

M.Tech. (Environmental Engineering)

Program Outcomes of M.Tech. (Environmental Engineering)

PO#1. Scholarship of Knowledge: Acquire in-depth knowledge of Environmental Engineering, including wider and global perspectives, with the ability to identify, evaluate, analyze, and synthesize existing and new knowledge, and integrate the same for the enhancement of knowledge.

PO#2. Critical Thinking: Analyze complex Environmental Engineering problems critically, apply independent judgment for synthesizing information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical, and policy context.

PO#3. Problem-Solving: Think laterally and originally, conceptualize and solve environmental engineering problems, evaluate a wide range of potential solutions for those problems, and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal, and environmental factors in the core areas of expertise.

PO#4. Research Skill: Extract information pertinent to unfamiliar problems through literature surveys and experiments; apply appropriate research methodologies, techniques, and tools; design and conduct experiments; analyze and interpret data; demonstrate higher-order skills; view things from a broader perspective, contribute individually/in groups to the development of scientific & technological knowledge in one or more domains of engineering.

PO#5. Usage of modern tools: Create, select, learn, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex environmental engineering activities with an understanding of the limitations.

PO#6. Collaborative and Multidisciplinary Work: Possess knowledge and understanding of group dynamics, recognize opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness, objectivity, and rational analysis to achieve common goals and further the learning of themselves as well as others.

PO#7. Project Management and Finance: Demonstrate knowledge and understanding of engineering and management principles and apply the same to one's work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economic and financial factors.

PO#8. Communication: Communicate with the engineering community, and with society and policy-makers at large, regarding complex environmental engineering activities confidently and effectively, such as being able to comprehend and write effective reports and design

documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.

PO#9. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improving knowledge and competence continuously.

PO#10. Ethical Practices and Social Responsibility: Acquire professional and intellectual integrity, a professional code of conduct, the ethics of research and scholarship, consideration of the impact of research outcomes on professional practices, and an understanding of responsibility to contribute to the community for the sustainable development of society.

PO#11. Independent and Reflective Learning: Observe and examine the outcomes of one's actions, and make corrective measures subsequently, and learn from mistakes without depending on external feedback.

Program Educational Outcomes of M.Tech. (Environmental Engineering)

1. To educate graduate students in the current emerging areas of Environmental Engineering and to develop professionals of various core areas of Environmental Engineering.
2. To prepare skilled professionals for designing sustainable solutions to complex environmental engineering problems.
3. To equip students with skills important for working in multi-disciplinary groups and enable them for self-learning and developing integrity to become responsible Environmental Engineers.

Program-Specific Outcomes of M.Tech. (Environmental Engineering)

1. Enhancing employability skills by making the students capable of qualifying for National-level competitive examinations
2. Competency in professional and Industrial areas
3. Inculcating human values and ethics, tech-savviness and self-learning to deal with challenges of Environmental Engineering.

Course Outcomes of M.Tech. (Environmental Engineering) (New Scheme as per NEP-2020)

Sr. No.	Course Title	CO#	Course Outcome
1	DCC 1 - Water and Waste Water Engineering & Design	CO#1	Gain enhanced knowledge of Physical, chemical, biological properties of water & waste water
		CO#2	Understand the design of various unit processes/operations provided in water treatment plants and design of water distribution systems
		CO#3	Understand/ Develop the design of sewer
		CO#4	Understand the Concept of Common Effluent Treatment Plants
		CO#5	Understand/Analyze the kinetics of reactor & reactor design
2	DCC 2 - Air Pollution & Control	CO#1	Understand the fundamentals of air pollution, their sources and effects
		CO#2	Analyse the air quality data
		CO#3	Evaluate the efficiency of air pollution control equipment
		CO#4	Predict / Estimate concentration at any point downwind of the emission source
		CO#5	Develop air and noise pollution control management plan
3	DCC 3 - Environmental Impact Assessment	CO#1	Identify the environmental attributes to be considered for the EIA study
		CO#2	Understand a variety of professional tools used in predicting environmental impacts
		CO#3	Evaluate the methodology to prepare EIA
		CO#4	Formulate the methodology for Environmental Auditing
		CO#5	Develop their own perspectives on impact assessment and able to relate this to other subject areas

