Course Outcomes: Students should be able to

Course Outcomes: Students should be able to

Second Year Chemical Engineering (SE) (Curriculum 2015 Pattern)

Semester-I

Subject	**Engineering Mathematics-III**
Subject Code	207004
Course Outcome (COs)	
CH207004.1	Solve higher order linear differential equations and apply to modeling and analyzing chemical transformation and heat and mass transfersystems.
CH207004.2	Apply Laplace Transform and Fourier Transform techniques to solve differential equations involved in vibration theory , Liquid level systems and
	related chemical engineering applications.
CH207004.3	Perform vector differentiation and integration, analyze the vector fields and apply to fluid mechanics problems.
CH207004.4	Solve various partial differential equations such as wave equation , one and two dimentional heat flow equations.

Subject	**Chemistry-I**
Subject Code	209341
Course Outcome (COs)	
CH209341.1	Understand strength of acids and bases and can modify its strength
CH209341.2	Understand rate constant and evaluate rate constant of complex reactions
CH209341.3	Understand the analysis of organic molecules using UV and IR

CH209341.4	Understand various types of solution and expressing their concentration
CH209341.5	Understand reactions and its mechanism with different intermediates
CH209341.6	Understand synthesis and requirement for making of dyes.

Subject	**Fluid Mechanics**
Subject Code	209342
Course Outcome (COs)	
CH209342.1	To introduce basic concepts of fluid mechanics and their applications in Chemical Engineering.
CH209342.2	To study basic equations of fluid flow and applications to determine losses occurring through pipelines
CH209342.3	To develop relationships among process or system variables using dimensional analysis.

Subject	**Engineering Materials**
Subject Code	209343
Course Outcome (COs)	
CH209343.1	On completion of the unit learner will be able to– understand Basic Principles in Selection of Materials for Fabrication and Erection of Chemical Plant
CH209343.2	On completion of the unit learner will be able to– understand Basic Principles in Selection of Materials for Fabrication and Erection of Chemical PlanMetals and their Alloys:
CH209343.3	On completion of the unit learner will be able to– understand Nanomaterials, Classification, synthesis, characterization and application of Nanomaterials
CH209343.4	On completion of the unit learner will be able to– understand Electron Microscopes; scanning electron microscopy (Basics, Principal Elements, working),
CH209343.5	On completion of the unit learner will be able to– understand Typical Engineering Materials:
CH209343.6	

Subject	**Process Calculations**

Subject Code	209344
Course Outcome (COs)	
CH209344.1	Develop ideas in dimensional analysis and to be familiar with different unit systems and conversion from one set of system to another.
CH209344.2	Understand the various unit operations and unit processes performed in a chemical industry.
CH209344.3	Learn fundamentals of stoichiometry and apply the material balance concept
CH209344.4	Learn to calculate the amount of materials required to carry out the suitable unit operation or process.
CH209344.5	Learn the application of the general energy balance equation
CH209344.6	Learn to calculate the energy requirements of the unit operation or process involved.

Subject	**Introduction to Chemical Engineering**
Subject Code	209345
Course Outcome (COs)	
CH209345.1	This Course will help the students to acquire knowledge of Chemical engineering.
CH209345.2	Describe the scope of Chemical engineering with multidisciplinary industries.
CH209345.3	Understand & identify Unit operations and Unit Processes with their functions
CH209345.4	Learn material and Energy balances
CH209345.5	Impart knowledge of basic concept of Chemical processes applied to industrial applications.
CH209345.6	Understand lying principles of processes design

Subject	**Soft Skills**
Subject Code	209346
Course Outcome (COs)	
CH209346.1	On completion of the course, learner will be able to Communicate, interact and present his ideas to the other professionals
CH209346.2	On completion of the course, learner will be able to Understand and aware of importance, role and contents of soft skills through instructions, knowledge acquisition, demonstration and practice.

