

R16 B.TECH CIVIL AND ENV. ENGG.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
**B.TECH. CIVIL AND ENVIRONMENTAL ENGINEERING
 III YEAR COURSE STRUCTURE & SYLLABUS (R16)**
Applicable From 2016-17 Admitted Batch
III YEAR I SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	CE501PC	Concrete Technology	4	0	0	4
2	CE502PC	Design of Reinforced Concrete Structures	4	0	0	4
3	CN503PC	Water Supply Engineering	4	0	0	4
4	SM504MS	Fundamentals of Management	3	0	0	3
5		Open Elective – I	3	0	0	3
6	CE505PC	Concrete Technology Lab	0	0	3	2
7	CE506PC	Geographical Information Systems Lab	0	0	3	2
8	CE507PC	Hydraulics and Hydraulic Machinery Lab	0	0	3	2
9	*MC500HS	Professional Ethics	3	0	0	0
		Total Credits	21	0	9	24

III YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	CE601PC	Design of Steel Structures	4	1	0	4
2	CN602PC	Water Resources Engineering	4	1	0	4
3	CN603PC	Waste Water Engineering	4	0	0	4
4		Open Elective - II	3	0	0	3
5		Professional Elective - I	3	0	0	3
6	CN604PC	Computer Aided Design and Drafting Lab - II	0	0	3	2
7	CN605PC	Environmental Engineering lab	0	0	3	2
8	EN606HS	Advanced English Communication Skills Lab	0	0	3	2
		Total Credits	18	2	9	24

During Summer Vacation between III and IV Years: Industry Oriented Mini Project
Professional Elective - I

CE611PE	Air Pollution and Control
CN612PE	Watershed Management
CN613PE	Environmental Sanitation
CN614PE	Environmental Chemistry

***Open Elective** subjects' syllabus is provided in a separate document.

***Open Elective** – Students should take Open Electives from The List of Open Electives Offered by Other Departments/Branches Only.

Ex: - A Student of Mechanical Engineering can take Open Electives from all other departments/branches except Open Electives offered by Mechanical Engineering Dept.

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CONCRETE TECHNOLOGY

B.Tech. III Year I Sem.

Course Code: CE501PC

L T/P/D C

4 0/0/0 4

Pre Requisites: Building Materials

Course Objectives: Concrete is the basic construction material in the advancement of the present construction industry. A lot of advances are taking place in the concrete technology on par with development taking place in the engineering. The present day industry needs the knowledge of concrete technology thoroughly. The subject is designed to give the basic knowledge as well as latest developments in concrete technology.

Course Outcomes: At the end of the course, the student will be able to:

- Identify Quality Control tests on concrete making materials
- Understand the behavior of fresh and hardened concrete
- Design concrete mixes as per IS and ACI codes
- Understand the durability requirements of concrete
- Understand the need for special concretes

UNIT - I

Cement: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement. Admixtures: Types of admixtures – mineral and chemical admixtures.

UNIT - II

Aggregates: Classification of aggregate – Particle shape & texture –, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – III

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT - IV

Hardened Concrete : Water / Cement ratio – Abram's Law – Gelspae ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing.

Testing Of Hardened Concrete: Compression tests – Tension tests – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – code provisions for NDT.

Elasticity, Creep & Shrinkage – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – V

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by– BIS method and ACI mix design.

Special Concretes: Introduction to light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete.

TEXT BOOKS:

1. Properties of Concrete by A. M. Neville Pearson 5th edition Education ltd 2016.
2. Concrete Technology by M. S. Shetty. – S. Chand & Co. 2004
3. Concrete Technology by Job Thomas -Cengage learning India Pvt Ltd 2015.

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete: Micro structure, Properties and Materials – P. K. Mehta and J. M. Monteiro, McGraw Hill Publishers

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DESIGN OF REINFORCED CONCRETE STRUCTURES**B.Tech. III Year I Sem.****Course Code: CE502PC****L T/P/D C****4 0/0/0 4****Pre-Requisites:** Structural Analysis I & II

Course Objectives: Structural elements are subjected to different loading to with stand the structures, for external loading we need to design the structures for its safety and serviceability.

