

## Syllabus-2023-2024

### (SOET)(BTech-CivilEngineering)

<b>Title of the Course</b>	Minor Project
<b>Course Code</b>	CED0601[P]

#### Part A

<b>Year</b>	3rd	<b>Semester</b>	6th	<b>Credits</b>	L	T	P	
					2	1	1	4
<b>Course Type</b>	Project							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	Knowledge of Civil engineering and interdisciplinary subjects.			<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To enhance writing skills and knowledge.( <b>BL2-Understand</b> ) <b>CO2-</b> To increase their mental ability.( <b>BL3-Apply</b> ) <b>CO3-</b> To inculcate the ability to express innovative opinion and thoughts( <b>BL4-Analyze</b> ) <b>CO4-</b> To have Dissertation works as skills development in students.( <b>BL5-Evaluate</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG11(Sustainable cities and economies)				

#### Part B

Modules	Contents	Pedagogy	Hours
1	Project/Problem Identification	Project Work	8
2	Project Analysis, Requirement Gathering	Project Work	8
3	Implementation of Project/Solution	Project Work	8
4	Testing and Verification	Project Work	8
5	Presentation and Report Writing	Project Work	8

#### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-I	Identification of a problem and formulation of a topic of project/thesis	PBL	BL3-Apply	15 hrs
Module-III	Dissertation and Viva-voci	PBL	BL5-Evaluate	20 hrs



## Syllabus-2023-2024

### (SOET)(BTech-CivilEngineering)

<b>Title of the Course</b>	Water Resource & Irrigation Engineering							
<b>Course Code</b>	CEE0601[T]							
<b>Part A</b>								
<b>Year</b>	3rd	<b>Semester</b>	6th	<b>Credits</b>	L	T	P	C
					3	2	0	5
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	known about the soil properties			<b>Co-Requisite/s</b>	known about basic structure			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To remember the various concepts in theory of irrigation engg. <b>(BL1-Remember)</b> <b>CO2-</b> To understand & analyze the different irrigation engg problems. <b>(BL2-Understand)</b> <b>CO3-</b> To implement the different designing concepts of canal and well structures. <b>(BL3-Apply)</b> <b>CO4-</b> To provide experimental basis, and to enable the students to analyze the flood prediction. <b>(BL4-Analyze)</b> <b>CO5-</b> To evaluate the applications of different irrigation engg in various fields such as research & industries. <b>(BL5-Evaluate)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG11(Sustainable cities and economies)				

**Part B**

<b>Modules</b>	<b>Contents</b>	<b>Pedagogy</b>	<b>Hours</b>
unit 1	Hydrology : Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, raingauge over a drainage area, mass rainfall curves, intensity Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph S curve hydrograph, synthetic unit hydrograph.	Lectures with problem based learning, experimental learning, case study, field trips	10
unitII	Floods and Ground water: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge necessity and methods of improving ground water storage. Water logging prevention. Salt efflorescence-causes and effects. Reclamation of water logged and salt affected lands.	Lectures with problem based learning, experimental learning, case study, field trips	9
unit III	Irrigation water requirement and soil necessity, advantages and disadvantages, types and methods. Irrigation development. types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity,optimum water supply, consumptive use and its determination. Irrigati methodssurface and subsurface, sprinkler and drip irrigation.Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop roation , intensity of irrigation	Lectures with problem based learning, experimental learning, case study, field trips	8
unit IV	Canal irrigation: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings economics.Canal falls & cross drainage works, regulators. escapes and outlets, canal transitions	Lectures with problem based learning, experimental learning, case study, field trips	10
unit V	Well irrigation: Types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation. Rain water harvesting	Lectures with problem based learning, experimental learning, case study, field trips	8

**Part C**

<b>Modules</b>	<b>Title</b>	<b>Indicative-ABCA/PBL/ Experiments/Field work/ Internships</b>	<b>Bloom's Level</b>	<b>Hours</b>
I	module of canal designing by khosla theory	PBL	BL4-Analyze	3



## Syllabus-2023-2024

### (SOET)(BTech-CivilEngineering)

<b>Title of the Course</b>	Geo-synthetics and Reinforced Soil Structures
<b>Course Code</b>	CEE0602[T]

#### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C	
					3	1	0	4	
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Electives								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Identify the type of Geosynthetic and their relevance ( <b>BL2-Understand</b> ) <b>CO2-</b> Analyze & compute different properties of Geosynthetics( <b>BL4-Analyze</b> ) <b>CO3-</b> Understand the emerging trends of Geosynthetic in geotechnical applications( <b>BL2-Understand</b> ) <b>CO4-</b> Design the Reinforced Earth Walls using Geosynthetic material( <b>BL5-Evaluate</b> ) <b>CO5-</b> Design the Reinforced Foundation using Geosynthetic materials( <b>BL5-Evaluate</b> )								
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)					

