

Syllabus-2021-2022

(SOET)(BTech-CivilEngineering)

Title of the Course	Major Project
Course Code	CED0804[P]

Part A

Year	4th	Semester	8th	Credits	L	T	P
					0	0	8
Course Type	Project						
Course Category	Projects and Internship						
Pre-Requisite/s	Knowledge of Civil engineering and interdisciplinary subjects.			Co-Requisite/s			
Course Outcomes & Bloom's Level	CO1- To enhance writing skills and knowledge.(BL2-Understand) CO2- To increase their mental ability.(BL3-Apply) CO3- To inculcate the ability to express innovative opinion and thoughts(BL4-Analyze) CO4- To have Dissertation works as skills development in students.(BL5-Evaluate)						
Courses Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✓ Environment ✗		SDG (Goals)				

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

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	50				
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Syllabus-2021-2022

(SOET)(BTech-CivilEngineering)

Title of the Course	Plastic design of steel structure
Course Code	CEE0807[T]

Part A

Year	4th	Semester	8th	Credits	L	T	P	C
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Learn Introduction and basic hypothesis, Virtual work in the elastic-plastic state(BL2-Understand) CO2- Learn Method of Limit Analysis, applicable to beams basic theorems of limit analysis, rectangular portal frames, gable frames, grids(BL4-Analyze) CO3- Learn Limit design Principles, and method of combining(BL5-Evaluate) CO4- Calculate of Deflection in Plastic beams and frames.(BL5-Evaluate) CO5- Learn Minimum weight Design(BL5-Evaluate)							
Courses Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	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	Prepare at least one drawing in any CAD software (like AutoCAD) for design of structures conducted in the syllabus	PBL	BL4-Analyze	15
2	Preparation of EXCLE Worksheets for the design of various structural components of Plate Girder/ Gantry Girder/ Foot Over bridge	PBL	BL4-Analyze	15

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-2021-2022
(SOET)(BTech-CivilEngineering)

Title of the Course	Building Environment & Services
Course Code	CEE0808[T]

Part A

Year	4th	Semester	8th	Credits	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s					Co-Requisite/s			
Course Outcomes & Bloom's Level	CO1- Students will learn the importance of durability of civil engineering structures (BL2-Understand) CO2- Students will be able to detect the defects in foundation, masonry, plastering, Painting, flooring, doors and windows (BL3-Apply) CO3- Students will be able to provide preventive and remedial measures for Defects (BL4-Analyze) CO4- Students will be able to locate and place different components like Lifts, electrical panels etc. (BL4-Analyze) CO5- Students will learn the importance of Need for retrofitting and restoration (BL2-Understand)							
Courses Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)	SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours
1	Durability of civil engineering structures: – Importance of durability – Factors affecting durability of buildings – life expectancy of different classes of buildings. Environmental factors that affect the durability of structures – Effect of natural agents (Air, sun, rain, frost and biological agents such as vegetation & insects) – Environmental pollution – Effect of pollution of air, water and soil – Location effect (Marine, Industrial area etc.) – Usage aspects (Structures subjected to dynamical loading & abrasive condition) - Preventive and remedial measures. Role of maintenance in durability and serviceability of buildings: – Necessity of maintenance – Economic aspects of maintenance. Different types of maintenance – Preventive maintenance – Remedial maintenance – Routine maintenance – Pre-monsoon maintenance - Special maintenance – Planning aspects of maintenance	Lectures with Presentation, Video Lectures	8
2	Cracks in buildings – Defects in foundation, masonry, plastering, Painting, flooring, doors and windows, concrete (RCC and PCC) and wooden roof – Corrosion of reinforcement and steel structures – structural damage due to fire - Causes – Preventive and remedial measures Cracks in buildings – Causes - Preventive and remedial measures	Lectures with Presentation, Practical visits to detect cracks and defects in a building	8
3	Causes - Preventive and remedial measures for Defects in foundation, masonry wooden roof concrete (RCC and PCC) Corrosion of reinforcement and steel structures flooring doors and Painting Defects due to fire, Stair case, water supply system, sewage and sullage system, in drainage system and electrical system Building Services Introduction to other building services	Lectures with Presentation, Practical visits to detect cracks and defects in a building	8
4	Lift – Location – RTT – Number of lifts – lift well and shaft – Machine room. Air conditioning system: Types of A/C – Capacity determination – Requirements for an A/C room, Electrical installations: Panel board & Buss bar, rising mains – distribution boards – MCB – ELCB – DP - TP and change over switch switches - Telephone and TV connectivity – Requirements of domestic gas pipeline	Lectures with Presentation, Case Study on different lift locations	8
5	Retrofitting and restoration of building – Need for retrofitting and restoration – Common retrofitting works carried out – Shoring and underpinning – Different methods of retrofitting and restoration – Challenges in retrofitting and restoration works. Deterioration of monumental and historical buildings – Common causes – Preventive measures – Restoration works – Conservation of world heritages	Lectures with Presentation, Practical visits to provide solutions for cracks and defects in a building	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Plan and draw in detail ventilation and air-conditioning for a given building	PBL	BL3-Apply	15
2	Plan movement facilities: Lifts, escalators, ramps etc. for a given public building	PBL	BL3-Apply	15