4	DCC 4 - Environmental Chemistry & Microbiology	CO#1	Understand the chemical processes taking place in water, soil, and air
		CO#2	Analyze the research problems related to biochemical processes
		CO#3	Devise solutions for changes related to quality of water, wastewater, soil, and air
		CO#4	Design the biochemical solutions related to treatment of waste and wastewater
		CO#5	Suggest and manage engineering solutions to maintain the environmental quality
5	DCC 5 - Water Resources and Environmental Hydraulics	CO#1	Acquire enhanced knowledge of Global water resources, concept of water conservation
		CO#2	Calculate the precipitation, infiltration, evapotranspiration, runoff, hydrographs, unit hydrographs
		CO#3	Understand the different terminologies related with groundwater
		CO#4	Gain Enhanced knowledge of open channel flow & pipe flow and design of channels
6	DCC 6 - Solid Waste Management	CO#1	Understand about the concept and hierarchy of SWM
		CO#2	Evaluate and compare different configurations of waste collection and transportation
		CO#3	Learn about the design and operation of sanitary landfill
		CO#4	Compare different waste treatment methods for effective waste management
		CO#5	Design sustainable waste management system for hazardous waste
7	DCC 7 - Environmental Management &	CO#1	Understand the national and global environmental and social challenges

	Sustainable Development	CO#2	Analyse and quantify the sustainability issues with support from a systems perspective
		CO#3	Evaluate the relevance and appropriateness of environmental management responses in different contexts
		CO#4	Critically analyse the effectiveness of selected key tools and approaches currently used in environmental management
		CO#5	Develop a critical and analytical approach on how to adopt sustainable practices to achieve sustainable goals
8	DEC 1 - Global Warming & Climate Change	CO#1	Assess the status, trends of the changing climate
		CO#2	Analyze and evaluate the underlying causes, mitigation, and adaptation strategies
		CO#3	Evaluate greenhouse gas emissions from different processes at local, regional, and national level
		CO#4	Demonstrate a thorough understanding of the carbon market
		CO#5	Develop/Critique a scientific action plan to combat the environmental issues threatening the planet
9	DEC 1 - Planning and Design of Environmental Services	CO#1	Apply advanced principles and techniques in environmental engineering planning and design
		CO#2	Analyze concepts, methodologies, and strategies related to environmental engineering planning and design
		CO#3	Evaluate principles, methodologies, and strategies in environmental engineering planning and design
		CO#4	Design innovative and comprehensive environmental engineering plans and solutions by integrating advanced principles, methodologies, and strategies

10	DEC 1 - Industrial Waste Management	CO#1	Apply advanced techniques in managing industrial wastes effectively, including waste characterization, pollution prevention, and treatment methods.
		CO#2	Demonstrate knowledge and skills in industrial waste management, including waste characterization, pollution prevention, and treatment methods, through practical exercises.
		CO#3	Analyze industrial waste management challenges for informed decision-making, focusing on treatment methods and pollution prevention.
		CO#4	Evaluate industrial waste management practices for efficiency, environmental impact, and sustainability.
		CO#5	Design integrated industrial waste management strategies, ensuring regulatory compliance and environmental conservation.
11	DEC 2 - Environmental Monitoring & Assessment	CO#1	Estimate the status, trends, and changes in environmental quality
		CO#2	Collect and analyze the environmental matrices with accuracy to produce reliable data
		CO#3	Develop a suitable method for analysis, and its validation with different techniques of analysis
		CO#4	Estimate the geographic coverage & extent of environmental quality with known confidence
		CO#5	Provide statistical summaries and periodic assessments of environmental quality
12	DEC 2 - Design of Hydraulic Structures	CO#1	Knowledge of hydraulic structural elements
		CO#2	Understand the different terminologies related with dam
		CO#3	Analysis the hydraulic structures

		CO#4	Design the dam
		CO#5	Design the spillways
13	DEC2: Waste Containment and Remediation	CO#1	Understand the basics behavior of subsurface contaminants in respect of soil and groundwater
		CO#2	Analyze the Risk associated and suggest suitable intervention
		CO#3	Construct and operate a sanitary landfill
		CO#4	Design a sustainable barrier system to restrict subsurface contamination
14	DEC3: Environmental Modelling & Risk Assessment	CO#1	Understand the basics of air & noise quality research and modeling
		CO#2	Develop a skill to analyze the current air & noise quality data
		CO#3	Evaluate and predict air & noise pollution impact on society
		CO#4	Develop and apply model to resolve air & noise pollution issues
		CO#5	Develop concepts of numerical modeling methods and practical applications in environmental engineering and water resource management
15	DEC3: Bioremediation	CO#1	Understand the basics of environmental biotechnology and its applications
		CO#2	Analyze the method suitable for treatment/removal of diverse pollutants
		CO#3	Develop green and innovative methods suitable for commercial applications
		CO#4	Design sustainable environment-friendly solutions using plants
		CO#5	Comply with ethical guidelines related to environmental biotechnology
16	DEC3: Remote Sensing &	CO1	Apply mapping techniques, remote sensing, and GIS for spatial analysis in real-world scenarios.

