

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:B.E. Civil Engineering

Semester: 1

<b>Course:Engineering Chemistry-[CH22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Recall the basic concepts of water softening,nanomaterials and batteries. CO2 : Summarise the typesof corrosion,fuels and energy storage devices. CO3 : Explain the basic principles of electrochemistry and engineering materials. CO4 : Identify suitable methods for water treatment,fuel and corrosion control. CO5 : Apply the knowledge of engineering materials,fuels and energy storage devices for material selection and also in energy sectors.
<b>Course:Problem Solving and Python Programming-[CS22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the algorithmic solutions to simple and complex computational problems. CO2 : Apply functions, modules and packages in Python program and use conditionals and loops for solving problems. CO3 : Analyze conditional branching statements CO4 : Evaluate python programs. CO5 : Develop programs using compound data types and files.
<b>Course:Problem Solving and Python Programming Laboratory-[CS22102]</b>
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. CO4 : Deploy functions to decompose a Python program CO5 : Process compound data using Python data structures. CO6 : Utilize Python packages in developing software applications.
<b>Course:Communicative English-[EN22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 :Apply and practice the correct usages of language CO2 :Receive the language effectively and meaningfully through receptive skills CO3 :Produce the language appropriate to the needs and situations exercising productive skills CO4 :Transfer or interpret any piece of information with accuracy and fluency CO5 :Apply the language intellectually and confidently
<b>Course:Matrices and Calculus-[MA22101]</b>
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, ODE and integration CO2 : Explain the properties of matrices and nature of the quadratic form CO3 : Interpret the techniques of differentiation, partial differentiation, ODE and integration CO4 : Apply diagonalization of matrices in quadratic form and use Cayley Hamilton theorem in inverse of matrices CO5 : Solve problems on differentiation, partial differentiation, integration and ODE using different methods

**Course:Engineering Physics-[PH22101]**

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

- CO1 : Recall the basic concepts of environment and sustainable development.
- CO2 : Summarize the types of pollution, various natural resources and food adulterants.
- CO3 : Explain the methods for waste management and detection of adulterants.
- CO4 : Apply the gained knowledge to overcome various issues related to health and environment.
- CO5 : Identify suitable methods for local environmental issues and sustainability.

**Semester:2**

**Course:Building Materials and Techniques-[CE22201]**

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

- CO1 :List the various Building Materials, Techniques And Equipment
- CO2 :Demonstrate the construction practices and techniques in the field of civil Engineering
- CO3 :Apply the suitable construction materials, techniques and equipment
- CO4 :Identify the quality of materials and Construction Practices
- CO5 :Analyze the Suitability of Modern Building Materials and Equipment

**Course:Environment and Sustainability-[CH22201]**

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

- CO1 :recall the basic concepts of environment and sustainable development
- CO2 :summarise the types of p-ollution,various natural resources and food adulterants
- CO3 :explain the methods for waste management and detection of adulterants
- CO4 :apply the gained knowledge to overcome various issues related to health and environment
- CO5 :identify suitable methods for local environmental issues and sustainability

**Course:Technical English-[EN22201]**

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

- CO1 : Infer advanced technical texts from varied technical genres to expand engineering knowledge and explore more ideas.  
Analyse technical contents written on par with international standards and rewrite
- CO2 : contents using the right vocabulary without grammatical errors to make their articles published in reputed journals.
- CO3 : Present reports and Job Letters utilizing the required format prescribed on par with international standards using the exact vocabulary to make their works worthy to be read.
- CO4 : Employ the language tones and styles appropriately in interviews and Group Discussions effortlessly following the strategies expected by the corporate world.
- CO5 : Appraise the need for new products and descriptions and present them in formal and informal situations.

**Course:Basic Electrical and Electronics Engineering-[ES22202]**

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

- CO1 : Apply the basic laws to determine circuit parameters.
- CO2 : Explain the construction, working and application of electrical machines.
- CO3 : Explain the construction and working of semiconductor devices.
- CO4 : Interpret the function of combinational and sequential circuits.
- CO5 : Interpret the operating principles of measuring instruments.

**Course:Engineering Practices Laboratory-[ES22203]**

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

- CO1 : Prepare various pipe and furniture fittings used in common household.
- CO2 : Perform the given metal joining and metal removal operation in the given work piece as per the dimensions
- CO3 : Apply the fundamental concepts involved in Electrical Engineering
- CO4 : Explain the basic electrical wiring procedures
- CO5 : Assemble basic electronic components

**Course:Statistics and Numerical Methods-[MA22201]**

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

- CO1 : Define the basic concepts of statistical tests, ANOVA, iterative methods, interpolations and ODE.
- CO2 : Discuss the techniques of statistical tests and design of experiments.
- CO3 : Explain the solution of equations, ODE, single and multistep methods, interpolations,differentiation and integration.
- CO4 : Apply the concept of testing of hypothesis and design of experiment in real life.
- CO5 : Apply numerical techniques in system of equations, differential equations, interpolation, differentiation and integration.

**Course:Engineering Graphics-[ME22201]**

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 : Recall the existing national standards and interpret a given three dimensional drawing
- CO3 : Acquire visualization skills through the concept of projection
- CO4 : Develop the sectioned solids and discover its true shape
- CO5 : Develop imagination of physical objects to be represented on paper for engineering communication.

**Course:Physics for Civil Engineering-[PH22201]**

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

- CO1 : Recall the basic concepts of light, electron transport properties of conductors and basic principles of semiconductors.
- CO2 : List the factors affecting the buildings and the principles of advanced engineering materials.
- CO3 : Illustrate laser and fibre optics, classical and quantum concepts of conducting materials, physics of semiconducting materials.
- CO4 : Explain the impact of heat, sound and light in buildings and functioning of smart materials.  
Develop the applications of optics, fibre optics, moduli of elasticity and thermal energy,
- CO5 : behavior of conductors, semiconductors and advanced engineering materials and also the influence of various factors in building constructions.

**Semester:3**

**Course:Fluid Mechanics-[CE3301]**

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

- CO1 : State 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.

<p>CO3 : Identify the characteristics of fluids in static kinematic and dynamic equilibrium, types of flow, boundary layer and model analysis.</p> <p>CO4 : Calculate the flow characteristics and pressure of fluid passing through closed pipes and open channels.</p> <p>CO5 : Analyse the hydrostatic pressure of fluids, model studies and static, kinematic and dynamic equilibrium of fluids.</p>
<b>Course:Construction Materials and Technology-[CE3302]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define construction materials, practices, equipments and scheduling techniques.</p> <p>CO2 : Explain the usage of construction materials, practices, equipments, planning and scheduling techniques.</p> <p>CO3 : Apply suitable materials, scheduling and service practices such as thermal insulations and air conditioning for the construction.</p> <p>CO4 : Use various materials, equipments and techniques for construction of building.</p> <p>CO5 : Categorize the construction planning, scheduling and practicing techniques.</p>
<b>Course:Water Supply and Wastewater Engineering-[CE3303]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the fundamentals of water supply and sewerage systems, including water treatment, storage, distribution, and treatment, disposal of sewage.</p> <p>CO2 : Demonstrate the concepts in the design of water supply and sewerage systems.</p> <p>CO3 : Design the functional units of water supply and sewerage systems.</p> <p>CO4 : Identify the appropriate treatment method for water and sewage.</p> <p>CO5 : Infer the characteristics and methods of treatment of water and sewage.</p>
<b>Course:Water and Wastewater Analysis Laboratory-[CE3311]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Determine the physical, chemical and biological characteristics of water and waste water.</p> <p>CO2 : Compute the dosage requirement for coagulation process.</p> <p>CO3 : Interpret the pollution concentration in water and waste water.</p> <p>CO4 : Analyse the physico-chemical and biological parameters of water with regard to the water quality requirements.</p> <p>CO5 : Examine the growth of micro-organisms in waste water.</p>
<b>Course:Surveying and Levelling-[CE3351]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : State the rudiments of various surveying and its principle.</p> <p>CO2 : Demonstrate levels of ground and terrain feature.</p> <p>CO3 : Organize theodolite surveying for complex surveying operations.</p> <p>CO4 : Apply the procedure for establishing horizontal and vertical control.</p> <p>CO5 : Examine modern surveying.</p>
<b>Course:Surveying and Levelling Laboratory-[CE3361]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Relate surveying with construction projects and collect field data.</p> <p>CO2 : Summarize field notes from survey data.</p> <p>CO3 : Interpret survey data and compute areas and volumes.</p> <p>CO4 : Experiment with different methods and their procedure of surveying.</p> <p>CO5 : Categorise methods based on its application and advancements.</p>

**Course:Transforms and Partial Differential Equations-[MA3351]**

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

- CO1 : Describe the basic concept of formation of PDE,Fourier series, and Fourier and Z-Transform techniques for solving standard partial differential equations and ODE..
- CO2 : Explain the Transformations techniques and fourier series concept in Engineering.
- CO3 : Interpret the fourier transform and Z transform of standard functions.
- CO4 : Utilize the various types of PDE and apply fourier series in Wavenequations and Heat equation.
- CO5 : Solve the difference equation using Z-Transform techniques.

**Course:Engineering Mechanics-[ME3351]**

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

- CO1 : State the fundamentals of scalar and vector analytical techniques, free body diagrams, types of reaction and loading, friction, besides various laws for analyzing forces in Statically determinate structures and develop basic dynamics concepts – force, momentum, work and energy.
- CO2 : Explain the frictional resistance in simple contact surfaces, ladder friction, wedge friction, screw friction, and belt friction.
- CO3 : Apply the various laws in finding out the forces and reactions induced on any systems subjected to a set of forces.
- CO4 : Calculate the centroid, different types of moment of inertia of various symmetrical and unsymmetrical compound sections, besides simple sections.
- CO5 : Analyze the motion of particles using various laws of motion and energy methods.

**Semester:4**

**Course:Applied Hydraulics Engineering-[CE3401]**

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:Strength of Materials-[CE3402]**

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

- CO1 : Define the various behaviour of beams under loading.
- CO2 : Describe the effects of loading such as stress, shear force, bending moment and energy distortion.
- CO3 : Calculate the stress, shear force, bending moment and energy distortion of structural elements under various loading conditions.
- CO4 : Determine the effects on beam like stress, shear force, bending moment and slope for various loading conditions.
- CO5 : Analyse the structural behaviors such as stress, shear force, bending moment and deflections of beams.

**Course:Concrete Technology-[CE3403]**

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-[CE3404]**

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

- CO1 : Define various types of soil, its properties and behaviour under various conditions.
- CO2 : Demonstrate the concept of effective stress, stress distribution, shear strength and slope stability.
- CO3 : Apply the field and laboratory test to conclude the characteristics of the soil.
- CO4 : Categorize the soil based on various parameters considered.
- CO5 : Examine the types of soil based on its strength, bearing capacity and other properties.

**Course:Highway and Railway Engineering-[CE3405]**

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

- CO1 : Define the principles, planning, development and standards adopted in highway and railway.
- CO2 : Demonstrate the geometric features of road and railway network and components of pavement and track.
- CO3 : Apply the suitable construction materials and construction practice methods to perform pavement evaluation and management.
- CO4 : Design elements in highway and railway planning and constructions.
- CO5 : Analyze the construction techniques, maintenance and drainage of pavement and track.

**Course:Hydraulic Engineering Laboratory-[CE3411]**

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

- CO1 : Apply Bernoulli equation for calibration of flow measuring devices.
- CO2 : Measure friction factor in pipes and compare with Moody diagram
- CO3 : Determine the performance characteristics of rotodynamic pumps.
- CO4 : Determine the performance characteristics of positive displacement pumps.
- CO5 : Determine the performance characteristics of turbines and metacentric height of floating bodies.

**Course:Materials Testing Laboratory-[CE3412]**

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

- Know the mechanical properties of steel subjected to tension, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
- CO2 : Outline the physical properties of cement.
- CO3 : Evaluate the physical properties of fine and coarse aggregate.
- CO4 : Demonstrate the workability and compressive strength of concrete.
- CO5 : Test the strength properties of brick and wood.

**Course:Soil Mechanics Laboratory-[CE3413]**

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

- CO1 : Define the soil properties by conducting various test to soil samples.
- CO2 : Explain in detail the various test conducted to study the properties and characteristics of soil.
- CO3 : Apply the test to find the strength properties for construction of buildings.
- CO4 : Demonstrate the test procedures.
- CO5 : Appraise the testing methods based on its effectiveness for field test.

**Course:Environmental Sciences and Sustainability-[GE3451]**

- Upon completion of the course, the students will.../ will be able to...
- CO1 : Understand about environment, bio diversity, environmental pollution, renewable sources of energy, its sustainability and management.
- CO2 : Identify the causes of environmental pollution, effects and its preventive measures and the need for new energy sources.
- CO3 : Apply the safety management system and various renewable sources of energy to preserve the environment.
- CO4 : Examine different forms of energy and apply them for suitable applications in for technological advancement and societal development.
- CO5 : Analyze the environmental management and various real time sustainability practices.

**Semester:5**

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

- Upon completion of the course, the students will.../ will be able to...
- CO1 : State the various design concepts and behaviour of RCC elements under working and ultimate loads.
- CO2 : Describe the methods of design, use of design aids, types of stair cases, types of columns and concept of proportioning footings.
- CO3 : Design the structural elements such as beams, slabs and stair cases based on IS code specifications and draw reinforcement detailing.
- CO4 : Design the structural elements such as columns and footings based on IS code specifications and draw reinforcement detailing.
- CO5 : Analyse beams and columns based on limit state design and provide safe economic design.

**Course:Structural Analysis I-[CE8502]**

- Upon completion of the course, the students will.../ will be able to...
- CO1 : Define 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 : Solve pin-jointed indeterminate plane frames and rigid plane frames using alternate methods.
- CO4 : Categorize the analysing techniques based on its ease and application.
- CO5 : Analyse different structure using alternate methods.

**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]**

Upon completion of the course, the students will.../ will be able to...  
make the students to be familiar with measurments of length, area, volume,

CO1 : contotouring, L.S. and C.S., and traversing using tradional equipments as well as total station so that they will meet the requirements of industries.

**Course:Foundation Engineering-[CE8591]**

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

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 loadsacting.

CO4 : Analyze the lateral stability of pile foundation.

CO5 : Evaluate the design parameters of retaining walls in construction.

**Course:Water Supply Engineering-[EN8491]**

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

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 : Identify the elements of water quality, supply, treatment and their relation to public health, and water supply project alternatives.

CO4 : Design the functional units of water supply, treatment and distribution.

CO5 : Plan the unit operations and processes required in water supply and treatment.

**Course:Geographic Information System-[GI8014]**

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

CO1 : Define the fundamentals of GIS, history of GIS, database structures, data input methods and basic aspects of data quality.

CO2 : Compare the open source and proprietary software, topology and non-topology.

CO3 : Demonstrate E-R models and raster, vector data models in GIS.

CO4 : Build ER diagram, spatial data models, GPS data integration and data output models.

CO5 : Classify the datum projection, interoperability, data quality and raster- vector conversion in data input and output.

**Course:Environment and Agriculture-[OAI551]**

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

- CO1 : Define the environment concern based on agriculture
- CO2 : Interpret agriculture and its impacts on pollination crisis
- CO3 : Summarize global warming and its changes in environment and agriculture
- CO4 : Solve the problems on erosion, deposition in irrigation systems and its impact on agriculture and environment
- CO5 : Organize global environmental governance on farms with virtual water trade

**Semester:6**

**Course:Design of Steel Structural Elements-[CE8601]**

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

- CO1 : Infer the importance of 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: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:Irrigation Engineering-[CE8603]**

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

- CO1 : State the basic concept of irrigation, its classification, merits and demerits, different irrigation structures, and water management.
- CO2 : Explain the components of irrigation structures, irrigation methods and the various forces acting on them.
- CO3 : Design the irrigation structures such as gravity dam, prismatic canal and unlined canal.
- CO4 : Determine the evapotranspiration and water efficiencies and suggest irrigation management for reducing water losses.
- CO5 : Analyze the crop water requirements and modernized techniques for optimization of irrigation water use.

**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:Highway Engineering Laboratory-[CE8611]**

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

- CO1 : Know 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:Wastewater Engineering-[EN8592]**

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

- CO1 : List the characteristics, treatment processes and disposal methods of sewage.
- CO2 : Explain the characteristics, sewer appurtenances, plumbing systems, treatment processes and disposal methods of sewage.
- CO3 : Determine the quantity of BoD, sewage discharge, size of sewer and sewage treatment units.
- CO4 : Design the sewage and sludge treatment units.
- CO5 : Examine the recent advances in sewage treatment and sludge disposal and treatment.

**Course:Professional Communication-[HS8581]**

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

- CO1 : Make effective presentation
- 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:Construction Planning And Scheduling-[CE8012]**

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

- CO1 : State planning, scheduling, and control theory and principles
- CO2 :Summarize Project Schedule, Forecast and control the cost in a construction.
- CO3 :Apply information in Centralized database Management systems
- CO4 :Analyse the quality control, safety and database management system during construction.

CO5 : Evaluate the schedule network diagram, optimum cost, duration and critical path.
<b>Course: Estimation, Costing and Valuation Engineering-[CE8701]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : State the importance of estimation of quantities, types of specifications, principles for report preparation, tender notices types.
CO2 : Infer specification, tender document and design basis report based on the requirement.
CO3 : Identify the quantity and current rates for items of work and book value for property.
CO4 : Analyse rate for all Building works, canals, and Roads and Cost Estimate.
CO5 : Evaluate the quantity of works, cost, present value of buildings and the depreciation rate of buildings.
<b>Course: Railways, Airports, Docks and Harbour Engineering-[CE8702]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the concepts of planning, design, construction and maintenance of railways, airports and harbors.
CO2 : Describe the planning, design, construction and maintenance aspects of railways, airports and harbors.
CO3 : Design the geometrics of railways, airports and harbors.
CO4 : Select the structural components, layouts and design aspects of railways, airports and harbor.
CO5 : Examine the conventional and modern methods of construction and maintenance of railway tracks.
<b>Course: Structural Design and Drawing-[CE8703]</b>
Upon completion of the course, the students will.../ will be able to...
Interpret the working principles of various engineering structures such as Retaining
CO1 : Walls, flat slabs, reinforced concrete and steel bridges, reinforced concrete and steel water tanks, the various steel trusses and gantry girders and their elements.
CO2 : Design the retaining walls and water tanks subjected to different kinds of external loads acting.
CO3 : Design the structural elements such as flat slabs, bridges and industrial Structures subjected to different loading condition.
CO4 : Analyse the structures in order to obtain the internal forces induced due to various load combinations.
CO5 : Mark the reinforcement detailing of structures by manual drawing, as per the specifications of Indian standard code books available for various structures.
<b>Course: Creative and Innovative Project (Activity Based -Subject Related)-[CE8711]</b>
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.
<b>Course: Industrial Training (4 weeks During VI Semester ? Summer)-[CE8712]</b>
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.
<b>Course: Testing of Materials-[OML751]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Interpret 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 materials science engineering.
CO4 :	Identify the mechanical properties of materials.
CO5 :	Analyse the function on multi-disciplinary teams in the area of materials testing.

### Semester:8

<b>Course:Maintenance, Repair and Rehabilitation of Structures-[CE8020]</b>	
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.
<b>Course:Prefabricated Structures-[CE8022]</b>	
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.

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:M.E. Construction Engineering and Management

**Semester:1**

<b>Course:Modern Structural Materials and System Design-[CM22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : State the basics of structural materials, loadings, systems, design, repair and retrofitting CO2 : Describe the concepts of materials, loadings, systems, design, repair and retrofitting of structures. CO3 : Apply the design procedure underlying the design of structural systems. CO4 : Analyse the structural systems and system design. CO5 : Appraise the load transfer mechanism, techniques of repair and retrofitting of structures.
<b>Course:Construction Planning, Scheduling and Control-[CM22102]</b>
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, control and organization of data of construction projects. CO2 Describe the planning concepts, network representation and analysis, scheduling, : monitoring, control and data organization in construction. 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, : control and database models of construction projects. CO5 Appraise the methods of network representation and analysis, work scheduling, cost control : and database models of construction projects.
<b>Course:Statistical Methods for Engineers-[MA22107]</b>
Upon completion of the course, the students will.../ will be able to... CO1 Define the basic concepts of standard distributions, correlation, statistical hypothesis and : multivariate techniques. CO2 Explain random variables, statistical tests, classifications of design of experiments and : multivariate techniques used in engineering. CO3 Apply the concept of distributions, correlation and curve fitting in engineering disciplines. : CO4 Apply the concept of testing of hypothesis for small and large samples and analysis of : variance in real life problems. CO5 Develop exploratory analysis of multivariate data, such as multivariate normal density, : calculating descriptive statistics, testing for multivariate normality.
<b>Course:Research Methodology-[RM22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 :Outline the methodology of research. CO2 :Explain the research design, data collection methods, IPR and patent. CO3 :Prepare a well structured research paper, scientific presentations and patent applications. CO4 :Develop awareness on IPR, patent law and procedural mechanism in obtaining a patent. CO5 :Compare the methods of measurement scale, questionnaires, sampling and data analysis.
<b>Course:Advanced Concrete Technology-[SE22111]</b>

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the materials used in construction, test on concrete, special types of concrete and various concreting methods</p> <p>CO2 : Describe the materials used in construction, test on concrete and special types of concrete</p> <p>CO3 : Apply the rules in the mix proportion of concrete.</p> <p>CO4 : Identify the properties of concrete, special types of concrete and their applications.</p> <p>CO5 : Examine the properties of concrete, concreting methods.</p>
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## Semester:2

<b>Course:Disaster Management-[AC22201]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Summarize basics of disaster.</p> <p>CO2 : Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.</p> <p>CO3 : Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.</p> <p>CO4 : Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.</p> <p>CO5 : Develop the strengths and weaknesses of disaster management approaches.</p>
<b>Course:Computer Applications in Construction Engineering and Planning-[CM22201]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :State the basic concept of computer applications in construction management and planning</p> <p>CO2 :Describe the computer applications in construction management and planning.</p> <p>CO3 :Make use of the applications of software in construction management and planning.</p> <p>CO4 :Examine the application of software in construction management</p> <p>CO5 :Assess the application of software in construction management</p>
<b>Course:Economics and Finance Management in Construction-[CM22202]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basics of construction economics and finance including comparing and evaluating alternative proposals, management of funds, and management accounting.</p> <p>CO2 : Describe the concepts of construction economics and finance including comparing and evaluating alternative proposals, management of funds, and management accounting.</p> <p>CO3 : Develop cash flow diagrams, and cash flow and funds flow statements.</p> <p>CO4 : Infer the interest rates, and methods of comparing alternative proposals and investments.</p> <p>CO5 : Interpret the methods of evaluating alternative proposals and investments, and funds management.</p>
<b>Course:Contract Laws and Regulations-[CM22204]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basic terminology of law for contract &amp; labour regulations.</p> <p>CO2 : Explain the procedure for contract, tender and arbitration.</p> <p>CO3 : Identify the relevant legal aspects, legal requirements and provision.</p> <p>CO4 : Distinguish the various process involved in contract formation.</p> <p>CO5 : Examine the contract laws and regulations.</p>

<b>Course:Construction Personnel Management-[CM22231]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : State the fundamentals of construction personnel management . CO2 : Explain the concepts of leadership, human behaviour, human resources, communication and manpower in construction. CO3 : Make use of leadership qualities for personnel management in construction . CO4 : Examine the theories of leadership and human behavior. CO5 : Interpret the different aspects of construction personnel management.
<b>Course:Research Tool Laboratory-[RM22201]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : List the various stages in research and develop systematic planning of project stages CO2 : Write a journal paper and formulate as per the standard journal format CO3 : Develop a literature review and relevant references for a research problem using suitable software CO4 : Determine the plagiarism of the article / report content by using the Software CO5 : Compile a research report and the presentation

### Semester:3

<b>Course:Quality control and Assurance in Construction-[CN4013]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : State the concepts of quality management,systems,planning,assurrance & control in construction. CO2 : Explain the quality management systems, quality assurrance, control & improvement techniques in construction. CO3 : Apply the quality standards for preparing quality system documents. CO4 : Select the techniques and tools for quality assurranceand control in construction industry. CO5 : Evaluate the quality standards and quality improvement techniques in construction.
<b>Course:Practical Training (4 Weeks)-[CN4311]</b>
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 oppertunities.
<b>Course:Project Work I-[CN4312]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature. CO2 : Develop the methodology to solve the identified problem. CO3 : Preparing project reports and to face reviews and viva-voce examination
<b>Course:Environmental Sustainability-[CX4016]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : State the environmental problems, agriculture, global warming and environmental economics. CO2 : Describe the methods of valuing the environment, population problem, solid waste and recycling of sustainability.