CH209346.3	On completion of the course, learner will be able to Developing self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals
CH209346.4	On completion of the course, learner will be able to Assessing the requirements of a task, identifying the strengths within the team, utilizing the diverse skills of the group to achieve the set objective

Semester-II

Subject	**Chemistry - II**
Subject Code	209347
Course Outcome (COs)	
CH209347.1	Understand the types of biomolecules essential for various purposes.
CH209347.2	Understand essential condition for formation of important complex.
CH209347.3	Understand the analysis of inorganic molecules using different techniques
CH209347.4	Understand various types of forces holding substrate on the other
CH209347.5	Understand types of isomerism and its properties based isomerism
CH209347.6	Understand application of various drugs, insecticide,fertilizers in day today life

Subject	**Heat Transfer**
Subject Code	209348
Course Outcome (COs)	
CH209348.1	will be able to demonstrate Knowledge of basic concepts of Heat Transfer.
CH209348.2	will be able to demonstrate Knowledge of Heat Conduction
CH209348.3	will be able to demonstrate Knowledge of Heat Conduction
CH209348.4	An ability to identify, formulate and solve engineering problems related to Convection

CH209348.5	An ability to identify, formulate and solve engineering problems related to Radiation
CH209348.6	An ability to identify heat exchange equipment appropriate for a given duty and to design the same
CH209348.7	An ability to identify, formulate and solve engineering problems related to Evaporation.

Subject	**Principles of Design**
Subject Code	209349
Course Outcome (COs)	
CH209349.1	To impart the basic concepts of chemical engineering drawing and mechanical design.
CH209349.2	Knowledge of basics of process equipment design and important parameters of equipment design
CH209349.3	To acquire basic understanding of design parameters, complete knowledge of design procedures for commonly used machine components
CH209349.4	To develop understanding about drawing of shafts, coupling, bearings, keys belts etc.

Subject	**Chemical Engineering Thermodynamics-I**
Subject Code	209350
Course Outcome (COs)	
CH209350.1	Be able to understand the basic thermodynamic terminology and terminology and scope, Thermodynamics laws and their applicability and limitations.
CH209350.2	Select an appropriate equation of state for representing the P-V-T behavior of gases and/or liquids
CH209350.3	Calculate changes in U, H, S and G for ideal gases, and also for non- ideal gases through the use of residual properties and fugacity
CH209350.4	Understand the second law of thermodynamics and its limitations, various thermodynamic cycles, entropy concept, ideal engine efficiency.
CH209350.5	Understand the criteria for chemical equilibrium and derive Maxwell relations.
CH209350.6	Understand the working principle and performance of refrigerators and heat pumps.

Subject	**Mechanical Operations**
Subject Code	209351
Course Outcome (COs)	
CH209351.1	On completion of the course, learner will be able to To select suitable type of screening and size reduction equipment for different particle sizes
CH209351.2	On completion of the course, learner will be able to To select suitable type of thickeners and clarifiers for separation of suspended solid particles
CH209351.3	On completion of the course, learner will be able to To apply fluidization and beneficiation techniques in Chemical Industries.
CH209351.4	On completion of the course, learner will be able to
CH209351.5	On completion of the course, learner will be able to To select a suitable type of filter for filtration of a slurry or a suspension
CH209351.6	On completion of the course, learner will be able to To select a suitable type of conveyor for transportation of different types of solids.

Subject	**Workshop Practices**
Subject Code	209352
Course Outcome (COs)	
CH209352.1	Introduction to different material in engineering practices with respect to their workability, formability & machinability with hand tools & power & to develop skills through hands on experience.

Course Outcomes: Students should be able to

Third Year Chemical Engineering (TE) (Curriculum 2015 Pattern)

Semester-I

Subject	**Chemical Engineering Mathematics**

Subject Code	309341
Course Outcome (COs)	
CH309341.1	On completion of the course, learner will be able to To understand do the calculations on Error and Roots of Equation
CH309341.2	On completion of the course, learner will be able to To understand do the calculations on Linear Algebraic Equation
CH309341.3	On completion of the course, learner will be able to To understand do the calculations on Regression Analysis and Interpolation
CH309341.4	On completion of the course, learner will be able to To understand do the calculations on Ordinary Differential Equation
CH309341.5	On completion of the course, learner will be able to To understand do the calculations on Finite Difference Methods
CH309341.6	On completion of the course, learner will be able to To understand do the calculations on Optimization