	Geographical Information Systems	CO2	Analyze complex geospatial data, remote sensing, and GIS fundamentals for spatial analysis in diverse applications
		CO3	Demonstrate advanced skills in data interpretation, problem-solving, and decision-making within the context of geospatial technology applications.
		CO4	Evaluate the effectiveness of mapping techniques, remote sensing, and GIS spatial analysis in real-world scenarios.
		CO5	Develop advanced geospatial solutions using mapping, remote sensing, and GIS
17	SEC1: Occupational Health & Safety	CO#1	Understand the fundamental aspects of occupational safety & health issues
		CO#2	Analyse the positive and negative consequences of existing industrial health & safety plan
		CO#3	Evaluate and predict the effect of hazard on site engineers & workers
		CO#4	Develop a skill to prepare an effective management plan
18	Open Elective 1: Green Technology & Sustainability	CO#1	Understand the basic characteristics of green chemistry and its applications
		CO#2	Analyze and devise the treatment of wastewater following principles of green chemistry
		CO#3	Develop green and innovative methods suitable for commercial applications
		CO#4	Design sustainable environment-friendly solutions for industries
		CO#5	Comply with legal and financial standards related to environmental management
19	Open Elective 2: Non-Conventional Energy Systems	CO#1	Describe the environmental aspects of renewable energy resources
		CO#2	Explore the concepts involved in solar energy, wind energy conversion system by studying its components, types and performance

		CO#3	Illustrate hydro-electric energy, tidal energy and explain the operational methods of their utilization
		CO#4	Acquire the knowledge on Geothermal energy

B.Tech. (Environmental Engineering)

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PO#1 Engineering Knowledge: Integrate mathematics, sciences, and knowledge from environmental engineering sub-disciplines to design and evaluate complex environmental engineering problems.

PO#2 Problem Analysis: Analyze and formulate solutions for complex environmental engineering problems.

PO#3 Design of Solutions: Integrate learning with client requirements to produce feasible, practical, and environmentally sustainable solutions to complex environmental engineering problems.

PO#4 Investigation: Utilize research-based knowledge and methods to investigate and synthesize information to formulate solutions for complex environmental engineering problems.

PO#5 Usage of Modern Tools: Identify and apply suitable modern engineering and IT tools, including prediction and modelling, to complete complex environmental engineering analyses successfully.

PO#6 The Engineer and Society: Practice environmental engineering with a global perspective and appropriate standards pertaining to health, safety, legal and cultural issues to solutions for complex environmental engineering problems.

PO#7 Environment and Sustainability: Understand the impact of engineering solutions on society and the environment and produce sustainable solutions to complex environmental engineering problems.

PO#8 Ethics: Demonstrate ethical principles in the context of environmental engineering practice.

PO#9 Individual and Team Work: Apply knowledge of environmental engineering principles as a member and leader in a team, in managing projects in a multidisciplinary environment.

PO#10 Communication: Communicate effectively and professionally to all stakeholders on complex environmental engineering activities.

PO#11 Project Management: Apply project management principles as a member and leader in a team, in managing all projects in a multidisciplinary environment.

PO#12 Life-long Learning: Recognize the need for and be prepared to continually build upon knowledge and skills acquired during the undergraduate learning.

Program Educational Outcomes of B.Tech. (Environmental Engineering)

1. To educate undergraduate students in the current and vibrant emerging areas of Environmental Engineering and to develop the professionals of various core engineering subjects.
2. To prepare skilled professionals for designing solutions to complex environmental engineering problems in a sustainable way.
3. To equip students with an environment to be interested, motivated to tackle the complex problems and enable students for self-learning and developing integrity and ethical values so that they become responsible Environmental Engineers.