- CO3 : Explain the significance of biodiversity, pollution impacts and environmental economics
- CO4 : Apply the concept of sustainability, biodiversity and environmental economics in real life.
- CO5 : Analyse the environmental resources, pollution toxic, hazardous wastes and poverty.

**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 select Various strengthening and repair methods for different case.
- CO4 : Discriminate suitable type of concrete, protection methods, repair materials and methods to strengthen the structures.
- CO5 : Assess the causes of defects, quality and durability of concrete and adopt suitable repair techniques and protection methods.

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:M.E. Structural Engineering

**Semester:1**

<b>Course:Advanced Mathematical Methods-[MA22108]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concept of statistical tests, experimental designs, Taguchi's method, Laplace transform, Fourier transform and tensors.
CO2 : Explain the Laplace and Fourier transform techniques and the concept of tensors.
CO3 : Interpret Laplace and Fourier transform techniques with partial differential equations.
CO4 : Utilize the hypothesis tests, design of experiments, Taguchi's loss function and tensor analysis in engineering disciplines.
CO5 : Solve the boundary value problems using Laplace and Fourier transform techniques in engineering applications.
<b>Course:Research Methodology-[RM22101]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 :Outline the methodology of research.
CO2 :Explain the research design, data collection methods, IPR and patent.
CO3 :Prepare a well structured research paper, scientific presentations and patent applications.
CO4 :Develop awareness on IPR, patent law and procedural mechanism in obtaining a patent.
CO5 :Compare the methods of measurement scale, questionnaires, sampling and data analysis.
<b>Course:Structural Dynamics and Earthquake Engineering-[SE22101]</b>
Upon completion of the course, the students will.../ will be able to...
State the vibration analysis of system/structures with single degree of freedom as well
CO1 : as Multi degrees of freedom under free and forced vibration and the various terminologies of earthquake.
CO2 : Derive a mathematical model of various structural systems and illustrate the various factors affecting the dynamic response.
CO3 : Apply the various methods for calculating the dynamic properties and the earthquake load acting on the various structures.
CO4 : Analyse the dynamic response of the structures subjected to various dynamic loads as well as earthquake.
CO5 : Categorise the various steps and modern technology undertaken to make structures earthquake resistant.
<b>Course:Theory of Elasticity and Plasticity-[SE22102]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Define Strain tensor, plane stress and strain, photo elasticity, torsion, beams on elastic foundation and plasticity.
CO2 : Describe the fundamentals of stress and strain, photoelasticity, 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.
Analyse stress, strain, torsional behavior of sections, beams resting on elastic
CO4 : 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..

## Semester:2

<b>Course:Disaster Management-[AC22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Summarize basics of disaster.
CO2 : Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO3 : Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO4 : Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO5 : Develop the strengths and weaknesses of disaster management approaches.
<b>Course:Advanced Steel Structures-[SE22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Knowledge in the behavior of 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.
<b>Course:Finite Element Analysis of Structures-[SE22202]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : State 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.
<b>Course:Stability of Structures-[SE22203]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the buckling effect of structural elements by various approaches
CO2 : Describe the mathematical problems in structural elements.
CO3 : Apply differential equation and different methods in structural elements.
CO4 : Analysis the buckling effect of beam, column, and plate.
CO5 : Evaluate the inelastic behavior using different methods
<b>Course:Advanced Concrete Structures-[SE22204]</b>
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, grid floors and flat slab.
CO3 :	Design flexural, compression and special RC elements.
CO4 :	Analyse the concrete elements to provide safe construction.
CO5 :	Estimate the deflection, crackwidth, moment, shear and ductility of the concrete elements.
<b>Course: Maintenance and Rehabilitation of Structures-[SE22221]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	List the importance of maintenance, effects in structures due to climate and temperature variations, techniques for repair and their protection methods.
CO2 :	Summarize 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 :	Apply suitable type of strengthening techniques to the structures and the modern techniques for the demolition of large and hazardous structure in safe manner.
CO5 :	Analyze the distress in concrete, steel and masonry structures and adopt suitable repair and retrofitting techniques and protection methods.
<b>Course: Wind and Cyclone Effects on Structures-[SE22232]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	State the characteristics of wind and effects of wind on structures
CO2 :	Describe the behaviour of wind and cyclone effects on various types of structures and wind tunnel studies
CO3 :	Design high rise structures subjected wind load, even structures exposed to cyclone
CO4 :	Analyse the effects of wind and cyclone on low rise and tall buildings
CO5 :	Assess the static and dynamic effects on flexible and rigid structures through wind tunnel studies

### Semester:3

<b>Course: Structural Health Monitoring-[ST4013]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	State the different types of structural health inspection.
CO2 :	Explain the need and importance of structural health monitoring.
CO3 :	Identify the health of the Structure using the advance techniques.
CO4 :	Correlate the process and methods of health monitoring techniques.
CO5 :	Evaluate the accuracy of various health monitoring techniques.
<b>Course: Design of Bridge Structures-[ST4091]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Define the components of bridges, forces and load acting and its types.
CO2 :	Explain the types, design methodologies and principles of various bridge superstructure and substructures.
CO3 :	Model a bridge for the specifications given.
CO4 :	Analyse the bridges using various analytic techniques.
CO5 :	Prioritise a bridge design based on its efficiency over others.

**Course:Practical Training (4 Weeks)-[ST4311]**

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:Project Work I-[ST4312]**

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.**

2022 -- 2023 ODD Semester

**Course Outcomes**

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

Semester: 1

<b>Course:Engineering Chemistry-[CH22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Recall the basic concepts of water softening, nano materials and batteries. CO2 : Summarize the types of corrosion, fuels and energy storage devices. CO3 : Explain the basic principles of electrochemistry and engineering materials. CO4 : Identify suitable methods for water treatment, fuel and corrosion control. CO5 : Apply the knowledge of engineering materials, fuels and energy storage devices for material selection and also in energy sectors.
<b>Course:Problem Solving and Python Programming-[CS22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the algorithmic solutions to simple and complex computational problems CO2 : Apply functions, modules and packages in Python program and use conditionals and loops for solving problems CO3 :Analyze conditional branching statements. CO4 : Evaluate Python programs CO5 : Develop programs using compound data types and files
<b>Course:Problem Solving and Python Programming Laboratory-[CS22102]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Write and execute simple Python programs CO2 : Implement Python programs with conditional and looping statements CO3 : Develop python programs by defining functions and calling them CO4 : Use Python lists, tuples, dictionaries for representing compound data CO5 : Read and write data from/to files and write their own programs using python packages
<b>Course:Communicative English-[EN22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 :Recognise and practise the correct usages of language CO2 :Receive the language effectively and meaningfully through receptive skills CO3 :Infer and interpret any piece of information with accuracy and fluency CO4 :Produce the language appropriate to the needs and situations exercising productive skills CO5 :Apply the language intellectually and confidently
<b>Course:Universal Human Values-[HS22102]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Illustrate the significance of value inputs in a classroom and start applying them in their life and profession. CO2 : Explain the role of a human being in ensuring harmony in society and nature. CO3 : Summarise the value of harmonious relationship based on trust and respect in their life and profession. CO4 : Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. CO5 : Distinguish between ethical and unethical practices and start working out the strategy to actualize a harmonious wherever they work.

**Course:Matrices and Calculus-[MA22101]**

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, ODE and integration.
- CO2 : Explain the properties of matrices and nature of the quadratic form.
- CO3 : Interpret the techniques of differentiation, partial differentiation, ODE and integration.
- CO4 : Apply diagonalization of matrices in quadratic form and use Cayley Hamilton theorem in inverse of matrices.
- CO5 : Solve problems on differentiation, partial differentiation, integration and ODE using different methods.

**Course:Engineering Physics-[PH22101]**

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

- CO1 : Recall the basics of properties of matter, thermal physics and ultrasonics, to improve their engineering knowledge.
- CO2 : Define the advanced physics concepts of quantum theory and the characteristics of crystalline materials.
- CO3 : Illustrate Bending of beams, thermal behavior and ultrasonic devices to assess societal and safety issues.
- CO4 : Summarize the dual aspects of matter, crystal structures and imperfections of crystals.
- CO5 : Apply the moduli of elasticity of different materials, thermal energy, ultrasonics, scanning tunneling microscope and crystal growth techniques in engineering fields.

## Semester:2

<p style="text-align: center;"><b>Course:Environment and Sustainability-[CH22201]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Explain the basic concepts of Environment and Sustainable development</p> <p>CO2 :Summarize the types of pollution, various natural resources and food adulterants</p> <p>CO3 :Explain the methods for waste management and detection of adulterants</p> <p>CO4 :Apply the gained knowledge to overcome various issues related to health and environment</p> <p>CO5 :Identify suitable methods for local environmental issues and sustainability</p>
<p style="text-align: center;"><b>Course:Technical English-[EN22201]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Infer advanced technical texts from varied technical genres to expand engineering knowledge and explore more ideas. Analyse technical contents written on par with international standards and rewrite</p> <p>CO2 : contents using the right vocabulary without grammatical errors to make their articles published in reputed journals.</p> <p>CO3 : Present reports and Job Letters utilizing the required format prescribed on par with international standards using the exact vocabulary to make their works worthy to be read.</p> <p>CO4 : Employ the language tones and styles appropriately in interviews and Group Discussions effortlessly following the strategies expected by the corporate world.</p> <p>CO5 : Appraise the need for new products and descriptions and present them in formal and informal situations.</p>
<p style="text-align: center;"><b>Course:Basic Electrical and Electronics Engineering-[ES22202]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Apply the basic laws to determine circuit parameters</p> <p>CO2 : Explain the construction, working and application of electrical machines.</p> <p>CO3 : Explain the construction and working of semiconductor devices.</p> <p>CO4 : Interpret the function of combinational and sequential circuits.</p> <p>CO5 : Interpret the operating principles of measuring instruments.</p>
<p style="text-align: center;"><b>Course:Engineering Practices Laboratory-[ES22203]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Prepare various pipe and furniture fittings used in common household.</p> <p>CO2 : Perform the given metal joining and metal removal operation in the given work piece as per the dimensions.</p> <p>CO3 : Apply the fundamental concepts involved in Electrical Engineering</p> <p>CO4 : Explain the basic electrical wiring procedures</p> <p>CO5 : Assemble basic electronic components.</p>
<p style="text-align: center;"><b>Course:Statistics and Numerical Methods-[MA22201]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basic concepts of statistical tests, ANOVA, iterative methods, interpolations and ODE.</p> <p>CO2 : Discuss the techniques of statistical tests and design of experiments.</p> <p>CO3 : Explain the solution of equations, ODE, single and multistep methods, interpolations,differentiation and integration.</p> <p>CO4 : Apply the concept of testing of hypothesis and design of experiment in real life.</p> <p>CO5 : Apply numerical techniques in system of equations, differential equations, interpolation,</p>

differentiation and integration.
<b>Course:Engineering Graphics-[ME22201]</b>
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 : Interpret graphics as the basic communication and methodology of the design process. CO3 : Acquire visualization skills through the concept of projection CO4 : Develop the sectioned solids and discover its true shape CO5 : Develop imagination of physical objects to be represented on paper for engineering communications
<b>Course:Physics for Information Science-[PH22203]</b>
<b>Course Outcomes</b> Upon completion of the course, the students will.../ will be able to... CO1 : Recall the basic concepts of light, electron transport properties of conductors and basic principles of semiconductors. CO2 : Define the magnetic properties of materials and the principles of optoelectronic and nano devices CO3 : Illustrate laser and fibre optics, classical and quantum concepts of conducting materials and physics of semiconducting materials CO4 : Summarize the functioning of various magnetic,optoelectronic and nanodevices. Demonstrate the concepts of optics, fibre optics, moduli of elasticity and thermal CO5 : energy,behavior of conductors, semiconductors, magnetic and dielectric materials and also the functioning of optical and nano devices in various engineering applications.

### Semester:3

<b>Course:Data Structures-[CS3301]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Define linear and non-linear data structures. CO2 : Explain linear and non-linear data structure operations. CO3 : Use appropriate linear data structure operations for solving a given problem. CO4 : Apply appropriate tree and graph algorithms for applications. CO5 : Analyze the linear, non-linear data structures and various searching, sorting and hashing algorithms.
<b>Course:Data Structures Laboratory-[CS3311]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Implement linear data structure algorithms. CO2 : Implement applications using stacks and linked lists CO3 : Implement binary search tree and AVL tree operations. CO4 : Implement graph algorithms. CO5 : Implement various searching, sorting and hashing algorithms.
<b>Course:Digital Principles and Computer Organization-[CS3351]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : State the fundamentals of Computer systems and execution of an instruction CO2 : Explain different types of control design and identify hazards CO3 : Identify the characteristics of various memory systems and I/O communication

CO4 : Design various combinational digital circuits using logic gates CO5 : Design sequential circuits
<b>Course:Foundations of Data Science-[CS3352]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Acquire knowledge on relationships between data. CO2 : Summarize the data science process. CO3 : Illustrate different types of data descriptions for the data science process. CO4 : Use the Python Libraries for Data Wrangling CO5 : Apply visualization Libraries in Python to interpret and explore data
<b>Course:Data Science Laboratory-[CS3361]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Explore python libraries for data science. CO2 : Use the basic Statistical and Probability measures for data science. CO3 : Analyze the benchmark data sets using descriptive analytics. CO4 : Evaluate standard data sets using correlation and regression analytics. CO5 : Create visualization of data using visualization packages in Python.
<b>Course:Object Oriented Programming Laboratory-[CS3381]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Design and develop java programs using object-oriented programming concepts CO2 : Develop simple applications using object-oriented concepts such as packages and exceptions CO3 : Implement multithreading, and generics concepts CO4 : Develop GUIs and event-driven programming applications for real-world problems CO5 : Implement and deploy web applications using Java
<b>Course:Object Oriented Programming-[CS3391]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe 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, multithreaded models, I/O packages, String classes, collections and generics concepts. CO4 : Design interactive GUI based applications using the concepts of event handling and JavaFX components. CO5 : Analyze simple and advanced Java programming concepts.
<b>Course:Discrete Mathematics-[MA3354]</b>
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 : Discuss the techniques of logic and proofs, combinatorics & graphs. CO3 : Explain the properties algebraic structures, lattices and boolean algebra. CO4 : Apply the concepts needed to test the logic of a program, counting principles & graphs in real life. CO5 : Apply the concepts and properties of groups, rings, fields and lattices using algebraic structures and Boolean algebra.

**Semester:4**

**Course:Algorithms-[CS3401]**

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

- CO1 : Describe the algorithm analysis techniques to evaluate the complexity of an algorithm.
- CO2 : Identify and make use of various algorithm design techniques to solve real world problems.
- CO3 : Solve problems using divide and conquer, dynamic programming and greedy techniques.
- CO4 : Apply the state space tree method, approximation algorithms and randomized algorithms for solving problems.
- CO5 : Analyze the efficiency of algorithms using various frameworks.

**Course:Introduction to Operating Systems-[CS3451]**

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, virtual machines 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 , virtual machines and mobile OS.

**Course:Theory of Computation-[CS3452]**

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

Demonstrate the basic concepts of Mathematical proof, Automata theory, Regular

- CO1 : expressions, Context free grammar, Push down automata, Turing machine and Undecidable Problems.
- CO2 : Distinguish the computing languages and classify their respective types.
- CO3 : Prove the decidability and intractability of computational problems.
- CO4 : Solve the computation problems using Turing machines.
- CO5 : Design Finite automata, Push down automata, and Turing machines.

**Course:Operating Systems Laboratory-[CS3461]**

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

- CO1 :Work with UNIX commands ,shell programming and VMWare.
- 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-[CS3481]**

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:Artificial Intelligence and Machine Learning-[CS3491]**

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

- CO1 : Explain the basics of problem solving, reasoning and learning techniques
- CO2 : Describe the different models of neural networks.

CO3 : Apply the concepts of probabilistic reasoning under uncertainty.
CO4 : Use appropriate search algorithms for problem solving
CO5 : Build supervised learning, unsupervised learning and neural network models.
<b>Course:Database Management Systems-[CS3492]</b>
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.
<b>Course:Environmental Sciences and Sustainability-[GE3451]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain about environment, biodiversity, environmental pollution, renewable sources of energy, its sustainability and management
CO2 : Identify the causes of environmental pollution, effects and its preventive measures and the need for new energy sources
CO3 : Apply the safety management system and various renewable sources of energy to preserve the environment.
CO4 : Examine different forms of energy and apply them for suitable applications in for technological advancement and societal development.
CO5 : Analyze the Environmental management and various real time sustainability practices

### Semester:5

<b>Course:Theory of Computation-[CS8501]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the basic concepts of Mathematical proof, Automata theory, Context free grammar, Push down automata, Turing machine, and Undecidable Problems.
CO2 : Discuss the decidability and intractability of computational problems.
CO3 : Solve the computation problems using Turing machines.
CO4 : Sketch Finite Automata, Push down automata, and Turing machines.
CO5 : Interpret the automata by giving different input strings.
<b>Course:Networks Laboratory-[CS8581]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the basic network commands and to implement various applications using TCP and UDP sockets
CO2 : Simulate data link layer protocols
CO3 : Use simulation tools to analyze the performance of various network protocols
CO4 : Apply various routing algorithms.
CO5 : Implement Error detection codes.
<b>Course:Object Oriented Analysis and Design Laboratory-[CS8582]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply OO analysis and design for a given problem specification.
CO2 : Apply the design patterns to improve the software quality.
CO3 : Apply the basic software requirements in UML mapping.

