

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:B.E. Civil Engineering

Semester:1

<p style="text-align: center;">Course:Problem Solving and Python Programming-[GE3151]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Develop algorithmic solutions to simple computational problems.</p> <p>CO2 : Develop and execute simple python programs.</p> <p>CO3 : Write simple python programs using conditionals, loops for solving problems and decompose a python program into functions.</p> <p>CO4 : Represent compound data using python lists, tuples, dictionaries etc.</p> <p>CO5 : Read and write data from/to files in Python programs.</p>
<p style="text-align: center;">Course:Problem Solving and Python Programming Laboratory-[GE3171]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Develop algorithmic solutions to simple computational problems.</p> <p>CO2 : Develop and execute simple Python programs.</p> <p>CO3 : Write simple python programs using conditionals, loops for solving problems and decompose a python program into functions.</p> <p>CO4 : Represent compound data using Python lists, tuples, dictionaries etc.</p> <p>CO5 : Read and write data from/to files in Python programs.</p>
<p style="text-align: center;">Course:Professional English - I-[HS3151]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Listen and comprehend complex academic texts</p> <p>CO2 :Read and infer the denotative and connotative meanings of technical texts</p> <p>CO3 :Write definitions, descriptions, narrations and essays on various topics</p> <p>CO4 :Speak fluently and accurately in formal and informal communicative contexts</p> <p>CO5 :Express their opinions effectively in both oral and written medium of communication</p>
<p style="text-align: center;">Course:Matrices and Calculus-[MA3151]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basic concepts of matrices, limit and continuity of a function, differentiation and integration.</p> <p>CO2 :Explain the properties of matrices and nature of the quadratic forms.</p> <p>CO3 :Interpret the techniques of differentiation, partial differentiation and integration.</p> <p>CO4 :Apply diagonalization of matrices in quadratic form and apply C-H theorem to find the inverse of matrices.</p> <p>CO5 :Apply various methods to solve problems on differentiation, partial differentiation and integration.</p>
<p style="text-align: center;">Course: Engineering Physics-[PH3151]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Recall the basics of mechanics and electromagnetic waves.</p> <p>CO2 :Relate the concepts of oscillations, lasers and quantum physics.</p> <p>CO3 : Explain the theories of centre of mass, moment of inertia, properties of electromagnetic waves and Maxwell's equations.</p> <p>CO4 :Summarize the principles of sound waves, light waves and quantum mechanics.</p>

CO5 : Utilize the applications of mechanics, electromagnetic waves, oscillations, optics and quantum mechanics.

Course: Physics and Chemistry Laboratory-[BS3171]

Upon completion of the course, the students will.../ will be able to...

CO1 : Identify the moduli of elasticity used in day to day engineering applications.

CO2 : Indicate the optical parameters of visible and laser sources

CO3 : Make use of the bandgap of semiconducting materials.

CO4 : Detect the water quality parameters (DO, Chloride, Cu content, Alkalinity and hardness) of the given water sample.

CO5 : Examine quantitatively the metals (Fe, Na, Cu) in the given sample using potentiometer & flame photometer and the conductance of the solution by conductometric titrations.

Engineering Chemistry – CY3151

Upon completion of the course, the students will.../ will be able to...

CO1: Define the concepts of water quality parameters, nano materials and composites

CO2: Recall the types of fuels and energy resources

CO3: Outline suitable methods for water treatment and synthesis of nano materials.

CO4: Illustrate the properties of nano materials as well as fuel analysis

CO5: Apply the concept of composites, fuel analysis and energy resources for material selection requirements and also in energy sectors

Semester:2

Course:Basic Electrical and Electronics and Instrumentation Engineering-[BE3252]

Upon completion of the course, the students will.../ will be able to...

CO1 : Compute the electric circuit parameters for simple problems

CO2 : Explain the concepts of domestic wiring and protective devices

CO3 : Explain the working principle and applications of electrical machines

CO4 : Explain the basic concepts of analog electronic devices

CO5 : Explain the types and operating principles of sensors and transducers

Course:Basic Electrical and Electronics and Instrumentation Engineering Laboratory-[BE3272]

Upon completion of the course, the students will.../ will be able to...

CO1 : Verify the Ohm's and Kirchoff's Laws of electrical circuits.

CO2 : Analyze the performance characteristics of Electric Machines.

CO3 : Analyze the characteristics of basic electronic devices.

CO4 : Analyze the AC to DC converter circuits.

CO5 : Examine the characteristics of measuring instruments.

Course:Statistics and Numerical Methods-[MA3251]

Upon completion of the course, the students will.../ will be able to...

CO1 : Define the basic concept of statistical tests, ANOVA, solution of equations, interpolation and ODE.

CO2 : Interpret the techniques of statistical tests and design of experiments.

CO3 : Explain the solution of equations, ODE, interpolation, differentiation and integration.

CO4 : Apply the concept of testing of hypothesis and design of experiments as real life.

CO5 : Solve equations ODE, interpolation, differentiation and integration using numerical techniques.

Course:Engineering Graphics-[GE3251]

Upon completion of the course, the students will.../ will be able to...

CO1 : Exposed to existing national standards related to technical drawings

CO2 : Describe the given Engineering drawing and interpret a three dimensional drawing
CO3 : Apply the fundamentals and standards in engineering drawing through drafting exercises of geometrical solids
CO4 : Identify methods of development of surfaces of different solids and some of the hidden geometry of the cut object
CO5 : Analyze the three dimensional view of objects as perceived by the human eye
Course:Engineering Practices Laboratory-[GE3271]
Upon completion of the course, the students will.../ will be able to...
CO1 : Develop carpentry components and pipe connections
CO2 : Demonstrate basic machine operations
CO3 : Construct the models using sheet metal
CO4 : Create basic electrical circuits for home applications
CO5 : Infer foundry smithy and soldering works
Course:Physics for Civil Engineering-[PH3201]
Upon completion of the course, the students will.../ will be able to...
CO1 : Recall the basics of thermal behavior of materials, ventilation of buildings, sound absorbing materials and light effects.
CO2 : Choose the prevention and safety measures of natural disasters and properties of new engineering materials.
CO3 : Summarize the factors affecting the thermal performance of building and the measurement of daylight, noise and ventilation.
CO4 : Illustrate the importance of designing new engineering materials and prevention of natural disasters.
CO5 : Utilize the applications of ventilation, day light, sound absorption & new engineering materials in buildings and safety measures of natural disasters

Semester:3

Course:Strength of Materials I-[CE8301]
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the theory of stress, strain, forces, moment, torsion, deflection, principal stresses and principal plane.
CO2 : Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
CO3 : Compute elastic constants, deflection, bending and torsional behavior of shaft and springs.
CO4 : Analyze the beams, trusses, shaft and springs using alternate methods.
CO5 : Draw shear force and bending moment diagram for beams and Mohr's circle for principal plane.
Course:Fluid Mechanics-[CE8302]
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the concept of fluid properties in static, kinematic and dynamic equilibrium, pipe flow, boundary layer formation and model studies.
CO2 : Illustrate fluid laws and theorems pertaining to loss of fluid head.
CO3 : Identify and compare the characteristics of fluids in static kinematic and dynamic equilibrium, types of flow, boundary layer and model analysis.
CO4 : Calculate the flow characteristics and pressure of fluid passing through closed pipes and open channels.

CO5 : Evaluate the hydrostatic pressure of fluids, model studies and static, kinematic and dynamic equilibrium of fluids.
Course:Construction Materials Laboratory-[CE8311]
Upon completion of the course, the students will.../ will be able to... CO1 : List the various building materials. CO2 : Explain the different test available for the building materials. CO3 : Apply suitable tests to check the quality of materials. CO4 : Identify the physical and mechanical properties of building materials. CO5 : Check the durability of building materials.
Course:Surveying-[CE8351]
Upon completion of the course, the students will.../ will be able to... CO1 : Define the basics and principles of conventional and modern surveying. CO2 : Describe the principles of surveying and the working of surveying instruments. CO3 : Compute the bearings, levels, distances, latitude, longitude, azimuth and corrected values from the observed errors. CO4 : Infer the appropriate application of instrument and method of surveying. CO5 : Compare the modern surveying methods and instruments with conventional surveying.
Course:Surveying Laboratory-[CE8361]
Upon completion of the course, the students will.../ will be able to... CO1 : Illustrate the survey and collect field data. CO2 : Develop and prepare field notes from survey data. CO3 : Interpret survey data and compute areas and volumes. CO4 : Relate the different methods and their procedure for leveling. CO5 : Determine angle and distance between two points.
Course:Construction Materials-[CE8391]
Upon completion of the course, the students will.../ will be able to... CO1 : List the various building materials. CO2 : Explain the different test available for the building materials. CO3 : Apply suitable tests to check the quality of materials. CO4 : Identify the properties of building materials. CO5 : Analyse the suitability of modern building materials.
Course:Engineering Geology-[CE8392]
Upon completion of the course, the students will.../ will be able to... CO1 : Determine the importance of geology and geological features with engineering technology. CO2 : Classify faults, folds and joints in rocks. CO3 : Describe the types of rocks, their distribution and uses. CO4 : Enumerate the geological methods to study the structure of rocks in earth crust. CO5 : Differentiate dams, tunnels, bridges and reservoir for making of their engineering importance.
Course:Interpersonal Skills / Listening and Speaking-[HS8381]
Upon completion of the course, the students will.../ will be able to... CO1 : Listen and respond appropriately CO2 : Participate in group discussions CO3 : Make effective presentations CO4 : Speak clearly with proper stress and intonation CO5 : Participate confidently and appropriately in conversations both formal and informal

Course:Transforms and Partial Differential Equations-[MA8353]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe the formation of PDE and difference equation
- CO2 : Find the Fourier series of a given function satisfying Dirichlet's condition
- CO3 : Solve first and second order homogeneous and non-homogeneous PDE using standard methods and Fourier series method.
- CO4 : Determine Fourier transform and Z-transform of standard function.
- CO5 : Apply Z-transform to solve difference equation and Fourier transform to solve definite integrals.

Semester:4

Course:Construction Techniques and Practices-[CE8401]

Upon completion of the course, the students will.../ will be able to...

- CO1 :Define the construction techniques and structural systems
- CO2 :Compare various techniques and practices on masonry construction, flooring, and roofing.
- CO3 : Plan the requirements for substructure and superstructure construction.
- CO4 : Apply the methods and techniques involved in the construction of super structures
- CO5 :Analyse the superstructure and substructure construction

Course:Strength of Materials II-[CE8402]

Upon completion of the course, the students will.../ will be able to...

- CO1 : State the use of energy theorems in indeterminate structures and various theories for failure of material.
- CO2 : Interpret the basic concepts of strain energy and deflection of determinate beams, rigidly jointed and pin jointed plane frames, columns and cylinders.
- CO3 : Apply proper principles to find the bending moment, shear force, and load carrying capacity of columns and stresses induced in cylinders.
- CO4 : Apply the different theories of failures on structural elements and materials.
- CO5 : Analyze indeterminate beams, columns, cylinders and other structural elements for different loading conditions.

Course:Applied Hydraulic Engineering-[CE8403]

Upon completion of the course, the students will.../ will be able to...

- CO1 :Define the properties of open channel flow and hydraulic machines.
- CO2 : Compare the characteristics of uniform flow, Gradually varied flow and Rapidly varied flow.
- CO3 :Explain the principles and types of hydraulic machines.
- CO4 : Determine the characteristics of uniform flow, Gradually varied flow and Rapidly varied flow.
- CO5 :Calculate the efficiency of hydraulic machines.

Course:Concrete Technology-[CE8404]

Upon completion of the course, the students will.../ will be able to...

- CO1 : List the types of cement, special concretes and properties of fresh and hardened concrete.
- CO2 : Describe the materials, admixtures and properties and principles of mix design of concrete.

- CO3 : Make use of suitable materials, admixtures and mix proportion required for the preparation of concrete.
- CO4 : Compute concrete mix design for the required strength.
- CO5 : Analyze the properties of concrete and their effects due to the addition of admixtures.

Course:Soil Mechanics-[CE8491]

Upon completion of the course, the students will.../ will be able to...

- CO1 : State the basic concept of stress distribution in loaded soil medium and soil settlement due to consolidation
- CO2 : Demonstrate the flow through soil medium and its impact of engineering solution
- CO3 : Identify various types of soils and its properties, formulate and solve engineering Problems
- CO4 : Analyse the 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.
- CO5 : Design both finite and infinite slopes, component and process as per needs and specifications.

Course:Hydraulic Engineering Laboratory-[CE8461]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the concept of flow measuring devices.
- CO2 : Estimate the frictional losses in pipes and fittings.
- CO3 : Estimate the performance of pumps for specific applications.
- CO4 : Evaluate the performance of turbines based on flow and head.
- CO5 : Compute the meta centric height of floating body.

Course:Strength of Materials Laboratory-[CE8481]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the basic concept of stress, strain, deformation and material behaviour under different types of loading(axial, torsion and bending)
- CO2 : Demonstrate the testing of different material under the action of tensile load, compressive load, double shear and torsion.
- CO3 : Calculate the young's modulus of steel and wooden materials by considering deflection testing.
- CO4 : Determine the stiffness of open coil and closed coil springs by applying compressive and tensile load respectively.
- CO5 : Make use of equipment to assess special strength characteristics such as toughness and hardness experimentally.

Course:Advanced Reading and Writing-[HS8461]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Able to write different type of essays.
- CO2 : To write winning job applications.
- CO3 : To read and evaluate texts critically.
- CO4 : To display critical thinking in various professional contexts.

Course:Numerical Methods-[MA8491]

Upon completion of the course, the students will.../ will be able to...

- CO1. Find numerical solution of equations, matrices, ODE and PDE
- CO2. Explain the concepts of numerical differentiation and integration
- CO3. Interpret the techniques of interpolation, iteration and pivoting
- CO4. Identify numerical techniques of differentiation, integration and interpolation for Engineering problems

CO5. Solve algebraic equations, transcendental equations, ODE and PDE using numerical methods.

Semester:5

Course:Design of Reinforced Cement Concrete Elements-[CE8501]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe the guiding principles of the serviceability limit state and the ultimate limit state concepts.
- CO2 : Summarize the fundamental mechanics of reinforced concrete and the empirical assumption made for analysis.
- CO3 : Determine the fundamental machines to the design of RC beams, slabs and column by limit state methods.
- CO4 : Differentiate and check the strength and failure mode of structural element
- CO5 : Generate the basic structural elements like beams, columns slabs, footing and staircase according to IS code.

Course:Structural Analysis I-[CE8502]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define and distinguish static and kinematic indeterminacies, distribution factor, stiffness and point of contra flexure.
- CO2 : Check the position of shear force and maximum bending moment in the structural elements.
- CO3 : Analyze pin-jointed indeterminate plane frames and rigid plane frames using alternate methods.
- CO4 : Draw shear force and net bending moment diagram.
- CO5 : Generate stiffness and flexible matrices for structural elements.

Course:Soil Mechanics Laboratory-[CE8511]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Prepare soil samples for testing, performing the test, collecting and analyzing data according to ASTM.
- CO2 : Apply the laboratory results to problem identification, quantification, and basic soil mechanics related design problem.
- CO3 : Demonstrate the ability to write clear technical lab reports.
- CO4 : Perform common soil tests to identify physical and mechanical properties of soils.
- CO5 : Evaluate the soil mechanics tests and determines which test is needed in designing civil engineering projects.

Course:Water and Waste Water Analysis Laboratory-[CE8512]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Determine the physical, chemical and biological characteristics of water and waste water.
- CO2 : Compute the dosage requirement for coagulation process.
- CO3 : Interpret the pollution concentration in water and waste water.
- CO4 : Analyse the physico-chemical and biological parameters of water with regard to the water quality requirements.
- CO5 : Examine the growth of micro-organisms in waste water.

Course:Survey Camp (2 weeks ?During IV Semester)-[CE8513]

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>Make use of traditional equipment as well as total station to determine length, area, CO1 : volume, contouring, L.S. and C.S., and traversing, so that they will meet the requirements of industries.</p>
Course:Foundation Engineering-[CE8591]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Interpret the processes in site investigation and selection of foundation. CO2 : Summarize the importance of bearing capacity of soil regarding the shallow foundation. CO3 : Design the footings in soil according to the diverse types of loads acting. CO4 : Analyze the lateral stability of pile foundation. CO5 : Evaluate the design parameters of retaining walls in construction.</p>
Course:Water Supply Engineering-[EN8491]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the drinking water supply systems, including water transport, treatment and distribution. CO2 : Describe the structure and components of drinking water supply systems, including water transport, treatment and distribution. CO3 : Demonstrate the unit operations and processes in water supply and treatment. CO4 : Design the functional units of water supply, treatment and distribution. CO5 : Interpret the elements of water quality, supply, treatment and their relation to public health, and water supply project alternatives.</p>
Course:Geographic Information System-[GI8014]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the fundamentals of GIS, history of GIS, database structures, data input methods and basic aspects of data quality. CO2 : Compare the raster and vector data models, open source and proprietary software, topology and non-topology. CO3 : Demonstrate E-R models and raster, vector data models in GIS. CO4 : Check the datum projection, interoperability, data quality and raster- vector conversion in data input and output. CO5 : Generate ER diagram, spatial data models, GPS data integration and data output models.</p>
Course:Environment and Agriculture-[OAI551]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Investigate the environment concerns on agriculture with water shortage problems. CO2 : Emphasize on the importance of environment and agriculture on changing global scenario and the emerging issues connected to it CO3 : Monitor Global warming that changes environment in Ecosystem CO4 : The role of environment in the current practice of agriculture and concerns of sustainability, especially in the context of climate change and emerging global issues CO5 : Ecological context of agriculture and its concerns will be understood</p>

Semester:6

Course:Ground Improvement Techniques-[CE8001]
<p>Upon completion of the course, the students will.../ will be able to...</p>

CO1 :	State the use of ground improvement techniques in engineering, seepage analysis, mechanical modification techniques of cohesion-less and cohesive soils, role of geotextiles and grouting equipment and stabilization of soil.
CO2 :	Describe the concept of drainage, dewatering systems and reinforced earth retaining structures for complex civil engineering problems
CO3 :	Identify and compare the geotechnical problems in variety of soils and methods of dewatering and stabilization for varying site conditions.
CO4 :	Examine the problematic soil and suggest suitable remedial measures based on the requirement of project
CO5 :	Solve the deficiencies if any in the deposits of a project area and capable of providing alternate methods to improve its character.

Course:Design of Steel Structural Elements-[CE8601]

Upon completion of the course, the students will.../ will be able to...	
CO1 :	List the steel structural systems and its elements, its classifications and its advantages over reinforced concrete elements.
CO2 :	Interpret the differences between the concepts of various design philosophies.
CO3 :	Calculate the load carrying capacity of types of connections, tensile as well as compressive members and moment carrying capacity of flexural members.
CO4 :	Design the types of connections for the various design parameters for the different combinations of loads and examine its safety level.
CO5 :	Design of tension, compression and flexural members under various circumstances and examine its safety level.

Course:Irrigation Engineering-[CE8603]

Upon completion of the course, the students will.../ will be able to...	
CO1 :	Define the need, development, merits, and demerits of irrigation, Regime theory and crop season.
CO2 :	Outline various types of Irrigation, Irrigation structures, Management Technics.
CO3 :	Identify various Modernization and Management technics.
CO4 :	Categorize various Irrigation structures, Irrigation methods and schedulings.
CO5 :	Design various Irrigation structures by estimating various Efficiencies, Evapotranspiration, Duty etc.,

Course:Highway Engineering-[CE8604]

Upon completion of the course, the students will.../ will be able to...	
CO1 :	Define the planning, design, construction, evaluation and maintenance aspects of highways.
CO2 :	Describe the planning, design, construction, evaluation and maintenance of highways.
CO3 :	Design the geometrics and the layers of flexible and rigid pavements.
CO4 :	Apply the concepts of testing and evaluation for the construction and maintenance of pavements.
CO5 :	Infer the conventional and modern materials and methods of construction of pavements.

Course:Wastewater Engineering-[EN8592]

Upon completion of the course, the students will.../ will be able to...	
CO1 :	Estimate sewage generation, sewerage systems and wastewater collection.
CO2 :	Explain the basic concept of unit processes and operation.
CO3 :	Design the conventional unit processes and operations for the treatment of water and wastewater.

CO4 : Select the conventional waste management and Secondary treatment processes.
CO5 : Discuss the method of sludge disposal and health safety and sustainability, disposal standards, effluent standards
Course:Structural Analysis II-[CE8602]
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the theory of influence line, arches, suspension cables and plastic analysis.
CO2 : Distinguish the methods of analysis of arches, suspension bridges with stiffening girders, determinate and indeterminate beams frames and trusses.
CO3 : Compute critical stresses concentrated and moving loads, absolute maximum bending moment, Settlement and temperature effects of cable and shape factor.
CO4 : Analyze the beams, frames, trusses, arches and suspension bridges using alternate methods.
CO5 : Draw influence lines for statically determinate structures and indeterminate structure.
Course:Highway Engineering Laboratory-[CE8611]
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the properties of aggregates and bitumen by performing tests.
CO2 : Outline the properties of bituminous mixes by performing tests on it.
CO3 : Evaluate the pavement condition by Benkelman Beam method.
CO4 : Demonstrate the application of field testing equipment.
CO5 : Test the road aggregates and bitumen for their suitability as road material.
Course:Irrigation and Environmental Engineering Drawing-[CE8612]
Upon completion of the course, the students will.../ will be able to...
CO1 :Demonstrate the basic perception of environmental and irrigation engineering structures.
CO2 :Evaluate the principles in the designing of structure.
CO3 :Illustrate the engineering concepts in the substructure construction techniques.
CO4 :Apply the safety principles to avoid risk in the construction sequences.
CO5 :Examine the knowledge about the various roles of engineers in the construction
Course:Professional Communication-[HS8581]
Upon completion of the course, the students will.../ will be able to...
CO1 : Make effective Presentations
CO2 : Participate confidently in Group Discussion.
CO3 : Attend Job Interviews and be successful in them.
CO4 : Develop adequate Soft Skills required for the work place.

Semester:7

Course:Estimation, Costing and Valuation Engineering-[CE8701]
Upon completion of the course, the students will.../ will be able to...
CO1 : Infer the importance of estimation of quantities, types of specifications, principles for report preparation, tender notices types
CO2 :Identify the quantity and current rates for items of work and book value for property.
CO3 :Rate Analysis for all Building works, canals, and Roads and Cost Estimate
CO4 : Evaluate the quantity of works, cost, present value of buildings and the depreciation rate of buildings
CO5 :Evaluate the present value of buildings and the depreciation rate of buildings
Course:Railways, Airports, Docks and Harbour Engineering-[CE8702]
Upon completion of the course, the students will.../ will be able to...

CO1	: Define the concept of planning , design , construction , and maintenance of Railways airport and harbours
CO2	: Describe the planning , Design , Construction and Maintenance aspect of railways airport and harbour
CO3	: Demonstrate the structural components layouts and design aspects of Railways , Airport and Harbour
CO4	: Appraise the conventional and modern methods of construction and maintenance of Railways tracks
CO5	: Design the Geometric of Railways , Airport and Harbour

Course:Structural Design and Drawing-[CE8703]

Upon completion of the course, the students will.../ will be able to...	
Explain the working principles of various engineering structures such as retaining walls, flat slabs, reinforced concrete and steel bridges, reinforced concrete and steel water tanks, the various steel trusses and gantry girders and their elements.	
CO1	: slabs, reinforced concrete and steel bridges, reinforced concrete and steel water tanks, the various steel trusses and gantry girders and their elements.
CO2	: Calculate the different kinds of external loads acting on the structures.
CO3	: Analyse the structures in order to obtain the internal forces induced due to various load combinations.
CO4	: Identify the critical elements/region having maximum amount of internal forces.
CO5	: Do design and detailing of structures by manual drawing, as per the specifications of Indian standard code books available for various structures.

Course:Creative and Innovative Project (Activity Based -Subject Related)-[CE8711]

Upon completion of the course, the students will.../ will be able to...	
CO1	: Develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.

Course:Industrial Training (4 weeks During VI Semester ? Summer)-[CE8712]

Upon completion of the course, the students will.../ will be able to...	
CO1	: Make the students get exposed to practical training provided by the well-known construction companies to enhance their practical knowledge, leadership quality, communications skill, and placement opportunities.

Course:Municipal Solid Waste Management(EL-III)-[EN8591]

Upon completion of the course, the students will.../ will be able to...	
CO1	: Define the the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.
CO2	: Annotate the processes involved in the reduction in generation of municipal solid waste management system.
CO3	: Describe the design storage, collection, transport and processing of municipal solid waste.
CO4	: Demonstrate treatment and disposal techniques associated with the municipal solid waste.
CO5	: Interpret the components of municipal solid waste management system, processes and their relation to public health, and other environmental factors..

Course:Testing of Materials (Open EL-II)-[OML751]

Upon completion of the course, the students will.../ will be able to...	
CO1	: State the professional and ethical responsibility in the areas of material testing.
CO2	: Interpret the mathematics and engineering in calculating the mechanical properties of structural materials
CO3	: Apply the techniques, skills and modern engineering tools necessary for engineering.
CO4	: Identify the mechanical properties of materials.

CO5 : Analyse the function on multi-disciplinary teams in the area of materials testing.

Semester:8

Course:Maintenance, Repair and Rehabilitation of structures-[CE8020]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Summarize the importance of maintenance, effects in structures due to climate and temperature variations, techniques for repair and their protection methods.
- CO2 : Demonstrate the causes for deterioration and the repairing techniques to improve the service life of the structures elements.
- CO3 : Identify the damaged structure and maintain the engineering structures safely and effectively.
- CO4 : Discriminate suitable type of concrete to strengthen the structures and the modern techniques for the demolition of large and hazardous structure in safe manner.
- CO5 : Utilize the quality and durability of concrete and adopt suitable repair techniques and protection methods.

Course:Prefabricated Structures-[CE8022]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define prefabricated structures, the methods of prefabrication, connections, joints and its design under abnormal loading.
- CO2 : Explain prefabricated structures, its production, components, dimension and detailing and progressive collapse.
- CO3 : Model prefabricated components , connection of joints and equivalent design for abnormal loading.
- CO4 : Design precast concrete elements.
- CO5 : Analyse prefabrication design, joints and connections, progressive collapse and its efficient design.

Course:Professional Ethics in Engineering-[GE8076]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the meaning and purpose of profession, ethics, civic virtues like sharing, honesty, courage, time management, commitment, character and yoga for professional excellence and stress management. (Un)
- CO2 : Discuss the senses of engineering ethics, moral issues, inquiries, dilemma and autonomy, theories of moral development, right action and ethics. (Un)
- CO3 : Discuss the senses of engineering ethics, moral issues, inquiries, dilemma and autonomy, theories of moral development, right action and ethics. (Un)
- CO4 : Assess the safety and risk to reduce the risk. (Ap)
- CO5 : Realize the responsibilities of employers and rights of engineers. (Un)
- CO6 : Apply the ethical principles related to multinational corporations, environment, computer and weapons development. (Ap)
- CO7 : Act as manager, consultant, expert, witness, advisor and leader with social responsibilities. (Ap)

Course:Project Work-[CE8811]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Take up any challenging practical problems and find solution by formulating proper methodology

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.
2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping
Program:M.E. Construction Engineering and Management
Semester:1

Course:Advanced Concrete Technology-[CN4071]
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the materials used in construction, test on concrete, mix design, special types of concrete and various concreting methods.
CO2 : Describe the materials used in construction, test on concrete, mix design, special types of concrete and various concreting methods.
CO3 : Apply the rules in the mix proportion of concrete.
CO4 : Identify the special types of concrete and their applications.
CO5 : Examine the properties of concrete, concrete making materials and the concreting methods.
Course:Modern Construction Materials-[CN4101]
Upon completion of the course, the students will.../ will be able to...
CO1 : Choose construction materials based on their properties.
CO2 : Explain the manufacturing process and applications of construction materials.
CO3 : Apply the knowledge of smart and intelligent materials in construction field
CO4 : Compare performances of conventional materials over smart materials.
CO5 : Recommend the case studies showing the applications of smart and intelligent materials.
Course:Project Formulation and Appraisal-[CN4102]
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts of construction project formulation, costing, appraisal, finance and private sector participation.
CO2 : Describe the concepts of the formulation, costing, appraisal, financing and private sector participation of construction projects.
CO3 : Prepare feasibility reports and estimates of values of projects.
CO4 : Perform cost, risk and feasibility analyses for construction projects.
CO5 : Appraise costing, financing and private sector participation of construction projects.
Course:Construction Equipment and Management-[CN4103]
Upon completion of the course, the students will.../ will be able to...
CO1 : List the types of construction equipments and factors in selection of equipment.
CO2 : Illustrate the working operation of different types of construction equipments.
CO3 : Select suitable working operation of different types of construction equipments.
CO4 : Examine the cost management and the applications of earthwork equipment, construction equipments , concreting equipments and handling equipments.
CO5 : Evaluate the factors in equipment management and selection of different types of construction equipments.
Course:statistical Methods for Engineers-[MA4159]
Upon completion of the course, the students will.../ will be able to...
CO1 : Define various estimators, testing hypotheses & designing experiments.
CO2 : Explain the Concept of statistical testing, linear regression & correlation covariance
CO3 : Apply the various estimators of Consistency, efficiency and biasedness, method of maximum likelihood estimation.