Program-Specific Outcomes of B.Tech. (Environmental Engineering)

1. Enhancing employability skills by making the students capable of qualifying for National-level competitive examinations.
2. Competency in professional and Industrial areas
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Course Outcomes of B.Tech. (Environmental Engineering) (New Scheme as per NEP-2020)

Sr. No.	Course Title	CO#	Course Outcome
1	Basic Environmental Engineering	CO#1	To explain fundamentals of Environmental Engineering
		CO#2	To apply fundamentals of Environmental Engineering to various environmental issues
		CO#3	To analyse environment and pollution in each segment of the environment

		CO#4	To evaluate environmental services required for water supply and treatment and control of environmental pollution
		CO#5	To design various units for treatment of water, wastewater and for control of air and noise pollution
2	Environmental Awareness	CO#1	To explain National and International Legislations for Environmental Protection
		CO#2	To apply environmental legislations in case studies
		CO#3	To analyse basic components and principles of environmental legislations
		CO#4	To evaluate effectiveness of national and international environmental legislations
3	Water and Wastewater Analysis	CO#1	To demonstrate sampling and testing of water
		CO#2	To perform sampling and testing of water
		CO#3	To demonstrate sampling and testing of waste water
		CO#4	To perform sampling and testing of waste water
		CO#5	To monitor and analyse the water and wastewater samples
4	Air Pollution and Waste Management	CO#1	To demonstrate and perform measurement of air quality parameters
		CO#2	To demonstrate and perform the operations for sampling and testing solid waste
		CO#3	To demonstrate and perform skills for GIS based assessments
5	Strength of Materials	CO#1	Understand the concepts of stress and strain, and the stress-strain relationships for homogenous, isotropic materials.
		CO#2	Analyse the relationships between loads, member forces and deformations and material stresses and strains in

			structural members under axial loading, thermal expansion, flexural loadings, shear & torsion.
		CO#3	Evaluate failure of structural members under complex stress subjected to combined loadings.
		CO#4	Apply the above understanding to the designs and analysis of structural members based on strength and deformation criteria
		CO#5	Demonstrate and understanding of the assumptions and limitations of the theories used in mechanics of materials, problem identification, formulation & solution and critical thinking.
6	Environmental Chemistry and Microbiology	CO#1	Theoretical knowledge and numerical calculations related to pH, equilibrium, solubility, dissociation, etc.
		CO#2	Knowledge of sources and mechanisms resulting in degradation of water quality.
		CO#3	Understanding the direct and indirect processes related to air pollution.
		CO#4	Identification of microbes, and regulation of microbial growth in the lab
		CO#5	Application of microbes in waste treatment
7	Surveying	CO#1	Enhanced understanding of fundamentals, principles, and types of surveying.
		CO#2	Measuring the distance by chaining, compass surveying, and plane table
		CO#3	Analyzing the various methods of levelling, area, and volume
		CO#4	Gaining the proper knowledge of operations, adjustment of the Theodolite, and calculation of heights & distances by using the Theodolite.
		CO#5	Calculating the distance and elevation by Tachometry surveying.
8	Water Treatment &	CO#1	Gained knowledge of the properties of drinking water.

	Design	CO#2	Analyze the various methods of population forecasting.
		CO#3	Understand the principle & design of various unit processes/operations of water treatment.
		CO#4	Design the intake reservoirs and water distribution system.
		CO#5	Differentiate domestic and industrial water treatment plants.
9	Instrumentation Techniques for Environmental Monitoring	CO#1	Explain principles, importance, instruments, microprocessor benefits, error management, standards, calibration, and analysis techniques.
		CO#2	Apply instrumentation for monitoring systems, troubleshoot, analyze data, calibrate, and make decisions.
		CO#3	Analyze measurement systems, error analysis, statistics, calibration, and techniques for complex analyses.
		CO#4	Evaluate strategies for measurement, assess suitability, reliability, effectiveness, and make informed decisions.
		CO#5	Develop innovative solutions, synthesize principles, techniques, methodologies, and design specialized systems.
10	Fluid Mechanics & Hydraulic Machines	CO#1	Identify importance of various fluid properties and solve problems involving fluid properties and shear forces resulting from Newtonian fluids.
		CO#2	Derive magnitude and location of hydrostatic forces on surfaces immersed in a static fluid and equations of continuity, momentum and energy for various types of fluid flows.
		CO#3	Apply the above understanding in use of different fluid flow measuring devices.
		CO#4	Analyze a variety of practical fluid flow through pipes and flow in open channels using the integral form of the continuity, momentum and energy equations