CO4 : Use the compliance of the software with the SRS
CO5 : Apply the model for simple needs
<b>Course:Computer Networks-[CS8591]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Relate the concepts of Data Communication, basic layers and its function in computer networks
CO2 : Discuss the concepts in Routing, Addressing & working of functions of transport layer protocols
CO3 : Apply routing algorithms and their functionality.
CO4 : Analyze the working of various application layer protocols.
CO5 : Analyze the functional and procedural means to transfer data between network entities.
<b>Course:Object Oriented Analysis and Design-[CS8592]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Identify skills that are essential for the creation of well-designed, robust, and maintainable software using object technologies.
CO2 : Illustrate the importance of object design skills versus UML notation Knowledge.
CO3 : Apply appropriate design patterns to assign responsibilities to classes.
CO4 : Compare and contrast conceptual and implementation views.
CO5 : Analyze the quality of a software product and also to improve it by identifying defects.
<b>Course:Microprocessors and Microcontrollers Laboratory-[EC8681]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Write ALP Programs 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 : Execute Programs using MASM.
<b>Course:Microprocessors and Microcontrollers-[EC8691]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the basic concepts of Microprocessor, addressing modes and instruction set of 8086.
CO2 : Illustrate the detailed hardware and software structure of the microprocessor.
CO3 : Describe how peripherals (8255, 8253, etc.) are interconnected with the microprocessor.
CO4 : Interpret the overview of the internal architecture and various operating modes of a typical microcontroller.
CO5 : Develop assembly language programs for interrupts, subroutines, macros, peripheral devices, and interfaces in the 8086 and 8051 architectures.
<b>Course:Algebra and Number Theory-[MA8551]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts in 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 algebraic number theory 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.
<b>Course:Air Pollution and Control Engineering-[OCE551]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the nature and characteristics of air pollution, noise pollution and basic concepts of air quality management
CO2 : Interpret stacks and particulate air pollution control devices.
CO3 : Demonstrate the air pollution control equipment.
CO4 : Select indoor air pollution control devices.
CO5 : Solve air and noise pollution problems

### Semester:6

<b>Course:Mobile Computing-[CS8601]</b>
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.
<b>Course:Compiler Design-[CS8602]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe different phases of 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.
<b>Course:Distributed Systems-[CS8603]</b>
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.
<b>Course:Mini Project-[CS8611]</b>
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.
<b>Course:Internet Programming-[CS8651]</b>

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Construct a basic website using HTML and Cascading Style Sheets.</p> <p>CO2 : Design dynamic web page with validation using JavaScript objects.</p> <p>CO3 : Develop server side programs using Servlets and JSP.</p> <p>CO4 : Implement simple web page in PHP, and to represent data in XML format.</p> <p>CO5 : Develop rich client presentation using AJAX and Web Service Applications.</p>
<b>Course:Internet Programming Laboratory-[CS8661]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Construct Web pages using HTML/XML and style sheets.</p> <p>CO2 : Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.</p> <p>CO3 : Develop dynamic web pages using server side scripting.</p> <p>CO4 : Develop web applications using PHP.</p> <p>CO5 : Construct web applications using AJAX and web services.</p>
<b>Course:Mobile Application Development Laboratory-[CS8662]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Develop mobile applications using GUI and Layouts.</p> <p>CO2 : Develop mobile applications using Event Listener.</p> <p>CO3 : Develop mobile applications using Databases.</p> <p>CO4 : Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi-threading and GPS.</p> <p>CO5 : Analyze and discover own mobile app for simple needs.</p>
<b>Course:Artificial Intelligence-[CS8691]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the basic concept of intelligent agents and application of Artificial Intelligence.</p> <p>CO2 : Summarize various searching techniques, constraint satisfaction problem, game playing techniques and language processing.</p> <p>CO3 : Outline the concepts of knowledge representations and software agents.</p> <p>CO4 : Apply AI techniques that require problem solving, intelligent agents, inference, perception and knowledge representation to solve real-world problems.</p> <p>CO5 : Analyze the structures and algorithms of selection techniques related to searching, reasoning, intelligent agents, and language processing.</p>
<b>Course:Professional Communication-[HS8581]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : to make effective presentations</p> <p>CO2 : to participate confidently in group discussions.</p> <p>CO3 : to attend job interviews and be successful in them.</p> <p>CO4 : to develop adequate soft skills required for the workplace.</p>

### Semester:7

<b>Course:Cloud Computing Laboratory-[CS8711]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Configure various virtualization tools such as Virtual Box, VMware workstation.</p> <p>CO2 : Design and deploy a web application in a PaaS environment.</p> <p>CO3 : Learn how to simulate a cloud environment to implement new schedulers.</p>

CO4 : Demonstrate generic cloud environment that can be used as a private cloud CO5 : Manipulate large data sets in a parallel environment.
<b>Course:Cloud Computing-[CS8791]</b>
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 : Describe 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.
<b>Course:Cryptography and Network Security-[CS8792]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Outline OSI security Architecture, Security Practice and System Security. CO2 : Interpret Symmetric Key Cryptography and Public Key Cryptography CO3 : Make use of Algebraic structures, Mathematics of Symmetric Key Cryptography and Asymmetric Key Cryptography CO4 : Apply Classical Encryption Techniques CO5 : Apply Symmetric Key, Asymmetric Key and Message Authentication algorithms
<b>Course:Professional Readiness for Innovation, Employability and Entrepreneurship-[HX8001]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Identify oral and visual presentation skills and establish a foundation of confidence in the skills. CO2 : Translate their skills in customer development, customer validation, competitive analysis. CO3 : Apply their team work in real-world projects. CO4 : Compare creative presentations and business plans that articulate and apply financial, operational, organizational, market, and sales CO5 : Assess their awareness and deliberately practice the skills and disciplines necessary to increase confidence.
<b>Course:Software Project Management-[IT8075]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Explain the basic project management concepts, software project planning, evaluation techniques and staffing in projects. CO2 : Describe each stage of the software development life cycle, activity planning and risk management principles. CO3 : Demonstrate the organizational behavior and risk management principles. CO4 : Apply project management skills and cost estimation techniques in various project activities. CO5 : Analyse the cost-benefit evaluation
<b>Course:Security Laboratory-[IT8761]</b>
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
<b>Course:Principles of Management-[MG8591]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the basics of management, evolution and its core activities like planning, organizing, directing and controlling.
CO2 : Explain the types of business organization, job design, human resource management and the process of communication within an organization.
CO3 : Demonstrate individual and group behavior with theories of leadership and motivation.
CO4 : Apply the different controlling techniques and the way of reporting.
CO5 : Analyze the different organization types, career planning, training and development and barrier in communication.
<b>Course:Hospital Management-[OBM752]</b>
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 : Describe recruitment and training policies and safety procedures followed in hospitals.
CO3 : Explain the functional operations in Hospitals.
CO4 : Demonstrate recruitment policies, functional operations and supportive services in Hospitals.
CO5 : Analyse the importance of Human resource management.

### Semester:8

<b>Course:Green Computing-[CS8078]</b>
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.
<b>Course:Professional Ethics in Engineering-[GE8076]</b>
Upon completion of the course, the students will.../ will be able to...
Understand the meaning and purpose of profession, ethics, civic virtue, sharing, honesty,
CO1 : 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.**

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:M.E. Computer Science and Engineering

**Semester:1**

<b>Course:Advanced Data Structures and Algorithms-[CP22101]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explore data 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 : Develop one's own algorithm for an unknown problem.
CO5 : Analyze the suitable design strategy for problem solving.
<b>Course:Database Practices-[CP22102]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Outline Relational Data Model, Distributed Database, Xml Database, NoSQL Databases and Database Security
CO2 : Make use of Structured Query Language and Relational Algebra
CO3 : Develop Distributed Database Design
CO4 : Build XML Documents, Document Type Definition and XML Schema
CO5 : Experiment with NoSQL Databases and Access Control in Relational Databases
<b>Course:Advanced Data Structures and Algorithms Laboratory-[CP22103]</b>
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.
<b>Course:Network Technologies-[CP22111]</b>
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.

<b>Course:Applied Probability and Statistics for Computer Science Engineers-[MA22102]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts of one dimensional ,two dimensional random variables,distributions,statistical hypothesis and multivariate techniques.
CO2 : Demonstrate the concepts of random variables, probability distributions,correlation and regression in engineering Field.
CO3 : Explain statistical , multivariate techniques and principal components analysis.
CO4 : Apply the concept of probability,regression and correlation in engineering discipline.
CO5 : Apply the concept of testing of hypothesis ,analysis of variance and multivariate normality in real life problems.
<b>Course:Research Methodology-[RM22101]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 :Outline the methodology of research.
CO2 :Explain the research design, data collection methods, IPR and patent.
CO3 :Prepare a well structured research paper, scientific presentations and patent applications.
CO4 :Develop awareness on IPR, patent law and procedural mechanism in obtaining a patent.
CO5 :Compare the methods of measurement scale, questionnaires, sampling and data analysis.

### Semester:2

<b>Course:Disaster Management-[AC22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Summarize basics of disaster.
CO2 : Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO3 : Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO4 : Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO5 : Develop the strengths and weaknesses of disaster management approaches
<b>Course:Advanced Operating Systems-[CP22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explore the working of theoretical foundations of OS
CO2 : Explain the working principles of resource management
CO3 : Describe the concepts of distributed shared memory and scheduling mechanisms
CO4 : Apply the learning into multiprocessor system architectures
CO5 : Analyze the working of various operating systems
<b>Course:Multicore Architecture and Programming-[CP22202]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe multicore architectures and identify their characteristics and challenges.
CO2 : Identify the issues in programming Parallel Processors
CO3 : Write programs using OpenMP and MPI
CO4 : Design parallel programming solutions to common problems
CO5 : Compare and contrast programming for serial processors and programming for parallel processors

**Course:Machine Learning-[CP22203]**

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

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

**Course:Advanced Software Engineering-[CP22204]**

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

- CO1 : Identify appropriate process models based on the Project requirements.
- CO2 : Assess the importance of having a good Software Architecture.
- CO3 : Understand the five important dimensions of dependability,namely, availability, reliability, safety, security, and resilience.
- CO4 : Describe the basic notions of a web service, wb service standard and web service oriented architecture.
- CO5 : Be familiar with various levels of software testing.

**Course:Software Engineering Laboratory-[CP22205]**

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 method

**Course:Optimization Techniques and Applications-[CP22222]**

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

- CO1 : Familiarize with the basic concept of optimization techniques
- CO2 : Explain the concept of different advanced optimization techniques and their applications
- CO3 : Explain the concept of Multi-objective optimization and apply it for solving real world problems
- CO4 : Apply Genetic Algorithm for solving engineering problems
- CO5 : Apply Swarm Optimization techniques for solving engineering problems

**Course:Internet of Things-[CP22233]**

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

- CO1 : Describe the basics,architecture and levels of IoT
- CO2 : Interpret the working ofvarious enabling technologies
- CO3 : Outline the functions of different components used in building IoT
- CO4 : Develop simple real time projects in IoT
- CO5 : Analyze the performances of protocols used by IoT

**Course:Research Tools Laboratory-[RM22201]**

**Course Outcomes**

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

CO1 : List the various stages in research and develop systematic planning of project stages

CO2 : Write a journal paper and formulate as per the standard journal format

CO3 : Develop a literature review and relevant references for a research problem using suitable software

CO4 : Determine the plagiarism of the article / report content by using the Software

CO5 : Compile a research report and the presentation

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

2022 -- 2023 ODD Semester

**Course Outcomes**

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

Semester: 1

<p style="text-align: center;"><b>Course:Engineering Chemistry-[CH22101]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Recall the basic concepts of water softening, nanomaterials and batteries.</p> <p>CO2 : Summarise the types of corrosion, fuels and energy storage devices.</p> <p>CO3 : Explain the basic principles of electrochemistry and engineering materials.</p> <p>CO4 : Identify suitable methods for water treatment, fuels and corrosion control.</p> <p>CO5 : Apply the knowledge of engineering materials, fuels and energy storage devices for material selection and also in energy sectors.</p>
<p style="text-align: center;"><b>Course:Communicative English-[EN22101]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Apply and practice the correct usages of language</p> <p>CO2 : Receive the language effectively and meaningfully through receptive skills</p> <p>CO3 : Produce the language appropriate to the needs and situations exercising productive skills</p> <p>CO4 : Transfer or interpret any piece of information with accuracy and fluency</p> <p>CO5 : Apply the language intellectually and confidently</p>
<p style="text-align: center;"><b>Course:Universal Human Values-[HS22102]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate the significance of value inputs in a classroom and start applying them in their life and profession.</p> <p>CO2 : Explain the role of a human being in ensuring harmony in society and nature.</p> <p>CO3 : Demonstrate the value of harmonious relationship based on trust and respect in their life and profession.</p> <p>CO4 : Compare values, skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.</p> <p>CO5 : Classify ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.</p>
<p style="text-align: center;"><b>Course:Matrices and Calculus-[MA22101]</b></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, ODE and integration.</p> <p>CO2 : Explain the properties of matrices and nature of the quadratic form.</p> <p>CO3 : Interpret the techniques of differentiation, partial differentiation, ODE and integration.</p> <p>CO4 : Apply diagonalization of matrices in quadratic form and use Cayley Hamilton theorem in inverse of matrices.</p> <p>CO5 : Solve problems on differentiation, partial differentiation, integration and ODE using different methods.</p>
<p style="text-align: center;"><b>Course:Engineering Physics-[PH22101]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Recall the basics of properties of matter, thermal physics and ultrasonics, hence improve their engineering knowledge.</p> <p>CO2 : Define the advanced physics concepts of quantum theory and the characteristics</p>

	of crystalline materials.
CO3 :	Illustrate bending of beams, thermal behavior and ultrasonic devices to assess societal and safety issues.
CO4 :	Summarize the dual aspects of matter, crystal structures and imperfections of crystals.
CO5 :	Apply the moduli of elasticity of different materials, thermal energy, ultrasonics, scanning tunneling microscope and crystal growth techniques in engineering fields.

Semester:2

<b>Course:Environment and Sustainability-[CH22201]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	recall the basic concepts of environment and sustainable development
CO2 :	summarise the types of pollution,various natural resources and food adulterants
CO3 :	explain the methods for waste management and detection of adulterants
CO4 :	apply the gained knowledge to overcome various issues related to health and environment
CO5 :	identify suitable methods for local environmental issues and sustainability
<b>Course:Electric Circuits and Electron Devices-[EC22201]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Explain the basic concepts of electric circuits and electron devices.
CO2 :	Use suitable network theorems on DC circuits.
CO3 :	Calculate the two port network parameters and steady state response of any R, L, C.
CO4 :	Calculate the transient response for any RC, RL and RLC circuits and frequency response of parallel and series resonance circuits.
CO5 :	Illustrate the structure and operation of basic electronic devices.
<b>Course:Circuits and Devices Laboratory-[EC22202]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Verify KVL & KCL, and network theorems.
CO2 :	Demonstrate the characteristics of basic electronic devices.
CO3 :	Design series and parallel resonance circuits.
CO4 :	Design RL and RC transient circuits.
CO5 :	Design FWR circuit.
<b>Course:Basic Electrical and Instrumentation Engineering-[EE22201]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Explain the construction and working of Transformer
CO2 :	Explain the construction, working and applications of DC machines
CO3 :	Interpret the construction and working of AC machines
CO4 :	Explain the basics of power system
CO5 :	Interpret the operating principles of measuring instruments
<b>Course:Technical English-[EN22201]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Infer advanced technical texts from varied technical genres to expand engineering knowledge and explore more ideas. Analyse technical contents written on par with international standards and rewrite
CO2 :	contents using the right vocabulary without grammatical errors to make their articles published in reputed journals.

CO3 :	Present reports and Job Letters utilizing the required format prescribed on par with international standards using the exact vocabulary to make their works worthy to be read.
CO4 :	Employ the language tones and styles appropriately in interviews and Group Discussions effortlessly following the strategies expected by the corporate world.
CO5 :	Appraise the need for new products and descriptions and present them in formal and informal situations.

**Course:Statistics and Numerical Methods-[MA22201]**

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

CO1 :	Define the basic concepts of statistical tests, ANOVA, iterative methods, interpolations and ODE.
CO2 :	Discuss the techniques of statistical tests and design of experiments.
CO3 :	Explain the solution of equations, ODE, single and multistep methods, interpolations, differentiation and integration.
CO4 :	Apply the concept of testing of hypothesis and design of experiment in real life.
CO5 :	Apply numerical techniques in system of equations, differential equations, interpolation, differentiation and integration.

**Course:Engineering Graphics-[ME22201]**

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 :	Interpret graphics as the basic communication and methodology of the design process.
CO3 :	Acquire visualization skills through the concept of projection
CO4 :	Develop the sectioned solids and discover its true shape
CO5 :	Develop imagination of physical objects to be represented on paper for engineering communications

**Course:Physics for Electronics Engineering-[PH22202]**

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

CO1 :	Recall the basic concepts of light, electron transport properties of conductors and basic principles of semiconductors.
CO2 :	Define the magnetic properties of materials and the principles of optoelectronic and nano devices.
CO3 :	Illustrate laser and fibre optics, classical and quantum concepts of conducting materials and physics of semiconducting materials.
CO4 :	Summarize the functioning of various magnetic, optoelectronic and nano devices. Demonstrate the concepts of optics, fibre optics, moduli of elasticity and thermal energy,
CO5 :	behavior of conductors, semiconductors, magnetic and dielectric materials and also the functioning of optical and nano devices in various engineering applications.

Semester:3

**Course:C Programming and Data Structures-[CS3353]**

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

CO1 :	Describe the concepts of C programming.
CO2 :	Develop C programs for any real world/technical application.
CO3 :	Apply linear/non-linear data structure operations for solving a problem.
CO4 :	Apply sort and search algorithms for a given application.

CO5 : Apply hash functions for data storage and retrieval.
<b>Course:C Programming and Data Structures Laboratory-[CS3362]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Develop applications by using C programming constructs.
CO2 : Write functions to implement linear and non-linear data structure operations.
CO3 : Apply linear/non-linear data structure operationsfor solving a problem.
CO4 : Apply hash functions for data storage and retrieval.
CO5 : Implement Sorting and Searching algorithms for a given application.
<b>Course:Control Systems-[EC3351]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 :Model the various control system components and their representations.
CO2 :Identify the various time domain parameters.
CO3 :Construct the various frequency response plots and its system.
CO4 :Apply the concepts of various system stability criterions.
CO5 :Develop various transfer functions of digital control system using state variable models.
<b>Course:Digital Systems Design-[EC3352]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply Boolean algebra and simplification procedures relevant to digital logic.
CO2 : Design various combinational digital circuits using logic gates.
CO3 : Design synchronous sequential circuits and realize using logic gates.
CO4 : Design asynchronous sequential circuits and realize using logic gates and flip flops.
CO5 : Construct logic gates and use programmable devices for digital applications.
<b>Course:Electronic Devices and Circuits-[EC3353]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Demonstrate the method of construction and operation devices and circuits.
CO2 : Illustrate the various small signal amplifiers.
CO3 : Construct single stage and multistage amplifier circuits.
CO4 : Analyze feedback amplifiers and oscillator principles.
CO5 : Design power amplifiers and DC-DC converters.
<b>Course:Signals and Systems-[EC3354]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Classify the properties of signals and systems.
CO2 : Determine 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 : Determine the effects of discrete time signals using DTFT and Z-transform.
CO5 : Analyze recursive and non-recursive discrete and continuous time systems.
<b>Course:Electronic Devices and Circuits Laboratory-[EC3361]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the Characteristics of PN Junction Diode and Zener diode.
CO2 : Understand the operation of rectifiers and filters.
CO3 : Design and Testing of BJT and MOSFET amplifiers.
CO4 : Design the characteristics of Differential Amplifier.
CO5 : Study the Operation of power amplifiers
<b>Course:Random Processes and Linear Algebra-[MA3355]</b>

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define probability, random variables, linear combinations, null spaces, Ranges and inner product.</p> <p>CO2 : Classify the distributions, co-variance, regression and random processes.</p> <p>CO3 : Explain the fundamental concepts of vector spaces, linear transformation and inner product.</p> <p>CO4 : Apply the concepts of one and two dimensional random variables and random processes in engineering disciplines.</p> <p>CO5 : Apply computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces and orthogonalization.</p>
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Semester:4

<b>Course:Networks and Security-[EC3401]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate the network models, layers and functions.</p> <p>CO2 : Explain the functionalities of data link layer, network layer, transport layer and application layer.</p> <p>CO3 : Classify the different routing protocols and algorithms in network layer.</p> <p>CO4 : Summarize the network security, hardware security attacks and countermeasures.</p> <p>CO5 : Apply the error detection and correction techniques, algorithms in layers and network security for effective data transmission.</p> <p>CO6 : Analyse the error control, flow control, routing and security algorithms for effective data transmission.</p>
<b>Course:Linear Integrated Circuits-[EC3451]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Demonstrate the basic building blocks of linear integrated circuits.</p> <p>CO2 : Explain linear and non-linear applications of operational amplifiers.</p> <p>CO3 : Illustrate the applications of analog multiplier and PLL.</p> <p>CO4 : Construct ADC and DAC using OP – AMPS.</p> <p>CO5 : Constuct special function ICs and waveform generators.</p>
<b>Course:Electromagnetic Fields-[EC3452]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate the basic concepts of electric and magnetic field quantities and laws.</p> <p>CO2 : Outline the field potentials due to static charges and static magnetic fields.</p> <p>CO3 : Interpret the materials affect electric and magnetic fields.</p> <p>CO4 : Explain the concepts and characteristics of Magneto Static field in material space and at boundary conditions.</p> <p>CO5 : Assess the principles of propagation of uniform plane waves.</p>
<b>Course:Communication Systems Laboratory-[EC3461]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Apply the AM and FM Modulation and Demodulation in real time systems</p> <p>CO2 : Develop the sampling frequency for digital modulation.</p> <p>CO3 : Model various functional modules of pulses communication system.</p> <p>CO4 : Demonstrate their knowledge in base band signaling schemes through implementation of</p>

digital modulation schemes. CO5 : Construct various channel coding schemes.
<b>Course:Linear Integrated Circuits Laboratory-[EC3462]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Construct Series and Shunt feedback amplifiers, oscillators, RC Integrator and Differentiator circuits using operational amplifiers. CO2 : Construct filters using op-amp and performs an experiment on frequency response. CO3 : Analyze the working of .R-2R ladder type D-A converter, clippers, clampers and instrumentation amplifier using op amp. CO4 : Analyze the characteristics of PLL and its use as frequency multiplier. CO5 : Analyze the performance of filters, tuned amplifiers,multivibrators, Schmitt trigger and power amplifier using SPICE.
<b>Course:Communication Systems-[EC3491]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the principles of modulation techniques CO2 : Explain the concepts of Random Process to the design of communication systems CO3 : Examine the knowledge gained in digital techniques CO4 : Interpret information's in sampling and quantization CO5 : Demonstrate the importance of demodulation techniques
<b>Course:Digital Signal Processing-[EC3492]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Apply DFT for the analysis of digital signals and systems. CO2 : Construct IIR filters using transformation techniques CO3 : Construct FIR filters using windowing techniques CO4 : Identify the effects of finite precision representation on digital filters CO5 : Design multirate signal processing using a DSP processor.
<b>Course:Environmental Sciences and Sustainability-[GE3451]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Explain about environment, biodiversity, environmental pollution, renewable sources of energy, its sustainability and management . CO2 : Identify the causes of environmental pollution, effects and its preventive measures and the need for new energy sources CO3 : Apply the safety management system and various renewable sources of energy to preserve the environment CO4 : Examine different forms of energy and apply them for suitable applications in for technological advancement and societal development CO5 : Analyze the Environmental management and various real time sustainability practices

Semester:5

<b>Course:Digital Communication-[EC8501]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the principles of discrete memoryless source, channels,various waveform-

<p>coding schemes and digital modulation schemes.</p> <p>CO2 : Illustrate the various line coding and pulse shaping schemes.</p> <p>CO3 : Interpret the base band transmission schemes.</p> <p>CO4 : Develop the spectral characteristics of band pass signaling schemes.</p> <p>CO5 : Construct Shannon Fano Code, Huffman Code and error control codes.</p>
<b>Course:Communication Networks-[EC8551]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Choose the components needed to build a network.</p> <p>CO2 : Develop the network functionality into layers.</p> <p>CO3 : Outline the functionality of each layer of the network.</p> <p>CO4 : Illustrate the solutions for various functionalities at each layer.</p> <p>CO5 : Infer the application layer protocol for the given applications.</p>
<b>Course:Computer Architecture and Organization-[EC8552]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Enumerate data representation, instruction formats and the arithmetic operations and datapath elements of a digital computer.</p> <p>CO2 : Interpret the concept of fixed point and floating-point arithmetic, various memories and their interfacing and organization of multiple processors.</p> <p>CO3 : Illustrate the high performance arithmetic, pipelined operations and parallel processing of a processor.</p> <p>CO4 : Demonstrate the implementation schemes of pipelined data path and control units and parallel processing performance.</p> <p>CO5 : Investigate the hazards and multiprocessor architectures.</p>
<b>Course:Discrete-Time Signal Processing-[EC8553]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Apply DFT for the analysis of digital signals and systems.</p> <p>CO2 : Construct IIR and FIR filters using transformation techniques.</p> <p>CO3 : Identify the effects of finite precision representation on digital filters.</p> <p>CO4 : Utilize digital signal processor in digital systems.</p>
<b>Course:Communication Systems Laboratory-[EC8561]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate the sampling and Line coding schemes.</p> <p>CO2 : Demonstrate PCM and DM schemes.</p> <p>CO3 : Construct AM, FM modulators and TDM.</p> <p>CO4 : Simulate Analog, Digital modulation schemes and error coding schemes.</p> <p>CO5 : Develop end-to-end communication Link.</p>
<b>Course:Digital Signal Processing Laboratory-[EC8562]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Carryout basic signal processing operations</p> <p>CO2 : Demonstrate their abilities towards MATLAB based implementation of various DSP systems</p> <p>CO3 : Analyze the architecture of a DSP Processor</p> <p>CO4 : Analyze and Implement the FIR and IIR Filters in DSP Processor for performing filtering operation over real-time signals</p> <p>CO5 : Analyze a DSP system for various applications of DSP</p>
<b>Course:Communication Networks Laboratory-[EC8563]</b>