Subject	**Mass Transfer I**
Subject Code	309342
Course Outcome (COs)	
CH309342.1	Define mass transfer operation for individual processes
CH309342.2	Explain the basic mechanism for mass transfer
CH309342.3	Solve problems related to diffusion and molar flux
CH309342.4	Estimate the mass transfer coefficient and rate for a given system
CH309342.5	Formulate the separation process for given system
CH309342.6	Apply basic concept for design calculations of various mass transfer operations

Subject	**Industrial Organization & Management**
Subject Code	309343
Course Outcome (COs)	
CH309343.1	Student shall be able to understand and critically assess planning function, strategic planning, the organizing function, organization design.
CH309343.2	Student shall be able to understand the economic and operations management concepts useful in the production process.

CH309343.3	Student shall be able to apply the project management tools in effective development and implementation of the business activities.
CH309343.4	Student shall be able to develop the entrepreneurial spirit and plan to start their own enterprise.
CH309343.5	Students able to understand and apply basic management principles.
CH309343.6	Student shall be able to understand and critically assess the environment, social and ethical responsibilities of management

Subject	**Chemical Process Technology**
Subject Code	309344
Course Outcome (COs)	
CH309344.1	Understand the basic concepts of unit operations, unit processes, schematic representation and applications for unit operations and unit processes.
CH309344.2	Understand Nitro- Phosphorous Industry and Sulphur Industry
CH309344.3	Understand Sugar- Starch, Paper – Pulp and Fermentation Industry
CH309344.4	Understand Natural Chemicals
CH309344.5	Understand Industrial Gases and Petroleum Industry
CH309344.6	Understand Petrochemical Industry

Subject	**Chemical Engineering Thermodynamics II**
Subject Code	309345
Course Outcome (COs)	
CH309345.1	Be able to understand the concept of chemical potential, fugacity and partial molar properties
CH309345.2	Calculate solution properties by using Gibbs Duhem and activity coefficient equations
CH309345.3	Understand vapor liquid equilibrium and to perform bubble point, Dew point and flash calculation using an equation of state
CH309345.4	Understand the law of osmatic pressure, Solid- Liquid and Liquid- Liquid equilibrium and test the thermodynamics consistency
CH309345.5	Understand the criteria for chemical reaction equilibrium and evaluate the equilibrium constant
CH309345.6	Calculate the equilibrium composition of more than one chemical reaction occurs simultaneously

Subject	**Computer Aided Chemical Engineering I**
Subject Code	309346
Course Outcome (COs)	
CH309346.1	Ability to develop new programme in C Language to slove Chemical Engineering problem
CH309346.2	Ability to develop new programme in MATLAB to slove Chemical Engineering problem
CH309346.3	Ability to develop new programme in MS EXELto slove Chemical Engineering problem
CH309346.4	Ability to design Algorith for problem Statement

Subject	**Industrial Training Evaluation**
Subject Code	309347
Course Outcome (COs)	
CH309347.1	Students are able to preapare neatly typed detailed report
CH309347.2	After completion of Industrial Training students will understand all types of Unit Operations and Unit Processes.

Semester-II

Subject	**Chemical Reaction Engineering I**
Subject Code	309348
Course Outcome (COs)	
CH309348.1	Students able to easy to understand the stoichiometry preferable at more than one temperature.
CH309348.2	Students able to small scale laboratory set-up operated experimental batch reactor isothermally and at constant volume batch reactor.
CH309348.3	Students able to solve reactor engineering problems through reasoning rather than memorization of numerous equations together with the various restrictions and conditions.
CH309348.4	Students able to get size requirement and distribution of reaction products are affected by the patterns of flow within the vessel.
CH309348.5	Students able to propose a number of favorable reactor and heat exchange systems.

CH309348.6	Students able to calculate the conversion and concentration exiting a reactor.

Subject	**Transport Phenomena**
Subject Code	**309349**
Course Outcome (COs)	
CH309349.1	specify and explain the fundamental transport equations that describe non steady-state heat and mass transfer, i.e conduction and diffusion equations.
CH309349.2	develop modelling thinking by relating a problem involving non steady-state heat and mass transfer to the fundamental transport equations and specify initial and boundary conditions
CH309349.3	Describe qualitatively a non steady-state physical process related to a given conduction or diffusion equation with corresponding initial and boundary conditions.
CH309349.4	with deeper knowledge in mathematics and numerical methods, solve the equations analytically or numerically
CH309349.5	Identify and solve simple cases of non steady-state mass transfer including diffusion and bulk flow as well as simple cases of simultaneous heat and mass transfer.