		CO#5	Evaluate the performance parameters of hydraulic turbines and centrifugal & reciprocating pump.
11	Remote Sensing and Geographical Information System	CO#1	Explain the fundamental principles and technologies of remote sensing and geographical information systems for spatial analysis.
		CO#2	Demonstrate geospatial models, applications, and systems for specific environmental, urban, and socio-eCO
		CO#3	Analyze geospatial data, remote sensing and geographical information systems and their integration for spatial analysis in diverse applications.
		CO#4	Evaluate data quality, accuracy, reliability, and relevance to specific spatial analysis objectives and applications of remote sensing and geographical information systems
		CO#5	Develop solutions using remote sensing and geographical information systems
12	Wastewater Engineering: Design and Applications	CO#1	Understand the design of various physical treatment processes of wastewater.
		CO#2	Acquainted with the design of various secondary treatment processes of wastewater
		CO#3	Gained knowledge of the design of various biological treatment processes of wastewater
		CO#4	Design the sludge digestion.
		CO#5	Design the sewer systems.
13	Air Pollution & Control	CO#1	Understand the basics of Air Pollution, its effects, and measurement.
		CO#2	Analyse the trend of air quality data
		CO#3	Evaluate the performance and effectiveness of air pollution control equipment.
		CO#4	Develop a plan for awareness and management of air pollution

14	Solid Waste Management	CO#1	To make the students understand the fundamentals of solid waste and the types, needs, and sources of solid waste.
		CO#2	To understand the methods of waste characterization and source reduction and to study the various methods of generation of waste.
		CO#3	To understand in detail the storage, collection, and transport of wastes and to study the methods used for handling and segregation of wastes.
		CO#4	To know about the basics of waste disposal options and a detailed study on the disposal in landfills and to learn about landfill remediation.
		CO#5	To understand the waste transformation and material/energy recovery technologies regarding municipal solid wastes

Course Outcomes of B.Tech. (Environmental Engineering) (Old Scheme)

COURSE CODE	COURSE TITLE	CO#	COURSE OUTCOMES:
EN-201	Strength of Materials	CO1	The student will learn the concept of mechanical properties of materials.
		CO2	They will get knowledge of drawing the shear force and bending moment diagrams of beam.
		CO3	Give the concept of calculation of deflection of beam, column analysis and torsion of the shafts.
EN205	Environmental Chemistry & Microbiology	CO1	Theoretical knowledge and numerical calculations related to pH, equilibrium, solubility, dissociation etc.
		CO2	Knowledge of sources and mechanisms resulting degradation of water quality
		CO3	Understanding the direct and indirect processes related to air pollution
		CO4	Identification of microbes, and regulation of microbial growth in lab
		CO5	Application of microbes in waste treatment
EN207	Engineering Analysis & Design	CO1	The student will learn the various types of RCC materials and different types of beams used in practical.
		CO2	The student will get the concept of design of column.

		CO3	The student can do designs of slabs and foundations. The unit-5, the student will get the knowledge of steel structure elements.
EN-204	Water Engineering: Design & Application	CO1	Students can learn the basic fundamentals of water engineering and design.
		CO2	Students will know that how the population forecasting calculates.
		CO3	Students will understand the factors which effect the water properties.
		CO4	Students will learn the procedure to design sedimentation tank.
		CO5	Students will know the miscellaneous methods of water treatment.
EN-206	Engineering Geology, GIS & Remote Sensing	CO1	Student will learn about basics of Geology and its importance in engineering.
		CO2	Student will be able to understand the properties of rocks, minerals and its application and importance in environmental engineering.
		CO3	Student will learn the various effects of rocks and minerals on the quality of ground water.
		CO4	The unit of GIS will create a clear cut understanding among students about geographical information system, its components, DMS and its various applications in real life.
		CO5	Student will be able to attain thorough knowledge about remote sensing, electromagnetic spectrum, and its diverse applications.
EN 208	Fluid Mechanics and Hydraulic Machines	CO1	The students will learn the fluids and its properties.
		CO2	gives the understanding of hydro-static laws and hydro-static forces.
		CO3	The students get the ideas of kinematic of fluids, Bernoulli's equations and its applications.
		CO4	Gives the Laminar and Turbulent flow through pipes and Dimensional analysis and models.
		CO5	Gives the concepts of understanding the Boundary layer theory and Hydraulic Machines.
EN-301	Wastewater Engineering: Design and Applications	CO1	To make them understand the fundamentals of waste water treatment .To learn about the various
		CO2	Pollutants in water and waste water and also to study about their characteristics.
		CO3	To understand in detail about the design principles of various physical treatment processes of wastewater.
		CO4	To understand in detail about the design principles of various chemical treatment processes of wastewater.
		CO5	To understand in detail about the design principles of various biological treatment processes of wastewater.
		CO6	To improve the knowledge on the Selection of unit operation and processes and to study the design oriented aspects of sand filters and other treatment processes.