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Communicate between two desktop computers.</p> <p>CO2 : Implement the different protocols.</p> <p>CO3 : Program using sockets.</p> <p>CO4 : Implement and compare the various routing algorithms</p> <p>CO5 : Use simulation tools for networking concepts.</p>
<b>Course:Total Quality Management-[GE8077]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the concepts, dimensions, framework and barriers of quality.</p> <p>CO2 : Apply the quality principles and techniques of TQM.</p> <p>CO3 : Demonstrate tools utilization for quality improvement.</p> <p>CO4 : Apply the techniques and tools used to measure quality.</p> <p>CO5 : Illustrate quality systems in manufacturing and service sectors.</p>
<b>Course:Air Pollution and Control Engineering-[OCE551]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the nature and characteristics of air pollution, noise pollution and basic concepts of air quality management.</p> <p>CO2 : Interpret stacks and particulate air pollution control devices</p> <p>CO3 : Demonstrate the air pollution control equipment.</p> <p>CO4 : Select indoor air pollution control devices</p> <p>CO5 : Solve air and noise pollution problems.</p>

Semester:6

<b>Course:VLSI Design-[EC8095]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Summarize the fundamental concept of MOS circuits and its charecteristics.</p> <p>CO2 : Describe the combinational MOS circuits and its power strategies.</p> <p>CO3 : Explain the Sequential Circuits and its timing issues.</p> <p>CO4 : Illustrate the design of arithmetic building blocks and its subsystems.</p> <p>CO5 : Demonstrate different FPGA architectures and testability of VLSI circuits.</p>
<b>Course:Technical Seminar-[EC8611]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate the network models, layers and functions.</p> <p>CO2 : Illustrate to collect the relevant iterature survey and prepare a working outline.</p> <p>CO3 : Outline the understanding of the authors' contributions and critically analyze each paper.</p> <p>CO4 : Outline the linking of papers and prepare a draft of the paper.</p> <p>CO5 : Describe the writing of final paper and give final presentation.</p>
<b>Course:Transmission Lines and RF Systems-[EC8651]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the characteristics of transmission lines and its losses.</p> <p>CO2 : Measure the power, VSWR, wavelength and understand signal propagation in high frequency transmission lines.</p> <p>CO3 : Design impedance matching networks for unmatched lines and learn the importance of</p>

<p>Smith chart.</p> <p>CO4 : Design active RF components for RF systems.</p> <p>CO5 : Analyze the propagation of various modes in TE, TM and TEM waves.</p>
<b>Course:Wireless Communication-[EC8652]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain different parameters of mobile multipath channels, MIMO systems.</p> <p>CO2 : Explain the concepts of cellular system, multiple access techniques, OFDM Principles, Equalization and Diversity.</p> <p>CO3 : Construct various signalling schemes.</p> <p>CO4 : Identify the suitable multipath mitigation techniques.</p> <p>CO5 : Develop path loss models for wireless channels, cellular architecture, multiple access techniques and multiple antenna techniques</p>
<b>Course:VLSI Design Laboratory-[EC8661]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Write HDL code for digital integrated circuits.</p> <p>CO2 : Import the logic modules into FPGA Boards.</p> <p>CO3 : Simulate Digital &amp; Analog IC Blocks using EDA tools.</p> <p>CO4 : Design digital and analog circuits using EDA tools.</p> <p>CO5 : Extract the layouts of Digital circuits using EDA tools.</p>
<b>Course:Microprocessor and Microcontrollers Laboratory-[EC8681]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Write ALP Programs for fixed and Floating Point and Arithmetic operations.</p> <p>CO2 : Interface different I/Os with processor.</p> <p>CO3 : Generate waveforms using Microprocessors.</p> <p>CO4 : Execute Programs in 8051.</p> <p>CO5 : Execute Programs using MASM.</p>
<b>Course:Microprocessors and Microcontrollers-[EC8691]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basic concepts of Microprocessor, addressing modes and instruction set of 8086.</p> <p>CO2 : Illustrate the detailed hardware and software structure of the microprocessor.</p> <p>CO3 : Describe how peripherals (8255, 8253, etc.) are interconnected with the microprocessor.</p> <p>CO4 : Interpret the 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>
<b>Course:Professional Communication-[HS8581]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : to make effective presentations.</p> <p>CO2 : to participate confidently in group discussions.</p> <p>CO3 : to attend job interviews and be successful in them.</p> <p>CO4 : to develop adequate soft skills required for the workplace.</p>
<b>Course:Principles of Management-[MG8591]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Summarize the basics of management and different types of business.</p> <p>CO2 : Explain the planning and decision making process of management.</p>

- CO3 : Construct the organization structure, HR planning and management.
- CO4 : Determine the ability to directing, leadership and communicate effectively.
- CO5 : Analyze the control process, its issues and to formulate best methods used for management process.

Semester:7

<b>Course:Antennas and Microwave Engineering-[EC8701]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the basic principles in antenna and microwave system design.
CO2 : Demonstrate the radiation mechanism and design aspects of antennas.
CO3 : Explain antenna array and its applications.
CO4 : Interrupt the principles of passive and active microwave devices.
CO5 : Illustrate the design of microwave components for practical applications.
<b>Course:Ad hoc and Wireless Sensor Networks-[EC8702]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the Fundamental Concepts, routing protocol and applications of ad hoc networks and sensor networks.
CO2 : Summarize the challenges, goals, and architecture of wireless Sensor networks and the tools.
CO3 : Illustrate the networking concepts, issues and protocols used in wireless Sensor networks.
CO4 : Identify the security requirements, challenges issues, routing protocols and possible solutions for attacks.
CO5 : Apply various routing protocols, networking tools, Layer wise security attacks to develop ad-hoc and sensor networks.
<b>Course:Embedded Laboratory-[EC8711]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Write programs in ARM for a specific Application
CO2 : Explain memory and Write programs related to memory operations
CO3 : Design A/D and D/A convertors with ARM system
CO4 : Analyze the performance of interrupt
CO5 : Analyse programmes for interfacing keyboard, display, motor and sensor.
<b>Course:Optical Communication-[EC8751]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the basic elements in optical fibers, different modes and configurations.
CO2 : Summarize the transmission characteristics associated with dispersion and polarization techniques.
CO3 : Select optical sources and detectors in optical communication system applications.
CO4 : Analyze fiber optic receiver systems, measurements and coupling techniques.
CO5 : Appraise optical communication systems and its networks.
CO6 : Categorize the basics elements modes configurations and characteristics associated with optical fiber communication in real time applications.
<b>Course:Advanced Communication Laboratory-[EC8761]</b>
Upon completion of the course, the students will.../ will be able to...

- CO1 : Analyze the performance of simple optical link by measurement of losses and analyzing the mode characteristics of fiber.
- CO2 : Analyze the Eye Pattern, Pulse broadening of optical fiber and the impact on BER.
- CO3 : Estimate 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 : Develop the architecture of ARM processor
- CO3 : Construct and model the embedded programming
- CO4 : Analyse the real time operating systems
- CO5 : Examine real-time applications using embedded-system concepts.

**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 : Describe recruitment and training policies and safety procedures followed in hospitals.
- CO3 : Explain the functional operations in Hospitals.
- CO4 : Demonstrate recruitment policies, functional operations and supportive services in Hospitals.
- CO5 : Analyze the importance of Human resource management.

Semester:8

**Course:Project Work-[EC8811]**

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

- CO1 : Identify challenging practical problems and provide solutions to cope up with present scenario of Electronics and Communication Engineering field.
- CO2 : Analyze the various methodologies and technologies for solving the problem.
- CO3 : Apply technical knowledge and project management skills for solving the problem.
- CO4 : Design and develop hardware and/or software for their project specific problem
- CO5 : Prepare the project reports and give proper explanation during the presentation and demonstration.

**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 the characterization techniques in Nanotechnology.
- 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...

- CO1 : Understand 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

- 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.**

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:M.E. Medical Electronics

Semester: 1

<p align="center"><b>Course:Applied Mathematics for Medical Engineers-[MA22105]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basic concepts of matrices, standard distributions, correlation and regression, random processes and Fourier transforms.</p> <p>CO2 : Explain random variables, random processes, Fourier transform and decomposition techniques used in engineering</p> <p>CO3 : Interpret the concept of distributions, correlation and curve fitting in engineering disciplines.</p> <p>CO4 : Utilize matrix theory, random processes and Fourier transform boundary value problems techniques in real life problems.</p> <p>CO5 : Solve matrices, linear system of equations and boundary value problems using Fourier transforms in engineering applications.</p>
<p align="center"><b>Course:Bio Signal Processing-[MX22101]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Characterize different types of signals &amp; systems.</p> <p>CO2 : Interpret filters for the analysis of random signals</p> <p>CO3 : Design signals in time series domain &amp; estimate the spectrum.</p> <p>CO4 : Determine the significance of event detection and feature extraction from biosignal</p> <p>CO5 : Apply various classification methods for biosignals.</p>
<p align="center"><b>Course:Biomedical Instrumentation and Equipment-[MX22102]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the origin of bio-potentials and the electrical characteristics biopotential electrodes in biopotential acquisition</p> <p>CO2 : illustrate the Electro-physiology of different systems and recording of the bioelectric signals.</p> <p>CO3 : Explain the specialized bio amplifiers and filters for biopotential processing</p> <p>CO4 : Describe the Non-electrical parameters related to critical systems of human body and their measurements</p> <p>CO5 : Summarize the chemical biosensors used to monitor the critical care analytes</p>
<p align="center"><b>Course:Biomedical Instrumentation Laboratory-[MX22103]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Design preamplifiers and signal conditioning circuits for ECG signal acquisition.</p> <p>CO2 : Design amplifiers for different bio signals like EEG, EOG, EMG.</p> <p>CO3 : Design an optical isolation amplifier</p> <p>CO4 : Acquire various non-electrical parameters using suitable sensors/transducers.</p> <p>CO5 : Implement PCB layout for any bio amplifier.</p>
<p align="center"><b>Course:Medical Optics-[MX22114]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Interpret the various optical properties of tissue.</p> <p>CO2 : Explain the photonics instruments.</p> <p>CO3 : Show the diagnostic applications of lasers in medical field.</p> <p>CO4 : Apply the principle of lasers in therapeutic and surgical applications.</p> <p>CO5 : Find the types of optical sensors used in medical applications.</p>

Semester:2

<b>Course:Disaster Management-[AC22201]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Summarize basics of disaster.</p> <p>CO2 : Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.</p> <p>CO3 : Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.</p> <p>CO4 : Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.</p> <p>CO5 : Develop the strengths and weaknesses of disaster management approaches.</p>
<b>Course:Medical Image Processing-[MX22201]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basic concepts of medical image processing algorithms.</p> <p>CO2 : Enumerate the image pre-processing applications that incorporate different concepts of filters for medical image processing and reconstruction.</p> <p>CO3 : Identify the image representation model in real time applications.</p> <p>CO4 : Use image segmentation, feature extraction and image classification processes in medical applications.</p> <p>CO5 : Develop knowledge in image transform, registration and visualization concepts in medical imaging applications.</p>
<b>Course:Embedded Systems and Internet of Things for Medical Application-[MX22202]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : To understand hardware and software for ARM processor.</p> <p>CO2 : To understand ARM processor and Building Blocks of Embedded Systems</p> <p>CO3 : To provide information about sensor interfacing with microcontroller boards</p> <p>CO4 : To provide information about various protocols for IoT</p> <p>CO5 : To familiarize the student with the various applications in healthcare using IoT.</p>
<b>Course:Human Anatomy and Physiology-[MX22204]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the general terminology, cell structure and function, histology, gross anatomy, and physiology related to the various human systems.</p> <p>CO2 : Illustrate various anatomical parts of the human systems</p> <p>CO3 : Identify interconnectedness of anatomy and physiology of various systems</p> <p>CO4 : Identify human organ systems interrelation and apply a holistic approach to human health.</p> <p>CO5 : Apply concept and knowledge of human systems to novel technical and/or clinical scenarios.</p>
<b>Course:Wearable Technologies-[MX22211]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Summarize the existing wearable technology, with a futuristic vision along with socioeconomic impact and issues.</p> <p>CO2 : Explain the sensor and signal processing requirement of wearable systems.</p> <p>CO3 : Recognize the materials used in the field of flexible electronics technology and its power constraints</p> <p>CO4 : Summarize the techniques and issues associated with energy harvesting from human body.</p> <p>CO5 : Elucidate the applications of wearable technology in health care</p>
<b>Course:Health Care, Hospital and Equipment Management-[MX22221]</b>

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

CO1 : Explain the basics about Health system and their services.

CO2 : Illustrate the organization structure in hospitals.

CO3 : Explain the regulation of health care codes.

CO4 : Plan the duties of technical personnel.

CO5 : Establish Health system and hospital organization.

CO6 : Analyze the standards and the training required for technical work for equipment Management.

**Course:Research Tools Laboratory-[RM22201]**

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

CO1 : List the various stages in research and develop systematic planning of project stages.

CO2 : Write a journal paper and formulate as per the standard journal format

CO3 : Develop a literature review and relevant references for a research problem using suitable software.

CO4 : Determine the plagiarism of the article / report content by using the Software

CO5 : Compile a research report and the presentation

Semester:3

<b>Course:Healthcare, Hospital and Equipment Management-[MX4005]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basics about Health system and their services.</p> <p>CO2 : Illustrate the organization structure in hospitals.</p> <p>CO3 : Explain the regulation of health care codes.</p> <p>CO4 : Plan the duties of technical personnel.</p> <p>CO5 : Establish Health system and hospital organization.</p> <p>CO6 : Analyse the standards and the training required for technical work for equipment Management.</p>
<b>Course:Pattern Recognition Techniques and Applications-[MX4074]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the concept of classification theory and pattern recognition</p> <p>CO2 : Apply the principle of HMM and SVM for classification and regression problems.</p> <p>CO3 : Apply pattern recognition techniques for medical image segmentation and classification.</p> <p>CO4 : Implement the supervised machine learning algorithms for feature extraction and feature selection.</p> <p>CO5 : Analyze the clustering algorithms for pattern recognition</p>
<b>Course:Hospital / Biomedical Industry Training-[MX4312]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Recall the components used internally to construct biomedical equipment's.</p> <p>CO2 : Develop and gain knowledge on the machines for diagnosing medical problems.</p> <p>CO3 : Identify and practice the steps to Install, adjust, maintain, repair, or provide technical support for biomedical equipment.</p> <p>CO4 : Evaluate the safety and effectiveness of biomedical equipment and other personnel on the proper use of biomedical equipment.</p>
<b>Course:Smart Grid-[PS4093]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identify the challenges and benefits of smart grid</p> <p>CO2 : Utilize the different smart grid technologies</p> <p>CO3 : Identify the issues of Power Quality in Smart Grid.</p> <p>CO4 : Examine the power quality management in Smart Grid.</p> <p>CO5 : Identify suitable communication networks for smart grid applications</p>

Semester:4

<b>Course:Project Work II-[MX4411]</b>
<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 : Design engineering solutions to complex problems utilizing a systems approach.</p> <p>CO3 : Undertake problem identification, formulation and solution.</p> <p>CO4 : Communicate with engineers and the community at large in written an oral forms.</p> <p>CO5 : Acquire 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.**

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:M.E. Applied Electronics

Semester: 1

<b>Course:Advanced Digital System Design-[AE22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Explain the testing procedure for combinational circuits and PLA. CO2 : Construct asynchronous sequential circuits. CO3 : Construct synchronous sequential circuits. CO4 : Develop synchronous circuits using programmable devices. CO5 : Use programming tools for implementing digital circuits. CO6 : Analyse synchronous and asynchronous sequential circuits.
<b>Course:Digital CMOS VLSI Desig-[AE22102]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the basics of FET,PMOS, NMOS and CMOS digital integrated circuits CO2 : Describe the memory process for VLSI circuits CO3 : Construct combinational and sequential logic circuits. CO4 : Develop and analyze digital CMOS circuits. CO5 : Identify the methodology of memory architectures and arithmetic building blocks.
<b>Course:Electronics System Design Laboratory-[AE22103]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Design an instrumentation amplifier and voltage regulator CO2 : Design a PCB layout using CAD tool CO3 : Write a Verilog code for various combinational and sequential circuits CO4 : Develop a memory module with FPGA CO5 : Design an PLL circuit
<b>Course:Application Specific Integrated Circuits-[AE22111]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Illustrate the CMOS logics, ASIC library and programmable ASICs CO2 : Explain ASIC design flow, programmable ASIC cells and architectures CO3 : Describe I/O cells, interconnects tentative and high performance algorithms for ASICs CO4 : Demonstrate logic synthesis, system partitioning, placement and routing CO5 : Interpret new developments in SOC and low power design
<b>Course:Applied Mathematics for Electronics Engineers-[MA22103]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Define fuzzy logic, probability, random processes and queueing models. CO2 : Classify fuzzy, distributions, and random processes. CO3 : Explain the ideas of single and multiple server queueing models. CO4 : Apply fuzzy prepositions, random variables, markov and Poisson processes in electronics field. CO5 : Apply queueing models with finite and infinite capacity to solve practical problems.

Semester:2

<b>Course:Disaster Management-[AC22201]</b>
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Upon completion of the course, the students will.../ will be able to...

CO1 : Summarize basics of disaster.

CO2 : Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.

CO3 : Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

CO4 : Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO5 : Develop the strengths and weaknesses of disaster management approaches.

**Course:Semiconductor Devices and Modeling-[AE22201]**

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

CO1 : Explain the properties of MOS capacitors.

CO2 : Illustrate the CMOS design parameters and their impact on performance of the device.

CO3 : Summarize the device level characteristics of BJT transistors.

CO4 : Identify the suitable mathematical technique for device simulation.

CO5 : Analyze the various characteristics of MOSFET devices.

**Course:Advanced Digital Signal Processing-[AE22202]**

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

CO1 : Explain the basics of Digital Signal Processing, Discrete Time Transforms and DSP Integrated circuits.

CO2 : Construct FIR/IIR digital filters using various structures.

CO3 : Analyze the applications of multi rate signal processing at different sampling frequencies.

CO4 : Inspect the various field effects in digital signal processing and the procedure involved in the fabrication of DSP Integrated circuits.

CO5 : Analyze multirate signal processing and power spectrum using appropriate parametric/non- parametric methods.

**Course:Embedded Systems-[AE22203]**

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

CO1 : Explain Embedded System architecture, different protocols and its overview.

CO2 : Summarize the general and single purpose processor

CO3 : Interpret the different bus protocols

CO4 : Illustrate state machine and design process models

CO5 : Outline embedded software development tools and RTOS

CO6 : Develop simple logic blocks in FPGA chip-based boards.

**Course:Power Conversion Circuits for Electronics-[AE22204]**

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

CO1 : Explain the characteristics, operation of power switching devices and identify their ratings and applications.

CO2 : Illustrate the construction and performance of SCR.

CO3 : Construct the converter based on SCR for various industrial applications.

CO4 : Develop the ability to know heating systems, timers, relevant sensors & actuator and their application in Industrial Setting.

CO5 : Analyze the data communication, Telemetry & SCADA system in Industrial Applications.

**Course:Industrial Internet of Things-[AE22214]**

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the basic concepts and Architectures of Internet of Things, Machine learning, Big Data Analytics and Cloud Computing.</p> <p>CO2 : Describe the various layers of the Internet of Things and their relative importance.</p> <p>CO3 : Implement different IoT platforms and security measures.</p> <p>CO4 : Analyze the importance of Data Analytics in IoT.</p> <p>CO5 : Analyze the challenges, developments, and applications that are related to IoT.</p>
<b>Course:Micro Electro Mechanical Systems-[AE22222]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the working principles of micro sensors and actuators</p> <p>CO2 : Summarize the materials used for fabrication of micro machines</p> <p>CO3 : Design of microsystems based on scaling laws</p> <p>CO4 : Apply the principles of standard micro fabrication techniques</p> <p>CO5 : Analyse the design and fabrication challenges in RF, Bio, and MOEMS systems.</p>
<b>Course:Research Tools Laboratory-[RM22201]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : List the various stages in research and develop systematic planning of project stages.</p> <p>CO2 : Write a journal paper and formulate as per the standard journal format</p> <p>CO3 : Develop a literature review and relevant references for a research problem using suitable software.</p> <p>CO4 : Determine the plagiarism of the article / report content by using the Software</p> <p>CO5 : Compile a research report and the presentation</p>

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:M.E. Communication Systems

Semester: 1

<b>Course:Electromagnetic Interference and Compatibility-[AE22112]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Demonstrate knowledge of the various sources of electromagnetic interference.</p> <p>CO2 : Display an understanding of the effect of how electromagnetic fields couple through apertures, and solve simple problems based on that understanding.</p> <p>CO3 : Explain the EMI mitigation techniques of shielding and grounding.</p> <p>CO4 : Explain the need for standards and EMC measurement methods.</p> <p>CO5 : Discuss the impact of EMC on wireless and broadband technologies.</p>
<b>Course:Statistical Signal Processing-[CU22101]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate discrete time random processes, spectrum estimation and filtering.</p> <p>CO2 : Explain appropriate parametric methods for spectral estimation.</p> <p>CO3 : Use signal models suitable for modelling random process.</p> <p>CO4 : Apply the discrete time random processes ,spectral estimation and optimum filter for signal processing.</p> <p>CO5 : Construct the signal modeling and adaptive filters for different applications.</p>

<b>Course:Modern Digital Communication Systems-[CU22102]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Explain the performance of coherent and non-coherent receivers under AWGN channel conditions
CO2 :	Illustrate the effect of signalling through band limited channels and Equalization techniques used to overcome ISI
CO3 :	Describe the basics of OFDM as a multicarrier communication and CDMA as a multiuser communication technique.
CO4 :	Construct convolutional coders to study the performance of different decoding techniques.
CO5 :	Determine the channel capacity and design various block coding techniques to combat channel errors
<b>Course:Digital Communication Systems Laboratory-[CU22103]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Establish digital communication signals of various modulation techniques using MATLAB.
CO2 :	Develop cellular mobile communication technology and propagation model.
CO3 :	Apply mathematical formulation to analyze spectrum estimation of a signal and bit rate determination of a transmission link.
CO4 :	Apply the performance of optimization algorithms for equalizing the channel or noise/echo cancellation.
CO5 :	Construct synchronization algorithm for Digital Communication systems.
<b>Course:Applied Mathematics for Communication Engineers-[MA22104]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Define norms, innerproducts, probability, random processes, Little's formula and Fourier transforms
CO2 :	Describe the axioms of probability, random variables and queueing models
CO3 :	Discuss singular values, Poisson processes, and Fourier transforms of elementary functions
CO4 :	Solve matrices, linear system of equations and boundary value problems using Fourier transform technique
CO5 :	Apply the ideas of probability, random processes, queueing theory and Baye's theorem in Engineering problems

Semester:2

<b>Course:Disaster Management-[AC22201]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Summarize basics of disaster.
CO2 :	Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO3 :	Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO4 :	Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO5 : Develop the strengths and weaknesses of disaster management approaches.