CO4 : Apply testing of hypothesis in statistical concepts and covariance in correlation in real life problems
CO5 : Apply the key historical figures in Design of Experiments & multivariate analysis in mathematical modeling
Course:Research Methodology and IPR-[RM4151]
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the research problem and Literature review.
CO2 : Select the appropriate tool for analysis based on the nature of data.
CO3 : Prepare a well-structured research paper and scientific presentations.
CO4 : Explore on various IPR Components and process of filing.
CO5 : Develop awareness the patent law and procedural mechanism in obtaining a patent.
Course:Advanced Construction Engineering and Experimental Techniques Laboratory-[ST4161]
Upon completion of the course, the students will.../ will be able to...
CO1 : Find the design concrete mix which will satisfy the fresh and hardened concrete properties.
CO2 : Describe the experimental methods to find the material properties.
CO3 : Apply suitable non-destructive testing for checking the strength of concrete.
CO4 : Apply the analytical techniques and graphical analysis to interpret the experimental data.
CO5 : Analyze the effect of mineral admixtures in fresh and hardened concrete property.
Course:Technical Seminar-[CN4111]
Upon completion of the course, the students will.../ will be able to...
CO1 : Show competence in identifying relevant information, defining and explaining topics under discussion. Speak clearly and audibly in a manner appropriate to the subject, ask appropriate
CO2 : questions, respond to a range of questions, and take part in meaningful discussion to reach a shared understanding.
CO3 : Demonstrate the ability to pay close attention to what others say and respond constructively.
CO4 : Present information in a well-structured, and logical sequence, respond respectfully to opposing ideas, and develop the ability to synthesize, evaluate and reflect on information.
CO5 : Demonstrate through asking appropriate questions, the understanding of discussions and spark further discussion.

Semester:2

Course:Computer Applications in Construction Engineering and Planning-[CN4006]
Upon completion of the course, the students will.../ will be able to...
CO1 :State the basic concept of computer applications in construction management and planning
CO2 :Describe the computer applications in construction management and planning.
CO3 :Make use of the applications of software in construction management and planning.
CO4 :Examine the application of software in construction management
CO5 :Assess the application of software in construction management
Course:Resource Management and Control in Construction (EL-III)-[CN4008]
Upon completion of the course, the students will.../ will be able to...
CO1 : State the construction resources and it's usage in construction Industry.

- CO2 : Describe the needs of labour management in construction Industry.
 CO3 : Identify the selection of material and equipment in construction.
 CO4 : Analyse the time flow in construction projects.
 CO5 : Evaluate the allocation of resource levelling in construction.

Course:Advanced Construction Techniques-[CN4201]

Upon completion of the course, the students will.../ will be able to...

- CO1 : List the latest construction techniques of structures.
 CO2 : Demonstrate the present and upcoming techniques in construction, repair and strengthening.
 CO3 : Develop a new construction, rehabilitation and strengthening method.
 CO4 : Execute a strengthening technique for a structure.
 CO5 : Organise a construction technique for realtime structure.

Course:Construction Planning, Scheduling and Control-[CN4202]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define the basic concepts of planning, network representation and analysis, scheduling, monitoring and control of construction projects.
 CO2 : Describe the concepts of planning, network representation and analysis, scheduling, monitoring and control of construction projects.
 CO3 : Develop the coding system, network representation, schedule and estimate the duration of construction projects.
 CO4 : Infer the choice of technology, network analysis, scheduling techniques, monitoring and control of construction projects.
 CO5 : Appraise the methods of network representation and analysis, work scheduling and cost control of construction projects.

Course:Contract Laws and Regulations-[CN4203]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define the basic concept and terminology of law of contract & law of labour regulations.
 CO2 : Describe the procedure for contract ,tender and arbitration.
 CO3 : Identify the relevant legal aspects, legal requirements and provision.
 CO4 : Distinguish the various process involved in contract formation.
 CO5 : Examine the contract laws and regulations.

Semester:3

Course:Resource Management and Control in Construction-[CN5010]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Identify the resources and it's usage in construction Industry.
 CO2 : Describe the needs of labours management .
 CO3 : Demonstrate the selection of material and equipment
 CO4 : Determine the flow of time in construction projects
 CO5 : Formulate the allocation levelling of resources

Course:Project Safety Management-[CN5011]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Demonstrate the various safety concepts in construction and requirements applied in construction project.

CO2 : Describe the construction accidents and safety in construction site and contractual obligations.

CO3 : Design for safety in construction site and company activities

CO4 : Explain the owners Responsibility for safety and workers compensation

CO5 : Develop efficient system for safety management based on Principles

Course:Quality Control and Assurance in Construction-[CN5301]

Upon completion of the course, the students will.../ will be able to...

CO1 : Describe about the quality management in construction.

CO2 : Enumerate quality systems in construction.

CO3 : Determine quality planning in construction

CO4 : Implement quality assurance in construction.

CO5 : Illustrate quality improvement techniques in construction

Course:Project Work (Phase I)-[CN5313]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same and prepare project reports.

Course:Practical Training II (2 Weeks)-[CN5311]

Upon completion of the course, the students will.../ will be able to...

Make the students get exposed to practical training provided by the well known

CO1 :construction companies to enhance their practical knowledge, leadership quality, communications skill, and placement opportunities.

Course:Seminar-[CN5312]

Upon completion of the course, the students will.../ will be able to...

CO1 : Show competence in identifying relevant information, defining and explaining topics under discussion.

Speak clearly and audibly in a manner appropriate to the subject, ask appropriate questions.

CO2 :respond to a range of questions, and take part in meaningful discussion to reach a shared understanding.

CO3 :Demonstrate the ability to pay close attention to what others say and respond constructively.

CO4 : Present information in a well-structured, and logical sequence, respond respectfully to opposing ideas, and develop the ability to synthesize, evaluate and reflect on information.

CO5 : Demonstrate through asking appropriate questions, the understanding of discussions and spark further discussion.

Semester:4

Course:Practical Training III-[CN5411]

Upon completion of the course, the students will.../ will be able to...

Make the students get exposed to practical training provided by the well-known

CO1 :construction companies to enhance their practical knowledge, leadership quality, communications skill, and placement opportunities.

Course:Project Work (Phase II)-[CN5412]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same and prepare project reports.

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:M.E. Structural Engineering

Semester:1

Course:Advance Mathematical Methods-[MA4153]
Upon completion of the course, the students will.../ will be able to... CO1 : Apply the Laplace and Fourier transform to Initial and boundary value problems in PDE. CO2 : Maximize and minimize the functional that occur in various branches of engineering disciplines. CO3 : Construct conformal mappings between various domains and use of conformal mapping in studying problems in physics and engineering particularly fluid flow and heat flow problems. CO4 : Determine the tensor algebra and its applications in applied sciences and engineering and develop ability to solve mathematical problems involving tensors. CO5 : Understand the concept of tensor analysis
Course:Research Methodology and IPR-[RM4151]
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the research problem and Literature review. CO2 : Select the appropriate tool for analysis based on the nature of data. CO3 : Prepare a well-structured research paper and scientific presentations. CO4 : Explore on various IPR Components and process of filing. CO5 : Develop awareness the patent law and procedural mechanism in obtaining a patent.
Course:Prefabricated Structures (EL-I)-[ST4004]
Upon completion of the course, the students will.../ will be able to... CO1 : State the standardization, structural components, joints and tolerance system of prefabrication. CO2 : Illustrate the production, construction of structural members, detailing and codal provisions. CO3 : Summarize the effects of abnormal loads and codal provisions CO4 : Differentiate the erection processes, large panel construction and joint flexibility in prefabrication CO5 : Interpret the Design principles of the structural members, expansion joints, connections and abnormal loads
Course:Theory of Elasticity and Plasticity-[ST4101]
Upon completion of the course, the students will.../ will be able to... CO1 : Define Strain tensor, plane stress and strain, torsion, beams on elastic foundation and plasticity. CO2 : Describe the fundamentals of stress and strain, torsional behavior, beams on elastic foundation and plastic stress strain relationship. CO3 : Solve real life problems on plane stress and plane strain conditions, Circular and non-

	circular sections, bending of beams and elastic foundations.
CO4 :	Analyse stress, strain, torsional behavior of sections, beams resting on elastic foundations and simple boundary value problems with elasto-plastic and strain hardening properties.
CO5 :	Compare various theories of failure, torsional behavior of sections and methods of analysis of beam resting on elastic foundation.

Course:Structural Dynamics and Earthquake Engineering-[ST4102]

	Upon completion of the course, the students will.../ will be able to...
CO1 :	Gain knowledge on vibration analysis of system/structures with single degree of freedom as well as Multi degrees of freedom under free and forced vibration
CO2 :	Derive a mathematical model of continuous system and do a dynamic analysis under free and forced vibration.
CO3 :	Explain the causes and effect of earthquake.
CO4 :	Design masonry and RC structures to the earthquake forces as per the commendations of IS codes of practice.
CO5 :	Calculate Earthquake Forces as per codal provisions.

Course:Advanced Construction Engineering and Experimental Techniques Laboratory-[ST4161]

	Upon completion of the course, the students will.../ will be able to...
CO1 :	Find the design concrete mix which will satisfy the fresh and hardened concrete properties.
CO2 :	Describe the experimental methods to find the material properties.
CO3 :	Apply suitable non-destructive testing for checking the strength of concrete.
CO4 :	Apply the analytical techniques and graphical analysis to interpret the experimental data.
CO5 :	Analyze the effect of mineral admixtures in fresh and hardened concrete property.

Course:Technical Seminar-[ST4111]

	Upon completion of the course, the students will.../ will be able to...
CO1 :	Show competence in identifying relevant information, defining and explaining topics under discussion. Speak clearly and audibly in a manner appropriate to the subject, ask appropriate questions.
CO2 :	respond to a range of questions, and take part in meaningful discussion to reach a shared understanding.
CO3 :	Demonstrate the ability to pay close attention to what others say and respond constructively.
CO4 :	Present information in a well-structured and logical sequence, respond respectfully to opposing ideas, and develop the ability to synthesize, evaluate and reflect on information.
CO5 :	Present information in a well-structured and logical sequence, respond respectfully to opposing ideas, and develop the ability to synthesize, evaluate and reflect on information.

Semester:2

Course:Advanced Concrete Technology-[CN4071]

	Upon completion of the course, the students will.../ will be able to...
CO1 :	Define the materials used in construction, test on concrete, mix design, special types of concrete and various concreting methods.
CO2 :	Describe the materials used in construction, test on concrete, mix design and special concrete.

- CO3 : Apply the rules in the mix proportion of concrete.
 CO4 : Identify the special types of concrete and their applications.
 CO5 : Examine the properties of concrete, concrete making materials and the concreting methods.

Course: Maintenance, Repair and Rehabilitation of Structures-[ST4073]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Summarize the importance of maintenance, effects in structures due to climate and temperature variations, techniques for repair and their protection methods.
 CO2 : Demonstrate the causes for deterioration and the repairing techniques to improve the service life of the structures elements.
 CO3 : Identify the damaged structure and maintain the engineering structures safely and effectively.
 CO4 : Discriminate suitable type of concrete to strengthen the structures and the modern techniques for the demolition of large and hazardous structure in safe manner.
 CO5 : Assess the quality and durability of concrete and adopt suitable repair techniques and protection methods.

Course: Advanced Steel Structures-[ST4201]

Upon completion of the course, the students will.../ will be able to...

- CO1 : List the structural elements in the industrial structures subjected to different forces.
 CO2 : Interpret the basic concepts in the design of structural members subjected to combined forces.
 CO3 : Choose an appropriate method to design the structural elements and joints of steel structures.
 CO4 : Analyze the plastic behavior of industrial structures, light gauge steel structures and design the structural elements subjected to different loading conditions.
 CO5 : Evaluate the plastic moment, design strength and failure stress in the structural elements.

Course: Advanced Concrete Structures-[ST4202]

Upon completion of the course, the students will.../ will be able to...

- CO1 : State the properties and behaviour of concrete elements.
 CO2 : Describe the structural and inelastic behaviour of beams, columns, corbels, RC walls, deep beams, gridfloors and Flat slab.
 CO3 : Design Flexural, compression and special RC elements
 CO4 : Analyse the concrete elements to provide a safe construction.
 CO5 : Estimate the deflection, crack width, moment, shear and ductility of the concrete elements.

Course: Finite Element Analysis in Structural Engineering-[ST4203]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Outline the basics of finite element analysis, its approximation, tackling errors induced and the step by step procedure involved in analysing various structures.
 CO2 : Explain the pioneer methods to finite element analysis and their comparison.
 CO3 : Apply the finite element analysis procedure on various structures in order to calculate the internal forces.
 CO4 : Interpret the results by varying the various parameters.
 CO5 : Evaluate the static as well as dynamics performances of various structures using any finite element analysis software.

Semester:3

Course:Design of Steel Concrete Composite Structures-[ST5014]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Generalize the knowledge in design concrete composite elements and structures.
- CO2 : Explain the behavior of concrete composite elements and structures
- CO3 : Identify the connection in composite structures
- CO4 : Applying knowledge in design of composite beams, columns, trusses and box girder bridges.
- CO5 : Analysis the position to design composite beams, columns, trusses and box – girder bridges including the related connections.

Course:Design of Bridges-[ST5015]

Upon completion of the course, the students will.../ will be able to...

- CO1 : State the basics, components, and the concepts of moving loads on the various types of bridges
- CO2 : Describe the types of load acting including heavy moving vehicle loadings and the different load combinations.
Apply the most suitable method in analyzing the various structural components of a
- CO3 : particular bridge and find out the maximum shear force and bending moment and other important internal forces.
- CO4 : Analyse the critical elements and check for stability requirements in structures as well as substructures.
- CO5 : Evaluate the reinforcement and draw its details in various types of bridges.

Course:Practical Training II (2 weeks-[ST5311]

Upon completion of the course, the students will.../ will be able to...

- Make the students get exposed to practical training provided by the well known
- CO1 : construction companies to enhance their practical knowledge, leadership quality, communications skill, and placement opportunities.

Course:Project Work (Phase I)-[ST5313]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same and prepare project reports.

Course:Earthquake Analysis and Design of Structures-[ST5301]

Upon completion of the course, the students will.../ will be able to...

- CO1 : List the various earthquake resistance techniques in different structures
- CO2 : Summarize and compare the various methods of dynamic loading
- CO3 : Compute the vibration behavior in structural and non-structural member
- CO4 : Differentiate the seismic motion in various structure.
- CO5 : Evaluate seismic hazards from past Earthquake.

Course:Seminar-[ST5312]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Show competence in identifying relevant information, defining and explaining topics under discussion.
Speak clearly and audibly in a manner appropriate to the subject, ask appropriate questions,
- CO2 : respond to a range of questions, and take part in meaningful discussion to reach a shared understanding
- CO3 : Demonstrate the ability to pay close attention to what others say and respond constructively
- CO4 : Present information in a well-structured and logical sequence, respond respectfully to

opposing ideas, and develop the ability to synthesize, evaluate and reflect on information. CO5 : Demonstrate through asking appropriate questions, the understanding of discussions and spark further discussion.

Semester:4

Course:Practical Training III(2 weeks)-[ST5411]
Upon completion of the course, the students will.../ will be able to... Make the students get exposed to practical training provided by the well known CO1 : construction companies to enhance their practical knowledge, leadership quality, communications skill, and placement opportunities.
Course:Project Work(Phase II)-[ST5412]
Upon completion of the course, the students will.../ will be able to... CO1 : Identified problem based on the formulated methodology CO2 : Develop skills to analyze and discuss the test results, and make conclusions

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program: B.E. Computer Science and Engg. (Sec-A)

Semester:1

Course: Physics and Chemistry Laboratory-[BS3171]

Upon completion of the course, the students will.../ will be able to...

CO1 : Identify the moduli of elasticity used in day to day engineering applications.

CO2 : Indicate the optical parameters of visible and laser sources

CO3 : Make use of the bandgap of semiconducting materials.

CO4 : Detect the water quality parameters (DO, Chloride, Cu content, Alkalinity and hardness) of the given water sample.

CO5 : Examine quantitatively the metals (Fe, Na, Cu) in the given sample using potentiometer & flame photometer and the conductance of the solution by conductometric titrations.

Course: Engineering Physics-[PH3151]

Upon completion of the course, the students will.../ will be able to...

CO1 : Recall the basics of mechanics and electromagnetic waves.

CO2 : Relate the concepts of oscillations, lasers and quantum physics.

CO3 : Explain the theories of centre of mass, moment of inertia, properties of electromagnetic waves and Maxwell's equations.

CO4 : Summarize the principles of sound waves, light waves and quantum mechanics.

CO5 : Utilize the applications of mechanics, electromagnetic waves, oscillations, optics and quantum mechanics.

Course: Problem Solving and Python Programming-[GE3151]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop algorithmic solutions to simple computational problems.

CO2 : Develop and execute simple Python programs.

CO3 : Write simple Python programs using conditionals, loops for solving problems and decompose a Python program into functions.

CO4 : Represent compound data using Python lists, tuples, dictionaries etc.

CO5 : Read and write data from/to files in Python programs.

Course: Problem Solving and Python Programming Laboratory-[GE3171]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop algorithmic solutions to simple computational problems

CO2 : Develop and execute simple Python programs.

CO3 : Implement programs in Python using conditionals and loops for solving problems and Deploy functions to decompose a Python program.

CO4 : Process compound data using Python data structures.

CO5 : Utilize Python packages in developing software applications.

Course: Professional English - I-[HS3151]

Upon completion of the course, the students will.../ will be able to...

CO1 : listen and comprehend complex academic texts

CO2 : read and infer the denotative and connotative meanings of technical texts

CO3 : write definitions, descriptions, narrations and essays on various topics

CO4 : speak fluently and accurately in formal and informal communicative contexts

CO5 : express their opinions effectively in both oral and written medium of communication

Engineering Chemistry – CY3151

Upon completion of the course, the students will.../ will be able to...

- CO1: Define the concepts of water quality parameters, nano materials and composites
- CO2: Recall the types of fuels and energy resources
- CO3: Outline suitable methods for water treatment and synthesis of nano materials.
- CO4: Illustrate the properties of nano materials as well as fuel analysis
- CO5: Apply the concept of composites, fuel analysis and energy resources for material selection requirements and also in energy sectors

Course: Matrices and Calculus-[MA3151]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define the basic concepts of matrices, limit and continuity of a function, differentiation and integration.
- CO2 : Explain the properties of matrices and nature of the quadratic forms.
- CO3 : Interpret the techniques of differentiation, partial differentiation and integration.
- CO4 : Apply diagonalization of matrices in quadratic form and use C-H theorem to get the inverse of matrices.
- CO5 : Solve problems on differentiation, partial differentiation and integration using different rules.

Semester:2

Course:Basic Electrical and Electronics Engineering-[BE3251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Compute the electric circuit parameters for simple problems
- CO2 : Demonstrate the working principle of electrical machines
- CO3 : Analyse the characteristics of analog electron devices
- CO4 : Analyse the concepts of Digital Electronics
- CO5 : Explain the operating principle of measuring instruments

Course:Programming in C-[CS3251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explore the basic concepts in C programming, searching and sorting algorithms.
- CO2 : Use C programming constructs for solving simple computational problems.
- CO3 : Analyse the performance of searching and sorting algorithms.
- CO4 : Evaluate and Review the C programs.
- CO5 : Develop applications in C using basic, derived, user-defined data types, pointers, functions and files.

Course:Programming in C Laboratory-[CS3271]

Upon completion of the course, the students will.../ will be able to...

- CO1 : To develop programs in C using basic constructs.
- CO2 : To develop programs in C using arrays.
- CO3 : To develop applications in C using strings, pointers, functions.
- CO4 : To develop applications in C using structures.
- CO5 : To develop applications in C using file processing.

Course:Engineering Graphics-[GE3251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Exposed to existing national standards related to technical drawings
- CO2 : Understand the given Engineering drawing and interpret a three dimensional drawing
- CO3 : Apply the fundamentals and standards in engineering drawing through drafting exercises of geometrical

solids CO4 : Identify methods of development of surfaces of different solids and understand some of the hidden geometry of the cut object CO5 : Analyze the three dimensional view of objects as perceived by the human eye
Course:Engineering Practices Laboratory-[GE3271]
Upon completion of the course, the students will.../ will be able to... CO1 : Understand all the fundamental concepts involved in Electrical Engineering. CO2 : Wire various electrical joints in common household electrical wire work. CO3 : Assemble simple common household equipments. CO4 : Solder and test simple electronic circuits. CO5 : Assemble and test simple electronic components on PCB.
Course:Professional English - II-[HS3251]
Upon completion of the course, the students will.../ will be able to... CO1 : Demonstrate products and ideas in technical texts. CO2 : Identify cause and effects in events, industrial processes through technical texts. CO3 : Analyse problems in order to arrive at feasible solutions and communicate them orally and in written format. CO4 : Report events and the processes of technical and industrial nature. CO5 : Present their opinions in a planned and logical manner,and draft effective resumes in context of job search.
Course: Physics for Information Science-[PH3256]
Upon completion of the course, the students will.../ will be able to... CO1 : Relate the electron transport properties of conductors, principles of semiconductors and magnetic properties of materials CO2 : Recall the optical properties of materials, principles of nano devices and basics of quantum computing CO3 : Summarize the classical and quantum concepts of conducting materials, semiconducting devices and magnetic materials. CO4 : Illustrate the functioning of various optoelectronic and nano devices CO5 : Identify the applications of semiconductor, magnetic, optical and quantum devices in engineering field
Course: Statistics and Numerical Methods-[MA3251]
Upon completion of the course, the students will.../ will be able to... CO1 : Define the basic concept of statistical tests, ANOVA, solution of equations, interpolation and ODE. CO2 : Interpret the techniques of statistical tests and design of experiments. CO3 : Explain the solution of equations, ODE, interpolation, differentiation and integration. CO4 : Apply the concept of testing of hypothesis and experimental design in real life. CO5 : Solve equations ODE, interpolation, differentiation and integration using numerical techniques.

Semester:3

Course:Digital Principles and System Design-[CS8351]
Upon completion of the course, the students will.../ will be able to... CO1 : Simplify Boolean functions using KMap CO2 : Design and Analyze Combinational Circuits.

CO3 : Design and Analyze Sequential Circuits.
CO4 : Implement designs using Programmable Logic Devices
CO5 : Write HDL code for combinational and Sequential Circuits.

Course:Data Structures Laboratory-[CS8381]

Upon completion of the course, the students will.../ will be able to...
CO1 : Write functions to implement linear and non-linear data structure operations
CO2 : Suggest appropriate linear / non-linear data structure operations for solving a given problem
CO3 : Appropriately use the linear / non-linear data structure operations for a given problem
CO4 : Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval
CO5 : Identify and use a suitable data structure and algorithm to solve a real world problem

Course:Digital Systems Laboratory-[CS8382]

Upon completion of the course, the students will.../ will be able to...
CO1 : Implement simplified combinational circuits using basic logic gates
CO2 : Implement combinational circuits using MSI devices
CO3 : Implement sequential circuits like registers and counters
CO4 : Simulate combinational and sequential circuits using HDL

Course:Object Oriented Programming Laboratory-[CS8383]

Upon completion of the course, the students will.../ will be able to...
CO1 : Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.
CO2 : Develop and implement Java programs with arraylist and exception handling.
CO3 : Develop and implement Java programs with multithreading.
CO4 : Design applications using file processing and generic programming.
CO5 : Design applications using swings and event handling.

Course:Data Structures-[CS8391]

Upon completion of the course, the students will.../ will be able to...
CO1 : Implement the list ADT and apply for complex engineering issues.
CO2 : Implement the stack and queue ADT for having a high level of understanding.
CO3 : Have a good knowledge of heap, search tree data structures and implement tree ADT.
CO4 : Analyze and implement graph data structures.
CO5 : Apply searching, sorting and hashing techniques and analyze their time complexities.

Course:Object Oriented Programming-[CS8392]

Upon completion of the course, the students will.../ will be able to...
CO1 :Understand the basic concepts of OOP and fundamentals in Java.
CO2 :Explain the advanced programming concepts of Java
CO3 :Develop simple and advanced Java applications using exceptions, I/O streams, threads and generics classes.
CO4 :Analyze simple and advanced Java programming concepts.
CO5 :Design interactive Java programs using exceptions and swings.

Course:Communication Engineering-[EC8395]

Upon completion of the course, the students will.../ will be able to...
CO1 : Describe analog Communication Techniques
CO2 : Explain the basics of Pulse Communication Techniques
CO3 : Classify Digital Communication techniques used for transmission
CO4 : Summarize the information theory and coding associated with the transmission.
CO5 : Analyze Spread Spectrum and Multiple Access Techniques

Course:Interpersonal Skills / Listening and Speaking-[HS8381]

Upon completion of the course, the students will.../ will be able to...

CO1 : Respond appropriately to the listening skill

CO2 : Speak clearly with proper stress and intonation

CO3 : Make effective presentations

CO4 : Participate in group discussions

CO5 : Participate confidently and appropriately in conversations both formal, informal

Air Pollution and Control Engineering - OCE551

CO1: Define the nature and characteristics of air pollution, noise pollution

CO2: Demonstrate indoor air pollution control devices

CO3: Explain and solve air and noise pollution problems

CO4: Make use of air pollution control equipments

CO5: Construct stacks and particulate air pollution control devices

MA3354 / DISCRETE MAHEMATICS (CSE & IT)

Upon completion of the course, the students will.../ will be able to...

CO1: Define the basic terminologies of logic and proofs, combinatorics, graph theory, algebraic structures, lattices and boolean algebra.

CO2: Interpret the techniques of logic and proofs, combinatorics & graphs.

CO3: Explain the properties algebraic structures, lattices and boolean algebra.

CO4: Utilize mathematical logic, combinatorial counting principles and graph model for solving network connectivity related problems in real life.

CO5: Apply algebraic ideas and boolean laws in developing cryptograph techniques.

Semester:4

Course:Design and Analysis of Algorithms-[CS8451]

Upon completion of the course, the students will.../ will be able to...

CO1 : Describe the algorithm design techniques to solve the problems.

CO2 : Explain the algorithm analysis techniques to assess the complexity of an algorithm.

CO3 : Identify algorithm design techniques to solve real world problems.

CO4 : Solve problems using suitable algorithm design techniques.

CO5 : Analyze the time and space complexity of different computing algorithms.

Course:Operating Systems Laboratory-[CS8461]

Upon completion of the course, the students will.../ will be able to...

CO1 : Work with UNIX commands and shell programming

CO2 : Implement the various scheduling algorithms

CO3 : Implement process creation and Inter process communication

CO4 : Implement Deadlock avoidance and Deadlock Detection algorithms

CO5 : Implement Page replacement algorithms, File organization and File allocation strategies

Course:Database Management Systems Laboratory-[CS8481]

Upon completion of the course, the students will.../ will be able to...

CO1 : Make use of typical data definitions and manipulation commands

CO2 : Apply database queries to retrieve records.

CO3 : Applying PL/SQL for processing database

CO4 : Apply front end tools to design forms, reports and menus

CO5 : Develop solutions using database concepts for real time requirements.

Course:Computer Architecture-[CS8491]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe the functional units of digital computer and its organization,operations, performance of MIPS processor.
- CO2 : Describe the organization of different memory systems,parallel processing architectures,I/O processors and its communication
- CO3 : Demonstrate the working of MIPS processor and control units with and without pipeline
- CO4 : Solve pocessor performance, cache performance, MIPS arithmetic and logical operations
- CO5 : Analyse eight great ideas,MIPS instruction set,multithreading,multiprocessing and parallel processing architectures

Course:Database Management Systems-[CS8492]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Summarize the modern and futuristic database applications based on size and complexity
- CO2 : Illustrate ER diagram to perform database design effectively.
- CO3 : Explain transaction concepts and locking mechanisms.
- CO4 : Make use of various indexing and storage strategies in database systems
- CO5 : Identify how advanced databases differ from traditional databases.

Course:Operating Systems-[CS8493]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define process, scheduling, memory, file systems and mobile OS.
- CO2 : Explain critical section, memory management, directory management and IO systems.
- CO3 : Elaborate interprocess communication, memory management schemes, file systems and different OS.
- CO4 : Apply the CPU scheduling, page replacement, deadlock detection and disk scheduling algorithms.
- CO5 : Analyze CPU scheduling, page replacement, disk scheduling algorithms and mobile OS.

Course:Software Engineering-[CS8494]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Identify the Key activities in managing a Software Project.
- CO2 : Summarize the concepts of requirements analysis and Analysis Modeling.
- CO3 : Apply systematic procedure for software design and deployment.
- CO4 : Analyze and contrast the various testing and maintenance.
- CO5 : Analyze project Schedule, Estimate project cost and Effort Required.

Course:Advanced Reading and Writing-[HS8461]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Write different types of essays
- CO2 : Write winning job applications
- CO3 : Read and evaluate texts critically
- CO4 : Display critical thinking in various professional contexts

Course:Probability and Queueing Theory-[MA8402]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define the basic concepts of probability, random variables, random processes and queueing models
- CO2 : Classify the moment generating function, distributions, transformation of random variable and random processes
- CO3 : Explain the ideas of single and multiple server queueing models and P-K formula.
- CO4 : Apply the concept of probability, correlation and regression in engineering field.
- CO5 : Utilize queueing models, series and open Jackson Networks in real life problems.

Semester:5

Course:Theory of Computation-[CS8501]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Demonstrate the basic concepts of Mathematical proof, Automata theory, Context free grammar, Push down automata, Turing machine and Undecidable Problem
- CO2 : Design Finite Automata, Push down automata and Turing machines.
- CO3 : Distinguish the computing languages and classify their respective Types.
- CO4 : Propose computation solutions using Turing machines.
- CO5 : Prove the decidability and intractability of computational problems.

Course:Networks Laboratory-[CS8581]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Implement various protocols using TCP and UDP
- CO2 : Compare the performance of different transport layer protocols.
- CO3 : Use simulation tools to analyze the performance of various network protocols.
- CO4 : Analyze various routing algorithms
- CO5 : Implement error correction codes.

Course:Object Oriented Analysis and Design Laboratory-[CS8582]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Perform OO analysis and design for a given problem specification.
- CO2 : Identify and map basic software requirements in UML mapping.
- CO3 : Design by applying appropriate design patterns.
- CO4 : Improve the software quality using design patterns and to explain the rationale behind applying specific design patterns
- CO5 : Test the compliance of the software with the SRS

Course:Computer Networks-[CS8591]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe the basic layers and its function in computer networks
- CO2 : Outline the performance of a network
- CO3 : Develop routing algorithms
- CO4 : Analyze the functions of transport layer protocols
- CO5 : Evaluate the working of various application layer protocols

Course:Object Oriented Analysis and Design-[CS8592]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Understand the basics of OO analysis and design concepts.
- CO2 : Explain the UML analysis and design diagrams.
- CO3 : Develop design patterns.
- CO4 : Analyze the code from design
- CO5 : Design various testing techniques.