Subject	**Chemical Engineering Design I**
Subject Code	309350
Course Outcome (COs)	
CH309350.1	To design storage vessels
CH309350.2	To do design of tall vessels
CH309350.3	To design heat exchangers
CH309350.4	To do design of heat exchange equipments
CH309350.5	To do design of agitators and reaction vessels

Subject	**Mass Transfer II**
Subject Code	309351
Course Outcome (COs)	

CH309351.1	Ability to apply concepts of separation processes to understand vapour-liquid equilibrium, relative volatility and methods of distillations etc.
CH309351.2	Ability to develop understanding of implications of factors affecting column operation and procedures to finding out number of plates in distillation column.
CH309351.3	Choose the extraction process which will be economical for separation.
CH309351.4	Describe the leaching equipments to separate the valuable chemicals.
CH309351.5	Gain an understanding of the fundamentals of adsorption and ion exchange via. Equilibrium properties, transport properties and kinetics of mass transfer.
CH309351.6	Ability to understand concepts of various membrane separation processes and background of nucleation, crystal growth in crystallization mechanism.

Subject	**Process Instrumentation & Control**
Subject Code	309352
Course Outcome (COs)	
CH309352.1	***Explain the basic principles & importance of process control in industrial process plants***
CH309352.2	**Specify the required instrumentation and final elements to ensure that well-tuned control is achieved**
CH309352.3	Explain the use of block diagrams & the mathematical basis for the design of control systems
CH309352.4	Explain the importance and application of good instrumentation for the efficient design of process control loops for process engineering plants

Subject	**Seminar**
Subject Code	309353
Course Outcome (COs)	
CH309353.1	Ability to develop presentation skill of students
CH309353.2	Ablity to aquire knowledge of various field of chemical engineering

Subject	**Industrial Training**

Subject Code	
Course Outcome (COs)	
	Train students to be independent to prepare them to join the workforce in the future.
	Develop the students in terms of ability, competence and interpersonal relationship.
	Expose the students to the actual working environment including rules, regulations and safety practices.
	Enhance and supplement the knowledge and skills of the students.

Course Outcomes: Students should be able to

Final Year Chemical Engineering (BE) (Curriculum 2012 Pattern)

Semester-I

Subject	**Process Dynamics and Control**
Subject Code	409341
Course Outcome (COs)	
CH409341.1	Study the dynamic behaviour of simple processes like Thermometer, Liquid level tank etc
CH409341.2	Understand single loop feedback control system and design of single-loop feedback control systems.
CH409341.3	Carry out Stability Analysis of feed-back systems.
CH409341.4	Carry out Frequency response analysis of linear processes.
CH409341.5	Design of controllers
CH409341.6	Understand the concepts of Digital and Computer- based Control Systems

Subject	**Chemical Reaction Engineering II**

Subject	**Chemical Reaction Engineering II**
Subject Code	409342
Course Outcome (COs)	
CH409342.1	Ability to understand kinetics of fluid-particle reactions.
CH409342.2	Students will able to use the knowledge they gained about development of mathematical model for design fluid-fluid reactions.
CH409342.3	Students are able to understand surface area determination of catalyst and adsorption process
CH409342.4	Ability to derive equation of diffusion in porous catalyst and mass balance equation to yield Thiele's modulus and effectiveness factor.
CH409342.5	Students can able to understand basics of reaction mechanism and kinetics of solid catalyzed reactions.
CH409342.6	Students will able to apply the knowledge they have gained to find the model equation and use this model to design the reactor used for heterogeneous reaction s takes place in isothermal and adiabatic reactors .