**Course: Microwave Circuits-[CU22201]**

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

CO1 : Illustrate the concepts of planar transmission line

CO2 : Demonstrate simulations, fabricate and test microwave devices

CO3 : Construct stability analysis of amplifiers and oscillators at microwave frequencies

CO4 : Develop impedance matching circuits using LC components and stubs

CO5 : Analyze microwave components

**Course: Radiating Systems-[CU22202]**

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

CO1 : Explain the fundamentals of wire antennas, antenna arrays and aperture antennas.

CO2 : Identify the antennas specific to the design and applications.

CO3 : Analyze the challenges associated in designing antennas based on different technologies.

CO4 : Categorize various modern antennas and measurement techniques.

CO5 : Examine the need for optimizing in antenna design and the methodologies for the same.

**Course: Machine Learning-[CU22203]**

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

CO1 : Describe the problems associated with each type of machine learning.

CO2 : Summarize a decision tree and a random forest for an application.

CO3 : Demonstrate Probabilistic Discriminative and Generative algorithms for an application.

CO4 : Analyze a tool to implement typical clustering algorithms for different types of applications.

CO5 : Design applications suitable for different types of Machine Learning.

**Course: Advanced Wireless Communication-[CU22204]**

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

CO1 : Outline the wireless channel characteristics and appropriate channel models

CO2 : Compare the capacity calculations under different channel conditions

CO3 : Interpret the implications of diversity combining methods and the knowledge of channel

CO4 : Illustrate the concepts in MIMO Communications

CO5 : Differentiate multiple access techniques in different multi-user Scenarios

**Course: Cognitive Radio Networks-[CU22212]**

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

CO1 : Explain the fundamental concepts of cognitive radio networks.

CO2 : Interpret the basics of various spectrum sensing techniques and algorithms.

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

CO4 : Explain the fundamental issues regarding dynamic spectrum access, the radio-resource management and trading

CO5 : Solve the security threats in cognitive radio networks.

**Course: MEMS and NEMS-[CU22223]**

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

CO1 : Discuss micro sensors

CO2 : Explain micro actuators

CO3 : Outline nanosystems and Quantum mechanics

CO4 : Design micro actuators for different applications

CO5 : Analyze atomic structures
<b>Course:Research Tools Laboratory-[RM22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : List the various stages in research and develop systematic planning of project stages.
CO2 : Write a journal paper and formulate as per the standard journal format
CO3 : Develop a literature review and relevant references for a research problem using suitable software.
CO4 : Determine the plagiarism of the article / report content by using the Software
CO5 : Compile a research report and the presentation

### Semester:3

<b>Course:VLSI for Wireless Communication-[CU4076]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the basic wireless communication concepts.
CO2 : Illustrate the parameters in receiver and low noise amplifier.
CO3 : Apply knowledge on various types of mixers designed for wireless communication.
CO4 : Analyze LNA, PLL and VCO circuits.
CO5 : Examine the concepts of transmitters and design the power amplifiers in wireless communication.
<b>Course:Optical Communication and Networking-[CU4301]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the differences and challenges involved in the design of optical systems and networks.
CO2 : Illustrate how connections are managed in the network and the pros and cons of the different approaches
CO3 : Apply knowledge for designing a fiber optic system addressing the channel impairments. Analyze the architectures and the protocol stack in use.in optical networks and would be
CO4 : able to identify a suitable backbone infrastructure for our present and future communication needs.
CO5 : Analyze the need for network survivability and the methodologies used.
CO6 : Manipulate the challenges involved in the design systems and networks of optical communication.
<b>Course:Smart Grid-[PS4093]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Identify the challenges and benefits of smart grid
CO2 : Utilize the different smart grid technologies
CO3 : Identify the issues of Power Quality in Smart Grid.
CO4 : Examine the power quality management in Smart Grid.
CO5 : Identify suitable communication networks for smart grid applications
<b>Course:Real Time Embedded Systems-[VE4072]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Outline the choice of suitable embedded processor for a given application
CO2 : Explain the hardware and software for the embedded system.
CO3 : Identify the real time kernel operating system functions and task control

block structure.

CO4 : Develop different types of inter task communication and synchronization techniques

CO5 : Examine the aspects of embedded connectivity in real time systems

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:B.E. Electrical and Electronics Engg.

Semester: 1

<b>Course:Physics and Chemistry Laboratory-[BS22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Determine different moduli of elasticity used in day to day engineering applications CO2 : Calculate the viscosity of liquids and radius of curvature of convex lens CO3 : Estimate the coefficient of thermal conductivity of bad conductors CO4 : Determine the water quality parameters of the given water sample CO5 : Analyze quantitatively the metals (Fe, Ni,) in the any sample volumetrically as well as by using spectroanalytical methods
<b>Course:Engineering Chemistry-[CH22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Recall the basic concepts of water softening,nano materials and batteries. CO2 : Summarize the types of corrosion, fuels and energy storage devices. CO3 : Explain the basic principles of electrochemistry and engineering materials. CO4 : Identify suitable methods for water treatment, fuel and corrosion control. CO5 : Apply the knowledge of engineering materials, fuels and energy storage devices for material selection and also in energy sectors.
<b>Course:Problem Solving and Python Programming-[CS22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the algorithmic solutions to simple and complex computational problems CO2 : Apply functions, modules and packages in Python program and use conditionals and loops for solving problems CO3 : Analyze conditional branching statements CO4 : Evaluate python programs CO5 : Develop programs using compound data types and files
<b>Course:Problem Solving and Python Programming Laboratory-[CS22102]</b>
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, loops and functions for solving. CO4 : Process compound data using Python data structures. CO5 : Utilize Python packages in developing software applications.
<b>Course:Communicative English-[EN22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 :Apply and practice the correct usages of language CO2 :Receive the language effectively and meaningfully through receptive skills CO3 :Produce the language appropriate to the needs and situations exercising productive skills CO4 :Transfer or interpret any piece of information with accuracy and fluency CO5 :Apply the language intellectually and confidently
<b>Course:Universal Human Values-[HS22102]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Illustrate the significance of value inputs in a classroom and start applying them in their

life and profession.
CO2 : Explain the role of a human being in ensuring harmony in society and nature.
CO3 : Demonstrate the value of harmonious relationship based on trust and respect in their life and profession.
CO4 : Compare values, skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO5 : Classify ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

**Course:Matrices and Calculus-[MA22101]**

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, ODE and integration.
CO2 : Explain the properties of matrices and nature of the quadratic form.
CO3 : Interpret the techniques of differentiation, partial differentiation, ODE and integration.
CO4 : Apply diagonalization of matrices in quadratic form and use Cayley Hamilton theorem in inverse of matrices.
CO5 : Solve problems on differentiation, partial differentiation, integration and ODE using different methods.

**Course:Engineering Physics-[PH22101]**

Upon completion of the course, the students will.../ will be able to...
CO1 : Recall the basics of properties of matter, thermal physics and ultrasonics, hence improve their engineering knowledge
CO2 : Define the advanced Physics concepts of quantum theory and the characteristics of crystalline materials
CO3 : Illustrate Bending of beams, thermal behavior and ultrasonic devices
CO4 : Summarize the dual aspects of matter, crystal structures and imperfections of crystals
CO5 : Apply the Moduli of elasticity of different materials, thermal energy, ultrasonics, scanning tunneling microscope and crystal growth techniques in engineering fields

Semester:2

**Course:Environment and Sustainability-[CH22201]**

Upon completion of the course, the students will.../ will be able to...
CO1 :Explain the basic concepts of environment and sustainable development
CO2 :Summarise the types of pollution, various natural resources and food adulterants.
CO3 :Outline the methods for waste management and detection of adulterants.
CO4 :Apply the gained knowledge to overcome various issues related to health and environment
CO5 :Identify suitable methods for local environmental issues and sustainability

**Course:Electric Circuit Analysis-[EE22202]**

Upon completion of the course, the students will.../ will be able to...
CO1 : Explain fundamental concepts in AC and DC circuits.
CO2 : Apply fundamental laws and network theorems in electric circuits.
CO3 : Interpret the concepts of Resonance and Coupled Circuits.
CO4 : Determine the DC and AC circuit transients.
CO5 : Explain balanced and unbalanced loads in three phase AC circuits.

**Course:Electric Circuits Analysis Laboratory-[EE22203]**

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

- CO1 : Verify the fundamental electrical laws for the given DC/AC circuit
- CO2 : Verify the various electrical theorems (Superposition, Thevenin , Norton and maximum power transfer) for the given DC/AC circuit.
- CO3 : Analyze transient behavior of the given RL/RC/RLC circuit.
- CO4 : Analyze frequency response of the given series and parallel RLC circuit.
- CO5 : Analyze the performance of the given three-phase circuit.

**Course:Technical English-[EN22201]**

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

- CO1 : Infer advanced technical texts from varied technical genres to expand engineering knowledge and explore more ideas.  
Analyse technical contents written on par with international standards and rewrite
- CO2 : contents using the right vocabulary without grammatical errors to make their articles published in reputed journals
- CO3 : Present reports and Job Letters utilizing the required format prescribed on par with international standards using the exact vocabulary to make their works worthy to be read
- CO4 : Employ the language tones and styles appropriately in interviews and Group Discussions effortlessly following the strategies expected by the corporate world
- CO5 : Appraise the need for new products and descriptions and present them in formal and informal situations

**Course:Basic Civil and Mechanical Engineering-[ES22201]**

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

- CO1 :Spell the scope of civil and mechanical engineering.
- CO2 :Interpret the building components, mechanism and various systems.
- CO3 :Apply surveying, building and mechanical systems in realtime.
- CO4 :Analyse the components of engines, powerplants, refridgeration system and infrastructures.
- CO5 :Examine the civil and mechanical engineering applications.

**Course:Statistics and Numerical Methods-[MA22201]**

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

- CO1 : Define the basic concepts of statistical tests, ANOVA, iterative methods, interpolations and ODE.
- CO2 : Discuss the techniques of statistical tests and design of experiments.
- CO3 : Explain the solution of equations, ODE, single and multistep methods, interpolations, differentiation and integration
- CO4 : Apply the concept of testing of hypothesis and design of experiment in real life.
- CO5 : Apply numerical techniques in system of equations, differential equations, interpolation, differentiation and integration.

**Course:Physics for Electronics Engineering-[PH22202]**

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

- CO1 : Recall the basic concepts of light, electron transport properties of conductors and basic principles of semiconductors.
- CO2 : Define the magnetic properties of materials and the principles of optoelectronic and nano devices

CO3 :	Illustrate laser and fibre optics, classical and quantum concepts of conducting materials, physics of semiconducting materials
CO4 :	Summarize the functioning of various magnetic, optoelectronic and nano devices Demonstrate the concepts of optics, fibre optics, moduli of elasticity and thermal energy,
CO5 :	behavior of conductors, semiconductors, magnetic and dielectric materials and also the functioning of optical and nano devices in various engineering applications

Semester:3

<b>Course:C Programming and Data Structures-[CS3353]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Develop C programs for any real world/technical application.
CO2 :	Apply advanced features of C in solving problems.
CO3 :	Write functions to implement linear and non-linear data structure operations.
CO4 :	Suggest and use appropriate linear/non-linear data structure operations for solving a given problem.
CO5 :	Appropriately use sort and search algorithms for a given application.
CO6 :	Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.
<b>Course:C Programming and Data Structures Laboratory-[CS3362]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Use different constructs of C and develop applications
CO2 :	Discover functions to implement linear and non-linear data structure operations
CO3 :	Relate and use the appropriate 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 :	Implement Sorting and searching algorithms for a given application
<b>Course:Electron Devices and Circuits-[EC3301]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Explain the structure, charactersitics and applications of diodes.
CO2 :	Explain the structure and charactersitics of transistors and thyristors.
CO3 :	Analyze the gain and frequency response of BJT and MOSFET amplifiers.
CO4 :	Construct multistage amplifier circuits and determine its gain and frequency response.
CO5 :	Construct different oscillator circuits and determine its frequency of oscillation.
<b>Course:Electronic devices and circuits laboratory-[EC3311]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Explain the structure and operation of PN junction devices (diode, Zener diode, LED and Laser diode)
CO2 :	Design clipper, clamper, half wave and full wave rectifier, regulator circuits using PN junction diodes
CO3 :	Analyze the structure and characteristics BJT, FET, MOSFET, UJT, Thyristor and IGBT
CO4 :	Analyze the performance of various configurations of BJT and MOSFET based

<p>amplifier</p> <p>CO5 : Explain the characteristics of MOS based cascade and differential amplifier</p> <p>CO6 : Explain the operation of various feedback amplifiers and oscillators</p>
<b>Course:Electromagnetic Fields-[EE3301]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Differentiate different coordinate systems, laws, theorems and characterizing parameters.</p> <p>CO2 : Analyze the concepts about electrostatic fields, electrical potential, energy density and their applications.</p> <p>CO3 : Analyze 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>
<b>Course:Digital Logic Circuits-[EE3302]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the terms in number system, Boolean theorems, combinational circuits, sequential circuits, digital logic families, PLDs and VHDL.</p> <p>CO2 : Explain the different types of number system, logic families, and the concepts of combinational circuits, sequential circuits, PLDs, VHDL programming.</p> <p>CO3 : Solve the problems on number systems and Apply K-maps for the implementation of combinational circuits.</p> <p>CO4 : Analyze the combinational, synchronous and asynchronous sequential circuits.</p> <p>CO5 : Design the combinational circuits, sequential circuits and develop its VHDL coding.</p>
<b>Course:Electrical Machines - I-[EE3303]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Analyse the excitation of Magnetic circuits in electromechanical system</p> <p>CO2 : Compute the Performance of DC Generators by conducting suitable test on it .</p> <p>CO3 : Analyse the performance and control of DC Motors.</p> <p>CO4 : Analyse the operation and testing of single phase static machine</p> <p>CO5 : Analyse the operation of three phase static machine and autotransformer</p>
<b>Course:Electrical Machines Laboratory - I-[EE3311]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Examine the performance of DC Machines</p> <p>CO2 : Interpretation of single phase and three phase transformer</p> <p>CO3 : Predetermination of DC Machines and single phase transformer</p> <p>CO4 : Examine the losses in single phase transformer</p> <p>CO5 : Explain the AC,DC starters and three phase transformer connections</p>
<b>Course:Probability and Complex Functions-[MA3303]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Know the fundamental concepts of probability, distributions and have knowledge of analytic and complex functions.</p> <p>CO2 : Describe the basic concepts of one and two dimensional random variables and ODE in Engineering applications.</p> <p>CO3 : Discuss the standard techniques of complex variable theory in particular analytic function and its mapping property.</p> <p>CO4 : Apply methods to construct analytic functions and complex integration techniques which can be used in real integrals.</p>

CO5 : Apply the concepts of probability and solution of ODE in Engineering disciplines

Semester:4

**Course:Transmission and Distribution-[EE3401]**

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

CO1 : Determine different parameters of a Transmission Line from fundamental principles

CO2 : Evaluate the performance of different classification of Transmission Lines

CO3 : Analyze the mechanical design of overhead transmission lines.

CO4 : Determine the parameters of underground cables

CO5 : Analyze AC and DC distribution systems

**Course:Linear Integrated Circuits-[EE3402]**

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

CO1 : Explain the fabrication of Integrated Circuits

CO2 : Analyze the characteristics of Op-Amp

CO3 : Analyze the application of Op-amp based circuits

CO4 : Analyze the operation of special ICs

CO5 : Analyze the operation of application ICs

**Course:Measurements and Instrumentation-[EE3403]**

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

CO1 : Interpret the functional aspects of measuring instruments.

CO2 : Explain the construction and working of various instruments.

CO3 : Identify the appropriate method to measure the unknown circuit elements.

CO4 : Apply the suitable methods for measurement of non-electrical parameters.

CO5 : Understand the concepts of analog, digital and virtual instrumentation.

**Course:Microprocessor and Microcontroller-[EE3404]**

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

CO1 : Illustrate the architecture, timing diagram, interrupts and interfacing of 8085 Microprocessor.

CO2 : Apply 8085 instruction set to program a 8085 microprocessor

CO3 : Explain the architecture of various peripheral interfacing ICs.

CO4 : Construct interfacing circuits using 8051 microcontroller for simple applications.

CO5 : Explain the architecture, ports, timers and interrupts of PIC18 microcontroller.

**Course:Electrical Machines - II-[EE3405]**

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

CO1 : Analyze the performance of synchronous generator.

CO2 : Analyze the characteristics and performance of synchronous motor.

CO3 : Analyze the performance of three phase induction motor.

CO4 : Analyse the different starting methods and speed control of three-phase induction motors.

CO5 : Analyse the construction and principle of operation of single phase induction motors and special machines.

**Course:Electrical Machines Laboratory - II-[EE3411]**

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

CO1 : Analyze the regulation of Alternator
CO2 : Analyze the equivalent circuit of Induction machines
CO3 : Analyze the characteristics of Synchronous machines
CO4 : Analyze the characteristics of Induction Machines
CO5 : Acquire knowledge on separation of losses
<b>Course:Linear and Digital Circuits Laboratory-[EE3412]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Implement Boolean functions, Code Converters and Parity Generator and Checker using Logic Gates
CO2 : Implement Circuits with Digital ICs like Decoders, Multiplexer,De-multiplexer
CO3 : Design and Implement Circuits with Digital ICs like Registers, Counters
CO4 : Acquire Knowledge on Application of Op-Amp
CO5 : Implement Circuits using Analog ICs like Timer, VCO and Voltage Regulator
<b>Course:Microprocessor and Microcontroller laboratory-[EE3413]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Execute assembly language program using 8085 microprocessor to perform basic operations.
CO2 : Demonstrate the interfacing of 8085 microprocessor for simple applications.
CO3 : Execute assembly language program using 8051 microcontroller to perform basic operations.
CO4 : Demonstrate the interfacing of 8051 microcontroller for simple applications
CO5 : Design and implement sequential and combinational circuits using logic gates and IC's
<b>Course:Environmental Sciences and Sustainability-[GE3451]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Gain knowledge on ecosystem, environment and biodiversity.
CO2 : Understand the process and disadvantages of environmental pollution.
CO3 : Explain the different types of renewable energy systems.
CO4 : Explain the social issues from unsustainable to sustainable development
CO5 : Outline the need for Sustainability Practices and its measures.

Semester:5

<b>Course:Object Oriented Programming Laboratory-[CS8383]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain 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.
<b>Course:Object Oriented Programming-[CS8392]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 :Define OOP concepts and characteristics in Java

CO2 :Summarize the principles of packages, inheritance and interfaces to write java programs.  
CO3 :Demonstrate exceptions and I/O streams to develop java application.  
CO4 :Develop Java applications with classes, exceptions, IO stream, threads and generics classes  
CO5 :Develop interactive java applications using graphics packages

**Course:Power System Analysis-[EE8501]**

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

CO1 : Explain the need for Power System analysis in planning and operational studies  
CO2 : Model the Power System under steady state operating conditions  
CO3 : Solve Power Flow Problems using Numerical Methods  
CO4 : Calculate operating conditions of Power Systems under various faults.  
CO5 : Apply Numerical Methods in Power System Stability Studies

**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 microprocessor and microcontroller.  
CO2 : Develop assembly language program for microprocessor and microcontroller.  
CO3 : Develop microprocessor and microcontroller based applications  
CO4 : Design and implement interfacing of peripheral with microprocessor.  
CO5 : Design and implement interfacing of peripheral with microcontroller for control and monitoring.

**Course:Power Electronics-[EE8552]**

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

CO1 : Remember the basics of power semiconductor devices and power converters  
CO2 : Summarize the working,principle of operation of power semiconductor devices and various converters  
CO3 : Apply switching concepts to determine performance parameters.  
CO4 : Analyze the waveforms and determine the performance parameters of various converter  
CO5 : Examine the operation of AC voltage controller and various configuration

**Course:Digital Signal Processing-[EE8591]**

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

CO1 : Analyse the functional blocks and characteristics of discrete time systems  
CO2 : Analyse discrete-time system using convolution and Z-transform.  
CO3 : Apply DTFT, DFT and FFT for the given discrete time signal.  
CO4 : Design and realize various digital filters for digital signal processing.  
CO5 : Explain the architecture and functional unit of digital signal processor.