#### Part B

Modules	Contents	Pedagogy	Hours
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#### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Students will use different materials for soil stabilization	PBL	BL4-Analyze	15
2	Increasing the compressive strength of soil with different fibres	PBL	BL4-Analyze	15



## Syllabus-2023-2024

### (SOET)(BTech-CivilEngineering)

<b>Title of the Course</b>	Introduction to Finite Element Analysis
<b>Course Code</b>	CEE0603[T]

#### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Electives							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> Understand the fundamental concepts of finite element method to solve engineering problems(<b>BL2-Understand</b>)</p> <p><b>CO2-</b> Formulate finite element models using appropriate element selection, development of stiffness &amp; force matrices, and application of boundary conditions(<b>BL3-Apply</b>)</p> <p><b>CO3-</b> Solve structural, thermal, and dynamic problems using the developed finite element formulations(<b>BL4-Analyze</b>)</p> <p><b>CO4-</b> Demonstrate the ability to create models for structural, thermal, and fluid flow applications using commercial finite element packages(<b>BL3-Apply</b>)</p> <p><b>CO5-</b> Interpret the analysis results to improve product and system design(<b>BL4-Analyze</b>)</p>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)				

#### Part B

Modules	Contents	Pedagogy	Hours
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#### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Comparative study of different properties of materials	PBL	BL3-Apply	15





## Syllabus-2023-2024

(SOET)(BTech-CivilEngineering)

<b>Title of the Course</b>	Smart Cities							
<b>Course Code</b>	CEE0604[T]							
Part A								
<b>Year</b>	3rd	<b>Semester</b>	6th	<b>Credits</b>	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Electives							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Students will Acquaint knowledge on smart cities planning and development( <b>BL2-Understand</b> ) <b>CO2-</b> Develop work break down structure, scheduling and project management of smart cities( <b>BL3-Apply</b> ) <b>CO3-</b> Work out the most energy efficient technique for development of Smart Cities( <b>BL4-Analyze</b> ) <b>CO4-</b> To understand the importance of different smart system( <b>BL2-Understand</b> ) <b>CO5-</b> To understand latest technologies used in intelligent building( <b>BL2-Understand</b> )							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)				

### Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Smart cities: Introduction to city planning Concept, Principle stakeholders, key trends in smart cities developments	Lectures with Presentation, Seminars	10
2	Smart Cities Planning and Development: Understanding smart cities, Dimension of smart cities, Global Standards and performance benchmarks, Practice codes, Smart city planning and development	Lectures with Presentation, Seminars	10
3	Financing smart cities development, Governance of smart cities	Lectures with Presentation, Seminars	6
4	Project management in Smart Cities: Phases, Stages of project and work break down Structure, Project organization structure, Planning, Scheduling and CPM, Project cost analysis, resource allocation & leveling, Line of balancing technique, Project monitoring and control, Project risk management	Lectures with Presentation, Seminars	8
5	Green building in smart cities: Introduction to green buildings, Rating system, Energy saving system	Lectures with Presentation, Seminars	6

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Smart material associated with smart building	PBL	BL4-Analyze	8
2	Technology involved in different construction of smart building	PBL	BL3-Apply	8
3	Model preparation on smart city	PBL	BL4-Analyze	8
4	Case study on ITS.	Case Study	BL3-Apply	10
5	Case study on smart city	Case Study	BL3-Apply	10

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation



## Syllabus-2023-2024

### (SOET)(BTech-CivilEngineering)

<b>Title of the Course</b>	Basic of Structural Design (Steel)
<b>Course Code</b>	CEL0617[T]

#### Part A

Year	3rd	Semester	6th	Credits	L	T	P
					3	1	2
<b>Course Type</b>	Embedded theory and lab						
<b>Course Category</b>	Discipline Core						
<b>Pre-Requisite/s</b>	basics of steel, strength of material			<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To remember the various concepts in theory of steel structures.(<b>BL1-Remember</b>)</p> <p><b>CO2-</b> To understand &amp; analyze the different steel structures problems.(<b>BL2-Understand</b>)</p> <p><b>CO3-</b> To implement the different designing concepts of steel structures(<b>BL3-Apply</b>)</p> <p><b>CO4-</b> To provide experimental basis, and to enable the students to analyze the behaviour of various steel structures and its properties.(<b>BL4-Analyze</b>)</p> <p><b>CO5-</b> To evaluate the applications of different steel structural members in various fields such as research &amp; industries.(<b>BL5-Evaluate</b>)</p> <p><b>CO6-</b> To apply the understanding of steel structure problems in identifying the quality of steel and its different types.(<b>BL6-Create</b>)</p>						
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>				