Course:Microprocessors and Microcontrollers Laboratory-[EC8681]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Write ALP Programmes for fixed and Floating Point and Arithmetic operations
- CO2 : Interface different I/Os with processor
- CO3 : Generate waveforms using Microprocessors
- CO4 : Execute Programs in 8051
- CO5 : Explain the difference between simulator and Emulator

Course:Microprocessors and Microcontrollers-[EC8691]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the architecture and instruction set of 8086 microprocessor.
- CO2 : Design Memory Interfacing circuits.
- CO3 : Design and interface I/O circuits
- CO4 : Design 8051 microcontroller based systems.
- CO5 : Implement 8051 microcontroller based systems.

Course:Algebra and Number Theory-[MA8551]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe the efficient use of advanced algebraic techniques and Number theory
- CO2 : Prove simple theorems about the statements proven by the text in advanced algebraic techniques and number theory
- CO3 : Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts
- CO4 : Apply the basic notions of groups, rings, fields which will then be used to solve related problems
- CO5 : Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

Course:Air Pollution and Control Engineering-[OCE551]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe the nature and characteristics of air pollution, noise pollution and basic concepts of air quality management
- CO2 : Explain and solve air and noise pollution problems
- CO3 : Design stacks and particulate air pollution control devices
- CO4 : Detect air pollution control equipments
- CO5 : Design indoor air pollution control devices

Semester:6

Course:Data Warehousing and Data Mining-[CS8075]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe the techniques and methods of data warehousing and mining.
- CO2 : Explain the reporting and querying tools for data visualization.
- CO3 : Apply data mining tools to discover the knowledge in data warehouse.
- CO4 : Apply the data mining algorithms to different data sets.
- CO5 : Analyze data mining algorithms for a given data sets.

Course:Mobile Computing-[CS8601]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the basics of mobile telecommunication systems.
- CO2 : Illustrate the generations of telecommunication systems in wireless networks.
- CO3 : Demonstrate the functionality of MAC, network layer.
- CO4 : Analyze routing protocol for a given Ad hoc network.
- CO5 : Evaluate the functionality of Transport and Application layers.
- CO6 : Develop a mobile application using android/blackberry/ios/Windows SDK.

Course:Compiler Design-[CS8602]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe different phases of the compiler.
 CO2 : Interpret syntax-directed translation and run-time environment.
 CO3 : Design a lexical analyzer for a sample language.
 CO4 : Apply different parsing algorithms to develop the parsers for a given grammar.
 CO5 : Implement syntax directed translation schemes, code optimization techniques and a simple code generator.

Course:Distributed Systems-[CS8603]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Elucidate the foundations and issues of distributed systems
 CO2 : Infer the various synchronization issues and global state for distributed systems.
 CO3 : Demonstrate Mutual Exclusion and Deadlock detection algorithms in distributed Systems.
 CO4 : Analyze the agreement protocols and fault-tolerance mechanisms in distributed Systems.
 CO5 : Analyze the features of peer-to-peer and distributed shared memory Systems.

Course:Mini Project-[CS8611]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Identify and Finalize problem statement by surveying variety of domains.
 CO2 : Perform requirement analysis and identify design methodologies.
 CO3 : Apply advanced programming techniques to develop solutions to the problem.
 CO4 : Test the quality of the proposed method by evaluation metrics.
 CO5 : Present technical report by applying different visualization tools.

Course:Internet Programming-[CS8651]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Understand the basics of HTML, CSS and JavaScript
 CO2 : Acquire the knowledge on the concepts of Servlets, JSP, PHP, AJAX and XML
 CO3 : Design dynamic web pages using HTML, Cascading Style Sheets and JavaScript objects
 CO4 : Develop server-side programs using Servlets, JSP and PHP, and to represent data in XML format
 CO5 : Develop rich client presentation using AJAX and Web Service Applications

Course:Internet Programming Laboratory-[CS8661]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Construct Web pages using HTML/XML and style sheets.
 CO2 : Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
 CO3 : Develop dynamic web pages using server side scripting.
 CO4 : Use PHP programming to develop web applications.
 CO5 : Construct web applications using AJAX and web services

Course:Mobile Application Development Laboratory-[CS8662]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Develop mobile applications using GUI and Layouts.
 CO2 : Develop mobile applications using Event Listener.
 CO3 : Develop mobile applications using Databases.
 CO4 : Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi-threading and GPS.
 CO5 : Analyze and discover own mobile app for simple needs.

Course:Artificial Intelligence-[CS8691]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Describe the basic concept of intelligent agents and application of Artificial Intelligence.
 CO2 : Summarize various searching techniques, constraint satisfaction problem, game playing techniques and language processing.

- CO3 : Outline the concepts of knowledge representations and software agents.
- CO4 : Apply AI techniques that require problem solving, intelligent agents, inference, perception and knowledge representation to solve real-world problems.
- CO5 : Analyze the structures and algorithms of selection techniques related to searching, reasoning, intelligent agents, and language processing.

Course: Intellectual Property Rights-[GE8075]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Understand the basics of Intellectual Property Rights and their significance
- CO2 : Explain the registration process of Copy Rights, Trademarks, Patents and Geographical Indications
- CO3 : Manage Intellectual Property portfolio to enhance the value of the firm
- CO4 : Identify different types of Intellectual Property Laws, the right of ownership, scope of protection as well as the ways to protect the digital content
- CO5 : Analyze the Infringement and enforcement measures of IPRs

Course: Professional Communication-[HS8581]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Make effective Presentations
- CO2 : Participate confidently in Group Discussions
- CO3 : Attend job interviews and be successful in them
- CO4 : Develop adequate Soft Skills required for the work place.

Semester:7

Course: Machine Learning Techniques-[CS8082]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Understand the characteristics of learning techniques
- CO2 : Discuss the decision tree algorithm, Neural Networks and Genetic Algorithms to various problems
- CO3 : Understand the Bayesian learning, computational learning, instant based learning, and advanced learning concepts
- CO4 : Analyze and differentiate between the various machine learning approaches
- CO5 : Design and implement various machine learning algorithms in a range of real-world applications

Course: Cloud Computing Laboratory-[CS8711]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Configure various virtualization tools such as Virtual Box, VMware workstation.
- CO2 : Design and deploy a web application in a PaaS environment.
- CO3 : Learn how to simulate a cloud environment to implement new schedulers.
- CO4 : Demonstrate generic cloud environment that can be used as a private cloud
- CO5 : Manipulate large data sets in a parallel environment.

Course: Cloud Computing-[CS8791]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explore the main concepts, key enabling technologies, strengths and limitations of cloud computing
- CO2 : Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models
- CO3 : Understand the core issues of cloud computing such as resource management and security
- CO4 : Design and use current cloud technologies
- CO5 : Analyse and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud

Course: Cryptography and Network Security-[CS8792]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
- CO2 : Apply the different cryptographic operations of symmetric cryptographic algorithms
- CO3 : Apply the different cryptographic operations of public key cryptography
- CO4 : Apply the various Authentication schemes to simulate different applications.
- CO5 : Understand various Security practices and System security standards

Course: Disaster Management-[GE8071]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Differentiate the types of disasters, causes and their impact on environment and society
- CO2 : Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- CO3 : To adopt various methods of risk reduction measures as well as mitigation.
- CO4 : To assess the damage caused by Disaster
- CO5 : Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

Course: Software Project Management-[IT8075]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Gain extensive knowledge about the basic project management concepts, framework and the process models.
- CO2 : Obtain adequate knowledge about software process models and software effort estimation techniques.
- CO3 : Estimate the risks involved in various project activities.
- CO4 : Demonstrate through application, knowledge of the key project management skills, such as product and work break-down structure, schedule, governance including progress reporting, risk and quality management
- CO5 : Demonstrate an ability to present his/her ideas both formally and informally to a group of their peers and the management.

Course: Security Laboratory-[IT8761]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Build cryptosystems by applying symmetric key encryption algorithms
- CO2 : Build cryptosystems by applying public key encryption algorithms.
- CO3 : Construct code for authentication algorithms.
- CO4 : Develop a signature scheme using Digital signature standard.
- CO5 : Demonstrate the network System using open source tool

Course: Principles of Management-[MG8591]

Upon completion of the course, the students will.../ will be able to...

- Have clear understanding of managerial functions and have some basic knowledge on international aspect of management; able to describe the basic of management and its types, skills, management roles, types of business organization and current trends in business
- CO2 : Understand the planning process in the organization; able to explain the nature and purpose of planning, types, objectives of planning and decision process
- CO3 : Understand the concept of organization; able to compare the different organization structures, authorities and responsibilities, human resource management and training and development
- CO4 : Demonstrate directing, leadership and communicate effectively; estimate the individual and group behavior, motivation, job satisfaction types and theories of leadership, communication and IT.
- CO5 : Analyze / isolate issues and formulate best control methods; apply the knowledge using the various system and process of controlling, budgetary and non-budgetary control techniques, use of computer and IT in management control, reporting.

Course: Hospital Management-[OBM752]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the principles of Hospital administration, HR management and supportive service in hospitals.

CO2 : Understand the safety procedures followed in hospitals.

CO3 : Explain the functional operations in Hospitals

CO4 : List the recruitment and training policies followed in Hospitals.

CO5 : Identify and analyse the importance of Human resource management.

Semester:8

Course:Green Computing-[CS8078]

Upon completion of the course, the students will.../ will be able to...

CO1 : Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.

CO2 : Illustrate green(power efficient) technologies for components of one single computer such as CPU,memory and disk.

CO3 : Extend the skill in energy saving practices in their use of hardware.

CO4 : Analyze the technology tools that can reduce paper waste and carbon footprint by the stakeholders.

CO5 : Examine the ways to minimize equipment disposal requirements.

Course:Project Work-[CS8811]

Upon completion of the course, the students will.../ will be able to...

CO1 : Identify and Finalize problem statement by surveying variety of domains.

CO2 : Perform requirement analysis and identify design methodologies.

CO3 : Apply advanced programming techniques to develop solutions to the problem.

CO4 : Test the quality of the proposed method by evaluation metrics.

CO5 : Present technical report by applying different visualization tools.

Course:Professional Ethics in Engineering-[GE8076]

Upon completion of the course, the students will.../ will be able to...

CO1 : Understand the meaning and purpose of profession, ethics, civic virtue, sharing, honesty, courage, time management, commitment, character and yoga for professional excellence and stress management.

CO2 : Discuss the senses of engineering ethics, moral issues, inquiries, dilemma and autonomy, theories of moral development, right action and ethics.

CO3 : Apply code of ethics in the engineering profession and act as responsible experimenters with a balanced outlook of the law.

CO4 : Assess the safety and risk to reduce the risk.

CO5 : Realize the responsibilities of employers and rights of engineers.

CO6 : Apply the ethical principles related to multinational corporations, environment, computer and weapons development.

CO7 : Act as manager, consultant, expert, witness, advisor and leader with social responsibilities.

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:M.E. Computer Science and Engineering

Semester: 1

Course:Advanced Data Structures and Algorithms-[CP4151]
Upon completion of the course, the students will.../ will be able to... CO1 :lata structures and algorithms to solve computing problems. CO2 : Choose efficient data structures and apply them to solve problems. CO3 : Solve real-life problems using graph structure and various string-matching algorithms. CO4 : one’s own algorithm for an unknown problem. CO5 : Analyze the suitable design strategy for problem solving.
Course:Database Practices-[CP4152]
Upon completion of the course, the students will.../ will be able to... CO1 : Understand the ER model to relational tables, populate relational databases and formulate SQL queries on data CO2 : Acquire the knowledge of XML to write well-formed XML documents CO3 : Design and implement secure database systems CO4 : Develop database systems using manipulation languages of the NoSQL databases CO5 : Develop database system using mangoDB
Course:Network Technologies-[CP4153]
Upon completion of the course, the students will.../ will be able to... CO1 : Impart the basic concepts of networks. CO2 : Explore the concepts of wireless networks. CO3 : Illustrate the concepts of 4G and 5G in mobile data networks. CO4 : Summarize the characteristics of Software Defined Networks. CO5 : Demonstrate Network Functions Virtualization.
Course:Principles of Programming Languages-[CP4154]
Upon completion of the course, the students will.../ will be able to... CO1 : Describe and understand the basics, syntax and semantics of programming languages CO2 : Explain data, data types, basic statements, control structures and subprograms of programming languages CO3 : Design and implement the basics and subprogram constructs CO4 : Apply object-oriented, concurrency, and event handling programming constructs CO5 : Develop programs in Scheme, ML, and Prolog
Course:Advanced Data Structures and Algorithms Laboratory-[CP4161]
Upon completion of the course, the students will.../ will be able to... CO1 : Design and implement basic and advanced data structures extensively CO2 : Design algorithms using graph structures CO3 : Design and develop efficient algorithms with minimum complexity using design techniques CO4 : Develop programs using various algorithms. CO5 : Choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.
Course:Applied Probability and Statistics for Computer Science Engineers-[MA4151]

Upon completion of the course, the students will.../ will be able to...
CO1 : Demonstrate the basic concepts of Linear Algebra , probability, standard distributions, one and two dimensional random variables.
CO2 : Explain statistical and multivariate techniques and and principal components analysis.
CO3 : Apply the concept of matrices ,probability and correlation in engineering disciplines.
CO4 : Apply the concept of testing of hypothesis for small and large samples in real life problems.
CO5 : Develop exploratory analysis of multivariate data, such as multivariate normal density, calculating descriptive statistics, testing for multivariate normality.

Course:Research Methodology and IPR-[RM4151]

Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the basic concepts of the research process, design and problems.
CO2 : Able to select the appropriate tool for analysis based on the nature of data.
CO3 : Prepare a well-structured research paper and scientific presentations.
CO4 : Explore various IPR Components and the process of filing.

Semester:2

Course:English for Research Paper Writing-[AX4091]

Upon completion of the course, the students will.../ will be able to...
CO1 : Explore how to improve your writing skills and level of readability.
CO2 : Assess what to write in each section.
CO3 : Illustrate the skills needed when writing a title.
CO4 : Summarize the skills needed when writing the conclusion.
CO5 : Ensure the good quality of the paper at very first time submission.

Course:Big Data Mining and Analytics-[BD4251]

Upon completion of the course, the students will.../ will be able to...
CO1 : Explain computational approaches to Modeling, Feature Extraction and various search algorithms applicable to Big Data
CO2 : Describe the need and application of Map Reduce
CO3 : Design algorithms and propose solutions for Big Data by optimizing main memory consumption.
CO4 : Design solutions for problems in Big Data by suggesting appropriate clustering techniques.
CO5 : Analyze and interpret streaming data and optimizing main memory consumption.

Course:Software Engineering Laboratory-[CP4212]

Upon completion of the course, the students will.../ will be able to...
CO1 : Can produce the requirements and use cases the client wants for the software being Produced. Participate in drawing up the project plan.The plan will include at least extent and
CO2 : work assessments of the project, the schedule, available resources, and risk management can model and specify the requirements of mid-range software and their architecture.
CO3 : Create and specify such a software design based on the requirement specification that the software can be implemented based on the design.
CO4 : Can assess the extent and costs of a project with the help of several different assessment methods.

Course:Internet of Things-[CP4251]

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the various concepts of IoT and their technologies</p> <p>CO2 : Discuss the basic principles of cloud computing</p> <p>CO3 : Describe various IoT Protocols</p> <p>CO4 : Develop IoT applications using different hardware platforms and protocols</p> <p>CO5 : Develop and deploy the IoT application into cloud environment</p>
Course:Machine Learning-[CP4252]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understand and outline problems for each type of machine learning</p> <p>CO2 : Design a Decision tree and Random forest for an application</p> <p>CO3 : Implement Probabilistic Discriminative and Generative algorithms for an application and analyze the results.</p> <p>CO4 : Use a tool to implement typical Clustering algorithms for different types of applications</p> <p>CO5 : Design and implement an HMM for a Sequence Model type of application</p> <p>CO6 : Identify applications suitable for different types of Machine Learning with suitable justification.</p>
Course:Multicore Architecture and Programming-[CP4253]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe multicore architectures and identify their characteristics and challenges.</p> <p>CO2 : Identify the issues in programming Parallel Processors.</p> <p>CO3 : Write programs using OpenMP and MPI.</p> <p>CO4 : Design parallel programming solutions to common problems.</p> <p>CO5 : Compare and contrast programming for serial processors and programming for parallel processors.</p>
Course:Cloud Computing Technologies-[MP4253]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Employ the concepts of virtualization in the cloud computing</p> <p>CO2 : Identify the architecture, infrastructure and delivery models of cloud computing</p> <p>CO3 : Develop the cloud application in various cloud platform and services in various cloud computing programming models.</p> <p>CO4 : Apply the concepts of virtualization and Windows Azure to design cloud application.</p> <p>CO5 : Analyze the various concepts of virtualization in the cloud computing for real world applications.</p>
Course:Advanced Software Engineering-[SE4151]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identify appropriate process models based on the Project requirements.</p> <p>CO2 : Assess the importance of having a good Software Architecture.</p> <p>CO3 : Understand the five important dimensions of dependability, namely, availability, reliability, safety, security, and resilience.</p> <p>CO4 : Describe the basic notions of a web service, wb service standard and web service oriented architecture</p> <p>CO5 : Be familiar with various levels of software testing.</p>

Semester:3

Course:Software Quality Assurance and Testing-[CP5005]

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understand the concept & issues in software testing</p> <p>CO2 : Understand system testing and test execution process</p> <p>CO3 : Understand the various types of system testing</p> <p>CO4 : Identify defect prevention techniques and software quality assurance metrics</p> <p>CO5 : Apply techniques of quality assurance for typical applications.</p>
Course:Social Network Analysis-[CP5074]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understand the components of the social network</p> <p>CO2 : Model and visualize the social network</p> <p>CO3 : Analyse the behaviour of users in the social network</p> <p>CO4 : Apply the various models in social network</p> <p>CO5 : Apply social network in real time applications</p>
Course:Information Storage Management-[CP5076]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Select various storage technologies to suit for required application.</p> <p>CO2 : Apply security measures to safeguard storage.</p> <p>CO3 : Creating an own Storage and network storage architecture.</p> <p>CO4 : Integrate emerging technologies into professional practice.</p> <p>CO5 : Designing security and virtualization check list for datacenter.</p>
Course:Project Work Phase-1-[CP5311]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identify the problem by applying acquired knowledge</p> <p>CO2 : Construct and organize executable project modules through proper designing</p> <p>CO3 : Choose efficient tools for implementation of the designed modules</p> <p>CO4 : Analyze and categorize the outcomes of the implementation and derive inferences</p> <p>CO5 : Examine the completed task and compile the project report</p>

Semester:4

Course:Project Work Phase II-[CP5411]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Able to identify and formulate research problem</p> <p>CO2 : Able to design and develop solution to the problem</p> <p>CO3 : Able to analyze and solve the complex problems</p> <p>CO4 : Able to plan, implement and execute the project</p> <p>CO5 : Able to write effective technical report and demonstrate through presentation</p>

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program: B.E. Electronics and Communication Engg. (Sec-A)

Semester:1

Course: Problem Solving and Python Programming-[GE3151]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop algorithmic solutions to simple computational problems.

CO2 : Develop and execute simple Python programs.

CO3 : Write simple Python programs using conditionals, loops for solving problems and decompose a Python program into functions.

CO4 : Represent compound data using Python lists, tuples, dictionaries etc.

CO5 : Read and write data from/to files in Python programs.

Course: Problem Solving and Python Programming Laboratory-[GE3171]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop algorithmic solutions to simple computational problems.

CO2 : Develop and execute simple Python programs.

CO3 : Implement programs in Python using conditionals and loops for solving problems and Deploy functions to decompose a Python program.

CO4 : Process compound data using Python data structures.

CO5 : Utilize Python packages in developing software applications.

Course: Professional English - I-[HS3151]

Upon completion of the course, the students will.../ will be able to...

CO1 : Listen and Comprehend complex academic texts.

CO2 : Read and infer the denotative and connotative meanings of technical texts.

CO3 : Write Definitions, descriptions, narrations and essays on various topics.

CO4 : Speak fluently and accurately in formal and informal communicative contexts.

CO5 : Express opinions effectively in both oral and written mode of communication

Course: Physics and Chemistry Laboratory-[BS3171]

Upon completion of the course, the students will.../ will be able to...

CO1 : Identify the moduli of elasticity used in day to day engineering applications.

CO2 : Indicate the optical parameters of visible and laser sources

CO3 : Make use of the bandgap of semiconducting materials.

CO4 : Detect the water quality parameters (DO, Chloride, Cu content, Alkalinity and hardness) of the given water sample.

CO5 : Examine quantitatively the metals (Fe, Na, Cu) in the given sample using potentiometer & flame photometer and the conductance of the solution by conductometric titrations.

Course: Engineering Physics-[PH3151]

Upon completion of the course, the students will.../ will be able to...

CO1 : Recall the basics of mechanics and electromagnetic waves.

CO2 : Relate the concepts of oscillations, lasers and quantum physics.

CO3 : Explain the theories of centre of mass, moment of inertia, properties of electromagnetic waves and Maxwell's equations.

CO4 : Summarize the principles of sound waves, light waves and quantum mechanics.

CO5 : Utilize the applications of mechanics, electromagnetic waves, oscillations, optics and quantum mechanics.

Engineering Chemistry – CY3151

Upon completion of the course, the students will.../ will be able to...

- CO1: Define the concepts of water quality parameters, nano materials and composites
- CO2: Recall the types of fuels and energy resources
- CO3: Outline suitable methods for water treatment and synthesis of nano materials.
- CO4: Illustrate the properties of nano materials as well as fuel analysis
- CO5: Apply the concept of composites, fuel analysis and energy resources for material selection requirements and also in energy sectors

Course: Matrices and Calculus-[MA3151]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define the basic concepts of matrices, limit and continuity of a function, differentiation and integration.
- CO2 : Explain the properties of matrices and nature of the quadratic forms.
- CO3 : Interpret the techniques of differentiation, partial differentiation and integration.
- CO4 : Apply diagonalization of matrices in quadratic form and use C-H theorem to get the inverse of matrices.
- CO5 : Solve problems on differentiation, partial differentiation and integration using different rules.

Semester:2

Course:Electrical and Instrumentation Engineering-[BE3254]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the working principle of electrical machines
- CO2 : Analyze the output characterizes of electrical machines
- CO3 : Choose the appropriate electrical machines for various applications
- CO4 : Explain the types and operating principles of measuring instruments
- CO5 : Explain the basic power system structure and protection schemes

Course: Circuit Analysis-[EC3251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Apply Kirchoff's laws, mesh current and node voltage method in DC circuits.
- CO2 : Apply suitable network theorems in AC and DC circuits.
- CO3 : Analyze steady state response of R, L and C circuits.
- CO4 : Analyze the transient response of RC, RL and RLC circuits and frequency response of parallel and series resonance circuits.
- CO5 : Analyze the coupled circuits and network topologies.

Course: Circuits Analysis Laboratory-[EC3271]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Verify KVL, KCL, Thevenin, Norton, Superposition and Maximum power transfer theorems.
- CO2 : Design series and parallel RLC resonance circuits.
- CO3 : Design RL and RC transient circuits.

Course:Statistics and Numerical Methods-[MA3251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define the basic concepts of statistical tests, ANOVA, solution of equations, interpolation and ODE
- CO2 : Discuss the techniques of statistical tests and design of experiments
- CO3 : Explain the solution of equations, ODE, interpolations, differentiation and integration
- CO4 : Apply the concept of testing of hypothesis and design of experiments in real life

CO5 :Solve equations, ODE, interpolation, differentiation and integration using numerical techniques

Course:Engineering Graphics-[GE3251]

Upon completion of the course, the students will.../ will be able to...

CO1 : Exposed to existing national standards related to technical drawings

CO2 : understand the given engineering drawings and interpret a three dimensional drawing

CO3 : Apply the fundamentals and standards in engineering drawing through drafting exercise of geometrical solids

CO4 : Identify the methods of development of surface of different solids and understand some of the hidden geometry of the cut object

CO5 : Analyze the three dimensional view of objects as perceived by human eye

Course: Statistics and Numerical Methods-[MA3251]

Upon completion of the course, the students will.../ will be able to...

CO1 : Define the basic concept of statistical tests, ANOVA, solution of equations, interpolation and ODE.

CO2 : Interpret the techniques of statistical tests and design of experiments.

CO3 : Explain the solution of equations, ODE, interpolation, differentiation and integration.

CO4 : Apply the concept of testing of hypothesis and experimental design in real life.

CO5 : Solve equations ODE, interpolation, differentiation and integration using numerical techniques.

Course:Physics for Electronics Engineering-[PH3254]

Upon completion of the course, the students will.../ will be able to...

CO1 :Recall the basics of crystal Physics and properties of electrical, magnetic & semiconducting materials.

CO2 :Choose the properties of optical materials and nano structures

CO3 : Illustrate the crystal structures, classical & quantum free electron theory and types of magnetic & semiconducting materials.

CO4 :Summarize the classifications of optical processes and concepts of quantum structures

CO5 : Identify the applications of crystallography, electrical, magnetic, semiconducting & optical materials and nano devices.

Semester:3

Course: Electronic Circuits- I-[EC8351]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the methods for biasing of transistors.

CO2: Explain regulated DC power supplies.

CO3: Analyze BJT amplifiers.

CO4 : Analyze single stage and multistage amplifiers.

CO5 : Analyze frequency response of amplifiers.

Course: Signals and Systems-[EC8352]

Upon completion of the course, the students will.../ will be able to...

CO1 :Explain the properties of signals and systems.

CO2 :Explain Fourier series, Fourier Transform and Laplace transform for continuous time signals and systems.

CO3 :Analyze continuous time LTI system using Fourier and Laplace transforms.

CO4 :Analyze the effects of discrete time signals using DTFT and Z-transform.

CO5 :Analyze recursive and non-recursive discrete and continuous time systems.

Course: Analog and Digital Circuits Laboratory-[EC8361]

Upon completion of the course, the students will.../ will be able to...

CO1 : Analyze the frequency response of BJT/JFET Amplifiers

CO2 : Analyze amplifier circuit using SPICE.

CO3 : Measure CMRR in differential amplifier.

CO4 : Design regulated power supply.

CO5 : Design BJT/JFET amplifier.

CO6 : Test digital logic circuits.

Course: Fundamentals of Data Structures in C Laboratory-[EC8381]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop C program for simple applications making use of basic constructs

CO2 : Apply basic data structure for a given problem using C

CO3 : Implement linear and non linear data structures using C

CO4 : Implement functions and recursive functions in C

CO5 : Analyze searching, sorting, and hashing algorithms

Course: Control Systems Engineering-[EC8391]

Upon completion of the course, the students will.../ will be able to...

CO1 : Identify the various control system components and their representations.

CO2 : Apply the concepts of system stability criterions.

CO3 : Analyze the various time domain parameters.

CO4 : Analyze the various frequency response plots.

CO5 : Examine state variable models from transfer function models.

Course: Digital Electronics-[EC8392]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the basic concepts of digital electronics.

CO2 : Explain the semiconductor memories and related technology

CO3 : Design various combinational digital circuits using logic gates.

CO4 : Design and analyze Synchronous Sequential Circuits.

CO5 : Design and analyze Asynchronous Sequential Circuits.

Course: Fundamentals of Data Structures In C-[EC8393]

Upon completion of the course, the students will.../ will be able to...

CO1 : Identify the basic features of C

CO2 : Explain pointers functions union structure and arrays

CO3 : Explain linear and non linear data structures

CO4 : Apply linear and non linear data structures in real world problems

CO5 : Analyze the basic sorting and searching algorithms.

Course: Interpersonal Skills/Listening & Speaking-[HS8381]

Upon completion of the course, the students will.../ will be able to...

CO1 : Listen and respond appropriately

CO2 : Participate in group discussions

CO3 : Make effective presentations

CO4 : Speak clearly with proper stress and intonation

CO5 : Participate confidently and appropriately in conversations both formal and informal

Course: Linear Algebra and Partial Differential Equations-[MA8352]

Upon completion of the course, the students will.../ will be able to...

CO1 : Define linear combinations, null spaces and ranges, inner product, linear and non-linear equations, Fourier series

CO2 : Explain the fundamental concepts of vector spaces, linear transformation and inner product

CO3 : Classify the PDEs and explain the Fourier series

CO4 : apply computational techniques and algebraic skills essential for the study of systems of linear equations,

matrix algebra, vector spaces, eigenvalues and eigenvectors, norms, orthogonalization and diagonalizability
 CO5 : solve various types of partial differential equations and apply Fourier series in wave equations and heat equations

Air Pollution and Control Engineering - OCE551

- CO1: Define the nature and characteristics of air pollution, noise pollution
 CO2: Demonstrate indoor air pollution control devices
 CO3: Explain and solve air and noise pollution problems
 CO4: Make use of air pollution control equipments
 CO5: Construct stacks and particulate air pollution control devices

Semester:4

Course:Electromagnetic Fields-[EC8451]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Illustrate the basic concepts of electric and magnetic field quantities and laws.
 CO2 : Outline the field potentials due to static charges and static magnetic fields.
 CO3 : Interpret the materials affect electric and magnetic fields.
 CO4 : Inspect the relation between the fields under time varying situations.
 CO5 : Analyze the principles of propagation of uniform plane waves.

Course:Electronic Circuits II-[EC8452]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Explain the basics of amplifier, oscillator and quality factor.
 CO2 : Design of oscillator, waveshaping circuit and power amplifiers.
 CO3 : Design of feedback amplifiers and multivibrators.
 CO4 : Analyze the performance of different amplifiers.
 CO5 : Analyze the stability and DC-DC converters.

Course:Linear Integrated Circuits-[EC8453]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Describe the basic building blocks of linear integrated circuits.
 CO2 : Develop linear and non-linear applications of operational amplifiers.
 CO3 : Build the applications of analog multiplier and PLL.
 CO4 : Construct ADC and DAC using OP – AMPS.
 CO5 : Construct special function ICs and waveform generators.