**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 softskills required for the work place.
<b>Course:Air Pollution and Control Engineering-[OCE551]</b>
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

<b>Course:Special Electrical Machines-[EE8005]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Determine the electrical and mechanical parameters of the stepper motor.
CO2 : Determine the electrical and mechanical parameters of the switched reluctance motors.
CO3 : Determine the electrical and mechanical parameters of the Permanent magnet brushless DC motors.
CO4 : Determine the electrical and mechanical parameters of the permanent magnet synchronous motors.
CO5 : Determine the electrical and mechanical parameters of the sensor less special machines.
<b>Course:Solid State Drives-[EE8601]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Analyze 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 Synchronus motor drives.
CO5 : Analyze the operation of current and speed controllers for a closed loop solid state DC motor Drive.
<b>Course:Protection and Switchgear-[EE8602]</b>
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 : Analyze the various electrical apparatus protection.
CO4 : Compare the performance of static and numerical relays.
CO5 : Interpret circuit breakers in the protection schemes.
<b>Course:Mini Project-[EE8611]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Summarize the key concepts from electrical and electronics engineering, then identify and formulate problems that require potential solutions.
CO2 : Design a system that is useful for the society without having negative impact on health,

<p>safety and environment</p> <p>CO3 : Design and simulate any system using appropriate software tools and come out with well defined conclusions.</p> <p>CO4 : Create a product/model and evaluate its credibility</p> <p>CO5 : Document the created model to various engineering communities.</p>
<b>Course:Power Electronics and Drives Laboratory-[EE8661]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Design and generate the Gate pulse using R, RC and UJT firing circuits.</p> <p>CO2 : Examine the characteristics of various power semiconductor devices.</p> <p>CO3 : Examine the characteristics of power electronic converter and controller circuits</p> <p>CO4 : Simulate the characteristics of power electronic converters and controllers using MATLAB/SCILAB software.</p> <p>CO5 : Examine the characteristics of a permanent magnet brushless DC motor.</p>
<b>Course:Microprocessors and Microcontrollers Laboratory-[EE8681]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Develop ALP using 8085 microprocessors to perform basic arithmetic operations, sorting operations and code conversions.</p> <p>CO2 : Build the interfacing of 8085 with A/D and D/A converter.</p> <p>CO3 : Build the interfacing of 8085 with traffic light, stepper motor and I/O Ports.</p> <p>CO4 : op simple ALP programs and demonstrate the interfacing of 8051 with stepper motor.</p> <p>CO5 : Build the interfacing of A/D, D/A converter with 8081 processor and simulation experiments.</p>
<b>Course:Embedded Systems-[EE8691]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the various components of embedded system.</p> <p>CO2 : Illustrate the types of serial bus communication interfaces in embedded system.</p> <p>CO3 : Explain the different approaches of embedded product development.</p> <p>CO4 : Understand the concept of Real Time Operating System and its scheduling.</p> <p>CO5 : Apply the concepts of embedded system to develop an embedded product.</p>

### Semester:7

<b>Course:Power Systems Transients-[EE8010]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understand the basic concepts of different types of transients in power systems.</p> <p>CO2 : Describe the types of switching transients in a Power system.</p> <p>CO3 : Analyze the mathematical model of lightning and protection of power systems from lightning</p> <p>CO4 : Explain the concept of travelling waves.</p> <p>CO5 : Interpret the impacts of transients and EMTP for transient computations</p>
<b>Course:High Voltage Engineering-[EE8701]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understand various types of over voltages in power system and protection methods</p> <p>CO2 : realise nature of breakdown mechanism in solid, liquid and gaseous dielectrics.</p> <p>CO3 : Apply the principle of high voltage and high current generation.</p>

CO4 : Apply the principle of high voltage and high current measurement.
CO5 : Test the power apparatus like cables, insulators, transformers and coordination of insulation.
<b>Course:Power System Operation and Control-[EE8702]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the day-to-day operation of electric power system .
CO2 : Analyse the control actions to be implemented on the system to meet the variations in load demand
CO3 : Analyze the static and dynamic characteristics of real power- frequency interaction and the reactive power-voltage interaction.
CO4 : Find solution for Economic dispatch and unit commitment problems
CO5 : Describe the concept of power system stability , monitoring and protection
<b>Course:Renewable Energy Systems-[EE8703]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explaining the Conventional and Non-Conventional energy resources, environmental impacts, national and international energy scenario.
CO2 : Interpreting the construction, operation and characteristics of Wind and Solar Energy conversion systems.
CO3 : Extending the concept about biomass, geothermal, hydro power plant, tidal energy, ocean thermal energy conversion, fuel cell, energy storage and hybrid energy systems.
CO4 : Apply the various maximization techniques and different forms of power harvesting from Wind, Solar and Biomass renewable energy resources.
CO5 : Analyze the various power harvesting methods and the applications of Wind and solar systems and energy storage systems.
<b>Course:Power System Simulation Laboratory-[EE8711]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Model and analyse the performance of the transmission lines.
CO2 : Perform power flow, short circuit, and stability analysis for any power system network.
CO3 : Understand, design, and analyse the load frequency control mechanism.
CO4 : Perform optimal scheduling of generators and compute the state of the power system.
CO5 : Apply Simulation tools for Power System Problems
<b>Course:Renewable Energy Systems Laboratory-[EE8712]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Analyze the Solar, Wind and Fuel Cell Renewable energy systems using hardware setups.
CO2 : Investigate the various power harvesting technique in 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.
<b>Course:Disaster Management-[GE8071]</b>
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 : Predict the vulnerability and various methods of disaster risk reduction measures by various authorities of the country
CO3 : Distinguish and restructure the projects using appropriate technologies in the country.
CO4 : Summarize the hazard and vulnerability profile of India, Disaster damage assessment

and management and make suitable policies .
CO5 : Discuss the rudimentary ability to respond the natural and human disasters.
<b>Course:Testing of Materials-[OML751]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Interpret 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.
Apply the techniques, skills and modern engineering tools necessary for material
CO3 : science engineering.
CO4 : Identify the mechanical properties of materials.
CO5 : Analyze the function on multi-disciplinary teams in the area of materials testing.

Semester:8

<b>Course:Smart Grid-[EE8019]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the concepts of Smart Grid and its present developments
CO2 : Elucidate different Smart Grid technologies and it's Architecture
CO3 : Explain different smart meters and advanced Metering infrastructure.
CO4 : Describe various power quality techniques and power quality management methods in Smart Grids
CO5 : Explain various communication and computing techniques in Smart Grid
<b>Course:Project Work-[EE8811]</b>
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.
<b>Course:Professional Ethics in Engineering-[GE8076]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand 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.
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.**

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:M.E. Power Electronics and Drives

Semester:1

<p><b>Course:Advanced Mathematics for Power Electronics Engineers-[MA22106]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basic concepts of matrices, calculus, transforms and probability.</p> <p>CO2 : Explain the decomposition techniques and the boundary value problems.</p> <p>CO3 : Demonstrate Laplace transform, Fourier transform and probability in electrical field.</p> <p>CO4 : Develop matrix theory and boundary value problems in electrical engineering.</p> <p>CO5 : Solve partial differential equations using transforms technique and distributions in engineering applications.</p>
<p><b>Course:Analysis of Power Converters-[PE22101]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate the working modes of power converters and their operation.</p> <p>CO2 : Apply knowledge of mathematics in power converter analysis.</p> <p>CO3 : Select device and calculate performance parameters of power converters under various operating modes.</p> <p>CO4 : Model and analyse power electronic systems and equipments.</p> <p>CO5 : Design and simulate phase controlled rectifiers and switched mode inverters for generic load and for machine loads.</p>
<p><b>Course:Modeling and Design of SMPS-[PE22102]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Calculate the performance parameters of Non isolated DC-DC converter.</p> <p>CO2 : Analyze the performances of Isolated DC-DC converter.</p> <p>CO3 : Derive the transfer function model of Dc to Dc converters.</p> <p>CO4 : Analyze the controller Design of DC-DC converters.</p> <p>CO5 : Explain the Design procedure of magnetics for SMPS application.</p>
<p><b>Course:Design Laboratory for Power Electronics and Drives-[PE22103]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Design isolated power converters and verify the output voltage for different firing angles</p> <p>CO2 : Design non isolated power converters and verify the output voltage for different firing angles</p> <p>CO3 : Understand the need for a power quality analyzer in power electronics circuit applications.</p> <p>CO4 : Design and verify buck and boost converters using simulation software.</p>
<p><b>Course:Power Semiconductor Devices-[PE22111]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Analyze working and characteristics of various types of power diodes</p> <p>CO2 :Analyze the working and characteristics of various current controlled power transistors.</p> <p>CO3 :Analyze the working and characteristics of various voltage controlled power transistors.</p> <p>CO4 :Employ suitable techniques and construct drive circuits for power semiconductor devices.</p>

CO5 : Determine the electrical and mechanical parameters of a heat sink using equivalent circuits.

**Course:Research Methodology-[RM22101]**

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

CO1 : Outline the methodology of research

CO2 : Explain the research design, data collection methods, IPR and patent

CO3 : Prepare a well structured research paper, scientific presentations and patent applications

CO4 : Develop awareness on IPR, patent law and procedural mechanism in obtaining a patent

CO5 : Compare the methods of measurement scale, questionnaire, sampling and data analysis

Semester:2

**Course:Disaster Management-[AC22201]**

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

CO1 : Summarize basics of disaster.

CO2 : Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.

CO3 : Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

CO4 : Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO5 : Develop the strengths and weaknesses of disaster management approaches.

**Course:Analysis of Electrical Machines-[PE22201]**

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

CO1 : Analyze the principles of electromechanical energy conversion and characteristics of DC motors

CO2 : Examine the modelling of AC machines

CO3 : Analyze the concepts of reference frame theory

CO4 : Develop induction machine model in both machine variable and reference variable forms

CO5 : Develop synchronous machine model in machine variables and reference variable form

**Course:Analysis of Electrical Drives-[PE22202]**

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

CO1 : Understand the drive characteristics for different load torque profiles and quadrants of operation

CO2 : Apply knowledge of mathematics in converter/machine dynamics.

CO3 : Analyse direct current motor and induction motor based adjustable speed drives.

CO4 : Design and simulate direct current motor and induction motor based adjustable speed drives.

CO5 : Design a closed loop motor drive system with controllers for the current and speed control operations.

**Course:System Design Using Microcontroller-[PE22203]**

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

CO1 : Recognize the basics of PIC and ARM microcontrollers

CO2 : Understand the interfacing and peripherals of PIC Microcontroller

CO3 : Realise the organization of ARM
CO4 : Apply the concepts for programming in PIC and ARM microcontroller
CO5 : Examine the various applications of PIC and ARM microcontroller
<b>Course:Electric Vehicles and Power Management-[PE22204]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand and compare electric vehicle and IC engine driven vehicles
CO2 : Explain the mechanics of motion of a vehicle
CO3 : Analyze the working and components of Electric Vehicle and Hybrid Electric Vehicle
CO4 : Contrast the operation of battery storage system
CO5 : Examine the various alternative energy storage systems for EV applications
<b>Course:Power Electronics for Renewable Energy Systems-[PE22221]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the impacts of renewable energy power generation on environment and structure of renewable Energy conversion systems.
CO2 : Apply the mode of operation and the characteristics of solar energy and wind energy conversion systems.
CO3 : Demonstrate the importance of solar and wind Maximum Power Point Tracking Techniques and hybrid systems.
CO4 : Demonstrate the applications of solar and wind energy conversion systems.
CO5 : Apply suitable power converters for solar PV and wind energy conversion systems.
<b>Course:Power Quality-[PE22231]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the basic terms and power quality problems
CO2 : Analyze single phase and three phase systems
CO3 : Explain the importance of conventional load compensation systems
CO4 : Explain load compensation problem using DSTATCOM
CO5 : Understand the series compensation of power distribution system
<b>Course:Research Tool Laboratory-[RM22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : list the various stages in research and develop systematic planning of project stages.
CO2 : Write a journal paper and formulate as per the standard journal format
CO3 : Develop a literature review and relevant references for a research problem using suitable software.
CO4 : Determine the plagiarism of the article / report content by using the Software
CO5 : Compile a research report and the presentation

Semester:3

<b>Course:Energy Management and Auditing-[PS4071]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 :Explain the present energy scenario and the energy policy.
CO2 :Comprehend the economic models for cost and load management.
CO3 :Analyze the need and design of an energy management program.
CO4 :Examine the energy audit methodology with financial and sensitivity analysis.
CO5 :Categorize the different energy efficient technologies and energy saving opportunities.

**Course:Smart Grid-[PS4093]**

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

CO1 : Identify the challenges and benefits of smart grid

CO2 : Utilize the different smart grid technologies

CO3 : Identify the issues of Power Quality in Smart Grid.

CO4 : Examine the power quality management in Smart Grid.

CO5 : Identify suitable communication networks for smart grid applications

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:B.Tech. Information Technology

Semester:1

<b>Course:Physics and Chemistry Laboratory-[BS22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Determine different moduli of elasticity used in day to day engineering applications CO2 : Calculate the viscosity of liquids and radius of curvature of convex lens CO3 : Estimate the coefficient of thermal conductivity of bad conductors CO4 : Determine the water quality parameters of the given water sample CO5 : Analyze quantitatively the metals (Fe, Ni,) in the any sample volumetrically as well as by using spectroanalytical methods
<b>Course:Engineering Chemistry-[CH22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Recall the basic concepts of water softening , nanomaterials and batteries. CO2 : Summarize the types of corrosion, fuels and energy storage devices CO3 : Explain the basic principles of electrochemistry and engineering materials. CO4 : Identify suitable methods for water treatment, fuel and corrosion control CO5 : Apply the knowledge of engineering materials,fuels and energy storage devices for material selection and also in energy sectors
<b>Course:Problem Solving and Python Programming-[CS22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the algorithmic solutions to simple and complex computational problems. CO2 : Apply functions, modules and packages in Python program and use conditionals and loops for solving problems. CO3 : Analyze conditional branching statements. CO4 : Evaluate python programs. CO5 : Develop programs using compound data types and files.
<b>Course:Problem Solving and Python Programming Laboratory-[CS22102]</b>
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, loops and functions for solving Problems CO4 : Process compound data using Python data structures CO5 : Utilize Python packages in developing software applications
<b>Course:Communicative English-[EN22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 :Recognise and practise the correct usages of language CO2 :Receive the language effectively and meaningfully through receptive skills CO3 :Infer and interpret any piece of information with accuracy and fluency CO4 :Produce the language appropriate to the needs and situations exercising productive skills CO5 :Apply the language intellectually and confidently
<b>Course:Universal Human Values-[HS22102]</b>
Upon completion of the course, the students will.../ will be able to...

CO1 :	Illustrate the significance of value inputs in a classroom and start applying them in their life and profession.
CO2 :	Explain the role of a human being in ensuring harmony in society and nature.
CO3 :	Demonstrate the value of harmonious relationship based on trust and respect in their life and profession.
CO4 :	Compare values,skills,happiness and accumulation of physical facilities, the self and the body,intention and competence of an individual, etc.
CO5 :	Classify ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

**Course:Matrices and Calculus-[MA22101]**

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, ODE and integration
CO2 :	Explain the properties of matrices and nature of the quadratic form
CO3 :	Interpret the techniques of differentiation, partial differentiation, ODE and integration
CO4 :	Apply diagonalization of matrices in quadratic form and use Cayley Hamilton theorem in inverse of matrices
CO5 :	Solve problems on differentiation, partial differentiation, integration and ODE using different methods

**Course:Engineering Physics-[PH22101]**

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

CO1 :	Recall the basics of properties of matter, thermal physics and ultrasonics, hence improve their engineering knowledge
CO2 :	Define the advanced Physics concepts of quantum theory and the characteristics of crystalline materials
CO3 :	Illustrate Bending of beams, thermal behavior and ultrasonic devices
CO4 :	Summarize the dual aspects of matter, crystal structures and imperfections of crystals
CO5 :	Apply the Moduli of elasticity of different materials, thermal energy, ultrasonics, scanning tunneling microscope and crystal growth techniques in engineering fields

Semester:2

**Course:Environment and Sustainability-[CH22201]**

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

CO1 :	Recall the basic concepts of environment and sustainable development.
CO2 :	Summarise the types of pollution, various natural resources and food adulterants.
CO3 :	Explain the methods for waste management and detection of adulterants.
CO4 :	Apply the gained knowledge to overcome various issues related to health and environment.
CO5 :	Identify suitable methods for local environmental issues and sustainability.

**Course:Programming in C-[CS22201]**

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

CO1 :	Explore simple applications in C using basic programming constructs
CO2 :	Develop C programs using arrays and strings
CO3 :	Develop modular programs in C using functions and pointers.
CO4 :	Build applications in C using structures

CO5 : Demonstrate applications using sequential and random-access file processing
<b>Course:C Programming Laboratory-[CS22202]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Develop programs in C using basic constructs.
CO2 : Develop programs in C using arrays.
CO3 : Develop applications in C using strings, pointers, functions.
CO4 : Develop applications in C using structures.
CO5 : Develop applications in C using file processing.
<b>Course:Technical English-[EN22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Infer advanced technical texts from varied technical genres to expand engineering knowledge and explore more ideas. Analyse technical contents written on par with international standards and rewrite
CO2 : contents using the right vocabulary without grammatical errors to make their articles published in reputed journals.
CO3 : Present reports and Job Letters utilizing the required format prescribed on par with international standards using the exact vocabulary to make their works worthy to be read.
CO4 : Employ the language tones and styles appropriately in interviews and Group Discussions effortlessly following the strategies expected by the corporate world.
CO5 : Appraise the need for new products and descriptions and present them in formal and informal situations.
<b>Course:Statistics and Numerical Methods-[MA22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts of statistical tests, ANOVA, iterative methods, interpolation and ODE
CO2 : Discuss the techniques of statistical tests and design of experiments
CO3 : Explain the solution of equations, ODE, single and multistep methods, interpolations,differentiation and integration.
CO4 : Apply the concept of testing of hypothesis and design of experiment in real life
CO5 : Apply numerical techniques in system of equations, differential equations, interpolation, differentiation and integration
<b>Course:Physics for Information Science-[PH22203]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Relate the concepts of light, electron transport properties of conductors and basic principles of semiconductors
CO2 : Define the magnetic properties of materials and the principles of optoelectronic and nano devices
CO3 : Illustrate laser and fibre optics, classical and quantum concepts of conducting materials, physics of semiconducting materials
CO4 : Summarize the functioning of various magnetic, optoelectronic and nano devices Demonstrate the concepts of optics, fibre optics, behavior of conductors, semiconductors
CO5 : and functioning of magnetic, optical and nano devices in various engineering applications

Semester:3

<p style="text-align: center;"><b>Course:Data Structures and Algorithms Laboratory-[CD3281]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Implement ADTs as Python classes.</p> <p>CO2 : Design lists, queues, and stacks.</p> <p>CO3 : Implement applications of linear data structures.</p> <p>CO4 : Implement sorting and searching algorithms.</p> <p>CO5 : Implement non linear data structures.</p>
<p style="text-align: center;"><b>Course:Data Structures and Algorithms-[CD3291]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define algorithm analyses techniques, linear and nonlinear abstract data types.</p> <p>CO2 : Explain linear data structures and non linear data structures according to the needs of different applications.</p> <p>CO3 : Implement list ADT, queue ADT, stack ADT, tree ADT and graph ADT.</p> <p>CO4 : Apply searching, sorting and recursion algorithms.</p> <p>CO5 : Analyse tree and graph structures.</p>
<p style="text-align: center;"><b>Course:Digital Principles and Computer Organization-[CS3351]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : State the fundamentals of computer systems and execution of an instruction</p> <p>CO2 : Explain different types of control design and identify hazards</p> <p>CO3 : Identify the characteristics of various memory systems and I/O communication</p> <p>CO4 : Design various combinational digital circuits using logic gates</p> <p>CO5 : Design sequential circuits</p>
<p style="text-align: center;"><b>Course:Foundations of Data Science-[CS3352]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Acquire knowledge on relationships between data.</p> <p>CO2 : Summarize the data science process.</p> <p>CO3 : Illustrate different types of data descriptions for the data science process.</p> <p>CO4 : Use the Python Libraries for Data Wrangling.</p> <p>CO5 : Apply visualization Libraries in Python to interpret and explore data.</p>
<p style="text-align: center;"><b>Course:Data Science Laboratory-[CS3361]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explore python libraries for data science.</p> <p>CO2 : Use the basic Statistical and Probability measures for data science.</p> <p>CO3 : Analyze the benchmark data sets using descriptive analytics.</p> <p>CO4 : Evaluate standard datasets using correlation and regression analytics.</p> <p>CO5 : Create visualization of data using visualization packages in Python.</p>
<p style="text-align: center;"><b>Course:Object Oriented Programming Laboratory-[CS3381]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Design and develop java programs using object oriented programming concepts</p> <p>CO2 :Develop simple applications using object oriented concepts such as package, exceptions</p> <p>CO3 :Implement multithreading, and generics concepts</p> <p>CO4 :Develop GUIs and event driven programming applications for real world problems</p> <p>CO5 :Implement and deploy web applications using Java</p>
<p style="text-align: center;"><b>Course:Object Oriented Programming-[CS3391]</b></p>

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

CO1 : Describe 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, multithreaded models, I/O packages, String classes, collections, and generics concepts.

CO4 : Design interactive GUI based applications using the concepts of event handling and JavaFX components.

CO5 : Analyze simple and advanced Java programming concepts.

**Course:Discrete Mathematics-[MA3354]**

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

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

CO4 : Apply the concepts needed to test the logic of a program, counting principles & graphs in real life.

CO5 : Apply the concepts and properties of groups, rings, fields and lattices using algebraic structures and Boolean algebra.

Semester:4

**Course:Introduction to Operating Systems-[CS3451]**

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

CO1 : Define process, scheduling, memory, file systems virtual machines and mobile OS.

CO2 : Explain critical section, memory management, directory management and IO systems.

CO3 : Elaborate interprocess communication, memory management schemes, file systems virtual machines 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:Theory of Computation-[CS3452]**

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

Demonstrate the basic concepts of Mathematical proof, Automata theory, Regular

CO1 : expressions, Context free grammar, Push down automata, Turing machine and Undecidable Problems.

CO2 : Distinguish the computing languages and classify their respective types.

CO3 : Prove the decidability and intractability of computational problems.

CO4 : Solve the computation problems using Turing machines.

CO5 : Design Finite automata, Push down automata, and Turing machines.

**Course:Operating Systems Laboratory-[CS3461]**

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

CO1 :Work with UNIX commands and shell programming

CO2 : Implement the various CPU Scheduling Algorithms

CO3 :Implement Process Creation and Inter-Process Communications

CO4 : Implement Deadlock Avoidance and Deadlock Detection Algorithms

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

**Course:Database Management Systems Laboratory-[CS3481]**

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:Artificial Intelligence and Machine Learning-[CS3491]**

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

CO1 : Illustrate the algorithms for problem solving.

CO2 : Apply reasoning under uncertainty.

CO3 : Use supervised learning models.

CO4 : Demonstrate ensembling and unsupervised models.

CO5 : Construct deep learning neural network models.

**Course:Database Management Systems-[CS3492]**

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:Environmental Sciences and Sustainability-[GE3451]**

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

CO1 : Explain about environment, biodiversity, environmental pollution, renewable sources of energy, its sustainability and management.

CO2 : Identify the causes of environmental pollution, effects and its preventive measures and the need for new energy sources.

CO3 : Apply the safety management system and various renewable sources of energy to preserve the environment.

CO4 : Examine different forms of energy and apply them for suitable applications in for technological advancement and societal development.

CO5 : Analyze the Environmental management and various real time sustainability practices.

**Course:Web Essentials-[IT3401]**

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

CO1 :Define the basic concepts of web programming and internet protocols. .

CO2 :Demonstrate simple web-applications

CO3 :Apply JavaScript, HTML and CSS effectively to create interactive and dynamic websites.

CO4 :Construct simple PHP scripts

CO5 :Construct multimedia components and database applications.

