standard Publishers.
2. Civil Engineering Drawing Series 'B' by R. Trimurthy, M/S Premier Publishing House.
3. Building Drawing with an integrated Approach to Built Environment by M.G.Shah, C.M.Kale and S.Y.Patki, McGraw-Hill Publishing Company Ltd.

CV2209 ENVIRONMENTAL SCIENCE

(Common for all Branches)

Course Objectives

- Familiarize the fundamental aspects of environment and the environmental management'
- Provide information of some of the important international conventions which will be useful during the future endeavors after graduation.
- Make realize the importance of natural resources management for the sustenance of the life and the society.
- Appraise the impact of pollution getting generated through the anthropogenic activities on the environment
- Provide the concept of sustainable development, energy and environmental management
- Impart knowledge on the new generation waste like e-waste and plastic waste.

Course Outcomes

At the end of the course the student will be able to:

- Knowledge on the fundamental aspects of environment and the environmental management
- The knowledge on the salient features of the important international conventions
- Understanding of the importance of natural resources management for the sustenance of the life and the society.
- Familiarity on various forms of pollution and its impact on the environment.

- Understand the elements of Sustainable Development, energy and environmental management
- Knowledge on the new generation waste like e-waste and plastic waste.

SYLLABUS

Introduction: Structure and functions of Ecosystems-Ecosystems and its Dynamics-Value of Biodiversity-impact of loss of biodiversity, Conservation of bio-diversity. Environmental indicators - Global environmental issues and their impact on the ecosystems.
Salient features of International conventions on Environment: Montreal Protocol, Kyoto protocol, Ramsar Convention on Wetlands, Stockholm Convention on Persistent Organic Pollutants, United Nations Framework Convention on Climate Change (UNFCCC),
Natural Resources Management: Importance of natural resources management-Land as resource, Land degradation, Soil erosion and desertification, Effects of usage of fertilizer, herbicides and pesticide- watershed management.

Forest resources: Use and over-exploitation, Mining and dams – their effects on forest ecosystems and the living beings.

Water resources: Exploitation of surface and groundwater, Floods, droughts, Dams:benefits and costs.

Mineral Resources: Impact of mining on the environment and possible environmental management options in mining and processing of the minerals.
Sustainable resource management (land, water, and energy), and resilient design under the changing environment.

Environmental Pollution: Local and Global Issues. Causes, effects and control measures. Engineering aspects of environmental pollution control systems.

Air pollution: impacts of ambient and indoor air pollution on human health. Water pollution: impacts water pollution on human health and loss of fresh water resources. Soil pollution and its impact on environment. Marine pollution and its impact on blue economy. Noise pollution.
Solid waste management: Important elements in solid waste management- Waste to energy concepts. Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act and their amendments. Salient features of Environmental protection Act, 1986.

Sustainable Development: Fundamentals of Sustainable Development– Sustainability Strategies and Barriers – Industrialization and sustainable development. Circular economy concepts in waste (solid and fluid) management.

Energy and Environment: Environmental Benefits and challenges, Availability and need of conventional energy resources, major environmental problems related to the conventional

energy resources, future possibilities of energy need and availability. Solar Energy: process of photovoltaic energy conversion, solar energy conversion technologies and devices, their principles, working and applications, disposal of solar panel after their usage. Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes, Wind Energy, energy conversion technologies, their principles, equipment and suitability in context of India.

Management of plastic waste and E-waste: Sources, generation and characteristics of various e- and plastic wastes generated from various industrial and commercial activities; Waste management practices including onsite handling, storage, collection and transfer. E- waste and plastic waste processing alternatives. E-Waste management rules and Plastic waste management rules, 2016 and their subsequent amendments.

Text Books:

1. Bharucha,Erach (2004). Textbook for Environmental Studies for Undergraduate Courses of all Branches of Higher Education, University Grants Commission, New Delhi.
2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
3. Masters, G. M., &Ela, W. P. (1991). Introduction to environmental engineering and science. Englewood Cliffs, NJ: Prentice Hall.
4. Enger, E. and Smith, B., Environmental Science: A Study of Interrelationships, Publisher: McGraw-Hill Higher Education; 12th edition, 2010.

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1. Sharma, P. D., & Sharma, P. D. (2005). Ecology and environment. RastogiPublications
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Clark R.S. (2001). Marine Pollution, Clanderson Press Oxford (TB)
4. Jadhav, H &Bhosale, V.M. (1995). Environmental Protection and Laws. HimalayaPub. House, Delhi 284 p.
5. MoEF&CC, Govt. of India, CPCB: E-waste management rules, 2016 and itsamendments 2018.

MoEF&CC, Govt. of India, CPCB: Plastic waste management rules, 2016