Course Outcomes: At the end of the course, the student will be able to:

- Design RC Structural elements
- Design the Reinforced Concrete beams using limit state Design
- Design Reinforced Concrete slabs
- Design the Reinforced Concrete Columns and footings
- Design structures for serviceability
- Design staircases, canopy

UNIT – I

Concepts of RC. Design – Working Stress Method - Limit State method – Material Stress-Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456 – 2000. **Beams:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections

UNIT – II

Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing; Design of canopy.

UNIT – III

Short and Long columns – under axial loads, uniaxial bending and biaxial bending – I S Code provisions.

UNIT – IV

Footings: Different types of footings – Design of isolated, square, rectangular, circular footings and combined footings.

UNIT - V

Design of one way slab, Two-way slabs and continuous slab Using I S Coefficients Limit state design for serviceability for deflection, cracking and codal provision. Design of dog-legged staircase.

TEXT BOOKS:

1. Reinforced concrete design by S. Unnikrishna Pillai & Devdas Menon, Tata McGraw Hill, New Delhi.
2. Reinforced concrete design by N. Subrahmanian Oxford University Press.
3. Limit state designed of reinforced concrete – P. C. Varghese, Prentice Hall of India, New Delhi.

REFERENCES:

1. Design of Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & company.
2. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers
Design of concrete structures – Arthus H. Nilson, David Darwin, and Charles W. Dolar, Tata McGraw-Hill, 3rd Edition, 2005.

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WATER SUPPLY ENGINEERING

B.Tech. III Year I Sem.
Course Code: CN503PC

L	T/P/D	C
4	0/0/0	4

Course Objectives:

- To assess drinking water requirement for planning drinking water schemes.
- To plan and design suitable settling units for water treatment
- To identify suitable filters and disinfection methods for treating water
- To assess capacity of storage reservoirs and design water distribution systems

Course Outcomes: At the end of the course, the student will be able to:

- Understand about quality of water to be used for various purposes
- Understand the water purification process
- Design the distribution systems

UNIT – I

Introduction: Water supply schemes – Protected water supply – Population forecasts, design period – water demand – Types of demand – factors affecting – per capita demand – fire demand – Sources of Water – intakes – infiltration galleries, confined and unconfined aquifers – water quality parameters and testing – drinking water standards. Estimation Water Requirements.

UNIT - II

Layout and general outline of water treatment units – sedimentation, Types of Settling uniform settling velocity – principles – design factors – surface loading – coagulation-flocculation, Theory of coagulation clarifier design – coagulants – feeding arrangements – Jar test – optimum dosage of coagulant -

UNIT - III

Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – types of disinfection - theory of chlorination - chlorine demand - other disinfection treatment methods.

UNIT – IV

Distribution systems – Types of layouts of Distribution systems – design of distribution systems - Hardy Cross and equivalent pipe methods - service reservoirs – Determination of Storage capacity.

UNIT - V

Advanced Water Treatment -Softening, Aeration, Iron and Manganese Removal, Fluoride Removal, Control of algal growth, colour removal, Disposal of Water Treatment Sludges.

TEXT BOOKS:

1. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B. C. Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt. Ltd, New Delhi
2. Water Supply Engineering Vol.1 & Waste water Engineering Vol. II, P.N. Modi, Standard Book Publishers, New Delhi.

REFERENCES:

1. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.
2. Water Supply and Pollution Control by Viessman Jr, Mark J Hammer, Perez Elizabeth M, Paul Chadik, pearson Publishers 2015.

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FUNDAMENTALS OF MANAGEMENT**B.Tech. III Year I Sem.****Course Code: SM504MS****L T P C****3 0 0 3**

Course Objective: To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills.

Course Outcome: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

UNIT - I

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

UNIT - II

Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans, Management by Objectives; Development of Business Strategy. Decision making and Problem Solving - Programmed and Non Programmed Decisions, Steps in Problem Solving and Decision Making; Bounded Rationality and Influences on Decision Making; Group Problem Solving and Decision Making, Creativity and Innovation in Managerial Work.