Subject	**Chemical Engineering Design II**
Subject Code	409343
Course Outcome (COs)	
CH409343.1	To do design of distillation column
CH409343.2	To do design of packed columns
CH409343.3	To do piping design
CH409343.4	To study materials for piping system
CH409343.5	To study plant utilities
CH409343.6	To study plant maintenance

Subject	**Environmental Engineering**
Subject Code	**409344**
Course Outcome (COs)	
CH409344.1	Student willl able to understand impact of population growth on environment, environmental impact of thermal, hydro and nuclear energy, chemical pollution,
CH409344.2	Student willl able to understand Effects of air pollutants on human health, plants, animals, materials, Economic effects of air pollution

CH409344.3	Student willl able to understand Air Pollution Control Methods and Equipments
CH409344.4	Student willl able to understand Waste water characteristics–DO, BOD, COD, TOC, total suspended solids, colour and odour, bacteriological quality, oxygen deficit, determination of BOD constants.
CH409344.5	Student willl able to understand Principles of primary treatment and secondary treatment, process design and basic operating principles of activated sludge (suspended growth) process
CH409344.6	Student willl able to understand Tertiary Water Treatment and Solid Waste Management practices.

Subject	**Chemical Process Synthesis** **409345**
Subject Code	409345
Course Outcome (COs)	
CH409345.1	After completion of this student will do Chemical Process Design
CH409345.2	Students will understand and do the Choice of Reactor
CH409345.3	Students will learn Choice of Separator
CH409345.4	Students will be able to do Heat Exchanger Network And Utilities

Subject	**Industrial Training Evaluation**
Subject Code	409346
Course Outcome (COs)	
CH409346.1	After completion of Industrial Training students will understand all types of Unit Operations and Unit Processes.

Subject	**Computer Aided Chemical Engineering II**
Subject Code	409347
Course Outcome (COs)	
CH409347.1	Students will able to perform the calculations on basic linear algebra involving matrix operations

CH409347.2	Students will generate Computer program for solving steady state staged operation
CH409347.3	Students will generate computer program for plotting P-x-y and T-x-y diagram
CH409347.4	Students will perform the Simulation of mass transfer equipment using simple and rigorous methods
CH409347.5	Students will perform Simulation of product synthesis using different reactors
CH409347.6	Students will perform Simulation of fluid flow problems with or without heat/mass transport

Subject	**Project Stage-I**
Subject Code	409348
Course Outcome (COs)	
CH409348.1	Students will able to Define the research problem.
CH409348.2	Students will able to Write a research proposal,
CH409348.3	Students will able to define Origin of the problem
CH409348.4	Students will able to write Literature review of research and development at national & international level
	Students will able to give Significance of the problem

Semester-II

Subject	**Process Modeling and Simulation**
Subject Code	409349
Course Outcome (COs)	
CH409349.1	Understand different types of models, application of mathematical modeling, scope of coverage. Fundamental Laws Apply conservation laws to produce model equations for a system or process in chemical engineering.
CH409349.2	Develop and analyse the mathematical models in the area of Fliud Flow Operations
CH409349.3	Develop and analyse the mathematical models in the area of heat transfer Equipment.
CH409349.4	Develop and analyse the mathematical models in the area of mass transfer.
CH409349.5	Develop and analyse the mathematical models for reaction engineering systems.
CH409349.6	Develop and understand simulation scheme for various chemical engineering systems.

Subject	**Process Engineering Costing & Plant Design**
Subject Code	409350
Course Outcome (COs)	
CH409350.1	Students shall understand the basics of Process Development
CH409350.2	Students shall be understand the basics of Cost Engineering
CH409350.3	Students shall be able to estimate the Cost
CH409350.4	Students shall understand the Optimum Design
CH409350.5	Students shall be able to apply Optimization of Different Process Equipment
CH409350.6	Students shall be able to apply the Scheduling and Networking of Project

Subject	**Chemical Process Safety**
Subject Code	409351
Course Outcome (COs)	
CH409351.1	Recognize ethical standards and professional codes of conduct for engineers, e.g., NSPE Code of Ethics for Engineers.
CH409351.2	Describe and apply the principles and approach of inherently safer design to reduce and eliminate hazards and thereby lower the risk of new or currently operating chemical systems.
CH409351.3	Identify the potential hazards and hazardous conditions associated with the processes and equipment involved in the chemical process industries.
CH409351.4	Identify government agencies, regulatory bodies, codes, and standards that govern the global, societal, and environmental impact of plant design projects.