Semester:5

**Course:Software Engineering-[CS8494]**

**Course Outcomes**

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the software development and testing principles.</p> <p>CO2 : Summarize the concepts of requirements analysis and software design.</p> <p>CO3 : Compare different software process models and testing methods.</p> <p>CO4 : Apply the systematic procedure for software design and deployment.</p> <p>CO5 : Analyze project management, project cost estimation techniques.</p>
<b>Course:Networks Laboratory-[CS8581]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Implement protocols using TCP and UDP.</p> <p>CO2 : Compare the performance of transport layer protocols.</p> <p>CO3 : Analyze the performance of network protocols using simulation tools.</p> <p>CO4 : Analyze network layer routing algorithms.</p> <p>CO5 : Implement error detection codes.</p>
<b>Course:Computer Networks-[CS8591]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Relate the concepts of Data Communication, basic layers and its function in computer networks.</p> <p>CO2 : Discuss the concepts in Routing, Addressing &amp; working of functions of transport layer protocols.</p> <p>CO3 : Apply routing algorithms and their functionality.</p> <p>CO4 : Analyze the working of various application layer protocol.</p> <p>CO5 : Analyze the functional and procedural means to transfer data between network entities.</p>
<b>Course:Microprocessors and Microcontrollers Laboratory-[EC8681]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Write ALP Programs for fixed and Floating Point and Arithmetic operations.</p> <p>CO2 : Interface different I/Os with processor.</p> <p>CO3 : Generate waveforms using Microprocessors.</p> <p>CO4 : Execute Programs in 8051.</p> <p>CO5 : Execute Programs using MASM.</p>
<b>Course:Microprocessors and Microcontrollers-[EC8691]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the basic concepts of Microprocessor, addressing modes and instruction set of 8086.</p> <p>CO2 : Illustrate the detailed hardware and software structure of the microprocessor.</p> <p>CO3 : Describe how peripherals (8255, 8253, etc.) are interconnected with the microprocessor.</p> <p>CO4 : Interpret the 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>
<b>Course:Web Technology-[IT8501]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basics of web essentials, scripting languages, Servlets, DOM, JSP and AJAX.</p> <p>CO2 : Explain HTML, scripting languages, DOM, JSP, and Webservices.</p> <p>CO3 : Implement client side scripting and server-side scripting using Java Servlets and JavaScript.</p>

CO4 : Apply HTML, CSS, JavaScript, JSP and XML to develop web applications. CO5 : Compare AJAX, WSDL, SOAP, HTML, CSS, JavaScript and Java Servlets .
<b>Course:Web Technology Laboratory-[IT8511]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Design interactive webpages using scripting languages. CO2 : Implement server side programming using servlets and JSP. CO3 : Develop web pages using XML/XSLT. CO4 : Implement client side scripting using JavaScript. CO5 : Implement webservices and database.
<b>Course:Algebra and Number Theory-[MA8551]</b>
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 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.
<b>Course:Air Pollution and Control Engineering-[OCE551]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Explain the nature and characteristics of air pollution, noise pollution and basic concepts of air quality management CO2 : Interpret stacks and particulate air pollution control devices. CO3 : Demonstrate the air pollution control equipment. CO4 : Select indoor air pollution control devices. CO5 : Solve air and noise pollution problems

Semester:6

<b>Course:Big Data Analytics-[CS8091]</b>
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.
<b>Course:Computer Graphics and Multimedia-[CS8092]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the basic concepts of computer graphics and multimedia. CO2 : Explain the concepts of illumination, color models and clipping techniques. CO3 : Apply two dimensional and three dimensional transformations for graphics primitives. CO4 : Apply clipping techniques for graphics primitives. CO5 : Develop applications based on multimedia and hypermedia.

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

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

- CO1 : Illustrate OO analysis and design for a given problem specification
- CO2 : Draw unified modeling language diagram for a given real world problem
- CO3 : Analyse the software quality using design patterns
- CO4 : Applying specific design patterns for a given problem specification
- CO5 : Examine the compliance of the real world system the software requirement specification

**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: 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: Professional Communication-[HS8581]**

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

- CO1 : Make effective presentation
- 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

**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]**

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

- CO1 : Explain the basics of mobile telecommunication system
- CO2 : Illustrate the generations of telecommunication systems in wireless network
- CO3 : Describe the architecture of Wireless LAN technologies
- CO4 : Identify the functionality of network layer and routing protocol for a given Ad hoc networks
- CO5 : Explain the functionality of Transport and Application layer

**Course: Mini Project-[IT8611]**

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

CO1 : On completion of mini project, the students will be in a position to take up a problem and find solution by formulating a proper methodology.

Semester:7

<b>Course:Cloud Computing-[CS8791]</b>
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 : Implement different types of virtualization technologies and service-oriented architecture systems
CO3 : Describe the core issues of cloud computing such as resource management and security.
CO4 : Design and use current cloud technologies.
CO5 : Analyze and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.
<b>Course:Cryptography and Network Security-[CS8792]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Outline OSI security Architecture, Security Practice and System Security
CO2 : Interpret Symmetric Key Cryptography and Public Key Cryptography
CO3 : Make use of Algebraic structures, Mathematics of Symmetric Key Cryptography and Asymmetric Key Cryptography
CO4 : Apply Classical Encryption Techniques
CO5 : Identify Symmetric Key Cryptography, Asymmetric Key Cryptography , Message Authentication and Integrity
<b>Course:Total Quality Management-[GE8077]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe the concepts, dimensions, framework and barriers of quality.
CO2 : Apply the quality principles and techniques of TQM.
CO3 : Utilize TQM tools for quality improvement.
CO4 : Apply the techniques and tools used to measure quality.
CO5 : Interpret quality systems in manufacturing and service sectors.
<b>Course:FOSS and Cloud Computing Laboratory-[IT8711]</b>
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.
<b>Course:Security Laboratory-[IT8761]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Build cryptosystems by applying symmetric key encryption algorithm
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 security system using open source tools
<b>Course:Principles of Management-[MG8591]</b>

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the basics of management and its types, skills, management roles, types of business organization and current trends in business.</p> <p>CO2 : Explain the managerial functions.</p> <p>CO3 : Explain the nature, types and purpose of planning, organizing, directing and controlling. Compare the different organization structures, authorities and responsibilities,</p> <p>CO4 : Communication tools and techniques, human resource management and training and development.</p> <p>CO5 : Analyze individual and group behavior, motivation theories, job satisfaction types and theories of leadership and formulate best control methods.</p>
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**Course:Waste Water Treatment-[OCY751]**

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define water quality parameters and treatment process.</p> <p>CO2 : Explain industrial water treatment.</p> <p>CO3 : Utilize conventional water treatment methods.</p> <p>CO4 : Make use of waste water treatment.</p> <p>CO5 : Analyze the absorption and oxidation processes.</p>
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Semester:8

**Course:Professional Ethics in Engineering-[GE8076]**

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Interpret the core human values that shape the ethical behaviour of an engineer.</p> <p>CO2 : Develop skills to solve various moral issues using ethical theories.</p> <p>CO3 : Experiment with ethical issues related to engineering.</p> <p>CO4 : Infer various social issues, industrial standards, code of ethics and role of professional ethics in engineering.</p> <p>CO5 : Illustrate the ethics of multinational cooperation and global social responsibility.</p>
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**Course:Electronic Commerce-[IT8005]**

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Summarize the basic concepts of E-Commerce platform, security and applications.</p> <p>CO2 : Construct website using HTML,CSS and JS.</p> <p>CO3 : Examine the Technology, infrastructure and Business in E-Commerce</p> <p>CO4 : Analyse the Challenges in E-Commerce.</p> <p>CO5 : Develop Own E-Commerce website and electronic payment systems.</p>
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**Course:Project Work-[IT8811]**

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>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.</p>
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**St. Xavier's Catholic College of Engineering, Chunkankadai, Nagercoil - 629003.**

2022 -- 2023 ODD Semester

**Course Outcomes**

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

Semester:1

<b>Course:Engineering Chemistry-[CH22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Recall the basic concepts of water softening, nano materials and batteries. CO2 : Summarize the types of corrosion, fuels and energy storage devices. CO3 : Explain the basic principles of electrochemistry and engineering materials. CO4 : Identify suitable methods for water treatment, fuel and corrosion control. CO5 : Apply the knowledge of engineering materials, fuels and energy storage devices for material selection and also in energy sectors.
<b>Course:Problem Solving and Python Programming-[CS22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Describe the algorithmic solutions to simple and complex computational problems. CO2 : Apply functions, modules and packages in Python program and use conditionals and loops for solving problems. CO3 : Analyze conditional branching statements. CO4 : Evaluate python programs. CO5 : Develop programs using compound data types and files.
<b>Course:Problem Solving and Python Programming Laboratory-[CS22102]</b>
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, loops and functions for solving problems. CO4 : Process compound data using Python data structures. CO5 : Utilize Python packages in developing software applications.
<b>Course:Communicative English-[EN22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Apply and practice the correct usages of language CO2 :Receive the language effectively and meaningfully through receptive skills CO3 :Produce the language appropriate to the needs and situations exercising productive skills CO4 :Transfer or interpret any piece of information with accuracy and fluency CO5 :Apply the language intellectually and confidently
<b>Course:Universal Human Values-[HS22102]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Illustrate the significance of value inputs in a classroom and start applying them in their life and profession. CO2 : Explain the role of a human being in ensuring harmony in society and nature. CO3 : Demonstrate the value of harmonious relationship based on trust and respect in their life and profession. CO4 : Compare values,skills,happiness and accumulation of physical facilities, the self and the body,intention and competence of an individual, etc. CO5 : Classify ethical and unethical practices, and start working out the strategy to actualize a

harmonious environment wherever they work.
<b>Course:Matrices and Calculus-[MA22101]</b>
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, ODE and integration.
CO2 : Explain the properties of matrices and nature of the quadratic form.
CO3 : Interpret the techniques of differentiation, partial differentiation, ODE and integration.
CO4 : Apply diagonalization of matrices in quadratic form and use Cayley Hamilton theorem in inverse of matrices.
CO5 : Solve problems on differentiation, partial differentiation, integration and ODE using different methods.
<b>Course:Engineering Physics-[PH22101]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Recall the basics of properties of matter, thermal physics and ultrasonics, hence improve their engineering knowledge.
CO2 : Choose the advanced physics concepts of quantum theory and the characteristics of crystalline materials.
CO3 : Illustrate bending of beams, thermal behavior and ultrasonic devices.
CO4 : Summarize the dual aspects of matter, crystal structures and imperfections of crystals.
CO5 : Identify the moduli of elasticity of different materials, thermal energy, ultrasonics, scanning tunneling microscope and crystal growth techniques.

Semester:2

<b>Course:Environment and Sustainability-[CH22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 :Recall the basic concepts of environment and sustainable development.
CO2 :Summarise the types of pollution, various natural resources and food adulterants.
CO3 :Explain the methods for waste management and detection of adulterants.
CO4 :Apply the gained knowledge to overcome various issues related to health and environment.
CO5 :Identify suitable methods for local environmental issues and sustainability.
<b>Course:Technical English-[EN22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Infer advanced technical texts from varied technical genres to expand engineering knowledge and explore more ideas. Analyse technical contents written on par with international standards and rewrite
CO2 : contents using the right vocabulary without grammatical errors to make their articles published in reputed journals.
CO3 : Present reports and Job Letters utilizing the required format prescribed on par with international standards using the exact vocabulary to make their works worthy to be read.
CO4 : Employ the language tones and styles appropriately in interviews and Group Discussions effortlessly following the strategies expected by the corporate world.
CO5 : Appraise the need for new products and descriptions and present them in formal and informal situations.
<b>Course:Basic Electrical and Electronics Engineering-[ES22202]</b>
Upon completion of the course, the students will.../ will be able to...

<p>CO1 : to introduce the basic circuit components</p> <p>CO2 : to educate on the working principles and working of electrical machines</p> <p>CO3 : to explain the construction and working of semiconductor devices</p> <p>CO4 : to educate on logic gates and flipflops</p> <p>CO5 : to introduce the function elements and working of measuring instruments</p>
<b>Course:Engineering Practices Laboratory-[ES22203]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Prepare various pipe and furniture fittings used in common household</p> <p>CO2 : Perform the given metal joining and metal removal operation in the given work piece as per the dimensions</p> <p>CO3 : Apply the fundamental concepts involved in Electrical Engineering</p> <p>CO4 : Explain the basic electrical wiring procedures</p> <p>CO5 : Assemble basic electronic components</p>
<b>Course:Statistics and Numerical Methods-[MA22201]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basic concept of statistical tests ANAVO,iterative methods,interpolations and ODE.</p> <p>CO2 : Discuss the techniques of statistical test and design of experiments.</p> <p>CO3 : Expline the solution of equation,ODE, single and multistep methods,interpolation,differentiation and itegration.</p> <p>CO4 : Apply the concepts of testing of hypothesis and designe of experiments in real life.</p> <p>CO5 : Apply the numerical techniques in system of equations, differential equation, interpolation,differentiation and integration.</p>
<b>Course:Engineering Graphics-[ME22201]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Recall the existing national standards and interpret a given three dimensional drawing ..</p> <p>CO2 : Interpret graphics as the basic communication and methodology of the design process</p> <p>CO3 : Acquire visualization skills through the concept of projection</p> <p>CO4 : Develop the sectioned solids and discover its true shape</p> <p>CO5 : Develop imagination of physical objects to be represented on paper for engineering communication.</p>
<b>Course:Engineering Mechanics-[ME22202]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Illustrate the vectorial and scalar representation of forces and moments.</p> <p>CO2 : Analyse the rigid body in equilibrium.</p> <p>CO3 : Evaluate the properties of distributed forces.</p> <p>CO4 : Determine the friction and the effects by the laws of friction.</p> <p>CO5 : Calculate dynamic forces exerted in rigid body.</p>
<b>Course:Computer Aided design and Drafting Laboratory-[ME22203]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : To learn the standard drawing practices using fits and tolerances.</p> <p>CO2 : To prepare assembly drawings both manually and using standard CAD packages</p> <p>CO3 : To preparing standard drawing layout for modeled parts.</p> <p>CO4 : To preparing standard drawing layout for assemblies with BoM</p> <p>CO5 : To acquaint the skills and practical experience in handling 2D drafting and 3D modelling software systems.</p>

**Course:Material Science-[PH22204]**

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

- CO1 : Recall the basic concepts of light, electron transport properties of conductors and basic principles of semiconductors.
- CO2 : Define the magnetic parameters and the principles of advanced engineering materials.
- CO3 : Illustrate laser and fibre optics, classical and quantum concepts of conducting materials, physics of semiconducting materials.
- CO4 : Summarize the theories of magnetic materials and functioning of magnetic devices.  
Develop the applications of fibre optics, moduli of elasticity and thermal energy,
- CO5 : behavior of conductors, semiconductors, magnetic and advanced engineering materials in various engineering fields.

Semester:3

**Course:Fluid Mechanics and Machinery-[CE3391]**

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

- CO1 : Infer the properties and characteristics of a fluid
- CO2 : Apply the conservation laws to flow through pipes and hydraulic machines.
- CO3 : Interpret various fluid properties using dimensional analysis
- CO4 : Determine the performance of pumps for specific applications
- CO5 : Predict the performance of turbines

**Course:Transforms and Partial Differential Equations-[MA3351]**

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

- CO1 : Describe the formation of PDE, fourier series and transforms.
- CO2 : Classify the PDE and explain fourier series in Engineering.
- CO3 : Determine fourier transform and z-Transform of standard functions.
- CO4 : Solve various types of PDE and apply fourier series in wave equation and heat equation.
- CO5 : Apply z-Transforms to solve difference equation and fourier transform to solve definite Integrals.

**Course:Engineering Mechanics-[ME3351]**

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

- CO1 : Illustrate the vector and scalar representation of forces and moments
- CO2 : Analyse the rigid body in equilibrium
- CO3 : Evaluate the properties of distributed forces
- CO4 : Determine the friction and the effects by the laws of friction
- CO5 : Calculate dynamic forces exerted in rigid body

**Course:Computer Aided Machine Drawing-[ME3381]**

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

- CO1 : Explain the drawing standards, Welding symbols, GD&T, Fits and Tolerances in a machine drawings.
- CO2 : Understand and interpret drawings of machine components.
- CO3 : Develop the part drawings, sectional views and assembly drawings as per standards manually.
- CO4 : Make use of 2D drafting commands model a machine component in 2D drafting package.
- CO5 : Develop a standard drawing layout for modelled parts, assemblies with BOM using 2D drawing package.

<b>Course:Manufacturing Technology Laboratory-[ME3382]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : To Selecting appropriate tools, equipment's and machines to complete a given job.
CO2 : To Performing various welding process using GMAW and fabricating gears using gear making machines.
CO3 : Tp performing various machining process using Lathe machine.
CO4 : To perform various shaping operations using shaping machine.
CO5 : To perform various milling operations using vertical and horizontal milling machines.
<b>Course:Engineering Thermodynamics-[ME3391]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply the zeroth and first law of thermodynamicsre to calculate the property changes in closed and open Engineering systems.
CO2 : Analyze the performance of thermal devices through energy and entropy calculations by using second law of thermodynamics
CO3 : Apply the second law of thermodynamics and avilability analysis concept in practical situations when called for.
CO4 : Make use of Steam Table and Mollier Chart analyze the thermodynamic properties of steam.
CO5 : Evaluate various thermodynamic relations, tables and charts for problem solving.
<b>Course:Engineering Materials and Metallurgy-[ME3392]</b>
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 : Explain the testing of mechanical properties.
CO4 : Clarify the effect of alloying elements on ferrous and non-ferrous metals.
CO5 : Summarize the properties and applications of non-metallic materials.
CO6 : Apply the concept of phase transformation and heat treatment for engineering materials.
CO7 : Identify the suitable materials and testing methods for various engineering applications.
<b>Course:Manufacturing Processes-[ME3393]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain different metal casting processes, associated defects, merits and demerits
CO2 : Compare different metal joining processes.
CO3 : Summarize various hot working and cold working methods of metals
CO4 : Explain various sheet metal making processes
CO5 : Distinguish various methods of manufacturing plastic components

Semester:4

<b>Course:Strength of Materials and Fluid Machinery Laboratory-[CE3481]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the tensile, torsion and hardness properties of metals by testing
CO2 : Understand the stiffness properties of helical and carriage spring
CO3 : Apply the conservation laws to determine the coefficient of discharge of a venturimeter and finding the friction factor of given pipe

CO4 : Apply the fluid static and momentum principles to determine the metacentric height and forces due to impact of jet

CO5 : Determine the performance characteristics of the turbine, rotodynamic pump and positive displacement pump.

**Course:Strength of Materials-[CE3491]**

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

CO1 : Understand the concepts of stress, strain, principal stresses and principal planes.

CO2 : Understand the load-transferring mechanism in beams and stress distribution due to shearing force and bending moment.

CO3 : Apply basic equation of torsion in designing of shafts and helical springs

CO4 : Calculate slope and deflection in beams using different methods.

CO5 : Analyze thin and thick shells for applied pressures.

**Course:Thermal Engineering-[ME3451]**

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

CO1 : Choose the appropriate thermodynamic cycle for different thermal devices.

CO2 : Apply thermodynamic principles to various air standard cycles.

CO3 : Relate the various thermodynamic devices based on their working principle.

CO4 : Interpret the different parameters for thermodynamic devices in relation to their performance.

CO5 : Solve problems in thermodynamic devices using the thermodynamic cycles and steam tables.

CO6 : Explain the various features, auxiliary systems and performance of IC engines.

**Course:Hydraulics and Pneumatics-[ME3492]**

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

CO1 : Explain the Fluid power and operation of different types of pumps.

CO2 : Summarize the features and functions of Hydraulic motors, actuators and Flow control valves.

CO3 : Explain the different types of Hydraulic circuits and systems.

CO4 : Explain the working of different pneumatic circuits and systems.

CO5 : Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems

**Course:Manufacturing Technology-[ME3493]**

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

CO1 : Explain the mechanism of material removal processes

CO2 : Describe the constructional and operational features of centre lathe and other special purpose lathes

CO3 : Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines

CO4 : Explain the constructional features and principle of CNC machine tools.

CO5 : Describe the numerical control of machine tools and write a part program.