Course:Circuits Design and Simulation Laboratory-[EC8461]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Design of feedback amplifiers
 CO2 : Design and simulation of various oscillator circuits
 CO3 : Design and simulation of tuned amplifiers
 CO4 : Design and simulation of waveshaping and multivibrator circuits.
 CO5 : Analysis and simulation of power amplifiers.

Course:Linear Integrated Circuits Laboratory-[EC8462]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Analyze the working of PLL and describe its application as a frequency multiplier
 CO2 : Analyze the performance of filters, multivibrators, A/D converter and analog multiplier using SPICE
 CO3 : Design amplifiers, oscillators, D-A converters using operational amplifiers

CO4 : Design filters using op-amp and performs an experiment on frequency response
CO5 : Design DC power supply using ICs

Course:Communication Theory-[EC8491]

Upon completion of the course, the students will.../ will be able to...

CO1 : Apply the concepts of Random Process to the design of Communication systems

CO2 : Analyze the noise performance of AM and FM systems

CO3 : Design Angle modulated communication systems

CO4 : Design AM communication systems

CO5 : Design pulse modulation system using the concept of sampling and quantization

Course:Environmental Science and Engineering-[GE8291]

Upon completion of the course, the students will.../ will be able to...

CO1 : Identify the importance of environmental education and ecosystem.

CO2 : Explain the environmental pollution and its prevention.

CO3 : Summarize the conservation of natural resources.

CO4 : Solve the social and environmental problems.

CO5 : Explain the need to control population for sustainable development.

Course:Probability and Random Processes-[MA8451]

Upon completion of the course, the students will.../ will be able to...

CO1 :Define the basic concepts in probability and random processes.

Discuss the concept of probability used in Baye's theorem, one and two dimensional random

CO2 :variables and introduce some standard distributions applicable to engineering which can describe real life phenomenon.

CO3 : Demonstrate the concepts of random processes, spectral densities and linear systems which are widely used in IT fields.

CO4 : Apply the concept of probability, correlation and spectral densities in communication engineering.

CO5 :Apply random processes and linear systems with random inputs in communication engineering.

Semester:5

Course:Medical Electronics-[EC8073]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the concepts of acquiring, measuring and recording biopotentials

CO2 : Illustrate the principle of physiological measuring systems

CO3 : Summarize the design principle of devices that restore the normal human functioning

CO4 : Compare the characteristic principle of theraptic equipment's used in physical medicine

CO5 : Employ the latest trends and recent happening in medical area

Course:Digital Communication-[EC8501]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the principles of information source &discrete memoryless channels.

CO2 : Explain the various waveform coding schemes.

CO3 : Design and implement base band transmission & reception schemes.

CO4 : Analyze the spectral characteristics of band pass signaling schemes and their noise performance.

CO5 : Employ error control coding schemes.

Course:Communication Networks-[EC8551]

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Select the components needed to build a network</p> <p>CO2 : Infer the network functionality into layers.</p> <p>CO3 : Outline the functionality of each layer of the network.</p> <p>CO4 : Identify solutions for various functionality at each layer.</p> <p>CO5 : Examine the node to node communication in the networks.</p>
Course:Computer Architecture and Organization-[EC8552]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe data representation, instruction formats and the operation of a digital computer</p> <p>CO2 : Explain the concept of various memories, interfacing and organization of multiple processors</p> <p>CO3 : Illustrate the fixed point and floating-point arithmetic for ALU operation.</p> <p>CO4 : Discuss about implementation schemes of control unit and pipeline performance</p> <p>CO5 : Discuss parallel processing technique and unconventional architectures</p>
Course:Discrete-Time Signal Processing-[EC8553]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate the effects of finite precision representation on digital filters.</p> <p>CO2 : Apply DFT for the analysis of digital signals and systems.</p> <p>CO3 : Design IIR and FIR filters.</p> <p>CO4 : Implement digital signal processor in digital systems.</p>
Course:Communication Systems Laboratory-[EC8561]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Simulate and validate the various functional modules of a communication system.</p> <p>CO2 : Demonstrate their knowledge in base band signaling schemes through implementation of digital modulation schemes</p> <p>CO3 : Apply various channel coding schemes</p> <p>CO4 : Demonstrate their capabilities towards the improvement of the noise performance of communication system</p> <p>CO5 : Simulate end-to-end communication Link</p>
Course:Digital Signal Processing Laboratory-[EC8562]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe basic signal processing operations</p> <p>CO2 : Demonstrate MATLAB based implementation of various DSP systems</p> <p>CO3 : Analyze the architecture of a DSP Processor</p> <p>CO4 : Design and Implement the FIR and IIR Filters in DSP Processor for performing filtering operation over real-time signals</p> <p>CO5 : Design a DSP system for various applications of DSP</p>
Course:Communication Networks Laboratory-[EC8563]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Demonstrate communication between two desktop computers</p> <p>CO2 : Experiment the different protocols.</p> <p>CO3 : Stimulate program using sockets</p> <p>CO4 : Identify and compare the various routing algorithms</p> <p>CO5 : Employ simulation tools for networking concepts</p>
Course:Air Pollution and Control Engineering-[OCE551]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the nature and characteristics of air pollution, noise pollution and basic concepts of air</p>

quality management
 CO2 : Explain and solve air and noise pollution problems
 CO3 : Develop stacks and particulate air pollution control devices
 CO4 : Identify air pollution control equipment's.
 CO5 : Construct indoor air pollution control devices

Semester:6

Course:VLSI Design-[EC8095]

Upon completion of the course, the students will.../ will be able to...
 CO1 : Enumerate the fundamental concept of MOS circuits.
 CO2 : Describe the combinational MOS circuits and its power strategies.
 CO3 : Explain the Sequential Circuits and Timing systems.
 CO4 : Outline the FPGA design flow and testing
 CO5 : Design arithmetic building blocks and memory subsystems.

Course:Technical Seminar-[EC8611]

Upon completion of the course, the students will.../ will be able to...
 CO1 : Describe the selection of a subject, narrow the subject into a topic and state an objective.
 CO2 : Illustrate to collect the relevant bibliography and prepare a working outline.
 CO3 : Outline the understanding of the authors' contributions and critically analyze each paper.
 CO4 : Outline the linking of papers and prepare a draft of the paper.
 CO5 : Describe the writing of final paper and give final presentation.

Course:Transmission Lines and RF Systems-[EC8651]

Upon completion of the course, the students will.../ will be able to...
 CO1 : Explain the characteristics of transmission lines, impedance and their losses
 CO2 : Explain the characteristics wave guide and RF transceiver system
 CO3 : Analyze impedance, VSWR, impedance matching by stubs using smith charts
 CO4 : Analyze the characteristics of TE and TM waves in parallel planes and waveguides
 CO5 : Design a RF transceiver system for wireless communication

Course:Wireless Communication-[EC8652]

Upon completion of the course, the students will.../ will be able to...
 CO1 : Explain different parameters of mobile multipath channels, MIMO systems.
 CO2 : Explain the concepts of cellular system, multiple access techniques, OFDM Principles, Equalization and Diversity.
 CO3 : Construct various signalling schemes.
 CO4 : Identify the suitable multipath mitigation techniques.
 CO5 : Develop path loss models for wireless channels, cellular architecture, multiple access techniques and multiple antenna techniques

Course:VLSI Design Laboratory-[EC8661]

Upon completion of the course, the students will.../ will be able to...
 CO1 : Explain HDL code for basic as well as advanced digital integrated circuit
 CO2 : Import the logic modules into FPGA Boards.
 CO3 : Explain the fundamental principles of VLSI circuit design in digital and analog domain.
 CO4 : Simulate Digital & Analog IC Blocks using EDA tools.
 CO5 : Extract the layouts of Digital & Analog IC Blocks using EDA tools.

Course:Microprocessors and Microcontroller Laboratory-[EC8681]

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Write ALP Programmes for fixed and Floating Point and Arithmetic operations</p> <p>CO2 : Demonstrate Interfacing different I/Os with processor</p> <p>CO3 : Compute waveforms using Microprocessors</p> <p>CO4 : Stimulate Programs in 8051</p> <p>CO5 : Explain the difference between simulator and Emulator</p>
Course:Microprocessors and Microcontroller-[EC8691]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the detailed hardware and software structure of the microprocessor..</p> <p>CO2 : Explain the basic concepts of Microprocessors, addressing modes and instruction set of 8086</p> <p>CO3 : Describe how peripherals (8255, 8253, etc.) are interconnected with the microprocessor.</p> <p>CO4 : Illustrate an overview of the internal architecture and various operating modes of a typical microcontroller.</p> <p>CO5 : Develop assembly language programs for interrupts, subroutines, macros, peripheral devices, and interfaces in the 8086 and 8051 architectures.</p>
Course:Intellectual Property Rights-[GE8075]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the Basic concepts and need for Intellectual Property</p> <p>CO2 : Describe the registration processes of various types of IPR</p> <p>CO3 : Illustrate the agreements and legislations that frame the IP</p> <p>CO4 : Illustrate the laws that protect digital products</p> <p>CO5 : Analyze the enforcement, infringement and issues related to IPR</p>
Course:Principles of Management-[MG8591]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain management evolution and different types of business.</p> <p>CO2 : Illustrate the planning and decision making process of management.</p> <p>CO3 : Explain organization structure, HR planning and management.</p> <p>CO4 : Demonstrate the ability to directing, leadership and communicate effectively.</p> <p>CO5 : Analyze the isolate issues and formulate best control methods.</p>
Course:Professional Communication-[HS8581]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Make effective presentation</p> <p>CO2 : Participate confidently in Group Discussions</p> <p>CO3 : Attend job interviews and be successful in them</p> <p>CO4 : Develop adequate soft skills required for the work place</p>

Semester:7

Course:Antennas and Microwave Engineering-[EC8701]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basic principles in antenna and microwave system design</p> <p>CO2 : Describe passive microwave components and active sources</p> <p>CO3 : Demonstrate antenna array with excitation amplitude</p> <p>CO4 : Design various types of antennas, microwave mixer, oscillator and amplifiers</p>
Course:Ad hoc and Wireless Sensor Networks-[EC8702]
<p>Upon completion of the course, the students will.../ will be able to...</p>

CO1 : Explain the Fundamental Concepts, routing protocol and applications of ad hoc networks
CO2 : Describe the challenges, goals and architecture of wireless Sensor networks.
CO3 : Illustrate the networking concepts and protocols used in wireless Sensor networks.
CO4 : Discuss the security requirements, challenges issues and possible solutions for attacks
CO5 : Analyze the challenges in programming and the platform and tools

Course:Embedded Laboratory-[EC8711]

Upon completion of the course, the students will.../ will be able to...

CO1 : Write programs in ARM for a specific Application
CO2 : Write programs related to memory operations and Interface memory.
CO3 : Demonstrate the Interfacing of A/D and D/A convertors with ARM system
CO4 : Analyze the performance of interrupt.
CO5 : Analyze the interfacing of keyboard, display, motor and sensor.

Course:Optical Communication-[EC8751]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain basic elements in optical fibers, different modes and configurations.
CO2 : Illustrate the transmission characteristics associated with dispersion and polarization techniques.
CO3 : Apply optical sources and detectors with their use in optical communication system.
CO4 : Construct fiber optic receiver systems, measurements and coupling techniques.
CO5 : Analyze optical communication systems and its networks.

Course:Advanced Communication Laboratory-[EC8761]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the performance of simple optical link by measurement of losses and analyzing the mode characteristics of fiber.
CO2 : Apply the Eye Pattern, Pulse broadening of optical fiber and the impact on BER.
CO3 : Analyze the Wireless Channel Characteristics and analyze the performance of Wireless Communication System.
CO4 : Analyze the intricacies in Microwave System design

Course:Embedded and Real Time Systems-[EC8791]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the architecture, RTOS computing platform and design techniques
CO2 : Utilize the concepts of embedded computing platform design.
CO3 : Explain the basic concepts of real time Operating system design.
CO4 : Apply the system design techniques to develop software for embedded systems.
CO5 : Test real-time applications using embedded-system concepts.

Course:Disaster Management-[GE8071]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the types of disasters, causes and their impact on environment and society
CO2 : Demonstrate the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.
CO3 : Illustrate vulnerability and various methods of risk reduction measures as well as mitigation.
CO4 : Apply various methods of risk reduction measures as well as mitigation.
CO5 : Analyze the damage caused by Disaster.

Course:Hospital Management-[OBM752]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the principles of Hospital administration
- CO2 : Identify the importance of Human resource management.
- CO3 : Apply various marketing research techniques.
- CO4 : Analyze Information management systems and its uses.
- CO5 : Analyze safety procedures followed in hospitals

Semester:8

Course:Project Work-[EC8811]
<p>Upon completion of the course, the students will.../ will be able to...</p> <ul style="list-style-type: none"> CO1 : Identify challenging practical problems and provide solutions to cope up with present scenario of Electronics and Communication Engineering field. CO2 : Apply the various methodologies and technologies for solving the problem. CO3 : Analyze project management skills for solving the problem. CO4 : Design and develop hardware and/or software for their project specific problem CO5 : Formulate the project reports and validate the presentation and demonstration.
Course:Fundamentals of Nano Science-[GE8073]
<p>Upon completion of the course, the students will.../ will be able to...</p> <ul style="list-style-type: none"> CO1 : Classify nanostructured materials and technology CO2 : Compare Bottom-up synthesis and top-down approach CO3 : Summarize nanomaterial properties and applications CO4 : Demonstrate characterization techniques and analysis CO5 : Analyze the applications of nano InfoTech and biotechnology
Course:Professional Ethics in Engineering-[GE8076]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p style="padding-left: 20px;">Explain the meaning and purpose of profession, ethics, civic virtues like sharing,</p> <ul style="list-style-type: none"> CO1 : honesty, courage, time management, commitment, character and yoga for professional excellence and stress management. CO2 : Discuss the senses of engineering ethics, moral issues, inquiries, dilemma and autonomy, theories of moral development, right action and ethics. CO3 : Apply code of ethics in the engineering profession and act as responsible experimenters with a balanced outlook of the law. CO4 : Apply the safety and risk to reduce the risk. CO5 : Act as manager, consultant, expert, witness, advisor and leader with social responsibilities. CO6 : Analyze the responsibilities of employers and rights of engineers . CO7 : Devise the ethical principles related to multinational corporations, environment, computer and weapons development.

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:M.E. Communication Systems

Semester:1

Course:Advanced Wireless Communication-[CU4151]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the wireless channel characteristics and appropriate channel models</p> <p>CO2 : Illustrate the capacity calculations under different channel conditions</p> <p>CO3 : Apply the implications of diversity combining methods and the knowledge of channel</p> <p>CO4 : Analyze the concepts in MIMO Communications</p> <p>CO5 : Appraise the concepts of multiple access techniques in different multi-user scenarios</p>
Course:Radiating Systems-[CU4152]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the fundamentals behind the different techniques in antenna technology.</p> <p>CO2 : Identify the challenges associated in designing antennas based on different technologies.</p> <p>CO3 : Determine the capability to assess the performance of various antennas.</p> <p>CO4 : Analyze the antennas specific to the applications, design and characterize.</p> <p>CO5 : Evaluate the need for optimizing in antenna design and the methodologies for the same.</p>
Course:Statistical Signal Processing-[DS4152]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate discrete time random processes.</p> <p>CO2 : Apply appropriate model for estimation and signal modeling for the given problem.</p> <p>CO3 : Analyze non-parametric and parametric methods for spectral estimation.</p> <p>CO4 : Design optimum filter for the given problem.</p> <p>CO5 : Design adaptive filters for different applications.</p>
Course:Modern Digital Communication Systems-[EL4151]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Differentiate coherent and non-coherent receivers and analyze their performance under AWGN channel conditions</p> <p>CO2 : Illustrate the effect of signalling through band limited channels and Equalization techniques used to overcome ISI</p> <p>CO3 : Determine the channel capacity and design various block coding techniques to combat channel errors</p> <p>CO4 : Construct convolutional coders and analyze the performance of different decoding techniques.</p> <p>CO5 : Analyze the basics of OFDM as a multicarrier communication and CDMA as a multiuser communication technique.</p>
Course:Linear Algebra, Probability and Queueing Theory-[MA4156]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define norms, innerproducts, probability, random processes, Little's formula and solutions of LPP</p> <p>CO2 : Illustrate the axioms of probability, random variables and queueing models</p> <p>CO3 : Discuss singular values, Poisson processes, and formulation of LPP</p> <p>CO4 : Apply various methods to solve matrices, linear system of equations and linear programming problems</p> <p>CO5 : Analyze the ideas of random processes, queueing theory and Baye's theorem</p>
Course:Research Methodology and IPR-[RM4151]
<p>Upon completion of the course, the students will.../ will be able to...</p>

CO1 : Explain the research problem and Literature review.
CO2 : Identify the appropriate tool for analysis based on the nature of data.
CO3 : Develop a well-structured research paper and scientific presentations.
CO4 : Interpret various IPR Components and process of filing.
CO5 : Evaluate the patent law and procedural mechanism in obtaining a patent.
Course:Advanced Digital Signal Processing Laboratory-[CU4161]
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the deterministic/Random sequences using simulation tool.
CO2 : Illustrate the frequency response of FIR/IIR digital filters for the given specifications
CO3 : Apply power spectrum of the given random sequence using parametric/nonparametric estimation methods.
CO4 : Demonstrate adaptive filters using LMS/RLS algorithm.
CO5 : Analyze the discrete time systems at various sampling rates.
Course:Digital Communication Systems Laboratory-[EL4161]
Upon completion of the course, the students will.../ will be able to...
CO1 :Explain the adaptive filtering algorithms
CO2 : Illustrate and detect digital communication signals of various modulation techniques using MATLAB
CO3 :Apply cellular mobile communication technology and propagation model
CO4 : Demonstrate mathematical formulation to analyze spectrum estimation of a signal and bit rate determination of a transmission link.
CO5 : Analyze the performance of optimization algorithms for equalizing the channel or noise/echo cancellation.
CO6 :Design synchronization algorithm for digital communication systems
Course:Advanced Digital Signal Processing Laboratory-[CU4161]
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain deterministic/Random sequences using simulation tool.
CO2 : Illustrate the frequency response of FIR/IIR digital filters for the given specifications
CO3 : Estimate power spectrum of the given random sequence using parametric/nonparametric estimation methods.
CO4 : Demonstrate adaptive filters using LMS/RLS algorithm.
CO5 : Analyze the discrete time systems at various sampling rates.
Course:Digital Communication Systems Laboratory-[EL4161]
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the adaptive filtering algorithms
CO2 : Illustrate the digital communication signals of various modulation techniques using MATLAB
CO3 : Demonstrate the cellular mobile communication technology and propagation model.
CO4 : Apply mathematical formulation to analyze spectrum estimation of a signal and bit rate determination of a transmission link.
CO5 : Analyze the performance of optimization algorithms for equalizing the channel or noise/echo cancellation.
CO6 : Design synchronization algorithm for digital communication systems

Semester:2

Course:Machine Learning-[CP4252]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain and outline problems for each type of machine learning
- CO2 : Illustrate Decision tree and Random forest for an application
- CO3 : Demonstrate Probabilistic Discriminative and Generative algorithms for an application and analyze the results.
- CO4 : Identify the tool to implement typical Clustering algorithms for different types of applications.
- CO5 : Analyze and implement an HMM for a Sequence Model type of application.
- CO6 : Analyze the applications suitable for different types of Machine Learning with suitable justification.

Course:Microwave Integrated Circuits-[CU4201]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the concepts of planar transmission line
- CO2 : Illustrate impedance matching circuits using LC components and stubs.
- CO3 : Identify and analyze microwave components.
- CO4 : Correlate the stability analysis, design amplifiers and oscillators at microwave frequencies.
- CO5 : Analyze the material and fabrication techniques of microwave devices.

Course:Advanced Wireless Networks-[CU4202]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the latest 4G networks and LTE
- CO2 : Demonstrate the wireless IP architecture and LTE network architecture.
- CO3 : Apply the adaptive link layer and network layer graphs and protocol
- CO4 : Analyze the mobility management and cellular network.
- CO5 : Appraise the wireless sensor network architecture and its concepts.

Course:RF System Design-[CU4251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the specifications of transceiver modules.
- CO2 : Summarize the pros and cons of transceiver architectures and their associated design considerations.
- CO3 : Demonstrate the impact of noise and amplifier non-linearity of amplification modules and also will learn the resultant effect during cascade connections.
- CO4 : Analyze the spurs and generation principles during signal generation and frequency translations.
- CO5 : Estimate the case study of transceiver systems and aid to select specification parameters selections

Course:Electromagnetic Interference and Compatibility-[EL4071]

Upon completion of the course, the students will.../ will be able to...

- CO1 :Explain the various sources of electromagnetic interference
- CO2 : Demonstrate an understanding of the effect of how electromagnetic fields couple through apertures, and solve simple problems based on that understanding.
- CO3 :Apply the EMI mitigation techniques of shielding and grounding.
- CO4 :Analyze the need for standards and EMC measurement methods.
- CO5 :Analyze the impact of EMC on wireless and broadband technologies.

Course:Cognitive Radio Networks-[NC4251]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the fundamental concepts of cognitive radio networks.

CO2 : Summarize the basics of various spectrum sensing techniques and algorithms

CO3 : Illustrate the functions of MAC layer and Network layer and its various protocols

CO4 : Apply the concepts of cooperative spectrum sensing and handoff process
Analyze the fundamental issues regarding dynamic spectrum access, the radio-resource

CO5 : management and trading, as well as a number of optimization techniques for better spectrum exploitation.

Semester:3

Course:Internet of Things-[CP5292]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the fundamentals of Internet of Things.</p> <p>CO2 : Identify different IOT architectures.</p> <p>CO3 : Apply various protocols for IoT.</p> <p>CO4 : Analyze a portable IoT using Rasperry Pi.</p> <p>CO5 : Correlate applications of IoT in real time scenario.</p>
Course:Millimeter Wave Communications-[CU5301]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the fundamentals of Millimeter wave Communication.</p> <p>CO2 : Identify the Millimeter devices and circuits.</p> <p>CO3 : Apply various components of Millimeter wave Communications system.</p> <p>CO4 : Analyze the design of antenna for Millimeter wave frequencies.</p> <p>CO5 : Evaluate the concepts involved in Millimeter wave technology.</p>
Course:Project Work Phase I-[CU5311]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Demonstrate a sound technical knowledge of their selected project topic.</p> <p>CO2 : Identify engineering solutions to complex problems utilizing a systems approach.</p> <p>CO3 : Determine the problem, formulation and solution.</p> <p>CO4 : Analyze with engineers and the community at large in written and oral forms.</p> <p>CO5 : Formulate the ability to make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.</p>
Course:Soft Computing Techniques-[MP5092]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the basics of artificial neural network, fuzzy logic and genetic algorithm.</p> <p>CO2 : Explain the operation of feed forward and feedback neural networks, fuzzy logic systems and genetic algorithm.</p> <p>CO3 : Apply the concept of neural network, fuzzy logic and genetic algorithm to solve practical problems.</p> <p>CO4 : Analyze the systems using neural network and fuzzy logic.</p> <p>CO5 : Evaluate the neural networks, fuzzy systems and genetic algorithm to solve problems.</p>

Semester:4

Course:Project Work (Phase II)-[CU5411]
--

Upon completion of the course, the students will.../ will be able to...

CO1 : Demonstrate a sound technical knowledge of their selected project topic.

CO2 : Identify engineering solutions to complex problems utilizing a systems approach.

CO3 : Determine the problem, formulation and solution.

CO4 : Analyze with engineers and the community at large in written and oral forms.

CO5 : Formulate the ability to make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:M.E. Medical Electronics

Semester:1

<p style="text-align: center;">Course:Bio Signal Processing-[BM4151]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the different types of bio signals & systems</p> <p>CO2 : Identify signals in time series domain & estimate the spectrum</p> <p>CO3 : Apply the significance of adaptive filtering and wavelet detection applied in biosignal processing</p> <p>CO4 : Analyze the features from biosignal</p> <p>CO5 : Evaluate various biosignal classification and recognition methods.</p>
<p style="text-align: center;">Course:Human Anatomy and Physiology-[BM4152]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basics of Human Anatomy and Physiology.</p> <p>CO2 : Examine the muscular and skeletal system in human body.</p> <p>CO3 : Apply the basics CVS and endocrine system in human body.</p> <p>CO4 : Analyze the various organs and systems involved in nervous and Reproductive system.</p> <p>CO5 : Evaluate the digestive and urinary system in human body.</p>
<p style="text-align: center;">Course:Bio Signal Processing Laboratory-[BM4161]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Develop an algorithm for preprocessing of biosignals.</p> <p>CO2 : Apply denoising and analyze the spectral characteristics of biosignals</p> <p>CO3 : Analyze the biosignals in virtual instrumentation platform</p>
<p style="text-align: center;">Course:Bio Medical Instrumentation and Equipments-[MX4101]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Recall basic medical terms, physical values and describe the origin of bio-potentials and explain the role of bio-potential electrodes.</p> <p>CO2 : Explain the type of recorders to record biosignals.</p> <p>CO3 : Demonstrate the working of bio-amplifiers, bio-potential signals and their recording.</p> <p>CO4 : Analyze the measuring techniques used for blood flow and blood cell counting</p> <p>CO5 : Evaluate biochemical sensors used for biochemical measurements</p>
<p style="text-align: center;">Course:Embedded Systems and Internet of Things for Medical Application-[MX4102]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain ARM processor and Building Blocks of Embedded Systems.</p> <p>CO2 : Explain the data acquisition system.</p> <p>CO3 : Demonstrate sensor interfacing with Arduino.</p> <p>CO4 : Analyze various IoT protocols in healthcare.</p> <p>CO5 : Test various applications in healthcare using IOT based approach.</p>
<p style="text-align: center;">Course:Research Methodology and IPR-[RM4151]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the research problem and Literature review.</p> <p>CO2 : Identify the appropriate tool for analysis based on the nature of data.</p> <p>CO3 : Develop a well-structured research paper and scientific presentations.</p>

CO4 : Interpret various IPR Components and process of filing.
CO5 : Evaluate the patent law and procedural mechanism in obtaining a patent.
Course:Biomedical Instrumentation Laboratory-[MX4111]
Upon completion of the course, the students will.../ will be able to...
CO1 : Design an preamplifier circuit For ECG,EEG and EMG
CO2 : Design an amplifier circuit for EOG and EEG circuit.
CO3 : Design an optical Isolator
CO4 : Analyze non-electrical parameters using suitable sensors/transducers.
CO5 : Evaluate PCB layout for any bio amplifier.
MA4152 Advanced Applied Mathematics
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts of matrices, , random variables, random processes, solutions of LPP and Fourier transforms.
CO2 : Explain the decomposition techniques, singular values, probability distributions
CO3 : Interpret the Poisson processes, formulation of LPP and Fourier transform boundary value problems techniques.
CO4 : Utilize matrix theory, standard distributions and random processes in engineering disciplines.
CO5 : Solve linear programming problems, boundary value problems using Fourier transforms in engineering applications.

Semester:3

Course:Wearable Devices and Technologies-[BM5075]
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the basics of wearable system.
CO2 : Identify smart sensors to monitor vital parameters.
CO3 : Demonstrate wireless body area networks.
CO4 : Apply classification algorithms.
Course:Hospital / Biomedical Industry Training-[BM5361]
Upon completion of the course, the students will.../ will be able to...
CO1 : Recall the components used internally to construct biomedical equipment
CO2 : Develop and gain knowledge on the machines for diagnosing medical problems
CO3 : Identify and practice the steps to Install, adjust, maintain, repair, or provide technical support for biomedical equipment
CO4 : Evaluate the safety and effectiveness of biomedical equipment and other personnel on the proper use of biomedical equipment
Course:Advanced Neural Computing-[MX5072]
Upon completion of the course, the students will.../ will be able to...
CO1 : Demonstrate an understanding of the principles of Neural Networks and a knowledge of their main areas of application.
CO2 : Design, implement and analyze the behavior of simple neural networks.
CO3 : Apply neural network to solve real-world problems
CO4 : Analyze the basic operations of Genetic Algorithm
CO5 : Analyze different Neural Computing techniques
Course:Human Assist Devices-[MX5301]

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the importance of Heart lung machine and artificial Heart.</p> <p>CO2 : Explain the characteristics of cardiac assist devices and related issues.</p> <p>CO3 : Demonstrate the principle of dialyzer.</p> <p>CO4 : Apply the prosthetic and orthotic devices for rehabilitation.</p> <p>CO5 : Analyze the function of ventilator and hearing aids</p>
<p>Course:Project Work Phase I-[MX5311]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Demonstrate a sound technical knowledge of their selected project topic.</p> <p>CO2 : Identify engineering solutions to complex problems utilizing a systems approach.</p> <p>CO3 : Determine the problem, formulation and solution.</p> <p>CO4 : Analyze with engineers and the community at large in written and oral forms.</p> <p>CO5 : Formulate the ability to make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.</p>

Semester:4

<p>Course:Prject Work (Phase II)-[MX5411]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Demonstrate a sound technical knowledge of their selected project topic.</p> <p>CO2 : Identify engineering solutions to complex problems utilizing a systems approach.</p> <p>CO3 : Determine the problem, formulation and solution.</p> <p>CO4 : Analyze with engineers and the community at large in written and oral forms.</p> <p>CO5 : Formulate the ability to make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.</p>

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:B.E. Electrical and Electronics Engg.