UNIT - III

Organization and HRM: Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization; Organizational Culture; Organizational Climate and Organizational Change.

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

UNIT - IV

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

Motivation - Types of Motivation; Relationship between Motivation, Performance and Engagement, Content Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT - V

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non- Budgetary Controls. Characteristics of Effective Controls, Establishing control systems, Control frequency and Methods.

Text Books:

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

References:

1. Essentials of Management, Koontz Kleihrich, Tata McGraw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.

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CONCRETE TECHNOLOGY LAB**B.Tech. III Year I Sem.****Course Code: CE505PC****L T/P/D C****0 0/3/0 2****Pre-Requisites:** Concrete Technology Theory

Course Objectives: The objectives of the course is to gain the practical knowledge of properties of concrete materials, behavior of concrete properties of fresh and hardened concrete

Course Outcomes: At the end of the course, the student will be able to:
Understand properties of concrete material, behavior of concrete & properties of fresh & hardened concrete

I. Test on Cement

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement
4. Soundness of cement.
5. Compressive strength of cement.
6. Workability test on concrete by compaction factor, slump and Vee-bee.

II. Test on Aggregate

1. Sieve Analysis and gradation charts
2. Bulking of sand.
3. Bulk and compact densities of fine and coarse aggregates

III. Test on Fresh Concrete

1. Slump test
2. CF (compact factor stress)
3. Vee-bee Test
4. Flow Table Test

Self Compacting Concrete

1. Slump cone
2. V funnel
3. L Box

IV. Test on hardened concrete

1. compression test on cubes & Cylinders
2. flexure test
3. Splitting Tensile Test
4. Modulus of Elasticity

V. Non Destructive test of concrete

1. Rebound hammer
2. Ultrasound pulse Velocity (UPV)

TEXT BOOK:

1. Concrete Technology by M.S. Shetty – S. Chand & Co.
2. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons

GEOGRAPHICAL INFORMATION SYSTEMS LAB**B.Tech. III Year I Sem.****L T/P/D C****Course Code: CE506PC****0 0/3/0 2****Prerequisites:** Surveying**Course Objectives:** To Develop GIS interface to field problems through geofencing.**Course Outcomes:** At the end of the course, the student is exposed to spatial technologies, mapping the field problems and solution convergence through GIS.**UNIT - I**

Development of georeferencing of maps either from cadastral or AutoCAD based map.

UNIT - II

Identification of best locations of ground control points and mosaicing the different sources of maps of information like topo sheets & satellite data and other drawings.

UNIT - III

Digitization and GIS coordination.

UNIT - IV

GIS interface and features using open Source Software QGIS.

UNIT - V

Case example on mapping like water distinguish, Road alignment road network etc.,

TEXT BOOKS:

1. Lo, C.P. & Yeung A.K.W., Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, New Delhi, 2002.
2. Burrough, P.A., Principles of Geographical Information Systems, Oxford Publication, 1998.
3. Clarke, K., Getting Started with Geographic Information Systems, Prentice Hall, New Jersey, 2001.
4. DeMers, M.N., Fundamentals of Geographic Information Systems, John Wiley & Sons, New York, 2000.
5. Geo Information Systems – Applications of GIS and Related Spatial Information Technologies, ASTER Publication Co., Chestern (England), 1992.

HYDRAULICS AND HYDRAULIC MACHINERY LAB**B.Tech. III Year I Sem.****Course Code: CE507PC****L T/P/D C****0 0/3/0 2****Pre Requisites:** HHM Theory**Course Objectives:** To give the student an exposure to various hydraulic machines.**Course Outcomes:** Hydraulics & Hydraulic Machinery

- Compute drag coefficients
- Test the performance of pumps and turbines
- Determine Manning's and Chezy's coefficients for smooth and rough channels
- Determine Energy loss in Hydraulic jump and Calibrate standing wave flume

1. Impact of jet on vanes
2. Study of Hydraulic jump in Open Channel.
3. Performance test on Pelton wheel turbine.
4. Performance test on Francis turbine.
5. Performance test on Kaplan turbine.
6. Performance characteristics of a single stage centrifugal pump.
7. Performance characteristics of a multi-stage centrifugal pump.
8. Performance characteristics of a reciprocating pump.
9. Study of Flow in Open Channel (Applying Chezy's and Manning's equations).
10. Determination of Coefficient of discharge for the given Weir (Sharp crested /Broad crested / Cippoletti weir).