Subject	**Catalysis**
Subject Code	409352
Course Outcome (COs)	
CH409352.1	Introduction to catalysis
CH409352.2	Application to Heterogeneous catalysis

CH409352.3	Application to Gas – solid catalytic reactions
CH409352.4	Students shall be able for Preparation of catalysts
CH409352.5	Introduction to Zeolites
CH409352.6	Introduction to Biocatalysts

Subject	**Project Phase II**
Subject Code	409353
Course Outcome (COs)	
	Students will able to Define the research problem.
	Students will able to Write a research proposal,
	Students will able to define Origin of the problem
	Students will able to write Literature review of research and development at national & international level
	Students will able to give Significance of the problem

Course Outcomes:

First Year (ME) Environmental Engineering (Curriculum 2015 Pattern)

Semester-I

Subject	**509131: Applied Statistics for Environmental Engineers**
Course Outcome (COs)	
CH509131.1	Students will able to understand Principle of least squares -Correlation and regression - rank correlation.
CH509131.2	Students will able to understand SAMPLING DISTRIBUTIONS AND ESTIMATION
CH509131.3	Students will able to understandTESTING OF HYPOTHESIS
CH509131.4	Students will able to understand Completely randomized design - Randomized block design – Latin square design - 2 power 2 factorial design.
CH509131.5	Students will able to understand Basic concepts - Graphical and Simplex methods – Transportation problem

Subject	**509132: Environmental Management**
Course Outcome (COs)	
CH509132.1	Students will able to understand Concept and scope,Green funding and taxes
CH509132.2	Students will able to understand Environment Impact on Business
CH509132.3	Students will able to understand Environmental Legislation
CH509132.4	Students will able to understand Environmental Policy of the Government of India and the working of the Ministry of Environment and Forest

Subject	**509133: Environmental Chemistry**
Course Outcome (COs)	
CH509133.1	Students will able to understand Stoichiometry and mass balance-Chemical equilibria
CH509133.2	Students will able to understand Water quality parameters- environmental significance and determination; Fate of chemicals in aquatic environment,
CH509133.3	Students will able to understand Atmospheric structure –-chemical and photochemical reactions – photochemical smog. Ozone layer depletion,
CH509133.4	Students will able to understand Nature and composition of soil-Clays- cation exchange capacity-
CH509133.5	Students will able to understand Principles of green chemistry, Atom economy, mass index - Nano materials

Subject	**509134: Research Methodology**
Course Outcome (COs)	
CH509134.1	Students will able to understand Objectives of research Types of research, Various steps in research process, Problem formulation, Literature search

CH509134.2	Students will able to understand Quantitative methods for problem solving
CH509134.3	Students will able to understand Design of Experiments
CH509134.4	Students will able to understand Tabular and graphical description of data
CH509134.5	Students will able to understand Soft Computing
CH509134.6	Students will able to understand Structure and Components of Research Report and Presentation

Subject	**509135 [Elective I](1) : Modeling of Environmental systems**
Course Outcome (COs)	
CH509135.1	Students will able to understand Classification, Examples and Models of Environmental Systems
CH509135.2	Students will able to understand air quality models
CH509135.3	Students will able to understand Simulations of special meteorological and topographic conditions
CH509135.4	Students will able to understand Model Calibration. Sensitivity Analysis
CH509135.5	Students will able to understand Dissolved Oxygen Models; Temperature Models, prediction of fate of organism and toxic substances.

Subject	**509135 [Elective I](2) : Environmental Auditing**
Course Outcome (COs)	
CH509135.1	Students will able to understand Concepts of Environmental Audit, Objectives of audit. Types of audits
CH509135.2	Students will able to understand Audit protocol, Onsite audit, Data Sampling
CH509135.3	Students will able to understand Environmental management planning, Implementing an environmental management system,

Subject	**509135 [Elective I](3) : Environmental Policies and Legislations**
Course Outcome (COs)	

CH509135.1	Students will able to understand Role of national, international, and UN agencies in dealing with the environmental aspects
CH509135.2	Students will able to understand USEPA 1969 to Clean Water and Air Act.Significant legislations in developing and developed countries.
CH509135.3	Students will able to understand OHSHAS 18001 and its significance. ISO 14000 and its significance

Subject	**509135 [Elective I](4) : Air & Noise Pollution Control**
Course Outcome (COs)	
CH509135.1	Students will able to understand Sources and classification of Air Pollutants
CH509135.2	Students will able to understand Filters, gravitational, centrifugal-multiple type cyclones, prediction of collection efficiency
CH509135.3	Students will able to understand Gaseous Pollutant Control
CH509135.4	Students will able to understand Noise Pollution, Characteristics. Sources, their Effects and Control Measures.