Semester:1

<p align="center">Course: Physics and Chemistry Laboratory-[BS3171]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identify the moduli of elasticity used in day to day engineering applications.</p> <p>CO2 : Indicate the optical parameters of visible and laser sources</p> <p>CO3 : Make use of the bandgap of semiconducting materials.</p> <p>CO4 : Detect the water quality parameters (DO, Chloride, Cu content, Alkalinity and hardness) of the given water sample.</p> <p>CO5 : Examine quantitatively the metals (Fe, Na, Cu) in the given sample using potentiometer & flame photometer and the conductance of the solution by conductometric titrations.</p>
<p align="center">Course: Engineering Physics-[PH3151]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Recall the basics of mechanics and electromagnetic waves.</p> <p>CO2 : Relate the concepts of oscillations, lasers and quantum physics.</p> <p>CO3 : Explain the theories of centre of mass, moment of inertia, properties of electromagnetic waves and Maxwell's equations.</p> <p>CO4 : Summarize the principles of sound waves, light waves and quantum mechanics.</p> <p>CO5 : Utilize the applications of mechanics, electromagnetic waves, oscillations, optics and quantum mechanics.</p>
<p align="center">Course: Problem Solving and Python Programming-[GE3151]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Develop algorithmic solutions to simple computational problems.</p> <p>CO2 : Develop and execute simple Python programs.</p> <p>CO3 : Write simple Python programs using conditionals, loops for solving problems and decompose a Python program into functions.</p> <p>CO4 : Represent compound data using Python lists, tuples, dictionaries etc.</p> <p>CO5 : Read and write data from/to files in Python programs</p>
<p align="center">Course: Problem Solving and Python Programming Laboratory-[GE3171]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Write, test and debug simple Python Programs</p> <p>CO2 : Implement Python Programs with conditionals and looping statements</p> <p>CO3 : Develop Python Programs using functions</p> <p>CO4 : Use Python lists, tuples, dictionaries for representing compound data</p> <p>CO5 : Read and write data from/to files and write programs using python packages</p>
<p align="center">Course: Professional English - I-[HS3151]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : listen and comprehend complex academic texts</p> <p>CO2 : read and infer the denotative and connotative meanings of technical texts</p> <p>CO3 : write definitions, descriptions, narrations and essays on various topics</p> <p>CO4 : speak fluently and accurately in formal and informal communicative contexts</p> <p>CO5 : express their opinions effectively in both oral and written medium of communication</p>

Engineering Chemistry – CY3151
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1: Define the concepts of water quality parameters, nano materials and composites</p> <p>CO2: Recall the types of fuels and energy resources</p> <p>CO3: Outline suitable methods for water treatment and synthesis of nano materials.</p> <p>CO4: Illustrate the properties of nano materials as well as fuel analysis</p> <p>CO5: Apply the concept of composites, fuel analysis and energy resources for material selection requirements and also in energy sectors</p>
<p>Course: Matrices and Calculus-[MA3151]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basic concepts of matrices, limit and continuity of a function, differentiation and integration.</p> <p>CO2 : Explain the properties of matrices and nature of the quadratic forms.</p> <p>CO3 : Interpret the techniques of differentiation, partial differentiation and integration.</p> <p>CO4 : Apply diagonalization of matrices in quadratic form and use C-H theorem to get the inverse of matrices.</p> <p>CO5 : Solve problems on differentiation, partial differentiation and integration using different rules.</p>

Semester:2

Course:Basic Civil and Mechanical Engineering-[BE3255]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understanding profession of civil and Mechanical engineering.</p> <p>CO2 : Summarise the planning of building, infrastructure and working of machineries.</p> <p>CO3 : Apply the knowledge gain in respective disciplines.</p> <p>CO4 : Illustrate the ideas of civil and Mechanical Engineering applications.</p> <p>CO5 : Explain the material, structures, machines and energy.</p>
<p style="text-align: center;">Course:Electric Circuit Analysis-[EE3251]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Analyze electric circuit's behavior using circuit laws.</p> <p>CO2 : Apply mesh analysis/ nodal analysis / network theorems to determine behavior of the given DC and AC circuit</p> <p>CO3 : Compute the transient response of first order and second order systems to step and sinusoidal input</p> <p>CO4 : Analyze the frequency response of series and parallel RLC circuits and the behavior of magnetically coupled circuits</p> <p>CO5 : Compute power, line/ phase voltage and currents of the given three phase circuit</p>
<p style="text-align: center;">Course:Electric Circuits Laboratory-[EE3271]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Verify fundamental electrical laws using simulation and experimental methods.</p> <p>CO2 : Verify electrical network theorems using simulation and experimental methods.</p> <p>CO3 : Analyze the transient behavior of RL, RC and RLC circuits using simulation and experimental methods.</p> <p>CO4 : Analyze the frequency response of series and parallel RLC circuit using simulation and</p>

experimental methods.
CO5 : Analyze the performance of three phase circuit using simulation and experimental methods.

Course:Engineering Graphics-[GE3251]

Upon completion of the course, the students will.../ will be able to...
CO1 : Exposed to existing national standards related to technical drawings
CO2 : understand the given engineering drawings and interpret a three dimensional drawing
CO3 : Apply the fundamentals and standards in engineering drawing through drafting exercise of geometrical solids
CO4 : Identify the methods of development of surface of different solids and understand some of the hidden geometry of the cut object
CO5 : Analyze the three dimensional view of objects as perceived by human eye

Course:Engineering Practices Laboratory-[GE3271]

Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the fundamental concepts in Electrical Engineering
CO2 : Wire various electrical joints in common household electrical wiring work
CO3 : Assemble simple household equipments
CO4 : Solder and test simple electronic circuits
CO5 : Assemble and test simple electronic components on PCB

Course:Professional English - II-[HS3251]

Upon completion of the course, the students will.../ will be able to...
CO1 : To engage learners in meaningful language activities to improve their LSRW skills.
CO2 : To enhance learners awareness of general rules of writing for specific audiences.
CO3 : To help learners understand the purpose , audience, contexts of different types of writing.
CO4 : To develop analytical thinking skills for problem solving in communicative contexts.
CO5 : To demonstrate an understanding of job applications and interviews for internships and placements.

Course: Physics for Information Science-[PH3256]

Upon completion of the course, the students will.../ will be able to...
CO1 : Relate the electron transport properties of conductors, principles of semiconductors and magnetic properties of materials
CO2 : Recall the optical properties of materials, principles of nano devices and basics of quantum computing
CO3 : Summarize the classical and quantum concepts of conducting materials, semiconducting devices and magnetic materials.
CO4 : Illustrate the functioning of various optoelectronic and nano devices
CO5 : Identify the applications of semiconductor, magnetic, optical and quantum devices in engineering field

Course: Statistics and Numerical Methods-[MA3251]

Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concept of statistical tests, ANOVA, solution of equations, interpolation and ODE.
CO2 : Interpret the techniques of statistical tests and design of experiments.
CO3 : Explain the solution of equations, ODE, interpolation, differentiation and integration.
CO4 : Apply the concept of testing of hypothesis and experimental design in real life.

CO5 : Solve equations ODE, interpolation, differentiation and integration using numerical techniques.

Semester:3

Course: Electronics Laboratory-[EC8311]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Examine the characteristics of semiconductor devices
- CO2 : Design the common emitter amplifier, differential amplifiers and oscillators and examine their frequency response characteristics
- CO3 : Examine the characteristics of light activated devices and passive filters
- CO4 : Construct a rectifier circuit using diode and illustrate the results with and without filter
- CO5 : Determine frequency and phase of the given signal using CRO
- CO6 : Simulate oscillator circuits using simulink and develop a mini project.

Course: Electronics Laboratory-[EC8311]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Examine the characteristics of semiconductor devices
- CO2 : Design the common emitter amplifier, differential amplifiers and oscillators and examine their frequency response characteristics
- CO3 : Examine the characteristics of light activated devices and passive filters
- CO4 : Construct a rectifier circuit using diode and illustrate the results with and without filter
- CO5 : Determine frequency and phase of the given signal using CRO
- CO6 : Simulate oscillator circuits using simulink and develop a mini project.

Course: Electron Devices and Circuits-[EC8353]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Understand the characteristics of diodes.
- CO2 : Compare the characteristics of different transistors and thyristors.
- CO3 : Analyze the gain and frequency response of BJT and MOSFET amplifiers.
- CO4 : Summarize the characteristics of multistage and differential amplifiers.
- CO5 : Develop the frequency of oscillation for different oscillators.

Course: Electrical Machines - I-[EE8301]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Outline the Magnetic circuits and its effects
- CO2 : Examine the performance of transformer and its applications
- CO3 : Illustrate the different methods of energy conversion in electromechanical system
- CO4 : Demonstrate the Performance and control of DC Machine
- CO5 : Analyze the performance of DC Machine

Course: Digital Logic Circuits-[EE8351]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Demonstrate the different number system and logic families.
- CO2 : Apply K-maps for the implementation of combinational circuits.
- CO3 : Solve synchronous sequential circuits by using flip flops.
- CO4 : Solve asynchronous sequential circuits by using flip flops and explain about different PLDs.
- CO5 : Write VHDL coding for Combinational and Sequential circuits.

Course: Electromagnetic Theory-[EE8391]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the different coordinate systems, laws, theorems and characterizing parameters.</p> <p>CO2 : Explain the concepts about electrostatic fields, electrical potential, energy density and their applications.</p> <p>CO3 : Explain the concepts in magneto static fields, magnetic flux density, vector potential and its applications</p> <p>CO4 : Derive Maxwell's equations for electromagnetic fields</p> <p>CO5 : Derive Electromagnetic wave equation for different media and Poynting theorem.</p>
Course: Power Plant Engineering-[ME8792]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>Understand Thermal Power Plant Operation, turbines, different types of high pressure</p> <p>CO1 : boilers including supercritical and supercharged boilers and Fluidized bed combustion systems</p> <p>CO2 : Understand the working of gas power Cycle and Combined Cycle Power Plants</p> <p>CO3 : Remember the working of Nuclear power plant and its safety measures.</p> <p>CO4 : Understand the construction and working of hydroelectric power plant.</p> <p>CO5 : Understand Power Plant Economics, environmental and safety aspects.</p>
Course: Transforms and Partial Differential Equations-[MA8353]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the formation of PDE and difference equation.</p> <p>CO2 : Find the fourier series of a given function satisfying Dirichlet's condition</p> <p>CO3 : Solve first,second order homogeneous and nonhomogeneous PDE using standard methods and fourier series method.</p> <p>CO4 : Determine fourier transform and z-Transform of standard functions</p> <p>CO5 : Apply z-Transforms to solve difference equation and fourier transform to solve definite integrals</p>

Semester:4

Course: Electrical Machines - II-[EE8401]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Apply the performance of synchronous generator.</p> <p>CO2 : Analyze the characteristics and performance of synchronous motor.</p> <p>CO3 : Analyze the performance of three phase induction motor.</p> <p>CO4 : Investigate the different Starting and speed control of three-phase induction motors.</p> <p>CO5 : Apply the principle of operation and performance of single phase induction motors and special machines</p>
Course: Transmission and Distribution-[EE8402]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Calculate the transmission line parameters for different configurations</p> <p>CO2 : Evaluate the performance of transmission lines.</p> <p>CO3 : Explain the mechanical design of overhead transmission lines.</p> <p>CO4 : Analyze various types of insulators and Underground Cables</p> <p>CO5 : Analyze AC and DC distribution systems</p>
Course: Measurements and Instrumentation-[EE8403]
<p>Upon completion of the course, the students will.../ will be able to...</p>

CO1 : Understand the Basic functional elements of instrumentation
CO2 : Understand the Fundamentals of electrical and electronic instruments.
CO3 : Compare and contrast the various measurement techniques
CO4 : Interprets various storage and display devices.
CO5 : Understand the concepts of various transducers and the data acquisition systems

Course: Electrical Machines Laboratory - II-[EE8411]

Upon completion of the course, the students will.../ will be able to...

CO1 : Examine the performance of alternator.
CO2 : Analyze the performance characteristics of synchronous motor
CO3 : Analyze the performance characteristics of single phase induction motors.
CO4 : Examine the performance characteristics of three phase Induction motors.
CO5 : Explain the working principle of starters used in three phase induction Machine.

Course: Linear Integrated Circuits and Applications-[EE8451]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the fabrication processes of Integrated Circuits
CO2 : Analyze the characteristics of Op-Amp
CO3 : Analyze the application of Op-amp based circuits
CO4 : Design special ICs
CO5 : Design circuits using application ICs

Course: Linear and Digital Integrated Circuits Laboratory-[EE8461]

Upon completion of the course, the students will.../ will be able to...

CO1 : Construct Combinational Circuits
CO2 : Design and implement the applications of flip flops.
CO3 : Determine the voltage gain of basic op-amps
CO4 : Design and implement Applications ICs.
CO5 : Construct a variable Voltage regulator using LM 317.

Course: Control Systems-[IC8451]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop mathematical model of physical system
CO2 : Experiment with time domain response
CO3 : Experiment with frequency domain response
CO4 : Construct Compensator for system stability
CO5 : Experiment with state space models

Course: Numerical Methods-[MA8491]

Upon completion of the course, the students will.../ will be able to...

CO1. Find numerical solution of equations, matrices, ODE and PDE
CO2. Explain the concepts of numerical differentiation and integration
CO3. Interpret the techniques of interpolation, iteration and pivoting
CO4. Identify numerical techniques of differentiation, integration and interpolation for Engineering problems
CO5. Solve algebraic equations, transcendental equations, ODE and PDE using numerical methods.

Course: Technical Seminar-[EE8412]

Upon completion of the course, the students will.../ will be able to...

CO1 : review technological developments
CO2 : Present technical reports

CO3 : face the placement interviews
 CO4 : communicate efficiently
 CO5 : Write technical reports

Semester:5

Course: Object Oriented Programming Laboratory-[CS8383]
Upon completion of the course, the students will.../ will be able to...
CO1 : Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.
CO2 : Develop and implement Java programs with array list and exception handling.
CO3 : Develop and implement Java programs with multithreading.
CO4 : Design applications using file processing and generic programming.
CO5 : Design applications using swings and event handling.
Course: Object Oriented Programming-[CS8392]
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the basic concepts of OOP and fundamentals in Java
CO2 : Explain the advanced programming concepts of Java
CO3 : Develop simple and advanced Java applications using exceptions, I/O streams, threads and generics classes.
CO4 : Analyze simple and advanced Java programming concepts.
CO5 : Design interactive Java programs using exceptions and swings
Course: Power System Analysis-[EE8501]
Upon completion of the course, the students will.../ will be able to...
CO1 : Model power system components based on per unit standards.
CO2 : Apply Numerical methods to solve power system load flow problems.
CO3 : Determine fault current and post fault parameters for symmetrical fault.
CO4 : Determine fault current and post fault parameters for unsymmetrical faults.
CO5 : Analyze the stability of a power system.
Course: Control and Instrumentation Laboratory-[EE8511]
Upon completion of the course, the students will.../ will be able to...
CO1 : Analyze the stability of control systems using MATLAB
CO2 : Analyze the dynamics of sensors and transducers
CO3 : Simulate the linear systems using MATLAB and SCILAB
CO4 : Calculate the unknown values of passive components using bridges
CO5 : Analyze the signal conditioning circuits
Course: Microprocessors and Microcontrollers-[EE8551]
Upon completion of the course, the students will.../ will be able to...
CO1 : Illustrate the architecture and timing diagram of 8085 Processor
CO2 : Apply 8085 instruction set to program a 8085 microprocessor
CO3 : Illustrate the architecture and timing diagram of 8051 microcontroller
CO4 : Illustrate the architecture peripheral interfacing devices
CO5 : Apply 8051 instruction set to program a 8051 microcontroller
Course: Power Electronics-[EE8552]
Upon completion of the course, the students will.../ will be able to...

CO1 :Explains the switching characteristics and control circuits of power semiconductor devices
 CO2 :Analyze the working and performances of phase controlled rectifiers.
 CO3 :Compute the performance parameters of DC-DC converter.
 CO4 :Explains the working and its modulation techniques of inverters.
 CO5 :Understand the working and performance of AC to AC converter.

Course: Digital Signal Processing-[EE8591]

Upon completion of the course, the students will.../ will be able to...
 CO1 : Acquire knowledge on Signals and systems & their mathematical representation
 CO2 : Understand the importance of Fourier transform, digital filters and DS Processors.
 CO3 : Analyze the transformation techniques & their computation.
 CO4 : Understand the types of filters and their design for digital implementation.
 CO5 : Acquire knowledge on programmability digital signal processor & quantization effects

Course: Professional Communication-[HS8581]

Upon completion of the course, the students will.../ will be able to...
 CO1 : Make effective presentations
 CO2 : Participate confidently in group discussions
 CO3 : Attend job interviews and be successful in them
 CO4 : Develop adequate soft skills required for the work place
 CO5 : Develop a long term career plan -making career changes

Course: Basics of Biomedical Instrumentation-[OMD551]

Upon completion of the course, the students will.../ will be able to...
 CO1 :Understand bio potential generation and its propagation
 CO2 :Determine bio signal characteristics and electrode placement for physiological recording
 CO3 :Understand the concepts of bio amplifier for physiological recording
 CO4 :Understand measurement techniques for non-electrical physiological parameters.
 CO5 :Understand different biochemical measurement techniques

Semester:6

Course:Power Quality-[EE8006]

Upon completion of the course, the students will.../ will be able to...
 CO1 : Understand the sources, causes and effects of power quality issues.
 CO2 : Analyze the sources of voltage sags, swell and its mitigation
 CO3 : Analyze the sources of harmonics in power system
 CO4 : Analyze passive filters and passive power compensators
 CO5 : Analyze the various methods of power quality monitoring

Course: Solid State Drives-[EE8601]

Upon completion of the course, the students will.../ will be able to...
 CO1 :Explain the steady state operation and transient dynamics of a motor load system.
 CO2 :Analyze the operation of the converter/chopper fed dc drive, both qualitatively and quantitatively.
 CO3 :Explain the operation and performance of induction motor drives.
 CO4 :Explain the operation and performance of synchronous motor drives.
 CO5 :Analyze and design current and speed controllers for a closed loop solid state DC motor drive.

Course: Protection and Switchgear-[EE8602]

Upon completion of the course, the students will.../ will be able to...

CO1 : Summarize the abnormal operating conditions of the apparatus and understand the need of protective schemes.

CO2 : Illustrate the characteristics and functions of relays and its protection schemes.

CO3 : Outline static and numerical relays

CO4 : Compare the performance of static and numerical relays.

CO5 : Interpret circuit breakers in the protection schemes.

Course: Embedded Systems-[EE8691]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the various components of embedded system.

CO2 : Illustrate the types of serial bus communication interfaces in embedded system.

CO3 : Explain the different approaches of embedded product development.

CO4 : Understand the concept of Real Time Operating System and its scheduling.

CO5 : Apply the concepts of embedded system to develop an embedded product.

Course:Mini Project-[EE8611]

Upon completion of the course, the students will.../ will be able to...

CO1 : Apply the fundamentals of mathematics, science and engineering knowledge to identify, formulate, design and investigate complex engineering problems of electrical and electronics engineering and allied applications.

CO2 : Apply appropriate techniques and modern engineering hardware and software tools in electrical and electronics engineering and allied applications.

CO3 : Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues with societal and environmental context in the field of electrical and electronics engineering and allied applications.

CO4 : Function effectively as an individual and as a member or leader in diverse teams in multidisciplinary settings and make effective presentation, and communicate effectively.

CO5 : Demonstrate the understanding of the engineering and management principles in multidisciplinary environments to engage in lifelong learning in the broadest context of technological change.

Course: Power Electronics and Drives Laboratory-[EE8661]

Upon completion of the course, the students will.../ will be able to...

CO1 : Design and generate the gate pulse using R,RC AND UJT FIRING CIRCUITS

CO2 : Examine the characteristics of various power semiconductor devices

CO3 : Examine the characteristics of power electronics converter and controller circuits

CO4 : Simulate the characteristics of power electronic converters and controllers using MATLAB/SCILAB software

CO5 : Examine the characteristics of permanent magnet brushless DC motor

Course: Microprocessors and Microcontrollers Laboratory-[EE8681]

Upon completion of the course, the students will.../ will be able to...

CO1 : Execute ALP using 8085 microprocessors to perform basic arithmetic, code conversion and sorting operations.

CO2 : Demonstrate the interfacing of 8085 with A/D and D/A converter.

CO3 : Demonstrate the interfacing of 8085 with traffic light and I/O Ports.

CO4 : Execute simple ALP programs and demonstrate the interfacing of 8051 and 8085 with stepper motor.

CO5 : Demonstrate the interfacing of A/D, D/A converter with 8085 processor and hardware development.
Course: Intellectual Property Rights-[GE8075]
Upon completion of the course, the students will.../ will be able to...
CO1 : Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
CO2 : Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development. Be familiar with the processes of Intellectual Property Management (IPM) and various
CO3 : approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy. Identify activities and constitute IP infringements and the remedies available to the IP
CO4 : owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development.
CO5 : Ability to manage intellectual property portfolio to enhance the value of firm
Course: Intellectual Property Rights-[GE8075]
Upon completion of the course, the students will.../ will be able to...
CO1 : Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
CO2 : Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development. Be familiar with the processes of Intellectual Property Management (IPM) and various
CO3 : approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy. Identify activities and constitute IP infringements and the remedies available to the IP
CO4 : owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development.
CO5 : Ability to manage intellectual property portfolio to enhance the value of firm

Semester: 7

Course: High Voltage Engineering-[EE8701]
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand transients and various types of over voltages in power system
CO2 : Understand the breakdown mechanisms of various dielectrics
CO3 : Understand the various generation methods of high voltages and currents
CO4 : Understand the various measurement methods of high voltages and currents
CO5 : Test power apparatus and insulation coordination
Course: Power System Operation and Control-[EE8702]
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the need for Power System Operation and Control
CO2 : Understand Real Power-Frequency interaction
CO3 : Understand Reactive Power-Voltage interaction
CO4 : Solve Economic dispatch and unit commitment problems
CO5 : Understand SCADA and its application for real time operation

Course: Renewable Energy Systems-[EE8703]
Upon completion of the course, the students will.../ will be able to...
CO1 : Interpret to create awareness and future role of Renewable Energy Sources and technologies.
CO2 : Illustrate the characteristics and functions of wind energy harvesting techniques.
CO3 : Investigate the various power harvesting methods and the applications of solar systems.
CO4 : Outline construction and operation of biomass, geothermal and hydro power plant.
CO5 : Understand the concept about tidal energy, ocean thermal energy conversion, fuel cell, energy storage and hybrid energy systems.
Course: Power System Simulation Laboratory-[EE8711]
Upon completion of the course, the students will.../ will be able to...
CO1 : Develop SCILAB programs to solve various power system problems.
CO2 : Evaluate the performance of power systems using computational tools.
CO3 : Create the one line diagrams of power systems in Power world simulator
CO4 : Summarize the results of the program and print necessary results.
CO5 : Create analysis reports of a power system in Power World Simulator.
Course: Renewable Energy Systems Laboratory-[EE8712]
Upon completion of the course, the students will.../ will be able to...
CO1 : Analyse the performance of Solar, Wind and Fuel Cell using hardware setups.
CO2 : Investigate power harvesting technique using Renewable Energy Sources.
CO3 : Investigate the Wind and Solar hybrid energy systems.
CO4 : Design and simulate the various Renewable energy sources.
CO5 : Analyze the current and possible future application of Renewable energy sources.
Course: Disaster Management-[GE8071]
Upon completion of the course, the students will.../ will be able to...
CO1 : To provide students an exposure to disasters, their significance and types.
CO2 : To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
CO3 : To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
CO4 : To enhance awareness of institutional processes in the country
CO5 : To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity
Course: Total Quality Management-[GE8077]
Upon completion of the course, the students will.../ will be able to...
CO1 : Outline the Dimensions and Barriers regarding with Quality.
CO2 : Illustrate the TQM Principles.
CO3 : Demonstrate Tools utilization for Quality improvement.
CO4 : Explain the various types of Techniques are used to measure Quality.
CO5 : Apply various Quality Systems and Auditing on implementation of TQM.
Course: Signals and Systems-[OEC753]
Upon completion of the course, the students will.../ will be able to...
CO1 : Illustrate the properties of signals and systems.
CO2 : Apply Fourier series, Fourier Transform and Laplace transform for continuous time signals and systems.
CO3 : Analyze continuous time LTI system using Fourier and Laplace transforms.
CO4 : Characterize the effects of discrete time signals using DTFT and Z-transform.

CO5 : Design recursive and non-recursive discrete and continuous time systems

Semester:8

Course: Electric Energy Generation, Utilization and Conservation-[EE8015]

Upon completion of the course, the students will.../ will be able to...

CO1 : Summarize the importance of designing lighting system to improve its efficiency

CO2 : Understand electric connections for any domestic appliance like refrigerator and air conditioner.

CO3 : Compare the methods of industrial heating and welding

CO4 : Explain the types of electric supply system suitable for traction unit

CO5 : Realize the importance of energy efficient domestic electric power system

Course: Smart Grid-[EE8019]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop more understanding on the concepts of Smart Grid and its present developments

CO2 : Organize about different Smart Grid technologies.

CO3 : Identify to acquire knowledge about different smart meters and advanced Metering infrastructure.

CO4 : Appraise knowledge on power quality management in Smart Grids.

CO5 : Estimate more understanding on LAN, WAN and Cloud Computing for Smart Grid applications

Course: Project Work-[EE8811]

Upon completion of the course, the students will.../ will be able to...

CO1 : Identify specific problems and solve them

CO2 : Take up any challenging practical problems and find solution by formulating proper methodology

CO3 : Prepare reports for projects

CO4 : Face interviews and viva -voce examinations

CO5 : Understand the recent technologies used in Engineering

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:M.E. Power Electronics and Drives

Semester:1

<p style="text-align: center;">Course: Soft Computing Techniques-[PX4004]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Analyze the basics of soft computing techniques and also the supervised and unsupervised learning networks.</p> <p>CO2 : Examine various ANN architectures, algorithms and know their limitations.</p> <p>CO3 : Apply different operations on the fuzzy sets and the fuzzy logic systems.</p> <p>CO4 : Analyze various concepts in genetic algorithm.</p> <p>CO5 : Illustrate the different hybrid control schemes and PSO technique.</p>
<p style="text-align: center;">Course: Analysis of Electrical Machines-[PX4101]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Analyze the principles of electromechanical energy conversion and characteristics of DC motors</p> <p>CO2 : Illustrate the concepts related to the operation of AC machines.</p> <p>CO3 : Formulate the concepts of reference frame theory.</p> <p>CO4 : Analyze the induction machine model in both machine variable form and reference variable forms.</p> <p>CO5 : Analyze the synchronous machine model in machine variables form and reference variable form.</p>
<p style="text-align: center;">Course: Modeling and Design of SMPS-[PX4102]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Analyze the performance of Non-Isolated DC-DC converter</p> <p>CO2 : Analyze and design Isolated DC-DC converter using simulation tools.</p> <p>CO3 : Derive transfer function of different converters</p> <p>CO4 : Design controllers for DC-DC converters</p> <p>CO5 : Design magnetics for SMPS application</p>
<p style="text-align: center;">Course: Analog and Digital Controllers for PE Converters Laboratory-[PX4111]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identification of suitable analog and digital controller for the converter design.</p> <p>CO2 : Know the advantages of gate driver, sensing and protection circuits in power converters.</p> <p>CO3 : Hands on with different controller with strategies for design.</p> <p>CO4 : Design and testing the proper driving circuits and protection circuits.</p> <p>CO5 : Fabrication of analog and digital controllers for various real time applications.</p>
<p style="text-align: center;">Course: Analysis of Power Converters-[PX4151]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Acquire and apply knowledge of mathematics in power converter analysis</p> <p>CO2 : Model, analyze and understand power electronic systems and equipment.</p> <p>CO3 : Formulate, design and simulate phase controlled rectifiers for generic load and for machine loads</p> <p>CO4 : Design and simulate switched mode inverters for generic load and for machine loads</p>

CO5 : Select device and calculate performance parameters of power converters under various operating modes
Course: Research Methodology and IPR-[RM4151]
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the basic concepts of research process and research design
CO2 : Understand the data collection methods and sources for research
CO3 : Understand the data analysis and report writing techniques
CO4 : Understand the purpose of IPR and Role and responsibility of WIPO and WTO
CO5 : Understand the objectives, benefits, concept and features of patent
Course: Power Converters Laboratory-[PX4161]
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the switching behavior of Power Electronic Switches.
CO2 : Understand the mathematical model of power electronic system using simulation tools.
CO3 : Implement arduino/microcontroller for power electronic applications.
CO4 : Design and simulate various topologies of inverters and analyze their harmonic spectrum.
CO5 : Simulate three phase controlled rectifiers and isolated DC-DC converters using simulation tools.
Course: Applied Mathematics for Power Electronics Engineers-[MA4106]
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts of matrices, calculus, transforms and Fourier series.
CO2 : Explain the decomposition techniques and the boundary value problems.
CO3 : Interpret the Laplace, Z-transforms and Fourier series techniques in Electrical field.
CO4 : Solve boundary value problems and system of equations using matrix theory in electrical engineering problems.
CO5 : Apply transforms and series in engineering applications.

Semester:2

Course: Power Electronics for Renewable Energy System-[PX4005]
Upon completion of the course, the students will.../ will be able to...
CO1 : Analyze the impacts of renewable energy technologies on the environment and demonstrate them to harness electrical power.
CO2 : Select a suitable Electrical machine for Wind Energy Conversion Systems.
CO3 : Design the power converters such as AC-DC, DC-DC, and AC-AC converters for Solar energy systems.
CO4 : Design the power converters such as AC-DC, DC-DC, and AC-AC converters for Wind energy systems.
CO5 : Interpret the stand-alone, grid-connected, and hybrid renewable energy systems with MPPT.
Course: Power Quality-[PX4071]
Upon completion of the course, the students will.../ will be able to...
CO1 : Comprehend the consequences of Power Quality issues
CO2 : Understand the harmonic analysis of single phase and three phase systems supplying non-linear loads.
CO3 : Design passive filter for load compensation

CO4 : Explain active filters for load compensation
CO5 : Analyze the mitigation techniques using custom power devices such as distribution static compensator (DSTATCOM), dynamic voltage restorer (DVR) & UPQC.

Course: Analysis of Electrical Drives-[PX4201]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Acquire and apply knowledge of mathematics and converter/machine dynamics in Electrical engineering.
CO2 : Formulate, design, and simulate power supplies for generic load and for machine loads.
CO3 : Analyze, comprehend, design and simulate direct current motor based adjustable speed drives.
CO4 : Analyze, comprehend, design and simulate induction motor based adjustable speed drives.
CO5 : Design a closed loop motor drive system with controllers for the current and speed control operations.