PROFESSIONAL ETHICS

B.Tech. III Year I Sem.
Course Code: MC500HS

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

Course Objective: To enable the students to imbibe and internalize the Values and Ethical Behaviour in the personal and Professional lives.

Course Outcome: The students will understand the importance of Values and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT - I

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT - II

Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT - III

Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession.

Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT - IV

Work Place Rights & Responsibilities, Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation.

Ethics in changing domains of research - The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.

UNIT - V

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCES:

1. Engineering Ethics, Concepts Cases : Charles E Harris Jr., Michael S Pritchard , Michael J Rabins, 4e , Cengage learning, 2015.
2. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

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DESIGN OF STEEL STRUCTURES

B.Tech. III Year II Sem.
Course Code: CE601PC

L T/P/D C
4 1/0/0 4

Pre-Requisites: Structural Analysis I & II

Course Objectives: The objective of the course is to make the student conversant with the design principles of steel structural elements as per IS Codal provisions

Course Outcomes: At the end of the course, the student will be able to

- Design tension and compression members
- Design beams and beam columns
- Design bolt and weld connections
- Design built up members and Column base
- Design of plate girders and Roof Trusses

UNIT – I

Materials – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads – and combinations local buckling behavior of steel. Concept of limit State Design – Limit States – Design Strengths- deflection limits – serviceability – stability check. Bolted connections – Riveted connections – IS – 800 – 2007 - specifications – Design strength – efficiency of joint – prying action. Welded connections – Types of welded joints – specifications - design requirements.

UNIT – II

Design of tension members – Design strength – Design procedure splice - lug angle. Design of compress in members – Buckling class – slenderness ratio / strength design – laced – battened columns – splice – column base – slab base.

UNIT – III

Plastic Theory, Plastic hinge, Theorems of plastic Analysis Classifications of beams as per I.S 800-2007.

Design of Beams – Plastic moment – Bending and shear strength / buckling – Built up sections – laterally / supported beams - Design of eccentric connections – Framed – stiffened / seat connection.

UNIT – IV

Design of plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffness bearing – intermediate stiffeners – Design of Websplica & Flange splica.

UNIT – V

Design of roof trusses – Types of roof trusses, loads on trusses – purlin design – truss design, Design of joints and end bearings.

TEXT BOOKS:

1. Design of steel structures – N. Subramanian, Oxford University Press – 2009.
2. Limit State Design of steel structures, S.K. Duggal, Tata McGraw-Hill, 2010

REFERENCES:

1. Fundamental of Structural Steel Design by M L Gambhir MC Graw Hill Education Pvt Ltd 2013
2. Design of Steel Structures Edwin H. Gaylord, Jr. Charles N. Gaylord and James Stallmeyer Tata McGraw-Hill Education pvt. Ltd.
3. Design of steel structures, S.S. Bhavikatti, IK International Publication House, New Delhi, 2010.
4. Structural Design and Drawing by N. Krishna Raju, Universities Press.
5. Design of Steel structures by K.S. Sai Ram, Person Education.

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WATER RESOURCES ENGINEERING

B.Tech. III Year II Sem.
Course Code: CN602PC

L T/P/D C
4 1/0/0 4

Pre-Requisites: Fluid Mechanics & HHM

Objectives: The objectives of the course is to study the concepts of

- Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.
- Irrigation Engineering – Water utilization for crop growth and their designs.

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

- Analyze hydro-meteorological data
- Estimate abstractions from precipitation
- Compute yield from surface and subsurface basin
- Develop rainfall-runoff models
- Formulate and solve hydrologic flood routing models
- Estimate runoff, design discharge from catchment

UNIT - I

Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data - Adjustment of record -Rainfall Double Mass Curve. Runoff- Factors affecting Runoff – Runoff over a Catchment- Empirical and Rational Formulae.

Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation- Evapotranspiration- Penman and Blaney & Criddle Methods -Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices..

UNIT - II

Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow- Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

UNIT - III

Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, Darcy's law, radial flow to wells in confined and unconfined aquifers. Types of wells,- Well Construction – Well Development.

UNIT - IV

Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility –Crop Rotation, preparation of land for Irrigation, standards of quality for Irrigation water.

Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and delta, factors affecting duty- Design discharge for a water course. Depth and frequency of Irrigation, irrigation efficiencies-Water Logging.

UNIT - V

Classification of canals, Design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, IS standards for a canal design canal lining.

Design Discharge over a catchment, Computation of design discharge-rational formulae etc.

TEXT BOOKS:

1. Engineering Hydrology by K. Subramanya McGraw Education (India) Pvt Ltd, 2014.
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
3. Irrigation and Water Resources & Water Power by P. N. Modi, Standard Book House

REFERENCES:

1. Engineering Hydrology by CSP Ojha, R. Brendtsson and P. Bhunya Oxford University Press, 2010
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications Pvt. Ltd., New Delhi
3. Applied hydrology by V.T. Chow, D.R. Maidment and L. W Mays McGraw Education (India) Pvt Ltd, 2014.
4. Hydrology in Practice by E. M. Shaw, K.J. Beven, CRC Press, 2015.

WASTE WATER ENGINEERING

B.Tech. III Year II Sem.
Course Code: CN603PC

L	T/P/D	C
4	0/0/0	4

Course Objectives:

- To discuss the characteristics of wastewater and their impacts on disposal.
- To estimate quantity of wastewater and design sewer elements.
- To identify and design suitable wastewater treatment units

Course Outcomes: At the end of the course, the student will be able to assess properties of sludge and plain suitable disposal methods

UNIT – I

Introduction– Sewage Systems sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – examination of sewage – B.O.D. – C.O.D. equations.

UNIT - II

Design of sewers – shapes and materials – sewer appurtenances manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses – house drainage – components requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing. Sewage maintenance, sewage construction sewage objectives of Treatment units

UNIT – III

Layout and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks

UNIT - IV

Principles and design of biological treatment – trickling filters – standard and high rate- Filters – ASP – ASP modification – Aeration. Construction and design of oxidation ponds – Oxidation ditches – Sludge Treatment. Other biological treatment with oxidation ponds, oxidation ditches lagoons

UNIT - V

Sludge digestion tanks –design of Digestion tank –Factors affecting sludge digestion - Sludge disposal by drying – septic tanks - working principles and design – soak pits. Ultimate disposal of waste water – self purification of rivers – Sewage farming.

TEXT BOOKS:

1. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi

2. Water Supply Engineering Vol.1 & Waste water Engineering Vol. II, P.N. Modi, Standard Book Publishers, New Delhi.

REFERENCES:

1. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.
2. Waste water treatment pollution control and Reuse by Solij Asceivalar, Shyam R Asolekar, Mc Graw hills Publisher 2015.
3. Waste water engineering by Metcalf and Eddy. McGraw-Hills Higher Education
4. Theory & Practice of Water & Wastewater Treatment by Ronald L Droste, John Wiley & Sons India Publishers.

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AIR POLLUTION AND CONTROL
(Professional Elective - I)

B.Tech. III Year II Sem.
Course Code: CE611PE

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

Pre Requisites: Environmental Engineering

Course Objectives: The subject provides the knowledge of various effects of Air pollution on human beings and Vegetation and Materials. The topics of control methods, details of control equipment, and the methods of controlling gaseous are also included. The objective of the course is to study the moment, occurrence of ground water and its development and management.

Course Outcomes: At the end of the course, the student will be able to:

- Identify sampling and analysis techniques for air quality assessment
- Describe the plume behavior for atmospheric stability conditions
- Able to control air pollution by properties various techniques to control

UNIT – I

Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources.

UNIT – II

Effects of Air pollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT - III

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO_x , NO_x , CO, HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity; Influence of Meteorological phenomena on Air Quality- wind rose diagrams.

