**DEPARTMENT OF CIVIL ENGINEERING**

***2.6.1. Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated***

**2021 REGULATION-COURSE OUTCOMES**

| SEMESTER | COURSE CODE | COURSE NAME | COURSE ID | COURSE OUTCOME |
|---|---|---|---|---|
| I | HS3151 | PROFESSIONAL ENGLISH I | CO 1 | At the end of the course, learners will be able<br>To use appropriate words in a professional context |
| | | | CO 2 | To gain understanding of basic grammatic structures and use them in right context. |
| | | | CO 3 | To read and infer the denotative and connotative meanings of technical texts |
| | | | CO 4 | To write definitions, descriptions, narrations and essays on various topics |
| I | MA3151 | MATRICES AND CALCULUS | CO 1 | At the end of the course the students will be able to<br>Use the matrix algebra methods for solving practical problems |
| | | | CO 2 | Apply differential calculus tools in solving various application problems. |
| | | | CO 3 | Able to use differential calculus ideas on several variable functions. |
| | | | CO 4 | Apply different methods of integration in solving practical problems. |
| | | | CO 5 | Apply multiple integral ideas in solving areas, volumes and other practical problems. |
| I | PH3151 | ENGINEERING PHYSICS | CO 1 | After completion of this course, the students should be able to<br>Understand the importance of mechanics. |
| | | | CO 2 | Express their knowledge in electromagnetic waves. |
| | | | CO 3 | Demonstrate a strong foundational knowledge in oscillations, optics and lasers. |

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| | | | | |
|---|---|---|---|---|
| | | | CO 4 | Understand the importance of quantum physics. |
| | | | CO 5 | Comprehend and apply quantum mechanical principles towards the formation of energy bands. |
| I | CY3151 | ENGINEERING CHEMISTRY | CO 1 | At the end of the course, the students will be able:<br>To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water. |
| | | | CO 2 | To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications. |
| | | | CO 3 | To apply the knowledge of phase rule and composites for material selection requirements. |
| | | | CO 4 | To recommend suitable fuels for engineering processes and applications. |
| | | | CO 5 | To recognize different forms of energy resources and apply them for suitable applications in energy sectors |
| I | GE3151 | PROBLEM SOLVING AND PYTHON PROGRAMMING | CO 1 | On completion of the course, students will be able to<br>Develop algorithmic solutions to simple computational problems |
| | | | CO 2 | Develop and execute simple Python programs. |

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| | | | | |
|---|---|---|---|---|
| | | | CO 3 | Write simple Python programs using conditionals and looping for solving problems. |
| | | | CO 4 | Represent compound data using Python lists, tuples, dictionaries etc. |
| | | | CO 5 | Represent compound data using Python lists, tuples, dictionaries etc. |
| | | | CO 6 | Read and write data from/to files in Python programs. |
| I | GE3171 | PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY | CO 1 | Upon completion of the course, students will be able to<br>Develop algorithmic solutions to simple computational problems |
| | | | CO 2 | Develop and execute simple Python programs. |
| | | | CO 3 | Implement programs in Python using conditionals and loops for solving problems. |
| | | | CO 4 | Deploy functions to decompose a Python program. |
| | | | CO 5 | Process compound data using Python data structures. |
| | | | CO 6 | Utilize Python packages in developing software applications. |
| I | BS3171 | PHYSICS AND CHEMISTRY LABORATORY | CO 1 | Upon completion of the course, the students should be able to<br>Understand the functioning of various physics laboratory equipment. |
| | | | CO 2 | Use graphical models to analyse laboratory data. |
| | | | CO 3 | Use mathematical models as a medium for quantitative reasoning and describing physicalreality. |
| | | | CO 4 | Access, process and analyse scientific information. |

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**2021 REGULATION-COURSE OUTCOMES**

| | | | | |
|---|---|---|---|---|
| | | | CO 5 | Solve problems individually and collaboratively. |
| I | CY 3151 | CHEMISTRY LABORATORY | CO 1 | Upon completion of the course, the students should be able to<br>To analyse the quality of water samples with respect to their acidity, alkalinity, hardness andDO. |
| | | | CO 2 | To determine the amount of metal ions through volumetric and spectroscopic techniques |
| | | | CO 3 | To analyse and determine the composition of alloys. |
| | | | CO 4 | To learn simple method of synthesis of nanoparticles |
| | | | CO 5 | To quantitatively analyse the impurities in solution by electroanalytical techniques |
| I | GE3172 | ENGLISH LABORATORY | CO 1 | At the end of the course, learners will be able<br>To listen and comprehend complex academic texts |
| | | | CO 2 | To speak fluently and accurately in formal and informal communicative contexts |
| | | | CO 3 | To express their opinions effectively in both oral and written medium of communication |
| II | HS3251 | PROFESSIONAL ENGLISH II | CO 1 | At the end of the course, learners will be able<br>To compare and contrast products and ideas in technical texts. |
| | | | CO 2 | To identify cause and effects in events, industrial processes through technical texts |