		CO7	To understand about the design principles of conveyance systems of wastewater.
EN-303	Instrumentation Techniques for Environmental Monitoring	CO1	Learned fundamentals of Measuring system, classification and calibration.
		CO2	Learned about Management of Data and measurement of non-electrical quantities.
		CO3	Can Use Spectro-analytical Methods.
		CO4	Able to use Chromatography Methods.
		CO5	Have the idea about Electro Analytical Methods and Continuous Monitoring Methods.
EN-302	Solid Waste Management	CO1	To make the students understand the fundamentals of solid wastes and also the types, need and sources of solid wastes.
		CO2	To understand about the methods of waste characterisation and source reduction and to study the various methods of generation of wastes.
		CO3	To understand in detail about the storage, collection and transport of wastes and also to study about the methods used for handling and segregation of wastes.
		CO4	To know about the basics of the waste disposal options and also a detailed study on the disposal in landfills and also to learn about landfill remediation.
		CO5	To understand about the waste transformation and material/energy recovery technologies with regard to municipal solid wastes
EN-304	Air Pollution & Control	CO1	Learned about Air Pollution, its effects and measurement.
		CO2	Understanding of the Metrological concept and Plume behaviour
		CO3	Understanding of control of particulate Matter by Different Methods.
		CO4	Learned about Control of Gaseous Pollutants and automobile Pollution.
		CO5	Awareness of Air Pollution Legislation in India and current topic.
EN-306	Hydrology & Groundwater Engineering	CO1	Students can learn the basic fundamentals of hydrology and Ground water.
		CO2	Students will know that how the precipitation, evaporation, infiltration and runoff calculate.
		CO3	Students will understand the factors which effect the hydrological equations.
		CO4	Students will learn the procedure to calculate and plot the hydrograph and unit hydrograph.
		CO5	Students will know the difference between confined aquifer and unconfined aquifer.
EN-405	Project Management	CO1	Estimate the buildings and RC work
		CO2	Prepare quantities, rate and resource planning
		CO3	Plan, schedule, monitor, update through management system in construction and prepare the project network

		CO4	Monitor Project, cost planning, resources allocation, time value of money, quality control
		CO5	Make contract documents, prepare tender and award the work, Land acquisition
EN- 407	Vibration Analysis & Control of Noise Pollution	CO1	The student will understand the basics about sound and noise
		CO2	They will be able to understand the worldwide scenario of noise pollution and different monitoring techniques.
		CO3	The student will have a clear cut understanding about traffic noise, its adverse effects and its modelling part.
		CO4	The students will have a clear understanding about the train and aircraft noise as well as its modelling part.
		CO5	They will be able to suggest the control measures to different noise generated from different sources.
EN – 409	Industrial Waste Management	CO1	Introduction to types of industrial waste, characterization and management.
		CO2	Study of manufacturing processes and wastes generated in various industries.
		CO3	Discovering the scope of prevention, treatment and disposal of solid, liquid and gaseous waste.
EN – 404	Environmental Impact Assessment & Audit	CO1	Acquiring knowledge on principle of EIA, definition, history and law related to EIA
		CO2	Study tools for evaluation of environmental impact.
		CO3	Assessment and prediction of environmental impacts on physical, biological, humans and quality of life.
		CO4	Learn Environmental auditing and Indian laws for EIA.
EN-305	Soil Pollution and Remediation	CO1	Understand different Sources of subsurface contamination
		CO2	Understand Mechanisms of Soil contamination
		CO3	Understand Physical-chemical and biological interactions in soils
		CO4	Understand Effect of contamination on geotechnical properties
		CO5	Capable of selecting of site for waste disposal
		CO6	Understand Leachate and Gas Generation from waste
		CO7	Capable of characterizing the waste
		CO8	Understand about types of landfill and liner material
		CO9	Capable of designing landfill elements
		CO10	Understand about construction, operation and performance monitoring of landfill
		CO11	Capable of planning Environmental monitoring around landfills
		CO12	Understand about detection, control and remediation of subsurface contamination
		CO13	Understand about various types of barrier systems
		CO14	Understand about reclamation process of contaminated sites
		CO15	Capable of doing economic analysis
EN-307		CO1	Importance of Planning, Resource management.