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-2021-2022

(SOET)(BTech-CivilEngineering)

Title of the Course	Design of Pre stressed Concrete Structure
Course Code	CEE0809[T]

Part A

Year	4th	Semester	8th	Credits	L	T	P	C
					4	1	0	5
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	basic properties of materials, and steel and Rcc design			Co-Requisite/s	basic knowledge of structures			
Course Outcomes & Bloom's Level	CO1- Students will remember the WSM Method for RCC and Pre-stressed Structures.(BL1-Remember) CO2- To understand different types and Methods of Pre-stressing.(BL2-Understand) CO3- Students will be able to apply the knowledge of Pre-stressing on different RCC Structures.(BL3-Apply) CO4- To analyze Beam for different Profiles of Tendons.(BL4-Analyze) CO5- To evaluate the stress distribution for different zones of beams(BL5-Evaluate) CO6- To Create and design a Pre-stressed beam and understand its advantages over RCC(BL6-Create)							
Courses Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)					

Part B

Modules	Contents	Pedagogy	Hours
unit 1	Introduction, Principles of prestressing, Different methods of prestressing – post tensioning and pre-tensioning. Prestressed concrete materials. Need for high strength concrete and High concrete tensile steel. Creep and shrinkage of concrete, relaxation of steel. Losses of prestress friction and anchorage of steel	Lectures with problem based learning, experimental learning, case study, field trips	10
unit II	Introduction , assumption in plastic analysis Safe moment ,yield moment , plastic moment, shape factor, load factor, moment curvature relationship , collapse load for standard cases, plastic hing length	Lectures with problem based learning, experimental learning, case study, field trips	9
unit III	Stress-pattern in anchorage zones. Transmission length. End zone reinforcement. Stress distribution in end block	Lectures with problem based learning, experimental learning, case study, field trips	8
unit IV	Plastic design of columns for different condition	Lectures with problem based learning, experimental learning, case study, field trips	10
unit V	Design of R.C.C structures concepts (W.S.M)	Lectures with problem based learning, experimental learning, case study, field trips	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	making model of prestressed beam	PBL	BL4-Analyze	3
II	making a model of prestressed slabs	PBL	BL5-Evaluate	2
III	making of model of prestressed coloums	PBL	BL4-Analyze	2

Syllabus-2021-2022

(SOET)(BTech-CivilEngineering)

Title of the Course	Traffic Engineering
Course Code	CEE0810[T]

Part A

Year	4th	Semester	8th	Credits	L	T	P
					4	2	0
Course Type	Theory only						
Course Category	Discipline Electives						
Pre-Requisite/s	basic knowledge of traffic and highway engineering			Co-Requisite/s			
Course Outcomes & Bloom's Level	CO1- To remember the various concepts in traffic engineering.(BL1-Remember) CO2- To understand & analyze the traffic engineering problems(BL2-Understand) CO3- To implement car-following models, queuing theories, and design of traffic signals in traffic engineering.(BL3-Apply) CO4- To provide experimental basis, and to enable the students to suggest the car-following theory and traffic control measures that will best suit the Indian traffic condition.(BL4-Analyze) CO5- To evaluate the vehicle, highway and traffic factors that influences the movement of vehicles and design of traffic control measures(BL5-Evaluate)						
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)				