Subject	**509136: Laboratory Practice – I**
Course Outcome (COs)	
CH509136.1	Students will able to understand Use of Ultra Filtration Technique
CH509136.2	Students will able to understand Analysis of soil types
CH509136.3	Students will able to understand Measurement of sounds by DB meter in silent, industrial, residential and commercial zones
CH509136.4	Students will able to understand Use of iteration technique in environmental modeling
CH509136.5	Students will able to understand To analyze the automobile/diesel engine exhaust

Semester II

Subject	**509137: Wastewater Treatment & Design**
Course Outcome (COs)	
CH509137.1	Students will able to understand Coagulation processes, stability of colloids and destabilization, coagulants Flocculation theory

CH509137.2	Students will able to understand depth filtration, filtration processes, principal mechanisms of filtration, filter hydraulics
CH509137.3	Students will able to understand Adsorption processes, causes and types of adsorption, influencing factors
CH509137.4	Students will able to understand Ion exchange, exchange materials, exchange capacity, ion exchange chemistry and reactions
CH509137.5	Students will able to understand Conventional activated sludge process, process kinetics and design considerations, process control measures, operational problems,

Subject	**509138: Solid Waste Management**
Course Outcome (COs)	
CH509138.1	Students will able to understand General considerations for waste storage at source, Types of collection systems. Transfer station
CH509138.2	Students will able to understand Sorting and material recovery
CH509138.3	Students will able to understand Composting of solid waste
CH509138.4	Students will able to understand Landfills, Site selection, Land filling methods, Leachate and landfill gas management.

Subject	**509139: Industrial Waste Treatment**
Course Outcome (COs)	
CH509139.1	Students will able to understand Classification and characterization of Industrial wastewater, Monitoring of wastewater flow in industries
CH509139.2	Students will able to understand Treatment techniques for removal of specific pollutants in industrial wastewaters
CH509139.3	Students will able to understand Treatability aspects of raw industrial wastewater with domestic sewage
CH509139.4	Students will able to understand Common Effluent treatment plant: Concept, Objectives, Methodology, Cost benefit analysis, Design,

Subject	**509140 [Elective II] (1): Membrane Technology in Environmental Engineering**
Course Outcome (COs)	

CH509140.1	Students will able to understand Introduction to Membrane Processes, Membranes and Modules
CH509140.2	Students will able to understand Applications of Membrane Processes in Environmental Engineering
CH509140.3	Students will able to understand Preparation of Synthetic Membranes
CH509140.4	Students will able to understand Characterization of Membranes
CH509140.5	Students will able to understand Module and process design

Subject	**509140 [Elective II] (2): Unit Operations in Environmental Engineering**
Course Outcome (COs)	
CH509140.1	Students will able to understand Preliminary Physical Unit Operations
CH509140.2	Students will able to understand Sedimentation And Floatation
CH509140.3	Students will able to understand Filtration And Gas Transfer
CH509140.4	Students will able to understand Chemical precipitation - phosphate removal - Adsorption – Manufacturing of Activated carbon
CH509140.5	Students will able to understand Kinetic of Biological growth - Suspended and attached growth processes

Subject	**509140 [Elective II] (3): Agricultural Pollution and Control**
Course Outcome (COs)	
CH509140.1	Students will able to understand Environmental issues in agriculture, types of farming systems
CH509140.2	Students will able to understand soil and water conservation practices,
CH509140.3	Students will able to understand water logging and salinity; causes and effects
CH509140.4	Students will able to understand Waste water reuse in agriculture