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| | | | | |
|---|---|---|---|---|
| | | | CO 3 | To analyse problems in order to arrive at feasible solutions and communicate them orally and inthe written format. |
| | | | CO 4 | To report events and the processes of technical and industrial nature. |
| | | | CO 5 | To present their opinions in a planned and logical manner, and draft effective resumes in contextof job search. |
| II | MA3251 | STATISTICS AND NUMERICAL METHODS | CO 1 | Upon successful completion of the course, students will be able to:<br>Apply the concept of testing of hypothesis for small and large samples in real life problems. |
| | | | CO 2 | Apply the basic concepts of classifications of design of experiments in the field of agriculture. |
| | | | CO 3 | Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems. |
| | | | CO 4 | Understand the knowledge of various techniques and methods for solving first and second orderordinary differential equations. |
| | | | CO 5 | Solve the partial and ordinary differential equations with initial and boundary conditions. |

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| | | | | |
|---|---|---|---|---|
| II | PH3201 | PHYSICS FOR CIVIL ENGINEERING | CO 1 | After completion of the course, the students should be able to<br>acquire knowledge about heat transfer through different materials, thermal performance ofbuilding and thermal insulation. |
| | | | CO 2 | gain knowledge on the ventilation and air conditioning of buildings |
| | | | CO 3 | understand the concepts of sound absorption, noise insulation and lighting designs |
| | | | CO 4 | know about the processing and applications of composites, metallic glasses, shape memoryalloys and ceramics |
| II | BE3252 | BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING | CO 1 | After completing this course, the students will be able to<br>Compute the electric circuit parameters for simple problems |
| | | | CO 2 | Explain the concepts of domestics wiring and protective devices |
| | | | CO 3 | Explain the working principle and applications of electrical machines |
| | | | CO 4 | Analyze the characteristics of analog electronic devices |
| | | | CO 5 | Explain the types and operating principles of sensors and transducers |
| II | GE3251 | ENGINEERING GRAPHICS | CO 1 | On successful completion of this course, the student will be able to<br>Use BIS conventions and specifications for engineering drawing. |
| | | | CO 2 | Construct the conic curves, involutes and cycloid. |
| | | | CO 3 | Solve practical problems involving projection of lines. |
| | | | CO 4 | Draw the orthographic, isometric and perspective projections of simple solids. |

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**2021 REGULATION-COURSE OUTCOMES**

| | | | | |
|---|---|---|---|---|
| | | | CO 5 | Draw the development of simple solids. |
| II | GE3271 | ENGINEERING PRACTICES LABORATORY | CO 1 | Upon completion of this course, the students will be able to<br>Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work. |
| | | | CO 2 | Wire various electrical joints in common household electrical wire work. |
| | | | CO 3 | Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assemblyof common household equipment's; Make a tray out of metal sheet using sheet metal work. |
| | | | CO 4 | Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB. |
| II | BE3272 | BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY | CO 1 | Use experimental methods to verify the Ohm's law and Kirchhoff's Law and to measurethree phase power |
| | | | CO 2 | Analyze experimentally the load characteristics of electrical machines |
| | | | CO 3 | Analyze the characteristics of basic electronic devices |
| | | | CO 4 | Use LVDT to measure displacement. |
| | | | CO 1 | Speak effectively in group discussions held in a formal/semi-formal contexts. |

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| | | | | |
|---|---|---|---|---|
| II | GE3272 | COMMUNICATION LABORATORY | CO 2 | Write emails and effective job applications. |
| III | MA3351 | TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS | CO 1 | Upon successful completion of the course, students should be able to: Understand how to solve the given standard partial differential equations. |
| | | | CO 2 | Solve differential equations using Fourier series analysis which plays a vital role in engineeringapplications. |
| | | | CO 3 | Appreciate the physical significance of Fourier series techniques in solving one and twodimensional heat flow problems and one dimensional wave equations. |
| | | | CO 4 | Understand the mathematical principles on transforms and partial differential equations wouldprovide them the ability to formulate and solve some of the physical problems of engineering. |
| | | | CO 5 | Use the effective mathematical tools for the solutions of partial differential equations by usingZ transform techniques for discrete time systems. |
| III | ME3351 | ENGINEERING MECHANICS | CO 1 | At the end of the course the students would be able to Illustrate the vectorial and scalar representation of forces and moments |
| | | | CO 2 | Analyse the rigid body in equilibrium |
| | | | CO 3 | Evaluate the properties of distributed forces |
| | | | CO 4 | Determine the friction and the effects by the laws of friction |