Part B

Modules	Contents	Pedagogy	Hours
unit 1	Introduction: Role of traffic Engineer, Vehicle, highway and traffic factors. Traffic characteristics, Vehicular Road users, Introduction to Traffic Noise and Air Pollution and remedial measures.	Lectures with problem based learning, experimental learning, case study, field trips	10
unit II	Traffic flow: Interrupted and Uninterrupted Traffic Flow, Highway capacity: Urban, rural and intersection, Capacity of transit system, Traffic flow theory: Car Following and Queuing Theory.	Lectures with problem based learning, experimental learning, case study, field trips	9
unit III	Traffic Studies: Traffic volume studies, speeds studies, Speed and Delay Studies, Origin and Destination studies, Accident studies, capacity studies, parking studies.	Lectures with problem based learning, experimental learning, case study, field trips	8
unit IV	Traffic Control: regulations and other operational controls, Traffic Signal and marking, street lighting, Traffic Safety: Barricades, delineators.	Lectures with problem based learning, experimental learning, case study, field trips	10
unit V	Design of Intersections: Channelizing islands, Design of Rotaries, Intersection and terminal Design, Parking facilities.	Lectures with problem based learning, experimental learning, case study, field trips	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	model of traffic light	PBL	BL2-Understand	3
II	drawing of pavement marking	Experiments	BL4-Analyze	2

Syllabus-2021-2022

(SOET)(BTech-CivilEngineering)

Title of the Course	Energy Efficient and Green Building
Course Code	CEE0811[T]

Part A

Year	4th	Semester	8th	Credits	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Understand the concept of Green Buildings(BL2-Understand) CO2- Analyze & compute the energy flow in buildings(BL4-Analyze) CO3- Understand the energy efficient buildings(BL2-Understand) CO4- Design the building as per LEED India Rating System(BL4-Analyze) CO5- Design an Eco-friendly captive power generation(BL5-Evaluate)							
Courses Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)	SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours
1	What is Green Building, Why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building	Lectures with Presentation and Seminar	8
2	Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency	Lectures with Microsoft Presentation, Poster Presentations and Interactive Video Lectures	8
3	Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources, Ecofriendly captive power generation for factory, Building requirement	Lectures with Microsoft Presentation, Poster Presentations and Interactive Video Lectures	8
4	Introduction, CII Godrej Green business centre, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handling units, Precooling of fresh air, Interior lighting system, Key feature of the building, Eco-friendly captive power generation for factory, Building requirement	Lectures with Microsoft Presentation, Poster Presentations and Interactive Video Lectures	8
5	Handling of non process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indoor air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels	Lectures with Microsoft Presentation, Poster Presentations and Interactive Video Lectures	8

Syllabus-2021-2022
(SOET)(BTech-CivilEngineering)

Title of the Course	Airport Engineering
Course Code	CEE0812[T]

Part A

Year	4th	Semester	8th	Credits	L 3	T 1	P 0	C 4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Describe the different components of airport and aircrafts(BL2-Understand) CO2- Analyse the requirements of an airport layout with respect to international regulations(BL4-Analyze) CO3- Explain the airport runway design(BL4-Analyze) CO4- Design Taxiways & Aprons.(BL3-Apply) CO5- Summarise the concepts of the terminal service facilities(BL3-Apply)							
Courses Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓	SDG (Goals)	SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
1	AIR TRANSPORTATION Airport terminology, component parts of Aeroplane, Classification and size of airports; Aircraft characteristics. Air traffic control need for ATC, Air traffic control network, Air traffic control aids –enroute aids, landing aids. Airport site location and necessary surveys for site section, airport obstructions.	Lectures with Presentation, Site Visit to Airport	8
2	PLANNING: Airport master plan –FAA recommendations, Regional Planning, ICAO recommendations, Estimation of future airport traffic needs-layout of Air Port	Lectures with Presentation, Site Visit to Airport	8
3	RUNWAYS: Runway orientation – windrose diagram, basic runway length, corrections for elevation, temperature and gradient, runway geometric design, runway pavement design introduction	Lectures with Presentation, Site Visit to Airport	8
4	TAXIWAYS AND APRONS: Loading aprons –holding aprons – Geometric design standards, exit taxiways –optimal location, design, and fillet and separation clearance	Lectures with Presentation, Site Visit to Airport	8
5	OTHER FACILITIES: Lighting, visual airport marking, airport lighting aids. OPERATIONS AND SCHEDULING: Ground transportation facilities; Airport capacity, runway capacity and delays.	Lectures with Presentation, Site Visit to Airport	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Project On Airport Planning and Design	PBL	BL3-Apply	15