	Planning and Design of Environmental Engg. Works	CO2	Understanding land-use planning and impacts of land-use change.
		CO3	Design various systems of conveyance and control
		CO4	Learn management techniques related to services and utilities
EN – 311	Climate Change and CDM	CO1	The student will learn about basics of greenhouse gases and its effects.
		CO2	The student will be able to understand the concept of global warming along with its effect on human life.
		CO3	The student will learn the role of climate change in different atmospheric phenomenon.
		CO4	The student will understand the significance of carbon credits, carbon sequestration along with the national and international policies related to climate change.
		CO5	Student will be able to attain thorough knowledge about ozone and chlorofluorocarbons. In addition to this they will also understand the concept of CDM and its operation.
EN – 313	Environmental Toxicology and Risk Assessment	CO1	Knowledge of direct and indirect toxicity associated with contaminated environment
		CO2	Identification of toxicity based type of contaminant, and vice-versa
		CO3	Identification of defects associated with pre-natal exposure, and genetic deformities
		CO4	Thorough understanding of carcinogenesis
		CO5	Evaluation and characterisation of risk/toxicity associated with a chemical compound
EN- 315	Ecology and Bio-monitoring Techniques	CO1	Understanding of ecosystem functions and their interrelationships
		CO2	Knowledge of effect of human activities on ecology
		CO3	Knowledge of biodiversity status
		CO4	Thorough understanding of conservation practices
		CO5	Evaluation and characterization of ecosystems based on bio-monitoring
EN -308	Hazardous & Biomedical Waste	CO1	To make the students understand the fundamentals of hazardous wastes and also the types, and sources of hazardous as well as biomedical wastes.
		CO2	To understand about the characteristics of various types of hazardous and biomedical wastes.
		CO3	To understand in detail about the storage, collection and transport of hazardous and biomedical wastes, and also to study about the methods used for handling and segregation of wastes.
		CO4	To improve the knowledge on the waste processing techniques which includes incineration, solidification and stabilization of hazardous wastes
		CO5	To know about the basics of the waste disposal options and also a detailed study on the disposal in landfills and also to learn about landfill remediation.

EN -310	Surface and Groundwater Pollution	CO1	To make the students understand the fundamentals of Ground water and the various hydrologic cycles.
		CO2	To make the students understand about the various steady state hydrologic budgets.
		CO3	To make the students understand in detail about the development of Ground Water resources and Aquifers.
		CO4	To know about the basics of the Transport process in solute transfer and hydro chemical behaviour of contaminants in the ground water.
		CO5	To know about the basics of the Transport process in solute transfer and hydro chemical behaviour of contaminants in the surface water.
EN-312	Advance Surveying	CO1	Students can learn the basic fundamental, principle of Triangulation Surveying.
		CO2	Students will understand the concepts of meaning, importance and scope of Trilateration.
		CO3	how the field astronomy is done.
		CO4	Students will know the classifications and laws of accidental errors.
		CO5	Students will learn the definition, principle and types of Photogrammetry.
EN -314	Green Technology	CO1	The student will be able to understand the basics of green technology and its applications.
		CO2	Understanding about green nanotechnology and green materials.
		CO3	Able to comprehend about the role of green energy and sustainable development in life.
		CO4	The students will learn about the importance of green management in corporate as well as in industrial sector.
		CO5	Learn about the application of green processes in various industries.
EN-316	Environmental Law and Policy	CO1	Be familiar with the laws, policies and institutions in the field of environment
		CO2	Acquire the skills needed for interpreting laws, policies and judicial decisions in a holistic perspective
		CO3	Acquire the ability to evaluate the role of law and policy in conservation and management of natural resources and prevention of pollution
EN-318	Transportation and Traffic Engineering	CO1	Students can learn the basic fundamentals of Transportation and Traffic Engineering
		CO2	Students will know the design of highways, railways and airways.
		CO3	Students will understand the Traffic Noise-Measurement, Patterns, control and Traffic impact.
		CO4	Students will learn the procedure to design Waterways.
		CO5	Students will know the routes navigation requirements.
		CO6	Occupational Hazards, Health & Safety
EN-413	Water and Soil conservation	CO1	Understanding of land resources of India
		CO2	Identification of problems related to water resources