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| | | | | |
|---|---|---|---|---|
| | | | CO 5 | Calculate dynamic forces exerted in rigid body |
| III | CE3301 | FLUID MECHANICS | CO 1 | On completion of the course, the student is expected to<br>Demonstrate the difference between solid and fluid, its properties and behaviour in staticconditions. |
| | | | CO 2 | Apply the conservation laws applicable to fluids and its application through fluid kinematicsand dynamics. |
| | | | CO 3 | Formulate the relationship among the parameters involved in the given fluid phenomenonand to predict the performance of prototypes by model studies. |
| | | | CO 4 | Estimate the losses in pipelines for both laminar and turbulent conditions and analysis ofpipes connected in series and parallel. |
| | | | CO 5 | Explain the concept of boundary layer and its application to find the drag force excreted bythe fluid on the flat solid surface. |
| III | CE3302 | CONSTRUCTION MATERIALS AND TECHNOLOGY | CO 1 | Students will be able to<br>Identify the good quality brick, stone and blocks for construction. |
| | | | CO 2 | Recognize the market forms of timber, steel, aluminum and applications of various compositematerials. |

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| | | | | |
|---|---|---|---|---|
| | | | CO 3 | Identify the best construction and service practices such as thermal insulations and airconditioning of the building |
| | | | CO 4 | Select various equipments for construction works conditioning of building Understand the construction planning and scheduling techniques |
| | | | CO 5 | Recognize the market forms of timber, steel, aluminum and applications of various compositematerials. |
| III | CE3303 | WATER SUPPLY AND WASTE WATER ENGINEERING | CO 1 | On completion of the course, the student is expected to Understand the various components of water supply scheme and design of intake structure and conveyance system for water transmission |
| | | | CO 2 | Understand on the characteristics and composition of sewage, ability to estimate sewage generation and design sewer system including sewage pumping stations |
| | | | CO 3 | Understand the process of conventional treatment and design of water and wastewater treatment system and gain knowledge of selection of treatment process and biologicaltreatment process |
| | | | CO 4 | Ability to design and evaluate water distribution system and water supply in buildings and understand the self-purification of streams and sludge and septage disposal methods. |

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**2021 REGULATION-COURSE OUTCOMES**

| | | | | |
|---|---|---|---|---|
| | | | CO 5 | Able to understand and design the various advanced treatment system and knowledge about the recent advances in water and wastewater treatment process and reuse of sewage |
| III | CE3351 | SURVEYING AND LEVELLING | CO 1 | On completion of the course, the student is expected to<br>Introduce the rudiments of various surveying and its principles. |
| | | | CO 2 | Imparts knowledge in computation of levels of terrain and ground features |
| | | | CO 3 | Imparts concepts of Theodolite Surveying for complex surveying operations |
| | | | CO 4 | Understand the procedure for establishing horizontal and vertical control |
| | | | CO 5 | Imparts the knowledge on modern surveying instruments |
| III | CE3361 | SURVEYING AND LEVELLING LABORATORY | CO 1 | On completion of the course, the student is expected to<br>Impart knowledge on the usage of basic surveying instruments like chain/tape, compassand levelling instruments |
| | | | CO 2 | Able to use levelling instrument for surveying operations |
| | | | CO 3 | Able to use theodolite for various surveying operations |
| | | | CO 4 | Able to carry out necessary surveys for social infrastructures |
| | | | CO 5 | Able to prepare planimetric maps |
| III | CE3311 | WATER AND WASTEWATER ANALYSIS LABORATORY | CO 1 | On completion of the course, the student is expected to<br>Calibrate and standardize the equipment |

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**2021 REGULATION-COURSE OUTCOMES**

| | | | | |
|---|---|---|---|---|
| | | | CO 2 | Collect proper sample for analysis |
| | | | CO 3 | To know the sample preservation methods |
| | | | CO 4 | To perform field oriented testing of water, wastewater |
| | | | CO 5 | To perform coliform analysis |
| III | GE3361 | PROFESSIONAL DEVELOPMENT | CO 1 | On successful completion the students will be able to<br>Use MS Word to create quality documents, by structuring and organizing content for their dayto day technical and academic requirements |
| | | | CO 2 | Use MS EXCEL to perform data operations and analytics, record, retrieve data as perrequirements and visualize data for ease of understanding |
| | | | CO 3 | Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects. |
| IV | CE3401 | APPLIED HYDRAULICS ENGINEERING | CO 1 | On completion of the course, the student is expected to<br>Describe the basics of open channel flow, its classification and analysis of uniform flow in steady state conditions with specific energy concept and its application |
| | | | CO 2 | Analyse steady gradually varied flow, water surface profiles and its length calculation using direct and standard step methods with change in water surface profiles due to change in grades. |