Course: Special Electrical Machines-[PX4202]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Know the concepts related with stepper motor.
CO2 : Understand the working and various characteristics of switched reluctance machines
CO3 : Study the working principle and characteristics of permanent magnet brushless DC motors.
CO4 : Know the construction, working principles and characteristics of permanent magnet synchronous motor and synchronous reluctance motor
CO5 : Understand the features of axial flux machines in comparison with radial flux machines and to know the principles of axial flux machines

Course: Electric Vehicles and Power Management-[PX4251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the concept of electric vehicle and energy storage systems
CO2 : Construct the components of Electric Vehicle and Hybrid Electric Vehicle
CO3 : Explain the principles of power converters and electrical drives
CO4 : Explain the operation of storage systems such as battery and super capacitors
CO5 : Explain the various energy storage systems based on fuel cells and hydrogen storage

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:B.Tech. Information Technology

Semester:1

<p align="center">Course:Problem Solving and Python Programming-[GE3151]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Develop algorithmic solutions to simple computational problems.</p> <p>CO2 : Develop and execute simple Python programs</p> <p>CO3 : Develop simple Python programs using conditionals, loops for solving problems and decompose a Python program into functions</p> <p>CO4 : Describe compound data using Python lists, tuples, dictionaries etc</p> <p>CO5 : Implement Python programs to Read and write data from/to files.</p>
<p align="center">Course:Problem Solving and Python Programming Laboratory-[GE3171]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Write and execute simple Python programs.</p> <p>CO2 : Implement Python programs with conditional and looping statements</p> <p>CO3 : Develop python programs by defining functions and calling them</p> <p>CO4 : Use Python lists, tuples, dictionaries for representing compound data.</p> <p>CO5 : Read and write data from/to files and write their own programs using python packages.</p>
<p align="center">Course:Professional English - I-[HS3151]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Listen and Comprehend academic and complex academic texts.</p> <p>CO2 : Read and infer the denotative and connotative meanings of technical texts.</p> <p>CO3 : Write definitions, descriptions, narrations and essays on various topics.</p> <p>CO4 : Speak English fluently and accurately in formal and informal communicative contexts.</p> <p>CO5 : Express their opinions effectively in both oral and written medium of communication</p>
<p align="center">Course:Engineering Physics-[PH3151]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basics of mechanics and electromagnetic waves, hence improve their engineering knowledge</p> <p>CO2 : State the concepts of oscillations, optics, lasers and quantum physics to develop a strong foundational knowledge</p> <p>CO3 : Exemplify Centre of mass, Moment of inertia, properties of electromagnetic waves and Maxwell's equations</p> <p>CO4 : Summarize the principles of sound waves, light waves, laser and quantum mechanics Comprehend and apply various concepts of mechanics, electromagnetic waves,</p> <p>CO5 : oscillations, optics, lasers and quantum mechanics to enhance the development of society</p>
<p align="center">Course: Physics and Chemistry Laboratory-[BS3171]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identify the moduli of elasticity used in day to day engineering applications.</p> <p>CO2 : Indicate the optical parameters of visible and laser sources</p> <p>CO3 : Make use of the bandgap of semiconducting materials.</p>

CO4 :	Detect the water quality parameters (DO, Chloride, Cu content, Alkalinity and hardness) of the given water sample.
CO5 :	Examine quantitatively the metals (Fe, Na, Cu) in the given sample using potentiometer & flame photometer and the conductance of the solution by conductometric titrations.

Course: Engineering Physics-[PH3151]

Upon completion of the course, the students will.../ will be able to...	
CO1 :	Recall the basics of mechanics and electromagnetic waves.
CO2 :	Relate the concepts of oscillations, lasers and quantum physics.
CO3 :	Explain the theories of centre of mass, moment of inertia, properties of electromagnetic waves and Maxwell's equations.
CO4 :	Summarize the principles of sound waves, light waves and quantum mechanics.
CO5 :	Utilize the applications of mechanics, electromagnetic waves, oscillations, optics and quantum mechanics.

Engineering Chemistry – CY3151

Upon completion of the course, the students will.../ will be able to...	
CO1:	Define the concepts of water quality parameters, nano materials and composites
CO2:	Recall the types of fuels and energy resources
CO3:	Outline suitable methods for water treatment and synthesis of nano materials.
CO4:	Illustrate the properties of nano materials as well as fuel analysis
CO5:	Apply the concept of composites, fuel analysis and energy resources for material selection requirements and also in energy sectors

Course: Matrices and Calculus-[MA3151]

Upon completion of the course, the students will.../ will be able to...	
CO1 :	Define the basic concepts of matrices, limit and continuity of a function, differentiation and integration.
CO2 :	Explain the properties of matrices and nature of the quadratic forms.
CO3 :	Interpret the techniques of differentiation, partial differentiation and integration.
CO4 :	Apply diagonalization of matrices in quadratic form and use C-H theorem to get the inverse of matrices.
CO5 :	Solve problems on differentiation, partial differentiation and integration using different rules.

Semester:2

Course:Basic Electrical and Electronics Engineering-[BE3251]

Upon completion of the course, the students will.../ will be able to...	
CO1 :	Compute the electric circuit parameters for simple problems
CO2 :	Demonstrate the working principle of electrical machines
CO3 :	Analyse the characteristic of analog devices
CO4 :	Analyse the basic concepts of digital electronics
CO5 :	Explain the operating principle of measuring instruments

Course:Programming in C-[CS3251]

Upon completion of the course, the students will.../ will be able to...	
CO1 :	Explore the basic concepts in C programming, searching and sorting algorithms.
CO2 :	Use C programming constructs for solving simple computational problems.
CO3 :	Analyse the performance of searching and sorting algorithms.

- CO4 : Evaluate and Review the C programs.
 CO5 : Develop applications in C using basic, derived, user-defined data types, pointers, functions and file concepts

Course:Statistics and Numerical Methods-[MA3251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define the basic concept of Statistics.
 CO2 : Apply the experimental concept for various blocks.
 CO3 : Apply and find the numerical solution of Equations.
 CO4 : Apply the Interpolation concept to the given experimental data.
 CO5 : Describe the numerical solution of first-order ODE.

Course:Engineering Graphics-[GE3251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Expose to existing national standards related to technical drawings
 CO2 : Describe the given Engineering drawing and interpret a three dimensional drawing
 CO3 : Apply the fundamentals and standards in engineering drawing through drafting exercises of geometrical solids
 CO4 : Identify methods of development of surfaces of different solids and understand some of the hidden geometry of the cut object
 CO5 : Analyze the three dimensional view of objects as perceived by the human eye

Course:Engineering Practices Laboratory-[GE3271]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe the basic electrical elements.
 CO2 : Identify the switches.
 CO3 : illustrate house wiring.
 CO4 : Identify basic electronic elements.
 CO5 : Describe PCB.

Course:Professional English - II-[HS3251]

Upon completion of the course, the students will.../ will be able to...

- CO1 : To engage learners in meaningful language activities to improve their LSRW skills.
 CO2 : To enhance learners awareness of general rules of writing for specific audiences
 CO3 : To help learners understand the purpose , audience, contexts of different types of writing.
 CO4 : To develop analytical thinking skills for problem solving in communicative contexts.
 CO5 : To demonstrate an understanding of job applications and interviews for internships and placements.

Course: Physics for Information Science-[PH3256]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Relate the electron transport properties of conductors, principles of semiconductors and magnetic properties of materials
 CO2 : Recall the optical properties of materials, principles of nano devices and basics of quantum computing
 CO3 : Summarize the classical and quantum concepts of conducting materials, semiconducting devices and magnetic materials.
 CO4 : Illustrate the functioning of various optoelectronic and nano devices
 CO5 : Identify the applications of semiconductor, magnetic, optical and quantum devices in engineering field

Semester:3

Course:Digital Principles and System Design-[CS8351]
Upon completion of the course, the students will.../ will be able to... CO1 : Apply arithmetic operations in any number system and simplify the Boolean expression using K-map. CO2 : Design and analyze combinational circuits. CO3 : Design the synchronous and asynchronous sequential circuits. CO4 : Analyze the synchronous and asynchronous sequential circuits. CO5 : Implement memory arrays using programmable logic devices.
Course:Data Structures Laboratory-[CS8381]
Upon completion of the course, the students will.../ will be able to... CO1 : Implement List ADT, Stack ADT, Queue ADT CO2 : Implement Binary Tree, Binary Search Tree, AVL Tree and heap using Priority Queue CO3 : Implement graph representation and graph traversal CO4 : Implement searching and sorting algorithms CO5 : Implement hashing
Course:Digital Systems Laboratory-[CS8382]
Upon completion of the course, the students will.../ will be able to... CO1 : Implement simplified combinational circuits using basic logic gates CO2 : Implement combinational circuits using MSI devices CO3 : Implement sequential circuits like registers and counters CO4 : Implement asynchronous sequential circuits. CO5 : Design combinational and sequential circuits using HDL
Course:Object Oriented Programming Laboratory-[CS8383]
Upon completion of the course, the students will.../ will be able to... CO1 : Explain the concepts of classes, packages, interfaces, arraylist, exception handling and file processing CO2 : Apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing CO3 : Apply the concepts of multithreading to develop concurrent programs. CO4 : Create applications using file processing, generic programming and event handling. CO5 : Design interactive applications using Graphics packages.
Course:Data Structures-[CS8391]
Upon completion of the course, the students will.../ will be able to... CO1 : Implement the list ADT and apply for complex engineering issues. CO2 : Implement stack and queue ADT for having a high level of understanding. CO3 : Implement heap, search tree data structures. CO4 : Analyse graph data structures. CO5 : Apply searching, sorting and hashing techniques.
Course:Object Oriented Programming-[CS8392]
Upon completion of the course, the students will.../ will be able to... CO1 : Describe OOP concepts and characteristics in Java CO2 : Apply the principles of packages, inheritance and interfaces to write java programs. CO3 : Develop Java applications using exceptions and I/O streams CO4 : Develop Java applications with threads and generics classes

CO5 : Develop interactive Java applications using graphics packages.
Course:Analog and Digital Communication-[EC8394]
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply analog communication techniques
CO2 : Describe the data and pulse communication techniques
CO3 : Apply digital communication techniques
CO4 : Analyze Source and Error Control Coding
CO5 : Summarize multi user radio communication systems
Course:Interpersonal Skills / Listening & Speaking-[HS8381]
Upon completion of the course, the students will.../ will be able to...
CO1 : Listen and respond appropriately.
CO2 : Participate in Group Discussion.
CO3 : Make effective presentation
CO4 : Speak Clearly with proper stress and intonation
CO5 : Participate Confidently and appropriately in conversation both formal and informal.
Air Pollution and Control Engineering - OCE551
CO1: Define the nature and characteristics of air pollution, noise pollution
CO2: Demonstrate indoor air pollution control devices
CO3: Explain and solve air and noise pollution problems
CO4: Make use of air pollution control equipments
CO5: Construct stacks and particulate air pollution control devices
MA3354 / Discrete Mathematics
Upon completion of the course, the students will.../ will be able to...
CO1: Define the basic terminologies of logic and proofs, combinatorics, graph theory, algebraic structures, lattices and boolean algebra.
CO2: Interpret the techniques of logic and proofs, combinatorics & graphs.
CO3: Explain the properties algebraic structures, lattices and boolean algebra.
CO4: Utilize mathematical logic, combinatorial counting principles and graph model for solving network connectivity related problems in real life.
CO5: Apply algebraic ideas and boolean laws in developing cryptograph techniques.

Semester:4

Course:Design and Analysis of Algorithms-[CS8451]
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the algorithm design techniques to solve the problems
CO2 : Explain the algorithm analysis techniques to assess the complexity of an algorithm
CO3 : Identify algorithm design techniques to solve real-world problems
CO4 : Solve problems using suitable algorithm design techniques
CO5 : Analyze the time and space complexity of different computing algorithms
Course:Computer Architecture-[CS8491]
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the functional units of digital computer and organization,operations, performance of MIPS processor.
CO2 : Describe the organization of different memory systems,parallel

<p>processing architectures,I/O processors and its communication.</p> <p>CO3 : Demonstrate the working of MIPS processor and control units with and without pipeline</p> <p>CO4 : Solve pocessor performance, cache performance, MIPS arithmetic and logical operations</p> <p>CO5 : Analyse eight great ideas,MIPS instruction set,multithreading,multiprocessing and parallel processing architectures</p>
<p>Course:Database Management Systems-[CS8492]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Analyse the modern and futuristic database applications based on size and complexity.</p> <p>CO2 : Draw ER model and Relational model to perform database design effectively.</p> <p>CO3 : Explain transaction concepts and locking mechanism.</p> <p>CO4 : Compare indexing strategies in different database systems.</p> <p>CO5 : Analyze advanced databases and traditional databases.</p>
<p>Course:Operating Systems-[CS8493]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define process, scheduling, memory, file systems and mobile OS.</p> <p>CO2 : Explain critical section, memory management, directory management and IO systems.</p> <p>CO3 : Elaborate interprocess communication, memory management schemes, file systems and different OS.</p> <p>CO4 : Apply the CPU scheduling, page replacement, deadlock detection and disk scheduling algorithms.</p> <p>CO5 : Analyze CPU scheduling, page replacement, disk scheduling algorithms and mobile OS.</p>
<p>Course:Environmental Science and Engineering-[GE8291]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Outline the importance of environmental education and ecosystem</p> <p>CO2 : Explain the environmental pollution and its prevention</p> <p>CO3 : Discuss the conservation of natural resources</p> <p>CO4 : Describe the social and environmental problems</p> <p>CO5 : Summarize the need to control population for sustainable development</p>
<p>Course:Probability and Statistics-[MA8391]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Demonstrate the basic concepts of probability, standard distributions, one and two dimensional random variables.</p> <p>CO2 : Explain sampling distributions, classifications of design of experiments and statistical quality control techniques used in engineering .</p> <p>CO3 : Apply the concept of probability and correlation in engineering disciplines.</p> <p>CO4 : Apply the concept of testing of hypothesis for small and large samples in real life problems.</p> <p>CO5 : Analyse the design of experiments in the field of agriculture and statistical quality control.</p>
<p>Course:Operating Systems Laboratory-[CS8461]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Implement UNIX commands and shell programming</p> <p>CO2 :Implement the various CPU Scheduling Algorithms</p> <p>CO3 :Implement Process Creation and Inter Process Communications</p> <p>CO4 :Implement Deadlock Avoidance and Deadlock Detection Algorithms</p>

CO5 :Implement Page Replacement Algorithms, File organization and File allocation strategies

Course:Advanced Reading and Writing-[HS8461]

Upon completion of the course, the students will.../ will be able...

CO1 : To write different types of essays.

CO2 : To write winning job applications.

CO3 : To read and evaluate texts critically.

CO4 : To display critical thinking in various professional contexts.

Course:Database Management Systems Laboratory-[CS8481]

Upon completion of the course, the students will.../ will be able to...

CO1 : Describe data definitions and data manipulation commands

CO2 : Apply the use of nested and join queries

CO3 : Apply the use triggers and constraints.

CO4 : Develop database connectivity with the use of a front-end and back-end tool.

CO5 : Design typical database applications

Semester:5

Course:Software Engineering-[CS8494]

Upon completion of the course, the students will.../ will be able to...

CO1 : Describe the software development and testing principles.

CO2 : Summarize the concepts of requirements analysis and software design.

CO3 : Compare different software process models and testing methods.

CO4 : Apply systematic procedures for software design and deployment.

CO5 : Explain project management, project cost estimation techniques.

Course:Networks Laboratory-[CS8581]

Upon completion of the course, the students will.../ will be able to...

CO1 : Implement protocols using TCP and UDP.

CO2 : Compare the performance of transport layer protocols.

CO3 : Analyze the performance of network protocols using simulation tools.

CO4 : Analyze network layer routing algorithms.

CO5 : Implement error correction codes

Course:Computer Networks-[CS8591]

Upon completion of the course, the students will.../ will be able to...

CO1 : Describe the seven layers of osi reference model in computer networks.

CO2 : Compute the performance of a network using packet drop and throughput.

CO3 : Analyze the data flow in network layer of computer networks

CO4 : Apply the routing algorithms in transport layer of the network

CO5 : Analyze the working principle of application layer protocols.

Course:Microprocessors and Microcontrollers Laboratory-[EC8681]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop ALP Programmes for fixed and Floating Point and Arithmetic operations.

CO2 : Summarize I/Os with the processor.

CO3 : Create waveforms using Microprocessors.

CO4 : Implement Programs in 8051.

CO5 : Differentiate simulator and Emulator.

Course:Microprocessors and Microcontrollers-[EC8691]
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the basic programs on 8086 microprocessor.
CO2 : Design Memory Interfacing circuits.
CO3 : Design and interface I/O circuits.
CO4 : Design 8051 microcontroller based systems.
CO5 : Implement 8051 microcontroller based systems.
Course:Web Technology-[IT8501]
Upon completion of the course, the students will.../ will be able to...
CO1 : Design simple web pages using markup languages like HTML and XHTML.
CO2 : Create dynamic web pages using DHTML and JavaScript.
CO3 : Implement server side scripts to process request from client side web pages.
CO4 : Develop web pages using JSP representing web data using XML.
CO5 : Describe various web services and the interaction between them.
Course:Web Technology Laboratory-[IT8511]
Upon completion of the course, the students will.../ will be able to...
CO1 : Design simple web pages using HTML and CSS.
CO2 : Create dynamic web pages using HTML and JavaScript.
CO3 : Generate server-side scripting to process request from the client.
CO4 : Develop JSP pages with web data representation using XML.
CO5 : Design web services using WSDL and SOAP.
Course:Algebra and Numeric Theory-[MA8551]
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the advanced algebraic techniques and number theory.
CO2 : Prove simple theorems about the statements in advanced algebraic techniques and Number theory
CO3 : Explain the fundamental concepts of advanced algebra and their role in modern mathematics.
CO4 : Utilize the basic notions of groups, rings, fields to get the solution of related problems in engineering.
CO5 : Apply integrated approach to number theory and abstract algebra in cryptography.
Course:Fundamentals of Nutrition-[OBT553]
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the various concepts of nutrition.
CO2 : Explain the steps involved in digestion.
CO3 : Summarize the types of diabetes and its control measures.
CO4 : Describe the composition and characteristics of proteins and fats.
CO5 : Explain the methods of weight control and also the dangers of unsafe weight loss

Semester:6

Course:Big Data Analytics-[CS8091]
Upon completion of the course, the students will.../ will be able to...
CO1 :Explore big data tools and its analysis techniques

CO2 :Analyze data by utilizing clustering and classification algorithms
CO3 :Apply different mining algorithms and recommendation systems for large volumes of data
CO4 :Explain analytics on data streams
CO5 :Describe NoSQL databases and management.

Course:Computer Graphics and Multimedia-[CS8092]

Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the basic concepts of illumination, color models.
CO2 : Construct the output primitives using algorithms.
CO3 : Explain the basic principles of two-dimensional, three-dimensional transformations and clipping techniques for graphics primitives.
CO4 : Apply two-dimensional and three-dimensional transformations and clipping techniques to graphics primitives.
CO5 : Illustrate multimedia system design and multimedia file handling.
CO6 : Summarize applications based on multimedia and hypermedia.

Course:Object Oriented Analysis and Design-[CS8592]

Upon completion of the course, the students will.../ will be able to...
CO1 : Develop unified processes and use case diagrams
CO2 : Develop static UML diagrams
CO3 : Develop dynamic implementation of UML diagrams
CO4 : Develop design pattern
CO5 : Apply software testing methodologies for object oriented software

Course:Intellectual Property Rights-[GE8075]

Upon completion of the course, the students will.../ will be able to...
CO1 : Outline the basics of Intellectual Property Rights and their significance.
CO2 : Explain the registration process of Copy Rights, Trademarks, Patents and Geographical Indications.
CO3 : Classify IPR agreements and legislations.
CO4 : Identify the importance of IP Laws, Cyber Law and Digital Content Protection.
CO5 : Illustrate the enforcement measures and emerging issues in IPRs.

Course:Information Storage and Management-[IT8001]

Upon completion of the course, the students will.../ will be able to...
CO1 : Classify the logical and physical components of a Storage infrastructure.
CO2 : Explain storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
CO3 : Outline the various forms and types of Storage Virtualization.
CO4 : Describe the different role in providing disaster recovery and business continuity capabilities.
CO5 : Compare different remote replication technologies.

Course:Computational Intelligence-[IT8601]

Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the fundamental goals, methods, and techniques in Computational Intelligence
CO2 : Apply the Intelligent searching techniques for problem-solving
CO3 : Solve the problems using perception, reasoning and learning techniques
CO4 : Compute intelligent computational system using machine learning techniques
CO5 : Explore Computational Intelligence techniques for information retrieval and language processing

Course:Mobile Communication-[IT8602]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basics of mobile telecommunication system</p> <p>CO2 : Illustrate the generations of telecommunication systems in wireless network</p> <p>CO3 : Describe the architecture of Wireless LAN technologies</p> <p>CO4 : Identify the functionality of network layer and Identify a routing protocol for a given Ad hoc networks</p> <p>CO5 : Explain the functionality of Transport and Application layer</p>
Course:Object Oriented Analysis and Design Laboratory-[CS8582]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate OO analysis and design for a given problem specification</p> <p>CO2 : Draw unified modeling language diagram for a given real world problem</p> <p>CO3 : Analyse the software quality usign design patterns</p> <p>CO4 : Applying specific design patterns for a given problem specification</p> <p>CO5 : Examine the compliance of the real world sysem the software requirement specification</p>
Course:Mobile Application Development Laboratory-[CS8662]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identify the components and structure of mobile application development frameworks for Android and Windows OS based mobile</p> <p>CO2 : Design basics concepts and issues of development of mobile applications</p> <p>CO3 : Implement various mobile applications using emulators</p> <p>CO4 : Summarize the capabilities and limitations of mobile devices</p> <p>CO5 : Deploy applications to hand-held devices</p>
Course:Professional Communication-[HS8581]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : To make effective presentation.</p> <p>CO2 : To Participate confidently in group discussion.</p> <p>CO3 : To attend job interviews and be successful in them.</p> <p>CO4 : To develop adequate soft skills required for the work place</p>

Semester:7

Course:Cloud Computing-[CS8791]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the concept of cloud computing</p> <p>CO2 : Explore the evolution of cloud from the existing technologies</p> <p>CO3 : Explain the various issues in cloud computing</p> <p>CO4 : Summarize the current cloud technologies</p> <p>CO5 : Describe the emergence of cloud as the next generation computing paradigm.</p>
Course:Cryptograpy and Network Security-[CS8792]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Compare the fundamentals of networks security, security architecture, threats and vulnerabilities</p> <p>CO2 : Apply the different cryptographic operations of symmetric cryptographic algorithms</p> <p>CO3 : Apply the different cryptographic operations of public key cryptography</p>

CO4 : Apply the various Authentication schemes to simulate different applications CO5 : Summarize various Security practices and System security standards
Course:Disaster Management-[GE8071]
Upon completion of the course, the students will.../ will be able to... CO1 : Explain the exposure to disasters, their significance and types CO2 : Illustrate approaches of Disaster Risk Reduction CO3 : Show the relationship between vulnerability, disasters, disaster prevention and risk reduction. CO4 : Outline the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management. CO5 : Develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity
Course:Total Quality Management-[GE8077]
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the concepts, dimensions, contributions and barriers regarding Quality. CO2 : Analyze the quality principles of TQM. CO3 : Demonstrate tools utilization for quality improvement. CO4 : Analyze the types of techniques used to measure Quality. CO5 : Evaluate quality systems in manufacturing and service sectors.
Course:FOSS and Cloud Computing Laboratory-[IT8711]
Upon completion of the course, the students will.../ will be able to... CO1 : Implement various virtualization tools such as Virtual Box, VMware workstation. CO2 : Design and deploy a web application in a PaaS environment. CO3 : Implement new scheduler in cloud environment. CO4 : Implement generic cloud environment that can be used as a private cloud. CO5 : Create large data sets in a parallel environment.
Course:Security Laboratory-[IT8761]
Upon completion of the course, the students will.../ will be able to... CO1 : Develop code for classical Encryption Techniques to solve the problems CO2 : Analyze cryptosystems by applying symmetric and public key encryption algorithms CO3 : Develop codes for authentication algorithms CO4 : Create a signature scheme using Digital signature standard CO5 : Use open source tools to Demonstrate the network security system
Course:Principles of Management-[MG8591]
Upon completion of the course, the students will.../ will be able to... CO1: Describe the basics of management and its types, skills, management roles, types of business organization and current trends in business. CO2:Explain the managerial functions. CO3:Explain the nature, types and purpose of planning, organizing, directing and controlling. CO4: Compare the different organization structures, authorities and responsibilities, human resource management and training and development. CO5: Analyze individual and group behavior, motivation theories, job satisfaction types and theories of leadership and formulate best control methods
Course:Hospital Management-[OBM752]
Upon completion of the course, the students will.../ will be able to... CO1 : Explain the principles of Hospital administration.

- CO2 : Identify the importance of Human resource management.
 CO3 : List various marketing research techniques.
 CO4 : Identify Information management systems and its uses.
 CO5 : Describe safety procedures followed in hospitals

Course:Waste Water Treatment-[OCY751]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Define water quality parameters.
 CO2 : Describe Industrial water treatment methods.
 CO3 : Implement conventional water treatment methods.
 CO4 : Analyse waste water treatment methods
 CO5 : Apply absorption and oxidation processes.

Semester:8

Course:Fundamentals of Nano Science-[GE8073]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Classify nanostructured materials and technology
 CO2 : Compare Bottom-up synthesis and top-down approach
 CO3 : Summarize nanomaterial properties and applications
 CO4 : Demonstrate characterization techniques and analysis
 CO5 : Illustrate applications of nano InfoTech and biotechnology

Course:Professional Ethics in Engineering-[GE8076]

- Upon completion of the course, the students will.../ will be able to...
 Describe the meaning and purpose of profession, ethics, civic virtues like sharing,
 CO1 : honesty, courage, time management, commitment, character and yoga for professional excellence and stress management.
 CO2 : Discuss the senses of engineering ethics, moral issues, inquiries, dilemma and autonomy, theories of moral development, right action and ethics.
 CO3 : Apply code of ethics in the engineering profession and act as responsible experimenters with a balanced outlook of the law.
 CO4 : Assess the safety and risk to reduce the risk.
 CO5 : Summarize the responsibilities of employers and rights of engineers.
 CO6 : Apply the ethical principles related to multinational corporations, environment, computer and weapons development.
 CO7 : Act as manager, consultant, expert, witness, advisor and leader with social responsibilities.

Course:Web Design and Management-[IT8078]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : Describe web design concepts in HTML, CSS and Javascript.
 CO2 : Make use of HTML, CSS and Javascript for web page.
 CO3 : Explain the responsive design and development
 CO4 : Explore the web project management and maintenance process
 CO5 : Develop a Website with HTML, JS, CSS / CMS - Word press

Course:Project Work-[IT8811]

- Upon completion of the course, the students will.../ will be able to...
 CO1 : On completion of project, the students will be in a position to take up a problem and find

solution by formulating a proper methodology.

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022

Course Outcomes, CO-PO and CO-PSO Mapping

Program: B.E. Mechanical Engineering (Sec-A)

Semester: 1

<p align="center">Course: Physics and Chemistry Laboratory-[BS3171]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identify the moduli of elasticity used in day to day engineering applications.</p> <p>CO2 : Indicate the optical parameters of visible and laser sources</p> <p>CO3 : Make use of the bandgap of semiconducting materials.</p> <p>CO4 : Detect the water quality parameters (DO, Chloride, Cu content, Alkalinity and hardness) of the given water sample.</p> <p>CO5 : Examine quantitatively the metals (Fe, Na, Cu) in the given sample using potentiometer & flame photometer and the conductance of the solution by conductometric titrations.</p>
<p align="center">Course: Engineering Physics-[PH3151]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Recall the basics of mechanics and electromagnetic waves.</p> <p>CO2 : Relate the concepts of oscillations, lasers and quantum physics.</p> <p>CO3 : Explain the theories of centre of mass, moment of inertia, properties of electromagnetic waves and Maxwell's equations.</p> <p>CO4 : Summarize the principles of sound waves, light waves and quantum mechanics.</p> <p>CO5 : Utilize the applications of mechanics, electromagnetic waves, oscillations, optics and quantum mechanics.</p>
<p align="center">Course: Problem Solving and Python Programming-[GE3151]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Develop algorithmic solutions to simple computational problems.</p> <p>CO2 : Develop and execute simple Python programs.</p> <p>CO3 : Write simple Python programs using conditionals, loops for solving problems and decompose a Python program into functions.</p> <p>CO4 : Represent compound data using Python lists, tuples, dictionaries etc.</p> <p>CO5 : Read and write data from/to files in Python programs.</p>
<p align="center">Course: Problem Solving and Python Programming Laboratory-[GE3171]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Write and execute simple Python programs.</p> <p>CO2 : Implement Python programs with conditional and looping statements.</p> <p>CO3 : Develop python programs by defining functions and calling them.</p> <p>CO4 : Use Python lists, tuples, dictionaries for representing compound data.</p> <p>CO5 : Read and write data from/to files and write their own programs using python packages.</p>
<p align="center">Course: Professional English - I-[HS3151]</p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : To listen and comprehend complex academic texts</p> <p>CO2 : To read and infer the denotative and connotative meanings of technical texts</p> <p>CO3 : To write definitions, descriptions, narrations and essays on various topics</p> <p>CO4 : To speak fluently and accurately in formal and informal communicative contexts</p> <p>CO5 : To express their opinions effectively in both oral and written medium of communication</p>
<p align="center">Course: Engineering Physics-[PH3151]</p>

Upon completion of the course, the students will.../ will be able to...
CO1 : Mention the basics of mechanics and electromagnetic waves, hence improve their engineering knowledge
CO2 : State the concepts of oscillations, optics, lasers and quantum physics to develop a strong foundational knowledge
CO3 : Exemplify Centre of mass, Moment of inertia, properties of electromagnetic waves and Maxwell's equations
CO4 : Summarize the principles of sound waves, light waves, laser and quantum mechanics
CO5 : Comprehend and apply various concepts of mechanics, electromagnetic waves, oscillations, optics, lasers and quantum mechanics to enhance the development of society.