#### Part B

Modules	Contents	Pedagogy	Hours
unit 1	Various loads and mechanism of the load transfer, partial load factors, structural properties of steel, design of structural connections- bolted, riveted and welded connections	Lectures with problem based learning, experimental learning, case study, field trips	10
unit II	Design of basic structural elements-tension, compression, flexure. Provision of IS 800-2007	Lectures with problem based learning, experimental learning, case study, field trips	10
unit III	Design of trusses-angular and tubular	Lectures with problem based learning, experimental learning, case study, field trips	8
unit IV	Design of Simple and Compound Column base grillage foundation	Lectures with problem based learning, experimental learning, case study, field trips	10
unit V	Introduction to flexural member, Design of beam-simple and built up, Laterally supported and laterally unsupported beam.	Lectures with problem based learning, experimental learning, case study, field trips	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	drawing of riveted connection	Experiments	BL2-Understand	3
II	drawing of bolted conecction	Experiments	BL2-Understand	2
III	drawing of wellded connection	Experiments	BL4-Analyze	2
IV	drawing of joints	Experiments	BL2-Understand	3

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	20	60	20
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

Part E

<b>Books</b>	Steel Structure
<b>Articles</b>	
<b>References Books</b>	Steel Structure
<b>MOOC Courses</b>	
<b>Videos</b>	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	2	1	-	-	1	1	1	-	2	-	-	3
CO2	-	1	1	1	3	-	-	1	-	1	-	2	-	-	2
CO3	1	-	2	1	2	1	-	1	-	1	-	2	-	2	-
CO4	1	1	2	1	-	-	-	-	1	-	-	-	1	-	2
CO5	-	-	1	-	-	-	1	-	-	-	1	-	-	1	-
CO6	1	3	-	2	-	-	-	1	-	-	-	-	-	-	1

## Syllabus-2023-2024

### (SOET)(BTech-CivilEngineering)

<b>Title of the Course</b>	Advanced Structural Design (RCC)
<b>Course Code</b>	CEL0619[T]

#### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					2	1	1	4
<b>Course Type</b>	Embedded theory and lab							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	basic knowledge of mechanics			<b>Co-Requisite/s</b>	basics of strength of materials			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To remember the various concepts Steel Design. <b>(BL1-Remember)</b> <b>CO2-</b> To understand the concept of design of Multi-Storey Buildings. <b>(BL2-Understand)</b> <b>CO3-</b> To implement the different designing concepts retaining of earth work with retaining walls. <b>(BL3-Apply)</b> <b>CO4-</b> To provide different types of structural elements as per the requirement of structure <b>(BL3-Apply)</b> <b>CO5-</b> To design the silos and bunkers <b>(BL5-Evaluate)</b> <b>CO6-</b> To create different RCC Complex structures with designing <b>(BL4-Analyze)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>					

#### Part B

Modules	Contents	Pedagogy	Hours
unit 1	Design of Multistory Buildings - Sway and non sway buildings, Shear walls and other bracing elements	Lectures with problem based learning, experimental learning, case study, field trips	10
unit II	Earth Retaining Structures: Cantilever and counter fort types retaining walls	Lectures with problem based learning, experimental learning, case study, field trips	10
unit III	Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks	Lectures with problem based learning, experimental learning, case study, field trips	8
unit IV	Silos and Bunkers	Lectures with problem based learning, experimental learning, case study, field trips	10
unit V	T-beam & Slab bridges- for highway loading (IRC Loads). Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit State Design	Lectures with problem based learning, experimental learning, case study, field trips	8





## Syllabus-2023-2024

### (SOET)(BTech-CivilEngineering)

<b>Title of the Course</b>	Quantity Surveying & Costing
<b>Course Code</b>	CEL0621[T]

#### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					2	1	1	4
<b>Course Type</b>	Embedded theory and lab							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	introduction of material			<b>Co-Requisite/s</b>	basic knowledge of materials			
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To remember the various concepts in theory of Specification(<b>BL1-Remember</b>)</p> <p><b>CO2-</b> To understand &amp; analyze the different Quantity Estimates(<b>BL4-Analyze</b>)</p> <p><b>CO3-</b> : To implement the different designing concepts of Quantity Estimation.(<b>BL5-Evaluate</b>)</p> <p><b>CO4-</b> To provide experimental basis, and to enable the students to analyze the quantity and cost estimates.(<b>BL3-Apply</b>)</p> <p><b>CO5-</b> To evaluate the applications of different Estimation and Costing in various fields such as research &amp; industries.(<b>BL3-Apply</b>)</p> <p><b>CO6-</b> : To apply the understanding of Rate Analysis in solving problem of Estimation(<b>BL2-Understand</b>)</p>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>					