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| | | | | |
|---|---|---|---|---|
| | | | CO 3 | Derive the relationship among the sequent depths of steady rapidly varied flow and estimatingenergy loss in hydraulic jump with exposure to positive and negative surges. |
| | | | CO 4 | Design turbines and explain the working principle |
| | | | CO 5 | Differentiate pumps and explain the working principle with characteristic curves and design centrifugal and reciprocating pumps. |
| IV | CE3402 | STRENGTH OF MATERIALS | CO 1 | Students will be able to<br>Understand the concepts of stress and strain, principal stresses and principal planes. |
| | | | CO 2 | Determine Shear force and bending moment in beams and understand concept of theory ofsimple bending. |
| | | | CO 3 | Calculate the deflection of beams by different methods and selection of method for determiningslope or deflection. |
| | | | CO 4 | Analyze propped cantilever, fixed beams and continuous beams for external loadings andsupport settlements. |
| | | | CO 5 | Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, andstudy the various theories of failure |

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| | | | | |
|---|---|---|---|---|
| IV | CE3403 | CONCRETE TECHNOLOGY | CO 1 | At the end of the course the student will be able to<br>Understand the requirements of cement, aggregates and water for concrete |
| | | | CO 2 | Select suitable admixtures for enhancing the properties of concrete |
| | | | CO 3 | Design concrete mixes as per IS method of mix design |
| | | | CO 4 | Determine the properties of concrete at fresh and hardened state. |
| | | | CO 5 | Know the importance of special concretes for specific requirements |
| IV | CE3404 | SOIL MECHANICS | CO 1 | On completion of the course, the student is expected to be able to<br>Demonstrate an ability to identify various types of soils and its properties, formulate and solveengineering Problems |
| | | | CO 2 | Show the basic understanding of flow through soil medium and its impact of engineering solution |
| | | | CO 3 | Understand the basic concept of stress distribution in loaded soil medium and soil settlementdue to consolidation |
| | | | CO 4 | Show the understanding of shear strength of soils and its impact of engineering solutions to the loaded soil medium and also will be aware of contemporary issues on shear strength of soils. |
| | | | CO 5 | Demonstrate an ability to design both finite and infinite slopes, component and process as per needs and specifications. |

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| | | | | |
|---|---|---|---|---|
| IV | CE3405 | HIGHWAY AND RAILWAY ENGINEERING | CO 1 | On completion of the course, the student is expected to<br>Plan a highway according to the principles and standards adopted in various institutions inIndia. |
| | | | CO 2 | Design the geometric features of road network and components of pavement. |
| | | | CO 3 | Test the highway materials and construction practice methods and know its properties andable to perform pavement evaluation and management. |
| | | | CO 4 | Understand the methods of route alignment and design elements in railway planning andconstructions. |
| | | | CO 5 | Understand the construction techniques and maintenance of track laying and railway stations |
| IV | CE3411 | HYDRAULIC ENGINEERING LABORATORY | CO 1 | On completion of the course, the student is expected to<br>Apply Bernoulli equation for calibration of flow measuring devices. |
| | | | CO 2 | Measure friction factor in pipes and compare with Moody diagram |
| | | | CO 3 | Determine the performance characteristics of rotodynamic pumps. |
| | | | CO 4 | Determine the performance characteristics of positive displacement pumps. |
| | | | CO 5 | Determine the performance characteristics of turbines. |
| | | | CO 1 | On completion of the course, the student is expected to |

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| | | | | |
|---|---|---|---|---|
| IV | CE3412 | MATERIALS TESTING LABORATORY | | Determine the mechanical properties of steel |
| | | | CO 2 | Determine the physical properties of cement |
| | | | CO 3 | Determine the physical properties of fine and coarse aggregate |
| | | | CO 4 | Determine the workability and compressive strength of concrete. |
| | | | CO 5 | Determine the strength of brick and wood. |
| IV | CE3413 | SOIL MECHANICS LABORATORY | CO 1 | On completion of the course, the student is expected to<br>Conduct tests to determine the index properties of soils |
| | | | CO 2 | Determine the insitu density and compaction characteristics. |
| | | | CO 3 | Conduct tests to determine the compressibility, permeability and shear strength of soils. |
| | | | CO 4 | Understand the various tests on Geosynthetics. |