Engineering Chemistry – CY3151

Upon completion of the course, the students will.../ will be able to...
CO1: Define the concepts of water quality parameters, nano materials and composites
CO2: Recall the types of fuels and energy resources
CO3: Outline suitable methods for water treatment and synthesis of nano materials.
CO4: Illustrate the properties of nano materials as well as fuel analysis
CO5: Apply the concept of composites, fuel analysis and energy resources for material selection requirements and also in energy sectors

Course: Matrices and Calculus-[MA3151]

Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts of matrices, limit and continuity of a function, differentiation and integration.
CO2 : Explain the properties of matrices and nature of the quadratic forms.
CO3 : Interpret the techniques of differentiation, partial differentiation and integration.
CO4 : Apply diagonalization of matrices in quadratic form and use C-H theorem to get the inverse of matrices.
CO5 : Solve problems on differentiation, partial differentiation and integration using different rules.

Semester:2

Course:Basic Electrical and Electronics Engineering-[BE3251]

Upon completion of the course, the students will.../ will be able to...
CO1 : Compute the electric circuit parameters for simple problems
CO2 : Demonstrate the working principle of electrical machines
CO3 : Analyse the characteristics of analog electron devices
CO4 : Analyse the basic concepts of digital electronics
CO5 : Explain the operating principle of measuring instruments

Course:Basic Electrical and Electronics Engineering Laboratory-[BE3271]

Upon completion of the course, the students will.../ will be able to...
CO1 : Verify the Ohm's and Kirchoff's Laws of electrical circuits.
CO2 : Analyze the performance characteristics of Electric Machines.
CO3 : Analyze the characteristics of basic electronic devices.
CO4 : Analyze the AC to DC converter circuits.

CO5 : Understand and implement Boolean Functions.
Course:Professional English - II-[HS3251]
Upon completion of the course, the students will.../ will be able to... CO1 : To engage learners in meaningful language activities to improve their LSRWskills CO2 : To enhance learners awareness of general rules of writing for specific audiences CO3 : To help learners understand the purpose ,audience,contexts of different types of writing CO4 : To develop analytical thinking skills for problem solving in communicative contexts CO5 : To demonstrate an understanding of job applications and interviews for internship and placements
Course:Materials Science-[PH3251]
Upon completion of the course, the students will.../ will be able to... CO1 : Recall the basics of crystal physics and properties of electrical and magnetic materials CO2 : Choose the properties of semiconductors, optical materials and nano structures CO3 : Summarize crystal structures, classical & quantum free electron theory and types of magnetic materials CO4 : Interpret charge carrier transport mechanism in semiconductors, optical absorption and emission processes and quantum interference effects. CO5 : Organize ideas on growth of crystals, applications of electrical, magnetic, semiconducting & optical materials and nano devices.
Course:Engineering Graphics-[GE3251]
Upon completion of the course, the students will.../ will be able to... CO1 : Recall the existing national standards and interpret a given three dimensional drawing CO2 : Construct orthogonal projection of lines and plane surfaces CO3 : Develop the orthographic projection of simple solids CO4 : Develop the sectioned solids and discover its true shape CO5 : Develop isometric projection and visualize objects as perceived by the human eye.
Course:Engineering Practices Laboratory-[GE3271]
Upon completion of the course, the students will.../ will be able to... CO1 : Develop carpentry components and pipe connections. CO2 : Demonstrate basic machining operations CO3 : Construct the models using sheet metal. CO4 : Construct basic electrical circuits for home applications. CO5 : Infer foundry, smithy and soldering works.
Course:Statistics and Numerical Methods-[MA3251]
Upon completion of the course, the students will.../ will be able to... CO1 : Define the basic concepts of statistical tests, ANOVA, solution of equations, interpolations and ODE CO2 : Discuss the techniques of statistical tests and design of experiments CO3 : Explain the solution of equations, ODE, interpolations, differentiation and integration CO4 : Apply the concept of testing of hypothesis and design of experiment in real life CO5 : Solve equations, ODE, interpolation, differentiation and integration using numerical techniques.

Semester:3

<p style="text-align: center;">Course:Fluid Mechanics and Machinery-[CE8394]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Infer the properties and characteristics of a fluid.</p> <p>CO2 : Apply the conservation laws to flow through pipes and hydraulic machines.</p> <p>CO3 : Analyze fluid properties using dimensional analysis.</p> <p>CO4 : Determine the performance of pumps for specific applications.</p> <p>CO5 : Estimate the performance of turbines.</p>
<p style="text-align: center;">Course:Electrical Drives and Controls-[EE8353]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understand the thermal rating of various electrical machines</p> <p>CO2 : Explain the performance characteristics of electrical machines.</p> <p>CO3 : Classify the starting methods of D.C motors and Induction motors.</p> <p>CO4 : Compare conventional and solid state speed control of DC drives.</p> <p>CO5 : Compare conventional and solid state speed control of AC drives.</p>
<p style="text-align: center;">Course:Electrical Engineering Laboratory-[EE8361]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Analyze the load test on DC motors</p> <p>CO2 : Examine the speed control of dc shunt motor</p> <p>CO3 : Analyze the characteristics of single phase transformer</p> <p>CO4 : Analyze the performance of Synchronous machine</p> <p>CO5 : Examine the performance characteristics of Induction motors</p>
<p style="text-align: center;">Course:Interpersonal Skills / Listening & Speaking-[HS8381]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Listen and respond appropriately</p> <p>CO2 : Participate in Group Discussion.</p> <p>CO3 : Make effective presentation</p> <p>CO4 : Speak clearly with proper stress and intonation.</p> <p>CO5 : Participate confidently and appropriately in coversations both formal and informal.</p>
<p style="text-align: center;">Course:Transforms and Partial Differential Equations-[MA8353]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the formation of PDE ,fourier series and transforms</p> <p>CO2 : Classify the PDE and explain fourier series in Engineering</p> <p>CO3 : Determine fourier transform and z-Transform of standard functions</p> <p>CO4 : Solve various types of PDE and apply fourier series in wave equation and heat equation</p> <p>CO5 : Apply z-Transforms to solve difference equation and fourier transform to solve definite integrals</p>
<p style="text-align: center;">Course:Manufacturing Technology - I-[ME8351]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain different metal casting processes, associated defects, merits and demerits.</p> <p>CO2 : Compare different metal joining processes.</p> <p>CO3 : Summarize various hot working and cold working methods of metals.</p> <p>CO4 : Explain various sheet metal making processes.</p> <p>CO5 : Distinguish various methods of manufacturing plastic components.</p>
<p style="text-align: center;">Course:Manufacturing Technology Laboratory - I-[ME8361]</p>

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Demonstrate the work piece as per given shape and size using Lathe.</p> <p>CO2 : Make use of milling machine and shaper to fabricate polygon.</p> <p>CO3 : Illustrate join two metals using arc welding.</p> <p>CO4 : Make use of sheet metal fabrication tools and make simple tray and funnel.</p> <p>CO5 : Make use of different moulding tools, patterns and prepare sand moulds.</p>
Course:Computer Aided Machine Drawing-[ME8381]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the drawing standards, welding symbols, fits & tolerances and applications of GD&T in machine drawings.</p> <p>CO2 : Interpret the drawing views, symbols and read the part and assembly drawings.</p> <p>CO3 : Create 2D drafting sketch of basic machine elements using standard CAD modelling software.</p> <p>CO4 : Design 3D model of machine elements by bottom-up approach using 3D modelling software.</p> <p>CO5 : Develop an assembly of 3D model of machine elements.</p>
Course:Engineering Thermodynamics-[ME8391]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : List the fundamental concepts in thermodynamics and classify the thermodynamic processes.</p> <p>CO2 : Classify and apply the laws of thermodynamics in practical situations when called for.</p> <p>CO3 : Apply mathematical fundamentals to analyze the properties of steam, gas and gas mixtures.</p> <p>CO4 : Evaluate various thermodynamic relations, tables and charts for problem solving.</p> <p>CO5 : Analyze different psychometric processes and adapt the same for computing the properties of air-vapour mixture.</p>

Semester:4

Course:Strength of Materials for Mechanical Engineers-[CE8395]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define stress, strain, Principal stresses and plane, Torsion, Thick and thin Cylinder</p> <p>CO2 : Illustrate Stress,shear force , bending moment, slope and deflection for beam.</p> <p>CO3 : Construct the Shear force , Bending moment diagram and conjugated beam Diagram.</p> <p>CO4 : Analyze and design thin and thick shells for the applied internal and external pressures.</p> <p>CO5 : Apply basic equation of simple torsion in designing of shafts and helical Spring.</p>
Course:Manufacturing Technology Laboratory ? II-[ME8462]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate various machine tool operations to manufacture gears.</p> <p>CO2 : Illustrate finishing operations using various machine tools.</p> <p>CO3 : Demonstrate manufacture of cutting tools using cutter grinder.</p> <p>CO4 : Infer the cutting forces in milling and turning process.</p> <p>CO5 : Develop CNC part programming for machining process.</p>
Course:Strength of Materials and Fluid Mechanics and Machinery Laboratory-[CE8381]
<p>Upon completion of the course, the students will.../ will be able to...</p>

- CO1 : Recall the importance of material strength under external force.
 CO2 : Make use of different destructive testing machines for material characterization.
 CO3 : Analyse different mechanical properties of metal and alloys
 CO4 : Apprise various heat treatment processes to alter mechanical properties.
 CO5 : Examine the microstructural characteristics.

Course:Statistics and Numerical Methods-[MA8452]

- Upon completion of the course, the students will.../ will be able to...
- CO1 : Define the basic concepts of statistical tests, ANOVA, solution of equations, interpolations and ODE.
 CO2 : Interpret the techniques of statistical tests and design of experiments.
 CO3 : Explain the solution of equations,ODE,interpolations,differentiation and integration.
 CO4 : Apply the concept of testing of hypothesis and design of experiment in real life.
 CO5 : Solve equations,ODE,interpolation,differentiation and integration using numerical techniques.

Course:Engineering Metallurgy-[ME8491]

- Upon completion of the course, the students will.../ will be able to...
- CO1 : Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
 CO2 : Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
 CO3 : Identify the effect of alloying elements on ferrous and non-ferrous metals.
 CO4 : Summarize the properties and applications of non-metallic materials.
 CO5 : Explain the testing of mechanical properties.

Course:Kinematics of Machinery-[ME8492]

- Upon completion of the course, the students will.../ will be able to...
- CO1 : Explain the principles of kinematic links, pairs, chains, mechanisms and its inversions, Degree of freedom of mechanisms
 CO2 : Analyze the planar mechanisms for position, velocity and acceleration.
 CO3 : Apply the various types of cam motion methodology to develop a cams and follower motion profiles
 CO4 : Apply the principles of gear design to the gears and gear trains to solve the motion study problems of gears
 CO5 : Apply the design principles to solve problems on friction in various machine elements like belt, chain, ropes, brakes and clutches

Course:Thermal Engineering- I-[ME8493]

- Upon completion of the course, the students will.../ will be able to...
- CO1 : Solve problems by applying thermodynamic concepts to various air standard cycles
 CO2 : Solve problems in single stage and multistage air compressors
 CO3 : Explain how IC engines, components, and auxiliaries work and what they do.
 CO4 : Experiment with the IC engine performance parameters
 CO5 : Explain the turbine working and how to solve problems in them

Course:Manufacturing Technology ? II-[ME8451]

- Upon completion of the course, the students will.../ will be able to...
- CO1 : Explain the mechanism of material removal processes
 CO2 : Explain the constructional and operational features of centre lathe and other special purpose lathes

CO3 :	Explain the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines
CO4 :	Explain the types of grinding and other super finishing processes apart from gear manufacturing processes
CO5 :	Summarize numerical control of machine tools and write a part program.

Semester:5

Course:Kinematics and Dynamics Laboratory-[ME8511]	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Compare the kinematics of various gears and joints.
CO2 :	Determine mass moment of inertia of various mechanical system
CO3 :	Infer gyroscopic effect and couple
CO4 :	Classify various governors and construct cam profile
CO5 :	Compare the frequency and vibrations in various dynamic systems
Course:Metrology and Measurements-[ME8501]	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Explain the concepts of measurements to apply in various metrological instruments
CO2 :	Outline the principles of linear and angular measurement tools used for industrial applications
CO3 :	Explain the procedure for conducting computer aided inspection
CO4 :	Demonstrate the techniques of form measurement used for industrial components
CO5 :	Apply various measuring techniques of mechanical properties in industrial applications
Course:Thermal Engineering Laboratory-[ME8512]	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Illustrate the valve timing, port timing and actual p-v diagrams
CO2 :	Evaluate the performance and heat balance of heat engines.
CO3 :	Determine the thermal conductivity for various material profiles.
CO4 :	Evaluate convective heat transfer coefficients for various modes.
CO5 :	Analyse the performance of heat exchanger and refrigeration systems
Course:Metrology and Measurements Laboratory-[ME8513]	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Determine the dimensions and the dimensional deviations of given parts.
CO2 :	Inspect the dimensions, angularity and parallelism of a given component
CO3 :	Evaluate the straightness of surfaces and determine size of irregularities on a machined surface
CO4 :	Measure the vertical distances or height of objects, taper angle of slope for a given component, various parameters of threads and gear wheel
CO5 :	Construct the torque characteristic curves to various loads at various distances
Course:Design of Machine Elements-[ME8593]	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Explain the influence of steady and variable stresses in machine component design.
CO2 :	Apply the concepts of design to shafts, keys and couplings.
CO3 :	Apply the concepts of design to temporary and permanent joints.
CO4 :	Apply the concepts of design to energy absorbing members, connecting rod and crank

shaft.
CO5 :Apply the concepts of design to bearings.
Course:Dynamics of Machines-[ME8594]
Upon completion of the course, the students will.../ will be able to...
CO1 : Develop the force-motion relationship in components subjected to external forces and analysis of standard mechanisms.
CO2 : Construct the undesirable effects of unbalances resulting from prescribed motions in mechanism.
CO3 : Analyze the concepts of degrees of freedom
CO4 : Apply the effect of dynamics of undesirable vibrations
CO5 : Evaluate the principles in mechanisms used for speed control
Course:Thermal Engineering- II-[ME8595]
Upon completion of the course, the students will.../ will be able to...
CO1 : Classify and design steam nozzle
CO2 : Relate the functioning and features of different types of Boilers auxiliaries and calculate performance parameters
CO3 : Compare the types of steam turbines and calculate the performance
CO4 : Summarize the concept of Cogeneration, Working features of Heat pumps and Heat exchangers
CO5 : Explain and solve problems on refrigeration, air-conditioning, and psychometric processes
Course:Renewable Energy Sources-[ORO551]
Upon completion of the course, the students will.../ will be able to...
CO1 :Explain the various types of renewable energy sources and the need of their utilization.
CO2 :Explain the solar energy and solar radiation.
CO3 :Explain the collection of solar energy, storage of solar energy and its applications.
CO4 :Illustrate the potential of wind energy as a renewable source.
CO5 : Analyze the potential of ocean energy, geothermal and bio mass as a renewable source.

Semester:6

Course:Heat and Mass Transfer-[ME8693]
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems
CO2 : Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems
CO3 : Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems
CO4 : Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems
CO5 : Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications

Course:Design of Transmission Systems-[ME8651]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Apply the concepts of design to belts, chains and rope drives.
- CO2 : Apply the concepts of design to spur, helical gears.
- CO3 : Apply the concepts of design to worm and bevel gears.
- CO4 : Apply the concepts of design to gear boxes
- CO5 : Apply the concepts of design to cams, brakes and clutches

Course:Automobile Engineering-[ME8091]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the various parts of the automobile and their functions and materials
- CO2 : Illustrate the engine auxiliary systems and engine emission control
- CO3 : Distinguish the working of different types of transmission systems
- CO4 : Explain the Steering, Brakes and Suspension Systems.
- CO5 : Explain possible alternate sources of energy for IC Engines

Course:Finite Element Analysis-[ME8692]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Apply the basics of finite element formulation.
- CO2 : Apply finite element formulations to solve one dimensional Problems.
- CO3 : Apply finite element formulations to solve two dimensional scalar Problems.
- CO4 : Apply finite element method to solve two dimensional Vector problems
- CO5 : Apply finite element method to solve problems on iso parametric element and dynamic Problems.

Course:Professional Communication-[HS8581]

Upon completion of the course, the students will.../ will be able to...

- CO1 : To make effective presentation.
- CO2 : To Participate confidently in group discussion.
- CO3 : To attend job interviews and be successful in them.
- CO4 : To develop adequate soft skills required for the work place.

Course:CAD / CAM Laboratory-[ME8681]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Apply the knowledge on use of 2D drafting commands for 2D drawing
- CO2 : Develop 3D assembly models using different features
- CO3 : Demonstrate manual part programming skills in CNC turning centre
- CO4 : Demonstrate manual part programming skills in CNC milling machine.
- CO5 : Illustrate computer aided part programming skills

Course:Design and Fabrication Project-[ME8682]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Summarise the literature of previous research works and relate them to present project
- CO2 : Formulate a work plan and methodology
- CO3 : Explain the project, outlining the approach and expected results using good oral and written presentation skills
- CO4 : Develop a prototype/model or experimental setup necessary to meet the objectives
- CO5 : Compile the work done through out the project and suggest the scope.

Course:Computer Aided Design and Manufacturing-[ME8691]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and

<p>Metrics</p> <p>CO2 : Explain the fundamentals of parametric curves, surfaces, and Solids</p> <p>CO3 : Summarize the different types of Standard systems used in CAD</p> <p>CO4 : Apply NC & CNC programming concepts to develop part program for Lathe & Milling Machines</p> <p>CO5 : Summarize the different types of techniques used in Cellular Manufacturing and FMS</p>
Course:Finite Element Analysis-[ME8692]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Apply the basics of finite element formulation.</p> <p>CO2 : Apply finite element formulations to solve one dimensional Problems.</p> <p>CO3 : Apply finite element formulations to solve two dimensional scalar Problems.</p> <p>CO4 : Apply finite element method to solve two dimensional Vector problems</p> <p>CO5 : Apply finite element method to solve problems on iso parametric element and dynamic Problems.</p>
Course:Hydraulics and Pneumatics-[ME8694]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the Fluid power and operation of different types of pumps</p> <p>CO2 : Summarize the features and functions of Hydraulic motors, actuators and Flow control valves.</p> <p>CO3 : Explain the different types of Hydraulic circuits and systems.</p> <p>CO4 : Explain the working of different pneumatic circuits and systems</p> <p>CO5 : Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems</p>

Semester:7

Course:Unconventional Machining Processes-[ME8073]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Compare and contrast the various unconventional machining processes, its classification & Illustrate mechanical energy based process and the influence of process parameters.</p> <p>CO2 : Illustrate various thermal energy and electrical energy based unconventional machining processes and the influence of process parameters.</p> <p>CO3 : Illustrate various chemical and electro-chemical energy based unconventional machining processes and the influence of process parameters.</p> <p>CO4 : Illustrate various nano abrasives based unconventional machining processes and the influence of process parameters.</p> <p>CO5 : Illustrate various recent trends based unconventional machining processes and the influence of process parameters.</p>
Course:Non Destructive Testing & Evaluation-[ME8097]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the fundamental concepts of NDT</p> <p>CO2 : Discuss the different methods of NDE</p> <p>CO3 : Explain the concept of Thermography and Eddy current testing</p> <p>CO4 : Explain the concept of Ultrasonic Testing and Acoustic Emission</p> <p>CO5 : Explain the concept of Radiography</p>

Course:Simulation and Analysis Laboratory-[ME8711]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define and illustrate the need for simulation and analysis for real world problems
- CO2 : Interpret and make use of different features in the simulation and analysis tools
- CO3 : Make use of the simulation software to construct and execute mechanical engineering problems
- CO4 : Model real world problems and analyze the effect of various mechanical and thermal forces through simulation.
- CO5 : Analyze the model and apply the results to resolve critical issues in real world engineering problems

Course:Technical Seminar-[ME8712]

Upon completion of the course, the students will.../ will be able to...

- CO1 :Acquired the basic skills for performing literature survey and paper presentation.
- CO2 :Provide students better communication skills.
- CO3 :Describe the current topics in Mechanical and related areas based on current publications.
- CO4 :Prepare the power point presentation report.

Course:Mechatronics Laboratory-[ME8781]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Develop assembly language programming of 8085 microprocessor.
- CO2 : Create interface to use microcontroller for various applications
- CO3 : Model basic hydraulic, pneumatic and electrical circuits using software.
- CO4 : Develop interface with PID controller for various applications.
- CO5 : Demonstrate programmable logic controller.

Course:Mechatronics-[ME8791]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the principle of sensors and Transducers
- CO2 : Explain the working of microprocessor and microcontroller
- CO3 : Illustrate the various programmable peripheral interface.
- CO4 : Explain the fundamentals of programmable logical control along with its characteristics and applications
- CO5 : Explain the different actuator systems through case studies

Course:Power Plant Engineering-[ME8792]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Illustrate the operation and maintenance of coal based thermal power plants.
- CO2 : Explain Diesel, Gas Turbine and Combined Cycle Power Plants.
- CO3 : Illustrate the operation and maintenance of Nuclear Power Plants
- CO4 : Classify and contrast various renewable energy sources
- CO5 : Analyze and solve energy and economic related issues in power sectors.

Course:Process Planning and Cost Estimation-[ME8793]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Define the various components and functions of process planning.
- CO2 : Estimate various production processes and its cost.
- CO3 : Evaluate various methods of cost estimation.
- CO4 : Evaluate the cost involved in various production process
- CO5 : Estimate machining time for various processess.

Course:Robotics-[OIE751]

Upon completion of the course, the students will.../ will be able to...

CO1 : Demonstrate the physical basic components of robot

CO2 : Explain the various types of drive systems and end effectors

CO3 : Demonstrate the principles and applications of sensors and data reduction techniques

CO4 : Compile kinematics equations in robot programming languages

CO5 : Analyze the economics of robot for implementation in industries

Semester:8

Course:Production Planning and Control-[IE8693]

Upon completion of the course, the students will.../ will be able to...

CO1 : Define the various components and functions of production planning and control.

CO2 : Analysis of method study and work measurement.

CO3 : Evaluate and prepare product planning and process planning activities.

CO4 : Evaluate various methods of scheduling.

CO5 : Appraise inventory control and recent trends in production planning and control.

Course:Project Work-[ME8811]

Upon completion of the course, the students will.../ will be able to...

CO1 : Summarize the literatureof previous research works and relate them to present project

CO2 : Formulate an work plan and methodology

CO3 : Explain the project outlining the approach and expected results using good oral and written presentation skills

CO4: Develop a prototype/model or experimental set-up necessary to meet the objectives

CO5: Compile the work done throughout the project and suggest the scope

Course:Principles of Management-[MG8591]

Upon completion of the course, the students will.../ will be able to...

CO1 : Explain the management evolution and different types of business.

CO2 : Explain the planning and decision making process of management.

CO3 : Explain the organization structure, HR planning and management.

CO4 : Demonstrate the ability to directing, leadership and communicate effectively.

CO5 : Analyse, isolate issues and formulate best control methods.

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:M.E. Energy Engineering

Semester: 1

Course:Renewable Energy Laboratory-[RY4111]

Upon completion of the course, the students will.../ will be able to...

CO1 : Evaluate the performance of renewable energy devices.

CO2 : Analyze the factors influencing the efficiency and suggest methods for improvement

CO3 : Evaluate the efficiency of renewable energy devices.

CO4 : Evaluate emissions from renewable energy systems

CO5 : Explain the emission from biodiesel engines and biofuel analysis.

Course:Applied Thermal Engineering Laboratory-[EY4112]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Construct the error curve and correction curve for different measuring instruments
- CO2 : Analyze the critical/influential properties of thermal systems.
- CO3 : Interpret the heat transfer and mass transfer in thermal devices
- CO4 : Explain the method of finding the thermal conductivity of material
- CO5 : Explain the method of evaluating the characteristics of bodies in wind and thermal systems

Course:Energy Management and Environmental Benefits-[EY4101]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the importance of energy conservation and suggest measures for improving per capita energy consumption
- CO2 : Analyse the energy sharing and cost sharing pattern of fuels used in industries
- CO3 : Apply Gantt Chart, CPM and PERT in energy conservation projects
- CO4 : Analysis the techno-economics of a project adopting discounting and non-discounting Cash flow techniques
- CO5 : Apply the sources of additional revenue generation for energy conservation projects Adopting UNFCC

Course:Fluid Mechanics and Heat Transfer-[EY4102]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Identify, formulate and analyze the governing equations for various engineering Applications
- CO2 : Explain the flow concepts of incompressible and compressible flow.
- CO3 : Solve the conduction and radiation heat transfer problems.
- CO4 : Infer the turbulent forced convective heat transfer
- CO5 : Design a heat exchanger as per the industrial needs.

Course:Instrumentation for Energy Systems-[EY4103]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Analyze and evaluate the uncertainties in measurement data.
- CO2 : Identify appropriate sensors for measuring electrical quantities and signal conditioning Circuits.
- CO3 : Explain the digital measurement techniques of physical quantities and solar instruments.
- CO4 : Compare the thermo-physical properties of air pollutants and identify air pollutant measurement techniques.
- CO5 : Design and develop the appropriate measurement and control system for an application.

Course:Renewable Energy Systems-[EY4104]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the basic concepts of renewable and nonrenewable energy technologies in present scenario.
- CO2 : Explain the principle of solar energy and its various technologies with applications.
- CO3 : Explain the basics of wind energy and their various technologies along with the applications.
- CO4 : Explain the present situation in various bio-energy technologies and its applications.
- CO5 : Explain the knowledge about ocean and geothermal technologies with its environmental

impact.
Course:Thermodynamic Analysis of Energy Systems-[EY4105]
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply various thermodynamic relations to solve the availability analysis problem of the thermodynamic systems and cycles
CO2 : Analyze the behavior of real gas and gas mixtures by the use of generalized charts and tables.
CO3 : Apply first and second law to chemically reacting closed and open systems to identify the various thermodynamic parameters
CO4 : Analyze the chemical composition of combustion products and distinguish the limits of various fuels with its properties
CO5 : Explain the process of combustion and its related parameters in various thermodynamic systems
Course:Research Methodology and IPR-[RM4151]
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the basic concepts of the research process, design and problems.
CO2 : Select the appropriate tool for analysis based on the nature of data.
CO3 : Choose a well-structured research paper and scientific presentations.
CO4 : Identify various IPR Components and the process of filing.
CO5 : Develop awareness of the patent law and procedural mechanism in obtaining a patent.