### Part B

Modules	Contents	Pedagogy	Hours
unit 1	Purpose and importance of estimates, principles of estimating methods of taking out Quantities of items of work. Mode of Measurement, Measurement sheet and abstract sheet; bills of quantities	Lectures with problem based learning, experimental learning, case study, field trips	10
unit II	Types of estimate, plinth area rate, cubical content rate, preliminary original, revised and supplementary estimates different projects preparing detailed estimates of various types of Building, RCC work earth work calculations for roads and estimating of culverts. Services for building such as water supply, drainage.	Lectures with problem based learning, experimental learning, case study, field trips	9
unit III	Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates (C.S.R), Specification.	Lectures with problem based learning, experimental learning, case study, field trips	8
unit IV	Cost works : Factors affecting cost of work, overhead charges Contingencies and work charge establishment, various percentage for different services in building.	Lectures with problem based learning, experimental learning, case study, field trips	10
unit V	Valuation : Purpose, depreciation, sinking fund. scrap value year's purchase, gross and net income, dual rates interest. Method of Valuation, rent fixation of buildings.	Lectures with problem based learning, experimental learning, case study, field trips	8

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	module of bulding	PBL	BL4-Analyze	3

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	0



## Syllabus-2023-2024

### (SOET)(BTech-CivilEngineering)

<b>Title of the Course</b>	Environmental Engineering
<b>Course Code</b>	CEL0634[T]

#### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					3	1	2	6
<b>Course Type</b>	Embedded theory and lab							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To remember the various concepts in theory of sources of water.(<b>BL1-Remember</b>)</p> <p><b>CO2-</b> To understand &amp; analyze the concept of population forecasting(<b>BL2-Understand</b>)</p> <p><b>CO3-</b> To provide experimental basis, and to enable the students to analyze physical, chemical and biological impurities(<b>BL4-Analyze</b>)</p> <p><b>CO4-</b> To evaluate the applications of rain water harvesting(<b>BL5-Evaluate</b>)</p> <p><b>CO5-</b> To apply the understanding of water treatment(<b>BL3-Apply</b>)</p>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		<b>SDG (Goals)</b>	SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours
1	Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.	Lectures with Presentation, Site Visit to STP	8
2	Characteristics and analysis of waste water, cycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, Th OD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self purification capacity of stream, Oxygen sag analysis.	Lectures with Presentation, Seminar and experiments	8
3	Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.	Lectures with Presentation, Site Visit to STP	8
4	Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.	Lectures with Presentation, Seminar and experiments	8
5	Advanced Waste Water treatment - Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sullage & night soil.	Lectures with Presentation, Seminar and experiments	8

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Physical examination of Sewage/Water: a. Total Solid b. Total dissolve solid c. Total suspended solid d. pH, color and odor	Experiments	BL4-Analyze	8
2	Chemical estimation of Sewage/Water and soil a. Determination of Chlorides b. Estimation of Chemical oxygen Demand	Experiments	BL4-Analyze	4
3	Microbial examination of Sewage/Water a. Confirmation of coliforms b. Biological oxygen demand	Experiments	BL4-Analyze	4
4	Determination of soil microbial biomass carbon	Experiments	BL4-Analyze	2
5	Examination of different bacteria, algae, fungi, plants and animals by microscopic or morphological examination	Experiments	BL4-Analyze	2

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	20	60	0

### Part E

<b>Books</b>	S.K.Garg, Environmental engineering volume 1 and 2 Khanna publisher B.C.Punamia Environmental engineering volume 1 and 2 Laxmi Publication
<b>Articles</b>	<a href="https://sciendo.com/journal/CEE">https://sciendo.com/journal/CEE</a>
<b>References Books</b>	Viesman, Hammer and Chadik Water supply and pollution control PHI Publication
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/courses/103107084">https://nptel.ac.in/courses/103107084</a>
<b>Videos</b>	<a href="http://www.digimat.in/nptel/courses/video/105107176/L01.html">http://www.digimat.in/nptel/courses/video/105107176/L01.html</a>

### Course Articulation Matrix

<b>COs</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	-	-	2	-	-	-	1	2	2	2	1
CO2	2	2	2	2	-	-	2	-	-	-	1	3	2	2	2
CO3	2	2	1	2	-	-	3	-	-	-	2	2	2	3	3
CO4	2	3	1	2	-	-	2	-	-	-	1	2	2	3	2
CO5	2	2	1	2	-	-	3	-	-	-	1	3	2	3	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