UNIT - IV

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.

Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – V

General Methods of Control of NO_x and SO_x emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Air Quality Management – Monitoring of SPM, SO_x, NO_x and CO Emission Standards.

TEXT BOOKS:

1. Air pollution By M. N. Rao and H. V. N. Rao – Tata McGraw Hill Company.
2. Air pollution by Wark and Warner. - Harper & Row, New York.

REFERENCE:

1. Air pollution and control By K.V.S.G. Murali Krishna, Kaushal Publishers. Kakinada.

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WATERSHED MANAGEMENT
(Professional Elective - I)

B.Tech. III Year II Sem.
Course Code: CN612PE

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

Prerequisites: Water Resources Engineering

Course Objectives:

- To understand different watershed behaviour
- To be able to interpret runoff data and quantify erosion by using various modelling methods.
- To understand land use classification and impact of land use changes on hydrological cycle parameters.

Course Outcomes: At the end of the course, the student will be able to

- Identify causes of soil erosion
- Plan and design soil conservation measures in a watershed
- Plan and design water harvesting and groundwater recharge structures
- Plan measures for reclamation of saline soils

UNIT - I

Introduction,- concept of watershed, need for watershed management, concept of sustainable development. Hydrology of small watersheds

UNIT - II

Principles of soil erosion- causes of soil erosion, types of soil erosion, estimation of soil erosion from small watersheds, Control of soil erosion, methods of soil conservation – structural and non-structural measures.

UNIT - III

Principles of water harvesting, methods of rainwater harvesting, design of rainwater harvesting structures.

UNIT - IV

Artificial recharge of groundwater in small watersheds-, methods of artificial recharge.

UNIT - V

Reclamation of saline soils -. Micro farming -, biomass management on the farm.

TEXT BOOKS:

1. Murthy, V.V.N. and M.K. Jha Land and Water Management, Kalyani Publishers, 2015

2. Watershed Management by Madan Mohan Das and M.D. Saikia, Prentice Hall of India, 2013
3. Watershed Management Muthy, J. V. S., , New Age International Publishers, 1998

REFERENCES:

1. Watershed Hydrology by P E Black, Prentice Hall Englewood Cliffs, 1991
2. Watershed Hydrology by R Suresh, Standard Publishers and Distributors, Delhi, 2007

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ENVIRONMENTAL SANITATION
(Professional Elective - I)

B.Tech. III Year II Sem.
Course Code: CN613PE

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

Course Objectives:

- The objective of this course is to provide an understanding of the principles of environmental sanitation.
- To present the concepts of food & milk sanitation
- To study the effects of noise pollution & its control
- To discuss the problems associated in rural sanitation and slum rehabilitation.

Course Outcomes: At the end of the course, the student will be able to

- Understand know the principles of protecting environment.
- Understand provide fundamentals of rural water supply, water sanitation and milk sanitation.
- Understand the concepts of solid waste management like handling and disposal of hazardous wastes.
- Acquires basic knowledge about measures and control of noise pollution.

UNIT - I

Epidemiology – Principles of protecting the environmental sanitation measures, Insect and Rodent Control – Occupational hazards, Industrial hygiene, Rural Water Supply and sanitation, biogas.

UNIT – II

Sanitation - community sanitation measures – sanitation of camps, festivals, schools, swimming pools etc. Food and milk sanitation, hotel management with reference to sanitation – food preservation, pasteurization methods and plants. Housing need – lighting and ventilation, natural and artificial provisions.

UNIT - III

Solid wastes – characteristics, collection, disposal by landfill, composting, incineration and other methods.

Handling and disposal of Hazardous Wastes. Industrial Hygiene – Occupational hazards – Various operations in industrial units, Engineering and safety measures. Radiological health – radioactive wastes and disposal.

UNIT - IV

Noise Pollution and control – Introduction, Measurement of noise, Effects of noise and control measures.

UNIT - V

Rural sanitation various methods of collection and disposal of faecal matter – community toilets – septic tanks and soak pits – biogas plants - Public Health – Aspects of slums – Problems associated with slum rehabilitation.