Syllabus-2021-2022

(SOET)(BTech-CivilEngineering)

Title of the Course	Solid Waste Management
Course Code	CEE0813[T]

Part A

Year	4th	Semester	8th	Credits	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s					Co-Requisite/s			
Course Outcomes & Bloom's Level	CO1- Students will Understand the concept of solid waste management(BL2-Understand) CO2- Students will be able to explain handling and processing of solid waste(BL2-Understand) CO3- Students will be able to apply the concept of landfilling for disposal of solid waste(BL3-Apply) CO4- Students will be able to design composting and other solid waste conversion units(BL4-Analyze) CO5- Students will understand the various hazardous waste, risk assessment and legislation (BL2-Understand)							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)	SDG6(Clean water and sanitation) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours
1	Solid waste: Public health and ecological impacts, Sources and types of solid wastes, material flow and waste generation, Functional elements: Waste generation, storage, collection, Transfer and transport, processing and recovery, disposal. Physical and chemical composition of municipal solid waste, integrated solid waste management, hierarchy of waste management options, different methods for generation rates. Storage: movable bins, fixed bins. Collection: home to home collection, community bin system, Theory and design of hauled container system, stationary container system	Lectures with problem based learning, experimental learning, case study, field trips	8
2	Transportation: handcart, tri-cycle, animal cart, tripper truck, dumper placer, bulk refuse carrier, railroad transport, water transport, conveyors, layout of routes. Engineering system for on-site handling and processing of solid waste: separators, size reduction equipments, screening equipments, densification, baling, cubing, pelleting equipments	Lectures with problem based learning, experimental learning, case study, field trips	8
3	Land filling: Site selection criteria, landfill layout, landfill sections, Occurrence of gases and leachate in landfills: composition and characteristics, generation factors, initial adjustment phase, transition phase, acid formation phase, methane formation phase, maturation phase of gases and leachate, Introduction to engineered landfills	Lectures with problem based learning, experimental learning, case study, field trips	8
4	Composting, types of composting, process description, design and operational consideration of aerobic composting, process description, design and operational consideration of anaerobic composting. Thermal conversion technologies: incineration and pyrolysis system, energy recovery, system. Overview of solid waste management practices in India	Lectures with problem based learning, experimental learning, case study, field trips	8
5	Introduction to Hazardous wastes, Definition of Hazardous waste, The magnitude of the problem; Hazardous waste: Risk assessment, Environmental legislation, Characterization and site assessment, Waste minimization and resource recovery, Transportation of hazardous waste, Disposal of hazardous waste. Introduction to Electronic waste and Biomedical waste and their disposal	Lectures with problem based learning, experimental learning, case study, field trips	8

Syllabus-2021-2022

(SOET)(BTech-CivilEngineering)

Title of the Course	Urban Transportation Planning
Course Code	CEE0814[T]