Semester:2

Course:Nuclear Engineering-[EY4003]
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the fundamentals of nuclear reactions
CO2 : Explain the basic concepts in nuclear fission and fusion chain reaction
CO3 : Solve problems related to nuclear reactions, reactor physics and nuclear safety
CO4 : Evaluate real-world questions relating to nuclear engineering
CO5 : Examine the issues that led to past reactor accidents and challenges of current new-build reactors
Course:Bio Energy Technologies-[EY4072]
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the availability of surplus biomass and study the characteristics
CO2 : Explain the basic sources and design a biogas plant using different bioenergy sources
CO3 : Determine and compare the cost of steam generation from biofuels with conventional fuels.
CO4 : Analyze the influence of process governing parameters in thermo chemical conversion of biomass and in internal combustion engines
CO5 : Apply and Analyze the production of liquid biofuels for power generation from biomass
Course:Energy Conservation in Industrial Utilities-[EY4201]
Upon completion of the course, the students will.../ will be able to...
CO1 : Estimate the stoichiometric air for fuel and suggest measures for efficient combustion
CO2 : Discover the cause for underperformance of thermal utilities and suggest suitable

remedial measures thereof
CO3 : Analyse the factors affecting the COP of a VCR and VAR system
CO4 : Evaluate the performance of induction motors and transformers.
CO5 : Assess energy conservation avenues of thermal and electrical utilities
Course:Computational Fluid Dynamics for Energy Systems-[EY4202]
Upon completion of the course, the students will.../ will be able to...
CO1 : Infer the governing equation and apply the boundary conditions to arrive at the unknowns
CO2 : Solve the diffusion heat transfer problems by finite volume method.
CO3 : Infer the convection-diffusion heat transfer problems by finite volume method
CO4 : Interpret the incompressible flow governing equations by applying various pressure velocity decoupling algorithms
CO5 : compare various turbulence models available.
Course:Energy Efficient Buildings Design-[EY4203]
Upon completion of the course, the students will.../ will be able to...
CO1 : Design climate responsive building
CO2 : Discover various physical properties influencing passive building design
CO3 : Apply the passive(air)conditioning techniques in energy efficient building
CO4 : Interpret the energy performance of buildings
CO5 : Appraise the adaptation of renewable energy systems in buildings
Course:Energy Conservation Laboratory-[EY4211]
Upon completion of the course, the students will.../ will be able to...
CO1 : Evaluate the specific energy consumption of industrial utilities
CO2 : Estimate the cost of energy for process essentials like steam, compressed air
CO3 : Examine the performance parameters of various energy equipments
CO4: Examine the performance of various induction motors
CO5: Evaluate the energy consumption of different pumping systems

Semester:3

Course:Advanced Power Plant Engineering-[TE5074]
Upon completion of the course, the students will.../ will be able to...
Compare the different types of power plant based on their merits and demerits, have
CO1 : an understanding about the different types of load curves and an idea about Indian power scenario
CO2 : Analyze the various methods to improve the thermodynamic efficiency, understanding about the power plant layout , their main components and ancillaries , water treatment and piping systems
CO3 :

<p>Analyze the different methodologies to augment the thermodynamic efficiency, compare the different theoretical and actual thermodynamic cycles and an understanding about the combustion in CI engines</p> <p>Evaluate the performance indices of a cogeneration system, analyze the efficiencies of the various cogeneration systems, an understanding about the binary cycle, combined cycle and MHD</p> <p>CO4 :</p> <p>Analyze the various environmental and safety issues related to nuclear power plants ,</p> <p>CO5 : understanding about the different types of nuclear reactors, hydro electric power plants and their layouts</p>
Course:Waste Management and Energy Recovery-[EY5013]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Familiarize the facts of waste characterization, segregation and disposal</p> <p>CO2 : Classify the different technologies that are available for effective waste disposal along with pros / cons</p> <p>CO3 : Summarize the First hand information on present day waste related problems</p> <p>CO4 : Explain the various types of waste available in the society</p> <p>CO5: Evaluate the principal of quality management and explain how this principles can be applied for waste management</p>
Course:Energy Conservation in Electrical Systems-[EY5301]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the concept power factor and load management</p> <p>CO2 : Analyze the energy conservation in static and rotating machines</p> <p>CO3 : Analyze the energy conservation in industrial loads</p> <p>CO4 : Illustrate the energy conservation in illumination devices</p> <p>CO5 : Explain the economic potential of energy conservation.</p>

Semester:4

Course:Project Work Phase ? II-[EY5411]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basic concepts of energy and related disciplines to identify the specific area.</p> <p>CO2 : Formulate work plan and methodology</p> <p>CO3 : Apply the theoretical concepts to solve industrial problems with teamwork and multidisciplinary approach</p> <p>CO4 : Develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.</p> <p>CO5: Compile the work done throughout the project and suggest the scope</p>

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program:Master of Business Administration

Semester:1

<p style="text-align: center;">Course:Entrepreneurship Development-[BA4032]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basic terms of entrepreneurship</p> <p>CO2 : To understand the role of different financial institutions for promotes the entrepreneurs</p> <p>CO3 : To know the different ways for generating idea for creating a new business or enterprises and also to identify the business opportunities and feasibility study.</p> <p>CO4 : To gain knowledge on EDP</p> <p>CO5 : To be able to sustain in the market according to the changing scenario and environment</p>
<p style="text-align: center;">Course:Statistics For Management-[BA4101]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basic concepts of probability ,distribution, sampling distribution, statistical tests, correlation, regression and estimation.</p> <p>CO2 : Explain the basics of probability and solve business problems</p> <p>CO3 : Discuss the methods of sampling and statistical tests in business decision making</p> <p>CO4 : Apply integrated approach to probability and correctly interpret the results.</p> <p>CO5 : Apply the statistical techniques in a work setting</p>
<p style="text-align: center;">Course:Management Concepts and Organisational Behavior-[BA4102]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understanding of various management concepts and skills required in the business world.</p> <p>CO2 : In-depth knowledge of various functions of management in a real time management context</p> <p>CO3 : Understanding of the complexities associated with management of individual behaviour in the organizations.</p> <p>CO4 : Develop the skillset to have manage group behaviour in organizations</p> <p>CO5 : Insights about the current trends in managing organizational behaviour.</p>
<p style="text-align: center;">Course:Managerial Economics-[BA4103]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understand basic economic problem facing society apply theory to practical problems in a business context</p> <p>CO2 : Utilize the business cycle implications and determine the interaction of demand and supply in the marketplace.</p> <p>CO3 : To evaluate the product and process decision and use the theory of demand and theory of supply.</p> <p>CO4 : Analyse the interrelationships between economic variables and evaluate the major economic aggregates and how they are measured.</p> <p>CO5 : Apply the appropriate economic tools to conduct a meaningful analysis of the economy in a professional ethical context.</p>
<p style="text-align: center;">Course:Accounting For Decision Making-[BA4104]</p>

Upon completion of the course, the students will.../ will be able to...

CO1 : Students will be able to prepare Final accounts.

CO2 : Students will learn to analyse the financial Statements

CO3 : Students will learn to prepare the cost sheet and cost concepts

CO4 : Students will learn the different Marginal costing and decision making techniques followed by different industries in different situations.

CO5 : Students will be able to make variance analysis and the current accounting standards followed

Course:Legal Aspects of Business-[BA4105]

Upon completion of the course, the students will.../ will be able to...

CO1 : Understand the fundamental legal principles in developing various contracts and commercial laws in the business world.

CO2 : Identify the common forms of business associations and elements of Corporate Governance.

CO3 : Develop insights regarding the laws related to industrial environment.

CO4 : Ability to understand the fundamentals of corporate tax and GST.

CO5 : Understand the role of consumer rights and cyber laws in the modern business environment.

Course:Information Management-[BA4106]

Upon completion of the course, the students will.../ will be able to...

CO1 : Student gains knowledge on information systems in business

CO2 : Ability to make system analysis, able to design and develop a system.

CO3 : Gains knowledge on database and Database management system

CO4 : Gains knowledge on Integrated systems, computer crimes, security.

CO5 : Learns about some new I.T initiatives and advancements in the latest technologies

Course:Business Communication-[BA4112]

Upon completion of the course, the students will.../ will be able to...

CO1 : Develop good managerial communication skills.

CO2 : Ability to excel in different forms of written communication required in a business context

CO3 : Develop good presentation skills.

CO4 : In-depth understanding of interview skills.

CO5 : Ability to prepare business reports

Course:Indian Ethos-[BA4111]

Upon completion of the course, the students will.../ will be able to...

CO1 : Understand the concepts of Ethos.

CO2 : Analyse the importance of Values and Karma

CO3 : Understand the concept of Ethics

CO4 : Acquire insights on the dimensions of Ethics.

CO5 : understand the various dimensions in Ethics

Semester:2

Course:Quantitative Techniques for Decision Making-[BA4201]

Upon completion of the course, the students will.../ will be able to...

CO1 : Define the knowledge of role of O.R. in solving industrial problems.

CO2 : Describe the mathematical tools that are needed to solve optimization problems.

Develop the students not to go beyond a single introductory course with enough understanding and confidence to appreciate the strengths and inherent limitations of the operations research approach.

CO3 :
CO4 : Apply and motivate future specialists to continue in their study by having an insightful overview of operations research.

CO5 : Make use of the Queuing and simulation in real time scenario optimization.

Course:Financial Management-[BA4202]

Upon completion of the course, the students will.../ will be able to...

CO1 : Facilitate student to understand the operational nuances of a Finance Manager

CO2 : Comprehend the technique of making decisions related to financial functions

CO3 : To enhance time value of money and its relevance in Investment decisions.

CO4 : To enable students to build capital structure and finance structure for an organization.

CO5 : Facilitate students to identify various sources of short term and long term finance.

Course:Human Resource Management-[BA4203]

Upon completion of the course, the students will.../ will be able to...

CO1 : Students would have gained knowledge on the various aspects of HRM

CO2 : Students will gain knowledge needed for success as a human resources professional.

CO3 : Students will develop the skills needed for a successful HR Manager.

CO4 : Students would be prepared to implement the concepts learned in the workplace.

CO5 : Students would be aware of the emerging concepts in the field of HRM.

Course:Operations Management-[BA4204]

Upon completion of the course, the students will.../ will be able to...

CO1 : Understanding of the evolution of operations management practices and world class manufacturing process

CO2 : Knowledge about capacity planning, strategic sourcing and procurement in organizations

CO3 : Enhances the understanding of product development and design process

CO4 : Ability to forecast demand and overcome bottlenecks

CO5 : Provides insight to Quality management tools and practices

Course:Business Research Methods-[BA4205]

Upon completion of the course, the students will.../ will be able to...

CO1 : Students will understand and appreciate scientific inquiry by learning the Fundamentals of Business Research

CO2 : Students would know to write research proposals by Learning Research design and measurement

The students would be able to undertake a systematic outlook towards business situations for the purpose of objective decision making, and the method of conducting scientific inquiry to solve organizational problems.

CO3 : Students would be able to analyze data and find solutions to the problems by learning data analysis for the preparation of reports

CO4 : Students could prepare research reports by learning report design and ethics in preparing the business research report

Course:Business Analytics-[BA4206]

Upon completion of the course, the students will.../ will be able to...

CO1 : Ability to understand the role of Business Analytics in decision making

CO2 : Ability to identify the appropriate tool for the analytics scenario

CO3 : Ability to apply the descriptive analytics tools and generate solutions

CO4 : Understanding of Predictive Analytics and applications
CO5 : Knowledge of Prescriptive Analytics and demonstrating business process improvement
Course:Marketing Management-[BA4207]
Upon completion of the course, the students will.../ will be able to...
CO1 : Applied knowledge of contemporary marketing theories to the demands of business and management practices.
CO2 : Enhanced knowledge of marketing strategies for consumer and industrial marketing.
CO3 : Deep understanding of choice of marketing mix elements and managing integrated marketing channels.
CO4 : Ability to analyze the nature of consumer buying behaviour.
CO5 : Understanding of the marketing research and new trends in the arena of marketing.
Course:Data Analysis & Business Modelling-[BA4212]
Upon completion of the course, the students will.../ will be able to...
CO1 : Deep knowledge about the nature of data and conducting hypothesis testing using various data analysis techniques
CO2 : Facilitates to identify the relationship between variables using data analytical tools
CO3 : Provides understanding about forecasting in real time business world using analytical tools
CO4 : Ability to conduct risk and sensitivity analysis and portfolio selection based on business data
CO5 : Enhances knowledge about networking, inventory models and queuing theory using data analytical tools

Semester:3

Course:BRAND MANAGEMENT-[BA5001]
Upon completion of the course, the students will.../ will be able to...
CO1 : Demonstrate knowledge and understanding of the nature and processes of branding, brand performance and key principles of strategic brand management.
CO2 : Evaluate the scope of brand management activity across the overall organizational context and analyses how it relates to other business areas.
CO3 : Appraise the key issues in managing a brand portfolio and making strategic brand decisions.
CO4 : Analyze and discuss contemporary brand related problems and develop appropriate strategies and initiatives.
CO5 : Ability to engage more confidently in and contribute brand building projects, developments and discussions.
Course:SERVICES MARKETING-[BA5006]
Upon completion of the course, the students will.../ will be able to...
CO1 : Will be able to apply the concepts of services marketing in promoting services
CO2 : Utilize the market knowledge to tap the unearthed opportunities
CO3 : Able to convert the idea conceived into a well-developed service product
CO4 : Able to make the promotional strategies and delivery channels
CO5 : Able to apply marketing strategies for different Industries
Course:MERCHANT BANKING & FINANCIAL SERVICES-[BA5011]

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Good Knowledge about Merchant Banking.</p> <p>CO2 : Knowledge about the role of Merchant banker in issue management.</p> <p>CO3 : Knowledge about business valuation.</p> <p>CO4 : Good Knowledge on financial evaluation.</p> <p>CO5 : Good Knowledge on other fund based financial services.</p>
Course:SECURITY ANALYSIS & PORTFOLIO MANAGEMENT-[BA5012]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Possess a managerial outlook on investments.</p> <p>CO2 : Able to read and understand the outcomes out of fundamental analysis.</p> <p>CO3 : Ability to evaluate the technical analysis of reports.</p> <p>CO4 : Able to acquire the ability to ascertain the impact of portfolio construction.</p> <p>CO5 : Able to identify the profitable trade-off between risk and return.</p>
Course:ENTERPRENUERSHIP DEVELOPMENT-[BA5014]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Ability to apply the business acumen gained in practice.</p> <p>CO2 : Ability to understand and solve managerial issues.</p> <p>CO3 : Ability to communicate and negotiate effectively, to achieve organizational and individual</p> <p>CO4 : Ability to upgrade their professional and managerial skills in their workplace.</p> <p>CO5 : Ability to explore and reflect about managerial challenges, develop informed managerial decisions in a dynamically unstable environment.</p>
Course:LABOUR LEGISLATION-[BA5016]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Students will know the development and the judicial setup of Labour Laws.</p> <p>CO2 : Students will learn the salient features of welfare and wage legislation.</p> <p>CO3 : Students will be empowered to integrate the knowledge of Labour law in General HRD Practice.</p> <p>CO4 : Students will learn the Law relating to Industrial Relations, Social Security and working conditions.</p> <p>CO5 : Students will learn the enquiry procedural and industrial discipline.</p>
Course:MANAGERIAL BEHAVIOUR & EFFECTIVENESS-[BA5017]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Students will understand and learn models and methods in MBE</p> <p>CO2 : Students will learn about designing managerial jobs</p> <p>CO3 : Students will learn about measuring the effectiveness</p> <p>CO4 : Students will learn about self-development and negotiations</p> <p>CO5 : Students can learn the creativity and innovations in managerial jobs</p>
Course:INTERNATIONAL TRADE FINANCE-[BA5031]
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Possess good knowledge on international trade and export, import procedures</p> <p>CO2 : Knowledge on source and application of export import finance</p> <p>CO3 : Able to deal with Foreign Exchange dealings and Management</p> <p>CO4 : Practical knowledge in export import documentation and its usage</p> <p>CO5 : Keep abreast of current export promotional measures of govt of India</p>

Course:INTERNATIONAL BUSINESS MANAGEMENT-[BA5301]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Students would be familiar with global business environment and concepts
- CO2 : Helps the students formulate new strategies that would enhance the transformation process at International levels
- CO3 : Enriches the importance of strategic management process for an organization
- CO4 : Acquainted with functional domain practices.
- CO5 : They would be familiar with conflicts situations and ethical issues in global

Course:STRATEGIC MANAGEMENT-[BA5302]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Students would be familiar with global business environment and concepts
- CO2 : Helps the students formulate new strategies that would enhance the transformation process at International levels
- CO3 : Enriches the importance of strategic management process for an organization
- CO4 : Acquainted with functional domain practices
- CO5 : They would be familiar with conflicts situations and ethical issues in global business

Semester:4

Course:PROJECT WORK-[BA5411]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Student will gain the fundamental knowledge of studies made in business
- CO2 : Students will gain the knowledge of preparing data collection methods
- CO3 : Students will learn data analysis
- CO4 : Students will learn scientific methods of data interpretations and making inferences
- CO5 : Students will learn preparation and presentations of business projects

St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.

2021 -- 2022 ODD Semester

Course Outcomes, CO-PO and CO-PSO Mapping

Program: Master of Computer Applications

Semester:1

Course:Applied Probability and Statistics for Computer Science Engineers-[MA4151]
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts of Linear Algebra , probability, standard distributions, one and two dimensional random variables.
CO2 : Explain statistical , multivariate techniques and principal components analysis.
CO3 : Apply the concept of matrices ,probability and correlation in engineering disciplines.
CO4 : Utilize testing of hypothesis for small and large samples in real life problems.
CO5 : Develop exploratory analysis of multivariate data, such as multivariate normal density, calculating descriptive statistics, testing for multivariate normality.
Course:Advanced Data Structures and Algorithms-[MC4101]
Upon completion of the course, the students will.../ will be able to...
CO1 : Design data structures and algorithms to solve computing problems
CO2 : Implement efficient data structures to solve problems.
CO3 : Design algorithms using graph data structures and various string-matching techniques to solve real-life problems.
CO4 : Design one's own algorithm for an unknown problem.
CO5 : Apply suitable design strategy for problem solving.
Course:Object Oriented Software Engineering-[MC4102]
Upon completion of the course, the students will.../ will be able to...
CO1 : Learn the object oriented software using appropriate process models.
CO2 : Compare software processes under waterfall and agile methodology.
CO3 : Design the UML diagrams for software project.
CO4 : Apply Design Patterns for a software process
CO5 : Categorize testing methods and compare different testing tools for software process.
CO6 : Analyze object oriented metrics and quality for software engineering process
Course:Python Programming-[MC4103]
Upon completion of the course, the students will.../ will be able to...
CO1 :Develop algorithmic solutions to simple computational problems.
CO2 :Represent compound data using Python lists, tuples and dictionaries.
CO3 :Read and write data from/to files in Python Programs,
CO4 :Structure simple Python programs using libraries, modules etc.
CO5 :Structure a program by bundling related properties and behaviors into individual objects.
Course:Fundamentals of Accounting-[MC4104]
Upon completion of the course, the students will.../ will be able to...
CO1 : Able to understand the basic concepts of Accounting standards.
CO2 : Able to understand the process of maintaining Accounts in an organization
CO3 :Helps to understand and calculating the financial position of an organization
CO4 :Helps to understand Financial Management concepts and its components
CO5 : It helps to understand the importance of BRS and generation of various financial reports

Course:Advanced Data Structures and Algorithms Laboratory-[MC4111]
Upon completion of the course, the students will.../ will be able to... CO1 : Design basic and advanced data structures. CO2 : Design algorithms using graph structures CO3 : Design efficient algorithms with minimum complexity using design techniques CO4 : Develop programs using various algorithms. CO5 : Design algorithms for a specific problem using appropriate data structures and ADT/libraries.
Course:Python Programming Laboratory-[MC4112]
Upon completion of the course, the students will.../ will be able to... CO1 : Apply the Python language syntax including control statements, loops and functions to solve a wide variety of problems in mathematics and science. CO2 : Use the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data CO3 : Create files and perform read and write operations CO4 : Illustrate the application of python libraries. CO5 : Build the exceptions and classes and objects for any real time applications
Course:Communication Skills Enhancement ? I-[MC4113]
Upon completion of the course, the students will.../ will be able to... CO1 : Listen and comprehend lectures in English CO2 : Articulate well and give presentation clearly CO3 : participate in group discussions successfully CO4 : Communicate effectively in formal and informal writing CO5 : Write proficient essays and email
Course:Research Methodology and IPR-[RM4151]
Upon completion of the course, the students will.../ will be able to... CO1 : Illustrate the various research designs and their characteristics. CO2 : Identify the appropriate tool for analysis based on the nature of data CO3 : Develop a well-structured research paper and scientific presentations. CO4 : Illustrate various IPR Components and process of filing. CO5 : Develop awareness the patent law and procedural mechanism in obtaining a patent.

Semester:2

Course:English for Research Paper Writing-[AX4091]
Upon completion of the course, the students will.../ will be able to... CO1 :Explain the techniques to improve the writing skills and level of readability CO2 :Describe what to write in each section CO3 :Illustrate the skills needed when writing a Title CO4 :Identify the skills needed when writing the Conclusion CO5 :Explain the basic requirements for the good quality of paper at very first-time submission
Course:Introduction to Computer Organization and Operating Systems-[BX4003]
Upon completion of the course, the students will.../ will be able to... CO1 : Analyse the basics structure of computers, operations and instructions. CO2 : Design arithmetic and logic unit, control unit.

- CO3 : Explain the various memory systems and I/O communication.
 CO4 : Compare operating system functions, types, system calls
 CO5 : Analyze Process and various scheduling algorithms

Course:Database Management Systems-[BX4004]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Design a database using ER diagrams using the basic concepts of the database and data models.
 CO2 : Apply the knowledge of Relational model and query evaluation to monitor the performance of the DBMS.
 CO3 : Develop simple database applications using normalization.
 CO4 : Apply the knowledge of Transaction Processing and concepts of Recovery.
 CO5 : Implement file operation and indexing techniques.

Course:Software Project Management-[MC4001]

Upon completion of the course, the students will.../ will be able to...

- CO1 :Describe the activities involved in project scheduling of any software application.
 CO2 :Apply the risk management activities and the resource allocation strategies for the projects.
 CO3 :Apply the software estimation and recent quality standards for evaluation of the software projects
 CO4 :Develop a highly reliable software project
 CO5 : Interpret reliable, replicable cost estimation that links to the requirements of project planning and managing

Course:Professional Ethics in IT-[MC4002]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Examine situations and to internalize the need for applying ethical principles, values to tackle various situations
 CO2 : Develop a responsible attitude towards the use of computers as well as the technology.
 CO3 : Analyze professional responsibility and empower access to information in the workplace.
 CO4 : Analyze the IPR issues and the procedure to protect different forms of IPR.
 CO5 : Apply social networking advertising in the development of Business and Educational Sectors

Course:Full Stack Web Development-[MC4201]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Develop client-side applications using HTML, CSS and JavaScript.
 CO2 : Develop server-side applications using NodeJS.
 CO3 : Use express framework in web development.
 CO4 : Build database systems in both NoSQL and SQL environments.
 CO5 : Use ReactJS library in front end web development.
 CO6 : Develop a full-stack Single Page Application using React, NodeJS and MongoDB and deploy on Cloud

Course:Advanced Database Technology-[MC4202]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Design a distributed database system and execute distributed queries.
 CO2 : Develop Spatial and Temporal Database systems and implement it in corresponding applications.
 CO3 : Develop NoSQL database systems and manipulate the data associated with it.
 CO4 : Design XML database systems and validate with XML schema.

CO5 : Apply knowledge of information retrieval concepts on web databases.
Course:Cloud Computing Technologies-[MC4203]
Upon completion of the course, the students will.../ will be able to...
CO1 : Able to use Distributed systems in Cloud Environment.
CO2 : Able to articulate the main concepts, key technologies, strengths and limitations of Cloud computing.
CO3 : Able to identify the Architecture, Infrastructure and delivery models of Cloud computing.
CO4 : Able to install, choose and use the appropriate current technology for the implementation of Cloud.
CO5 : Able to adopt Microservices and DevOps in Cloud environments.
Course:Mobile Application Development-[MC4204]
Upon completion of the course, the students will.../ will be able to...
CO1 : Make use of mobile application frameworks and tools.
CO2 : Develop a UI for mobile applications
CO3 : Design mobile applications that manage memory dynamically.
CO4 : Design an applications based on mobile OS like Android, iOS.
CO5 : Develop an application using location based services.
Course:Cyber Security-[MC4205]
Upon completion of the course, the students will.../ will be able to...
CO1 : Develop a set of risk and security requirements to ensure that there are no gaps in an organization's security practices.
CO2 : Analyse and monitor the performance of cyber security controls.
CO3 : Apply security for Business applications and Network Communications.
CO4 : Analyse the managerial, operational and technical means for effective cyber security.
CO5 : Identify gaps in the system. devise improvements and report vulnerabilities in the system.
Course:Advanced Database Technology Laboratory-[MC4211]
Upon completion of the course, the students will.../ will be able to...
CO1 : Design and implement advanced databases.
CO2 : Apply big data frameworks and tools.
CO3 : Develop complex queries using SQL.
CO4 : Create an XML document and perform Xquery.
CO5 : Apply Query processing in Mobile databases using open source tools.
Course:Full Stack Web Development Laboratory-[MC4212]
Upon completion of the course, the students will.../ will be able to...
CO1 : Develop and deploy the client side of the web application.
CO2 : Develop and deploy server side applications using NodeJS.
CO3 : Create web applications using Express framework
CO4 : Design and implement database systems in both NoSQL and SQL environments.
CO5 : Develop a full stack single page application using React, NodeJS, and a Database and deploy using containers.
Course:Communication Skills Enhancement? II-[MC4213]
Upon completion of the course, the students will.../ will be able to...
CO1 : Make presentations and Participate in Group Discussions with confidence.
CO2 : Perform well in the interviews.
CO3 : Make effective Presentations

Semester:3

<p style="text-align: center;">Course:Wireless Networking-[MC5023]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Apply the latest 3G/4G networks and its architecture.</p> <p>CO2 : Design wireless network environment for any application using latest wireless protocols and standards.</p> <p>CO3 : Select the suitable network depending on the availability and requirement.</p> <p>CO4 : Implement different type of applications for smart phones and mobile devices with latest network strategies.</p>
<p style="text-align: center;">Course:Data Mining and Data Warehousing Techniques-[MC5032]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identify data mining techniques in building intelligent model</p> <p>CO2 : Develop association mining techniques on transactional databases</p> <p>CO3 : Apply classification techniques in real world applications</p> <p>CO4 : Apply clustering techniques and Evaluate various mining techniques on complex data objects</p> <p>CO5 : Design, create and maintain data warehouses</p>
<p style="text-align: center;">Course:Professional Ethics in IT-[MC5035]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Examine situations and to internalize the need for applying ethical principles, values to tackle various situations</p> <p>CO2 : Develop a responsible attitude towards the use of computers as well as the technology</p> <p>CO3 : Analyze professional responsibility and empower access to information in the workplace</p> <p>CO4 : Analyze the IPR issues and the procedure to protect different forms of IPR</p> <p>CO5 : Apply social networking advertising in the development of Business and Educational Sectors</p>
<p style="text-align: center;">Course:Cryptocurrency and Blockchain Technologies-[MC5039]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basics of Block chain Technology concepts and its applications</p> <p>CO2 : know about the implementation of Crypto currency</p> <p>CO3 : identify the different ways to achieve Block chain Technology</p> <p>CO4 : Illustrate how to design and build smart contracts using various platforms</p> <p>CO5 : Outline the future of Block chain technology</p>
<p style="text-align: center;">Course:Data Science-[MC5306]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Convert real world problems to hypothesis and perform statistical testing</p> <p>CO2 : Perform data analysis using R.</p> <p>CO3 : Design efficient modeling of very large data and work with big data platforms.</p> <p>CO4 : Implement suitable data analysis for stream data.</p> <p>CO5 : Write efficient MapReduce programs for small problem solving methods.</p>
<p style="text-align: center;">Course:Embedded Systems and Internet of Things-[MC5307]</p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Compare architecture of embedded processors and micro controllers.</p> <p>CO2 : Design and deploy timers and interrupts.</p> <p>CO3 : Develop the prototype of embedded and IoTsystems.</p>

CO4 : Design portable IoT using Arduino/Raspberry Pi /equivalent boards.
CO5 : Analyze the applications of IoT in real time scenario.

Course:Data Science Laboratory-[MC5314]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Explain the steps for installing analytical tools and configure distributed file system.
CO2 : Develop and execute analytical procedures in various Distributed frameworks and databases
CO3 : Develop simple applications on very large datasets.
CO4 : Apply simple to complex data modeling in NoSQL databases.
CO5 : Develop and deploy simple applications in cloud.

Course:Internet of Things Laboratory-[MC5315]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Write the simple assembly programs that use various features of the processor.
CO2 : Experiment with different sensors for application development Arduino/Raspberry Pi/Equivalent boards.
CO3 : Develop an IOT applications with different platform and frameworks.

Semester:4

Course:Project Work-[MC5414]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe new field by studying various research papers related to a concept, to summarise and review them.
CO2 : Examine the methodology to perceive the problem.
CO3 : Apply new technologies and design techniques for devising solution for a given problem statement.
CO4 : Communicate technical information by means of written and oral reports.
CO5 : Practice the skills, diligence, and commitment to excellence needed to engage in lifelong learning.

Semester:5

Course:Professional Ethics-[MC5006]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Examine the situations and to internalize the need for applying ethical principles, values to tackle with various situations.
CO2 : Develop a responsible attitude towards the use of computer as well as the technology
CO3 : Identify the societal impact on the products/ projects they develop in their career
CO4 : Apply the code of ethics and standards of computer professionals.
CO5 : Analyze the professional responsibility and empowering access to information in the work place.

Course:Service Oriented Architecture-[MC5012]

Upon completion of the course, the students will.../ will be able to...

CO1 : Design XML structure to store data in XML format.
CO2 : Apply SOAP , HTTP and UDDI services in the web applications.
CO3 : Apply SOA architecture and the underlying design principles for the web projects
CO4 : Describe the role of SOA in J2EE and .NET.
CO5 : Describe the cloud computing architecture and the types of clouds

Course:Cloud Computing-[MC5501]

Upon completion of the course, the students will.../ will be able to...
CO1 : Compare the strengths and limitations of cloud computing
CO2 : Identify the architecture, infrastructure and delivery models of cloud computing
CO3 : Apply suitable virtualization concept.
CO4 : Choose the appropriate cloud player, Programming Models and approach.
CO5 : Find the core issues of cloud computing such as security, privacy and interoperability
CO6 : Design Cloud Services and Set a private cloud

Course:Big Data Analytics-[MC5502]

Upon completion of the course, the students will.../ will be able to...
CO1 : Examine big data platform and know the fundamentals of various big data analysis techniques
CO2 : Analyze the big data analytic techniques for useful business applications.
CO3 : Design efficient algorithms for mining the data from large volumes.
CO4 : Analyze the HADOOP and Map Reduce technologies associated with big data analytics
CO5 : Discover the applications of Big Data

Course:Software Testing and Quality Assurance-[MC5503]

Upon completion of the course, the students will.../ will be able to...
CO1 : Assess the software by applying various testing techniques
CO2 : Measure the project and to test the entire computer based systems at all levels
CO3 : Assess the applications in the specialized environment using various automation tools
CO4 : Evaluate the web applications using bug tracking tools.
CO5 : Apply quality and reliability metrics to ensure the performance of the software

Course:Cloud and Big Data Laboratory-[MC5511]

Upon completion of the course, the students will.../ will be able to...
CO1 : Apply the cloud and big data tool kits.
CO2 : Develop applications on the Cloud environment
CO3 : Describe the procedure to setup Single node hadoop cluster.
CO4 : Apply the map reduce tasks for various applications

Course:Software Testing Laboratory-[MC5512]

Upon completion of the course, the students will.../ will be able to...
CO1 : Assess the software by applying various testing techniques.
CO2 : Develop the project and to test the entire computer based systems at all levels.
CO3 : Design the applications in the specialized environment using various automation tools.
CO4 : Evaluate the web applications using bug tracking tools
CO5 : Apply quality and reliability metrics to ensure the performance of the software

Course:Mini Project-[MC5513]

Upon completion of the course, the students will.../ will be able to...
CO1 :Form a team with maximum of 4 members.
CO2 :Develop an application with social relevance.
CO3 :Document based on the standards.

CO4 :Submit a report, Presentation with demo.
CO5 :Do user based Testing

Semester:6

Course:Project Work-[MC5611]

Upon completion of the course, the students will.../ will be able to...

- CO1 : Describe new field by studying various research papers related to a concept, to summarise and review them.
- CO2 : Examine the methodology to perceive the problem.
- CO3 : Apply new technologies and design techniques for devising solution for a given problem statement
- CO4 : Communicate technical information by means of written and oral reports.
- CO5 : Practice the skills, diligence, and commitment to excellence needed to engage in lifelong learning.