TEXTBOOKS:

1. Municipal and Rural Sanitation by Euler's and Steel, Tata McGraw- Hill Publishing Co, New Delhi
2. Environmental Sanitation by Salvato – John Wiley & Sons
3. Environmental Protection by Chanlet- McGraw-hill New York
4. Environmental Sanitation by Baljeet S. Kapoor, S. Chand & Co., New Delhi

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ENVIRONMENTAL CHEMISTRY
(Professional Elective – I)

B.Tech. III Year II Sem.
Course Code: CN614PE

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

Course Objectives: The goals of this course are:

- To learn basic chemical content in context.
- To develop an understanding of chemicals and their effects on the environment.
- To design and carry out field research.
- To how business and government policies toward chemicals in the environment effect the planet.

Course Outcomes: At the end of the course, the student will be able to

- Developed expertise relevant to the professional practice of chemistry, environmental science and engineering
- An understanding of chemical methods employed for environmental problem solving
- Experience in some scientific methods employed in environmental chemistry
- Developed skills in procedures and instrumental methods applied in analytical tasks of environmental chemistry
- Developed skills in the scientific method of planning, developing, conducting, reviewing and reporting experiments

UNIT – I

Organic Chemistry : Concepts of physical and general chemistry - Properties of Organic Compounds, Sources of Organic Compounds, Isomerism, Types of Organic Compounds, Aliphatic, Aromatic and Heterocyclic compounds – Water and waste water chemistry – sampling and analysis – Instrumentation techniques.

UNIT – II

Concepts of Equilibrium Chemistry – Le-Chatlier's principle, Factor influencing equilibrium – Activity Coefficient- Variations of the equilibrium relationship -Oxidation Reduction reactions – Gas laws – acids and bases – buffers – solubility of salts - Action kinetics – rate of reactions – factors effecting, order of reactions – biodegradation – BOD, COD

UNIT – III

Concepts of Biochemistry – Structure of cell – Cell Biochemistry – minimal growth curve – Growth kinetics – Enzyme reactions – Functions affecting enzyme reactions – Coenzymes/ Cofactors – Temperature, pH, Macro pollutants, carbohydrates, Proteins, fats – Metabolic processes – Biological toxins – Bioaccumulation and Bio magnification – Case studies.

UNIT – IV

Growth and Production of Micro-organisms : Growth rates and Reproduction of micro-organisms, effect of chemical and physical agents on microbial growth, temperature, pH, Osmotic pressure, radiation, antibiotics, disinfectants, mutations, induced and spontaneous, destruction and removal (sterilization and disinfection) - Cell Kinetics – Energy (Aerobic and anerobic) reactions – Effects of Physical and Chemical agents on Cell control study of Protozoa, Bacteria, Viruses, Algae and fungi and their classification and significance – Enzyme Reaction.

UNIT – V

Nuclear Chemistry : Atomic Structure, Electron orbits, Neutron, Proton, Nuclear structure, Nomenclature of Isotopes, stable and radioactive nucleoids, Nature of Radiation, Energy of Radiation, Units of Radioactivity, half life, α , γ and neutron induced reaction, nuclear fission and nuclear fusion, use of radioactive materials as tracers.

TEXT BOOKS:

1. Chemistry for Environmental Engineering by Sawyer and McGraw-Hill, New York.
2. Microbiology by J.Pelczar, E.C.S.Chan & N R Krieg, Tata McGraw-Hill Publishers, New Delhi.
3. Microbiology for Sanitary Engineers by Mc kinney Ross E -McGraw-Hill New York

REFERENCE:

1. Microbiology for Scientists and Engineers by Gandy and Gandy, Tata Mc. Graw Hill Publications.

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COMPUTER AIDED DESIGN AND DRAFTING LAB - II**B.Tech. III Year II Sem.****Course Code: CN604PC****L T/P/D C****0 0/3/0 2****Pre-Requisites:** CAD Lab – I & Excel, C - Programming**Course Objectives:** To make students understand detailing of all kinds of structures such as reinforced concrete, plain concrete, steel structures.**Course Outcomes:** At the end of the course, the student will be able to Student can draft various structures