Part A

Year	4th	Semester	8th	Credits	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s					Co-Requisite/s			
Course Outcomes & Bloom's Level	CO1- Students will be able to Understand the basic concepts of planning at urban and regional levels(BL2-Understand) CO2- Students will be able to Distinguish between the Conventional and current approaches for travel demand estimation(BL4-Analyze) CO3- Students will be able to Implement various types of models and trip generation(BL3-Apply) CO4- Students will be able to Analyze the urban travel markets(BL4-Analyze) CO5- Students will be able to Evaluate the transport planning proposals(BL5-Evaluate)							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓	SDG (Goals)	SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to transportation planning, planning concept, Goals, objectives, and Importance of transportation planning. Nature of traffic problems in cities. Present Scenario of road transport and rail transport assets. Role of transportation: Social, Political, Environmental. Transport and Socioeconomic Activities, Historical Development of Transport, Transportation in the Cities, Freight Transportation, Future Developments.	Lectures with problem based learning, experimental learning, case study, field trips	8
2	Urban form and Transport patterns, land use – transport cycle, concept of accessibility. Types of transport systems, evolution of transport modes, transport problems and mobility issues. Public Transport: Intermediate Public Transport (IPT) Rapid and mass transport system like MRTS & bus rapid transit. Transport Planning Process, Problem Definition, Solution Generation	Lectures with problem based learning, experimental learning, case study, field trips	8
3	Travel demand: Estimation and fore casting, trip classification, trip generation: factor and methods, multiple regression analysis. Trip distribution methods, modal split, trip assignment	Lectures with problem based learning, experimental learning, case study, field trips	8
4	Studying travel behavior. Analyzing urban travel markets. Traffic and transportation surveys and studies, traffic and travel characteristics, urban transport planning process – stages, study area, zoning, database	Lectures with problem based learning, experimental learning, case study, field trips	8
5	Evaluation of transport planning proposals: Land Use Transport Planning, Economic Evaluation methods like Net present Value methods, and Benefit Cost method. Transport system management: Long-term and short-term planning	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
1	Traffic Survey of National Highways	PBL	BL4-Analyze	15
2	Parking Planning for given vehicles	PBL	BL4-Analyze	15

Syllabus-2021-2022
(SOET)(BTech-CivilEngineering)

Title of the Course	Design of Hydraulic Structures
Course Code	CEL0827[T]

Part A

Year	4th	Semester	8th	Credits	L	T	P	C
					3	1	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basics of Structural Design and Analysis			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember the various concepts in theory of Dams(BL1-Remember) CO2- To understand & analyze the different Hydraulic structures(BL2-Understand) CO3- To implement the different designing concepts of Spillways(BL3-Apply) CO4- To provide experimental basis, and to enable the students to analyze the design of gravity dams(BL4-Analyze) CO5- To evaluate the applications of different Energy dissipators in various fields such as research & industries(BL5-Evaluate) CO6- To apply the understanding of Hydel power plant in solving problem of electricity(BL3-Apply)							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)					

Part B

Modules	Contents	Pedagogy	Hours
1	Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.	Lectures with problem based learning, experimental learning, case study, field trips	8
2	Earth and Rock fill dams : Earth Dams: Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition. Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.	Lectures with problem based learning, experimental learning, case study, field trips	10
3	Spillways : Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.	Lectures with problem based learning, experimental learning, case study, field trips	8
4	Energy dissipators and gates : Principles of energy dissipation Energy dissipators based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works, sphyon aquaduct	Lectures with problem based learning, experimental learning, case study, field trips	10
5	Hydropower Plants: Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.	Lectures with problem based learning, experimental learning, case study, field trips	8

Syllabus-2021-2022

(SOET)(BTech-CivilEngineering)

Title of the Course	Retrofitting and rehabilitation of structures
Course Code	CEL0831[T]

Part A

Year	4th	Semester	8th	Credits	L	T	P
					3	1	2
Course Type	Embedded theory and field work						
Course Category	Discipline Core						
Pre-Requisite/s	Environmental Engineering and Basics of Waste water and hydraulics			Co-Requisite/s			
Course Outcomes & Bloom's Level	CO1- Students will be remember the different Pollutants responsible for Pollution(BL1-Remember) CO2- To understand different parameters like BOD and COD(BL2-Understand) CO3- Students will be able to apply the knowledge of treatment of waste water(BL3-Apply) CO4- To analyze different pollutants responsible for water pollution(BL4-Analyze) CO5- To evaluate the type of treatment required for sludge and solid waste CO6- To Create Water Treatment system and solve Rural Sanitization Problems						
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)				

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 problem based learning, experimental learning, case study, field trips	10
2	Characteristics and analysis of waste wate, rcycles 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 problem based learning, experimental learning, case study, field trips	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 problem based learning, experimental learning, case study, field trips	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 problem based learning, experimental learning, case study, field trips	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 problem based learning, experimental learning, case study, field trips	10