		CO3	Identification of causes of land/soil degradation
		CO4	Designing of suitable management practices for soil and water conservation
EN-415	System Simulation & Modelling	CO1	Learning the fundamentals of environmental systems, Systems approach, Models and modelling.
		CO2	Understanding the modes of contaminant transport and their modelling.
		CO3	Study of groundwater flow models and contaminant transport.
		CO4	Modelling of surface water flow models. Modelling in computer based softwares.
EN-408	Risk and Reliability Analysis of Environmental System	CO1	Student will learn about basics of Geology and its importance in engineering.
		CO2	Student will be able to understand the properties of rocks, minerals and its application and importance in environmental engineering.
		CO3	Student will learn the various effects of rocks and minerals on the quality of ground water.
		CO4	The unit of GIS will create a clear cut understanding among students about geographical information system, its components, DMS and its various applications in real life.
		CO5	Student will be able to attain thorough knowledge about remote sensing, electromagnetic spectrum, and its diverse applications.
EN- 410	Irrigation and Drainage Engineering	CO1	Students can learn the basic fundamental, principle and types of irrigation.
		CO2	Students will understand the concepts of Weir and Barrage.
		CO3	Students will know the Kennedy and Lacy theories.
		CO4	Students will learn the cross-drainage works.
		CO5	Students will learn Design of lined canal
EN-412	Environmental and Sustainable Development	CO1	The student will be able to understand the basics about sustainable development & its concepts.
		CO2	Understanding about different dimensions of sustainability as well as its different applications.
		CO3	Able to identify the environmental sustainability of transport system and capable to suggest required steps for further enhancement.
		CO4	The students will learn about role of technology in sustainable development.
		CO5	Development of responsibilities towards the protection of environment and society.
EN-414	Disaster Management	CO1	The student will be able to get the fundamentals of disasters.
		CO2	Understanding about different factors responsible for natural and manmade disasters.
		CO3	Able to understand and capable to develop different management strategies to handle the disastrous effect of disasters.

		CO4	The students will learn about the reduction and management methods of various kinds of disasters.
		CO5	The understanding about polices related to disaster management.
EN-416	Non-Conventional Energy Systems	CO1	Students can learn the basic fundamental, principle and types of Non-Conventional Energy Systems.
		CO2	Students will know Principle and systems of solar photo-thermal and photovoltaic conversion.
		CO3	Students will understand the concepts of Basic components of WECS and its design.
		CO4	Students will know Nature and classification of geothermal fields.
		CO5	Students will understand Advantages and limitations Non-Conventional Energy Systems.
EN-351	Environmental Pollution & E- Waste Management	CO1	Introduction to new and emerging contaminants and their transformation products.
		CO2	Study of pollutants from manufacturing of goods.
		CO3	Emerging area in environmental pollution.
		CO4	Study of life cycle of a contaminant, modelling and mitigation.
EN- 353	Occupational Health & Safety Management	CO1	The student will be able to understand the basics of occupational health and related issues.
		CO2	Understanding of the fundamental aspects of safety, industrial hygiene along with learning theory to safety training methodology.
		CO3	Considerate about hazardous materials, emergency management, ergonomics and human factors
		CO4	Able to understand the adverse effects of hazards and develop control strategies for hazardous conditions and work practices
		CO5	Learn about Indian standards of health and safety and able to apply applicable standards, Regulations and codes.
EN-355	GIS & Remote Sensing	CO1	The Student will learn about basics of GIS and its significance.
		CO2	The Student will be able to understand the utility of GIS data as well as Data Management System.
		CO3	The Student will learn the fundamentals of remote sensing.
		CO4	The unit of Remote Sensing Platform will generate a clear cut understanding among students about the satellites, their functioning and Global Positioning System. Geographical information system, its components, DMS and its various applications in real life.
		CO5	The Student will be able to attain thorough knowledge about the application of remote sensing in different areas.
EN-351		CO1	Introduction to new and emerging contaminants and their transformation products.

	Environmental Pollution & E- Waste Management	CO2	Study of pollutants from manufacturing of goods.
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