Subject	**509140 [Elective II] (4): Environmental Impact Assessment & Economics**
Course Outcome (COs)	

CH509140.1	Students will able to understand Environmental impact assessment
CH509140.2	Students will able to understand Public participation in environment decision making
CH509140.3	Students will able to understand Prediction and assessment of impacts
CH509140.4	Students will able to understand Economic Incentive and Environmental Protection

Subject	**509141: Laboratory Practice – II**
Course Outcome (COs)	
CH509141.1	Students will able to understand Determination of phenol
CH509141.2	Students will able to understand Determination of heavy metals
CH509141.3	Students will able to understand Development of flow sheet of effluent treatment plant
CH509141.4	Students will able to understand Designing of plant using software such as EnviroPro / SuperPro

Semester III

Subject	**509143:Remote Sensing and GIS applications in Environmental Engineering**
Course Outcome (COs)	
CH509143.1	Students will able to understand Fundamentals Of Remote Sensing
CH509143.2	Students will able to understand Platforms And Sensors
CH509143.3	Students will able to understand Data analysis - Visual Interpretation and Digital Image Processing – classification
CH509143.4	Students will able to understand Management and monitoring of land, air, water and pollution studies, conservation of resources

Subject	**509144: Industrial Pollution Prevention & Cleaner Production**
Course Outcome (COs)	

CH509144.1	Students will able to understand Industrialization and Sustainable Development – Indicators of Sustainability-Sustainability Strategies
CH509144.2	Students will able to understand Concept of Pollution Prevention and Cleaner Production
CH509144.3	Students will able to understand Pollution Prevention and Cleaner Production Project development and implementation
CH509144.4	Students will able to understand Life Cycle Assessment and Environmental Management Systems

Subject	**509145 [Elective III] (1): Ecology and Risk Assessment**
Course Outcome (COs)	
CH509145.1	Students will able to understand Principles and Concepts of Eco-system, Energy in Eco-system, Biogeochemical Cycles;
CH509145.2	Students will able to understand Principles and Concepts at the Community and Population Levels
CH509145.3	Students will able to understand Concepts and Principles in Sustainable Development and Biodiversity
CH509145.4	Students will able to understand Quantification of Uncertainty; Predictive Risk Assessment

Subject	**509145 [Elective III] (2): Water Quality Modeling**
Course Outcome (COs)	
CH509145.1	Students will able to understand Basic Concept of Modeling. Hydrological Considerations in Water Quality Modeling.
CH509145.2	Students will able to understand General Mathematical Formulation of Water Quality Models for Streams and Rivers
CH509145.3	Students will able to understand Stream Surveys for Model Calibration and Verification
CH509145.4	Students will able to understand Development of estuarine water quality models

Subject	**509145 [Elective III] (3): Modern Trends in Environmental Engineering**
Course Outcome (COs)	

CH509145.1	Students will able to understand Environmental pollution monitoring sensors. Basic understanding of the interaction of electromagnetic radiation,
CH509145.2	Students will able to understand Anthropogenic Endocrine Disruption
CH509145.3	Students will able to understand Various methods of refuse processing
CH509145.4	Students will able to understand Aerobic and anaerobic composting, Factors affecting composting Indore and Bangalore processes of composting

Subject	**509145 [Elective III] (4): Environmental Biotechnology**
Course Outcome (COs)	
CH509145.1	Students will able to understand Concept of Environmental Biotechnology and Environmental Engineering, scope and importance
CH509145.2	Students will able to understand Introduction to Genetic Engineering and Recombinant DNA Technology (RDT),
CH509145.3	Students will able to understand Microbiology of waste water treatment, Aerobic processes: Activated sludge, oxidation ditches,
CH509145.4	Students will able to understand Air pollution and its control through biotechnology
CH509145.5	Students will able to understand Bioremediation, Types of bioremediations, Bioaugmentation for bioremediation

Subject	**509147: Project Work Stage I**
Course Outcome (COs)	
CH509147.1	Students will able to understand & choose and evaluate the problem based on current interest
CH509147.2	Students will able to develop analyzing ability amongst the students.
CH509147.3	Students will able to understand & initiate and orient the students with R & D skills.
CH509147.4	Students will be given exposure of recent advances at national and international level