1. Detailing of reinforcement in Cantilever, Simply supported and Continuous Beams (Both Singly & Doubly Reinforced Beams)
2. Detailing of reinforcement in canopy & columns (both uniaxial & biaxial)
3. Detailing of reinforcement in RC isolated footings square, rectangular, circular and combined footings.
4. Detailing of reinforcement in RC one-way, two-way slabs and dog-legged staircases.
5. Drawing of Steel bolted and welded connections.
6. Drawing of steel compression and tension members.
7. Drafting of steel beams-built-up sections.
8. Drafting of steel plate girder
9. Drafting of steel roof truss.

Note: Drafting of all the exercises is to be carried out using commercially available drafting softwares.

ENVIRONMENTAL ENGINEERING LAB**B.Tech. III Year II Sem.****Course Code: CN605PC****L T/P/D C****0 0/3/0 2****Pre Requisites:** Chemistry Laboratory**Course Objectives:**

The laboratory provides knowledge of estimating various parameters like PH, Chlorides, Sulphates, and Nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand is also included. The estimation status of industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.

Course Outcomes: Students will able to find various properties of water**LIST OF EXPERIMENTS**

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids (Organic and Inorganic)
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination of iron.
6. Determination of Dissolved Oxygen.
7. Determination of Nitrates.
8. Determination of Optimum dose of coagulant
9. Determination of Chlorine demand
10. Determination of total Phosphorous.
11. Determination of B.O.D
12. Determination of C.O.D
13. Presumptive coliform test.

NOTE: All above experiments are to be conducted.

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B.Tech. III Year II Sem.

Course Code: EN606HS

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0	0	3	2

Introduction

A course on *Advanced English Communication Skills (AECS) Lab* is considered essential at the third year level of B.Tech and B.Pharmacy courses. At this stage, the students need to prepare themselves for their career which requires them to listen to, read, speak and write in English both for their professional and interpersonal communication. The main purpose of this course is to prepare the students of Engineering for their placements.

Course Objectives: This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve students' fluency in spoken English
- To enable them to listen to English spoken at normal conversational speed
- To help students develop their vocabulary
- To read and comprehend texts in different contexts
- To communicate their ideas relevantly and coherently in writing
- To make students industry-ready
- To help students acquire behavioral skills for their personal and professional life
- To respond appropriately in different socio-cultural and professional contexts

Course Outcomes: Students will be able to:

- Acquire vocabulary and use it contextually
- Listen and speak effectively
- Develop proficiency in academic reading and writing
- Increase possibilities of job prospects
- Communicate confidently in formal and informal contexts

Syllabus

The following course activities will be conducted as part of the Advanced English Communication Skills (AECS) Lab:

1. **Inter-personal Communication and Building Vocabulary** - Starting a Conversation – Responding Appropriately and Relevantly – Using Appropriate Body Language – Role Play in Different Situations - Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.
2. **Reading Comprehension** –General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, Skimming, Scanning, Inferring Meaning.
3. **Writing Skills** – Structure and Presentation of Different Types of Writing – Letter Writing/Resume Writing/ e-correspondence/ Technical Report Writing.

4. **Presentation Skills** – Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/e-mails/Assignments... etc.,
5. **Group Discussion and Interview Skills** – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation- Concept and Process, Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

Minimum Hardware Requirement

Advanced English Communication Skills (AECS) Lab shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- **Spacious room with appropriate acoustics**
- **Eight round tables with five movable chairs for each table.**
- **Audio-visual aids**
- **LCD Projector**
- **Public Address system**
- **Computer with suitable configuration**

Suggested Software: The software consisting of the prescribed topics elaborated above should be procured and used.

- **Oxford Advanced Learner's Compass, 8th Edition**
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**

REFERENCES:

1. Kumar, Sanjay, and Pushp Lata. **English for Effective Communication**, Oxford University Press, 2015.
2. Konar, Nira, English Language Laboratories – A Comprehensive Manual, PHI Learning Pvt. Ltd., 2011.