Semester:5

**Course:Metrology and Measurements-[ME8501]**

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

CO1 : Understand the concepts of measurements to apply in various metrological instruments

CO2 : Illustrate the principles of linear and angular measurement tools used for industrial applications.
CO3 : Explain the concept of various computer aided inspection techniques used for measurement.
CO4 : Demonstrate the techniques of form measurement used for industrial components.
CO5 : Outline the various measuring techniques to measure the mechanical properties in industrial applications.
CO6 : Apply the concept of metrology to measure the properties and inspect the geometry of the component by using various measuring instruments.
<b>Course:Kinematics and Dynamics Laboratory-[ME8511]</b>
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
<b>Course:Thermal Engineering Laboratory-[ME8512]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.
CO2 : Conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient
CO3 : Conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity
CO4 : Conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor
CO5 : Conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor
<b>Course:Design of Machine Elements-[ME8593]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Design of machine members and to identify the mode of failure.
CO2 : Design of shafts and couplings.
CO3 : Design and choose appropriate joints.
CO4 : Design energy storing elements and engine components
CO5 : Design and selection of bearing for specific applications
<b>Course:Dynamics of Machines-[ME8594]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Calculate static and dynamic forces of mechanisms
CO2 : Calculate the balancing masses and their locations of reciprocating and rotating masses.
CO3 : Compute the frequency of free vibration.
CO4 : Compute the frequency of forced vibration and damping coefficient.
CO5 : Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.
<b>Course:Thermal Engineering- II-[ME8595]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Identify the properties of steam in different thermal components

CO2 : Explain the concept of different thermal components
CO3 : Determine the various properties of steam using steam table, psychrometric charts and refrigerant table/charts
CO4 : Solve problems in HVAC components using psychrometric charts and refrigerant table/charts
CO5 : Relate the various properties of steam in thermal applications
<b>Course:Internal Combustion Engines-[OAT552]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : understand the principle of different IC engine components
CO2 : explain the principle and operation of petrol engine and its components
CO3 : interpret the major phenomena of diesel engine and its components
CO4 : show knowledge on cooling and lubrication systems on IC engines
CO5 : illustrate the recent trends in IC engines
CO6 : evaluate the problems and recommend suitable remedies for IC engine problems

Semester:6

<b>Course:Design of Transmission Systems-[ME8651]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply the concept of design to belt, 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 concept of design to gear boxes
CO5 : Apply the concepts of design to cams , brakes and clutches
<b>Course:Heat and Mass Transfer-[ME8693]</b>
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
<b>Course:Hydraulics and Pneumatics-[ME8694]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Explain the Fluid power and operation of different types of pumps.
CO2 : Summarize the features and functions of Hydraulic motors, actuators and Flow control valves.
CO3 : Explain the different types of Hydraulic circuits and systems.
CO4 : Explain the working of different pneumatic circuits and systems.
CO5 : Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems

Semester:7

<p style="text-align: center;"><b>Course:Unconventional Machining Processes-[ME8073]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Student will be able to demonstrate working principles of different unconventional machining processes and their needs.</p> <p>CO2 : Student will be able to identify tools required for different machining requirement with the knowledge of modern machining.</p> <p>CO3 : Student will be able to select the appropriate modern manufacturing process and provide solution with economical consideration.</p> <p>CO4 : Student will be able to select the appropriate manufacturing parameter and provide solutions with consideration of environmental issue.</p> <p>CO5 : Student will be able to have the knowledge about the modern tools used for manufacturing of products in a manufacturing industry.</p>
<p style="text-align: center;"><b>Course:Non Destructive Testing and Evaluation-[ME8097]</b></p> <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,acoustic emission and radiography techniques.</p> <p>CO5 : Apply the concept of NDT in real time applications.</p>
<p style="text-align: center;"><b>Course:Simulation and Analysis Laboratory-[ME8711]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define and illustrate the need for simulation and analysis for real world problems.</p> <p>CO2 : Interpret and make use of different features in the simulation and analysis tools.</p> <p>CO3 : Make use of the simulation software to construct and execute mechanical engineering problems.</p> <p>CO4 : Model real world problems and analyze the effect of various mechanical and thermal forces through simulation.</p> <p>CO5 : Analyze the model and apply the results to resolve critical issues in real world engineering problems.</p>
<p style="text-align: center;"><b>Course:Technical Seminar-[ME8712]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Acquired the basic skills for performing literature survey and paper presentation.</p> <p>CO2 :Provide students better communication skills.</p> <p>CO3 :Describe the current topics in Mechanical and related areas based on current publications.</p> <p>CO4 :Prepare the report.</p>
<p style="text-align: center;"><b>Course:Mechatronics Laboratory-[ME8781]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Develop assembly language programming of 8085 microprocessor.</p> <p>CO2 : Create interface to use microcontroller for various applications</p> <p>CO3 : Model basic hydraulic, pneumatic and electrical circuits using software</p> <p>CO4 : Develop interface with PID controller for various applications.</p> <p>CO5 : Demonstrate programmable logic controller.</p>

**Course:Mechatronics-[ME8791]**

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

- CO1 : Interpret the basic concepts of microprocessors,microcontrollers, programmable devices and mechatronics systems.
- CO2 : Explain the architecture and working of microprocessors and microcontrollers.
- CO3 : Illustrate the fundamentals of various programmable devices, actuators and mechatronics system.
- CO4 : Apply programming concepts & write programs for specific application.
- CO5 : Develop mechatronics based systems for various applications

**Course:Power Plant Engineering-[ME8792]**

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

- CO1 : Explain the operation and maintenance of coal based thermal power plants
- CO2 : Explain Diesel, Gas Turbine and Combined Cycle Power Plants
- CO3 : Explain the operation and maintenance of Nuclear Power Plants
- CO4 : Explain and contrast various renewable energy sources
- CO5 : Illustrate the 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 : Select equipment and tooling and material for process planning
- CO2 : Estimate the process parameters and quality assurance methods of process planning
- CO3 : Estimate the labour cost, material cost, depreciation cost and overheads for a process
- CO4 : Evaluate the production cost and estimate the machining time for various operations
- CO5 : Estimate the machining time for various machining operations

**Course:Robotics-[OIE751]**

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

- CO1 : Acquire information about robot environment
- CO2 : Demonstrate the working principle of robots
- CO3 : Utilize the basic engineering knowledge for the implementation of robots
- CO4 : Examine the errors in robot manipulation
- CO5 : Assess the robot safety issues and economics
- CO6 : Design an intelligent machine to assist human

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:M.E. Energy Engineering

Semester: 1

<b>Course:Fluid Mechanics and Heat Transfer-[EY22101]</b>
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 : Apply the flow concepts of incompressible and compressible flow.
CO3 : Solve the conduction and radiation heat transfer problems.
CO4 : Apply the turbulent forced convective heat transfer.
CO5 : Develop a heat exchanger as per the industrial needs.
<b>Course:Renewable Energy Systems-[EY22102]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Identify the present energy status of Indian and global energy scenario.
CO2 : Explain solar energy systems for different applications like heating and cooling.
CO3 : Illustrate the wind energy conversion system and its applications.
CO4 : Apply different types of bio energy conversion technologies for various applications.
CO5 : Illustrate the technologies of different renewable energy sources like ocean thermal, tidal and geothermal energy.
<b>Course:Thermodynamic Analysis of Energy Systems-[EY22103]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 :Apply various thermodynamic relations to calculate the availability of a system.
CO2 :Identify the behaviour of real gas to compute the properties of gas mixture
CO3 :Apply first and second law to chemically reacting systems
CO4 :Apply the concept of combustion chemistry to recall the various combustion parameters.
CO5 :Explain the combustion process and combustion chamber design

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program:M.E. Energy Engineering

Semester: 1

<b>Course:Fluid Mechanics and Heat Transfer-[EY22101]</b>
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 : Apply the flow concepts of incompressible and compressible flow.
CO3 : Solve the conduction and radiation heat transfer problems.
CO4 : Apply the turbulent forced convective heat transfer.
CO5 : Develop a heat exchanger as per the industrial needs.
<b>Course:Renewable Energy Systems-[EY22102]</b>

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Identify the present energy status of Indian and global energy scenario.</p> <p>CO2 : Explain solar energy systems for different applications like heating and cooling.</p> <p>CO3 : Illustrate the wind energy conversion system and its applications.</p> <p>CO4 : Apply different types of bio energy conversion technologies for various applications.</p> <p>CO5 : Illustrate the technologies of different renewable energy sources like ocean thermal, tidal and geothermal energy.</p>
<b>Course:Thermodynamic Analysis of Energy Systems-[EY22103]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Apply various thermodynamic relations to calculate the availability of a system.</p> <p>CO2 :Identify the behaviour of real gas to compute the properties of gas mixture</p> <p>CO3 :Apply first and second law to chemically reacting systems</p> <p>CO4 :Apply the concept of combustion chemistry to recall the various combustion parameters.</p> <p>CO5 :Explain the combustion process and combustion chamber design</p>
<b>Course:Energy Management and Environmental Benefits-[EY22114]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Describe the importance of energy conservation and suggest measures for improving per capita energy consumption</p> <p>CO2 : Apply the energy sharing and cost sharing pattern of fuels used in industries</p> <p>CO3 : Explain Gantt Chart, CPM and PERT in energy conservation projects</p> <p>CO4 : Apply the techno-economics of a project discounting and non-discounting Cash flow analysis</p> <p>CO5 : Describe the sources of additional revenue generation for energy conservation projects adopting UNFCC</p>
<b>Course:Research Methodology-[RM22101]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Outline the methodology of research</p> <p>CO2 :Explain the research design, data collection methods, IPR and patent</p> <p>CO3 :Prepare a well structured research paper, scientific presentations and patent applications</p> <p>CO4 :Develop awareness on IPR, patent law and procedural mechanism in obtaining a patent</p> <p>CO5 :Compare the methods of measurement scale, questionnaires, sampling and data analysis.</p>

Semester:2

<b>Course:Disaster Management-[AC22201]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Summarize basics of disaster.</p> <p>CO2 : Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.</p> <p>CO3 : Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.</p> <p>CO4 : Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.</p> <p>CO5 : Develop the strengths and weaknesses of disaster management approaches</p>
<b>Course:Computational Fluid Dynamics for Energy Systems-[EY22201]</b>

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

CO1 : Infer the fundamental governing equations and apply the boundary conditions to arrive at the unknown variables.

CO2 : Solve the diffusion heat transfer problems by finite volume method

CO3 : Formulate 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 : Construct various turbulence models available.

**Course:Energy conservation in Industrial Utilities-[EY22202]**

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

CO1 : Compute stoichiometric air for any given fuel and suggest measures for efficient combustion

CO2 : Diagnose the cause for under performance 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 : Perform energy audit in an Industry.

**Course:Waste to energy-[EY22203]**

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

CO1 : Illustrate the basic concepts of waste to energy resources and their conversion devices

CO2 : Examine the concept of pyrolysis and the production of different products by using pyrolysis

CO3 : Distinguish different types of biomass gasification techniques and understand Biochemical conversion of biomass for energy application

CO4 : Compare the different types of biomass combustion techniques and their working operations.

CO5 : Develop the concepts of biogas production and explore its plant technology along with their applications

**Course:Instrumentation for energy systems-[EY22204]**

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

CO1 : Interpret the characteristics of measurement systems, instruments for measuring various electrical parameters and circuits for signal conditioning.

CO2 : Illustrate appropriate sensors for measuring electrical quantities and signal conditioning circuits.  
Explain the digital measurement techniques for Displacement, Temperature, Pressure,

CO3 : Force, Torque, Vibration, Acceleration, Velocity, Level, Flow, Thermal ,Nuclear and Solar. Radiation.

CO4 : Identify the thermo-physical properties and air pollutants.

CO5 : Explain a specific technical expertise in the analysis and design of feedback control systems.

Semester:2

**Course:Disaster Management-[AC22201]**

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

CO1 : Summarize basics of disaster.

CO2 : Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.

CO3 : Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

CO4 : Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO5 : Develop the strengths and weaknesses of disaster management approaches.

**Course:Computational Fluid Dynamics for Energy Systems-[EY22201]**

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

CO1 : Infer the fundamental governing equations and apply the boundary conditions to arrive at the unknown variables.

CO2 : Solve the diffusion heat transfer problems by finite volume method

CO3 : Formulate 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 : Construct various turbulence models available.

**Course:Energy conservation in Industrial Utilities-[EY22202]**

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

CO1 : Compute stoichiometric air for any given fuel and suggest measures for efficient combustion

CO2 : Diagnose the cause for under performance 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 : Perform energy audit in an Industry.

**Course:Waste to energy-[EY22203]**

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

CO1 : Illustrate the basic concepts of waste to energy resources and their conversion devices

CO2 : Examine the concept of pyrolysis and the production of different products by using pyrolysis

CO3 : Distinguish different types of biomass gasification techniques and understand Biochemical conversion of biomass for energy application

CO4 : Compare the different types of biomass combustion techniques and their working operations.

CO5 : Develop the concepts of biogas production and explore its plant technology along with their applications

**Course:Instrumentation for energy systems-[EY22204]**

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

CO1 : Interpret the characteristics of measurement systems, instruments for measuring various electrical parameters and circuits for signal conditioning.

CO2 : Illustrate appropriate sensors for measuring electrical quantities and signal conditioning circuits.

CO3 : Explain the digital measurement techniques for Displacement, Temperature, Pressure, Force, Torque, Vibration, Acceleration, Velocity, Level, Flow, Thermal ,Nuclear and Solar. Radiation.

CO4 : Identify the thermo-physical properties and air pollutants.

CO5 : Explain a specific technical expertise in the analysis and design of feedback control systems.

**Course:Bioenergy technologies-[EY22212]**

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

CO1 : Understand the availability of surplus biomass and study the characteristics

CO2 : Examine the different bioenergy sources and design a biogas plant.

CO3 : 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 : Categorize the production of liquid biofuels for power generation from biomass

**Course:Advanced energy storage technologies-[EY22222]**

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

CO1 : Identify the concepts energy storage technologies for suitable applications.

CO2 : Explain the principles of energy storage systems.

CO3 : Summarize the concepts and types of various energy storage technologies.

CO4 : Classify the various energy storage technologies.

CO5 : Illustrate the concepts of Flywheel and compressed energy storage systems

**Course:Research tools laboratory-[RM22201]**

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

CO1 : List the various stages in research and develop systematic planning of project stages

CO2 : Write a journal paper and formulate as per the standard journal format

CO3 : Develop a literature review and relevant references for a research problem using suitable software

CO4 : Determine the plagiarism of the article / report content by using the Software

CO5 : Compile a research report and the presentation

Semester:3

**Course:Advanced Energy Storage Technologies-[EY5013]**

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

CO1 : Identify the necessity of appropriate energy storage technologies for thermal, electrical, hydrogen and flywheel energy storage systems

CO2 : Apply the principles of various energy storage technologies.

CO3 : Apply the various types of energy storage technologies and their applications.

CO4 : Categorize the model and method used in energy storage technologies.

CO5 : Analysis the safety and applications of thermal, electrical, hydrogen and flywheel energy storage systems.

**Course:Smart Grid-[PS4093]**

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

CO1 : Relate with the smart resources, smart meters and other smart devices.

CO2 : Explain the function of Smart Grid.

CO3 : Experiment with the issues of Power Quality in Smart Grid.

CO4 : Identify the performance of Smart Grid.

CO5 : Indentify suitable communication networks for smart grid applications

**Course:Advanced Power Plant Engineering-[TE4071]**

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

- CO1 : Calculate the performance characteristics of thermodynamic cycles of various conventional power plants.  
Compute the steam rate, heat rate, cost of power generation from thermal power plants
- CO2 : and analyze methods of Rankine cycle improvements such as superheat, reheat and regeneration
- CO3 : Calculate and suggest measures for improving the performance of gas turbine and diesel power plants
- CO4 : Develop the thermodynamic performance of various cogeneration systems  
Develop the performance characteristics of different types of turbines used in hydro power
- CO5 : plants and reactors used in nuclear power plants and their selection based on the prevailing condition

**Course: Hydrogen and Fuel Cell Technologies-[TE4073]**

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

- CO1 : List the cell reaction, electrolyte, electrode materials and hydrogen production technologies
- CO2 : Compare the various options for Hydrogen storage and fuel cells.
- CO3 : Describe the thermodynamic principles of a fuel cell, and how it depends on temperature, pressure and reactant concentrations
- CO4 : Classify the different types of fuel cells.
- CO5 : Demonstrate the techno-economics of fuel cells for domestic, automotive and space craft power generations.

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program: Master of Business Administration (Sec-A)

Semester: I

<p style="text-align: center;"><b>Course: Statistics for Management-[MS22101]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define the basic concepts of probability, sampling distribution, statistical tests, correlation and regression.</p> <p>CO2 : Explain the basics of probability and sampling distribution to implement business problems.</p> <p>CO3 : Interpret the correlation, regression and statistical tests in business decision making.</p> <p>CO4 : Utilize probability and distributions in real life problems.</p> <p>CO5 : Apply the statistical techniques, correlation and regression in business field..</p>
<p style="text-align: center;"><b>Course: Management Concepts and Organizational Behavior-[MS22102]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Outline the 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 : Rephrase the complexities associated with management of individual behavior in the organizations.</p> <p>CO4 : Develop the skills to have manage group behavior in Organizations.</p> <p>CO5 : Insights about the current trends in managing organizational behavior.</p>
<p style="text-align: center;"><b>Course: Managerial Economics-[MS22103]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Relate the concepts of scarcity and efficiency</p> <p>CO2 : Interpret the principles of microeconomics relevant to managing an organization.</p> <p>CO3 : Analyse the principles of macroeconomics.</p> <p>CO4 : Demonstrate the economic environment of business</p> <p>CO5 : Develop the policies that regulate economic variables.</p>
<p style="text-align: center;"><b>Course: Accounting for Management-[MS22104]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Demonstrate the financial accounting concepts.</p> <p>CO2 : Analyse the financial statements</p> <p>CO3 : Compare the management and cost accounting techniques.</p> <p>CO4 : Apply the management and cost accounting techniques for decision making.</p> <p>CO5 : Assess the accounting standards of practices in India.</p>
<p style="text-align: center;"><b>Course: Legal Aspects of Business-[MS22105]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : State the fundamental legal principles in developing various contracts and commercial laws in the business world.</p> <p>CO2 : Identify the common forms of business associations and elements of Corporate Governance.</p> <p>CO3 : Develop insights regarding the laws related to industrial environment.</p> <p>CO4 : Discuss the fundamentals of corporate tax and GST.</p>

CO5 : Relate the role of consumer rights and cyber laws in the modern business environment.
<b>Course:Information Management-[MS22106]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Interpret the basics of data and information systems.
CO2 : Develop the system development methodologies.
CO3 : Analyze the database management systems and its types.
CO4 : Make use of the various technologies in the information system and its security.
CO5 : Develop the knowledge on effective applications of information systems in business.
<b>Course:Entrepreneurship Development-[MS22107]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Demonstrate the entrepreneurial competence to run the business efficiently.
CO2 : Relate the businesses in the entrepreneurial environment.
CO3 : Construct business plans and will be able to undertake feasible projects.
CO4 : Take part in launching and develop their business ventures successfully.
CO5 : Plan and monitor the business effectively towards growth and development.
<b>Course:Business Tools Laboratory-[MS22109]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Develop the basic computer knowledge on presentation and numerical calculations in an office environment using office automation software.
CO2 : Simplify the accounting entries for business transactions.
CO3 : Utilizing the accounting software for finalization of accounts.
CO4 : Develop the knowledge on writing letters, e-mails and reports.
CO5 : Make use of the statistical tools and the acquired skills in the future projects.

Semester:2

<b>Course:Operations Research For Management Studies-[MS22201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts in Operations Research.
CO2 : Explain mathematical models and replacement and simulation techniques.
CO3 : Demonstrate the best strategy using decision making methods in game theory.
CO4 : Apply LPP, transportation and assignment models to find optimal solution.
CO5 : Apply replacement models and game theory in solving real life problems.
<b>Course:Financial Management-[MS22202]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Familiarizes with the concepts of financial decision of an organization
CO2 : Recognizes the time value of money
CO3 : Acquires the ability to apply the capital budgeting and cost of capital techniques
CO4 : Discover how to decide the decision of capital structure and distribution of dividend
CO5 : Enhances the experience in assessing the short-term and long-term sources of finance
<b>Course:Human Resource Management-[MS22203]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the various aspects of HRM
CO2 : Explain the importance of Human Resource Planning and Recruitment.

<p>CO3 : Develop the skills needed for a successful HR manager</p> <p>CO4 : Understand the motivation theories and models.</p> <p>CO5 : Enhance knowledge on the emerging concepts in the field of HRM</p>
<p><b>Course:Business Research Methods-[MS22205]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Interprets and appreciates scientific inquiry</p> <p>CO2 : Develop skills to write research proposals Undertake a systematic outlook towards business situations for the purpose of objective</p> <p>CO3 : decision making, and the method of conducting scientific inquiry to solve organizational problems</p> <p>CO4 : Analyze data and find solutions to the problems</p> <p>CO5 : Competent to prepare research reports</p>
<p><b>Course:International Business Management-[MS22206]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Interpret the driving factors of International Business.</p> <p>CO2 : Make use of theories of trade and investment practiced in the global world.</p> <p>CO3 : Examine various market entry strategies followed by Global Organizations.</p> <p>CO4 : Solve various global productions and supply chain issues and utilize foreign exchange determination system.</p> <p>CO5 : Demonstrate the cognitive knowledge of managing business across the cultures.</p>
<p><b>Course:Marketing Management-[MS22207]</b></p>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Apply &amp; construct contemporary marketing theories to the demands of business and management practice.</p> <p>CO2 : Infer marketing strategies for consumer and industrial marketing.</p> <p>CO3 : Deep inference of choice of marketing mix elements and managing integrated marketing channels.</p> <p>CO4 : Ability to analyze the nature of consumer buying behavior.</p> <p>CO5 : Evaluation of the marketing research and new trends in the arena of marketing.</p>

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

2022 -- 2023 ODD Semester

**Course Outcomes**

Program: Master of Computer Applications

Semester: 1

<b>Course: English for Research Paper Writing-[AC22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Develop your writing skills and level of readability. CO2 : Learn about what to write in each section. CO3 : Develop the skills needed when writing a Title. CO4 : Develop the skills needed when writing the Conclusion. CO5 : Ensure the good quality of paper at very first-time submission.
<b>Course: Data Structures and Algorithms-[BX22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Analyze algorithms and determines their time complexity. CO2 : Apply the concepts of data types, data structures and linear structures CO3 : Apply linked list concept to organize a linear datas CO4 : Apply different Sorting, Searching and Hashing algorithm CO5 : Apply non-linear data structures
<b>Course: Problem Solving and Programming in C-[BX22102]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Design a computational solution for a given problem. CO2 : Break and develop a problem into logical modules that can be solved. CO3 : Develop a problem solution into programs involving program constructs. CO4 : Develop programs using arrays, strings, functions and pointers for solving complex problems. CO5 : Develop programs using structures and files for solving complex computational problems.
<b>Course: Mathematical Statistics for Computer Applications-[MA22109]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Define the basic concepts of random variables, statistical hypothesis and logical techniques. CO2 : Demonstrate the concepts of probability distributions, correlation and regression in engineering field. CO3 : Explain statistical and logical techniques. CO4 : Apply the concept of probability and correlation in engineering discipline. CO5 : Apply the concept of testing of hypothesis, analysis of variance in real life problems and logics in network related problems.
<b>Course: Advanced Data Structures and Algorithms-[MC22101]</b>
Upon completion of the course, the students will.../ will be able to... CO1 : Analyze the complexity of algorithms to solve computing problems. CO2 : Analyze and use appropriate hierarchical data structures to solve problems. CO3 : Apply algorithms using graph data structure to solve real-life problems. CO4 : Apply suitable design strategy for problem solving. CO5 : Design one's own algorithm for an unknown problem.
<b>Course: Advanced Database Technology-[MC22102]</b>

<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Construct a database system using data models and query languages.</p> <p>CO2 : Build a distributed database system and execute distributed queries</p> <p>CO3 : Make use of spatial and temporal databases in its corresponding applications.</p> <p>CO4 : Develop a database system using NO SQL databases.</p> <p>CO5 : Construct XML database system and validate with XML schema</p>
<b>Course: Object Oriented Software Engineering-[MC22103]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define object oriented software using appropriate process models.</p> <p>CO2 : Differentiate software processes under waterfall and agile methodology.</p> <p>CO3 : Develop UML diagrams for software projects.</p> <p>CO4 : Apply Design Patterns for a software process.</p> <p>CO5 : Categorize testing methods and compare different testing tools for software processes.</p> <p>CO6 : Analyze object oriented metrics and quality for software engineering processes.</p>
<b>Course: Python Programming-[MC22104]</b>
<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 : Apply Python lists, tuples and dictionaries on compound data</p> <p>CO3 : Develop Python programs to read and write data from/to files</p> <p>CO4 : Design simple Python programs using libraries, modules etc.</p> <p>CO5 : Construct a program by bundling related properties and behaviors into individual objects</p>
<b>Course: Cloud Computing Technologies-[MC22105]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Use Distributed systems in Cloud Environment.</p> <p>CO2 : Articulate the main concepts, key technologies, strengths and limitations of Cloud computing.</p> <p>CO3 : Identify the Architecture, Infrastructure and delivery models of Cloud computing.</p> <p>CO4 : Install, choose and use the appropriate current technology for the implementation of Cloud.</p> <p>CO5 : Adopt Microservices and DevOps in Cloud environments.</p>
<b>Course: Advanced Database Technology Laboratory-[MC22106]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Explain the knowledge of query evaluation to monitor the performance of the DBMS</p> <p>CO2 : Design advanced databases.</p> <p>CO3 : Apply big data frameworks and tools on databases.</p> <p>CO4 : Formulate complex queries using SQL.</p> <p>CO5 : Create an XML document and perform Xquery.</p>

Semester:2

<b>Course: Introduction to Computer Organization and Operating Systems-[BX22201]</b>
<p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Outline the basics structure of computers, operations and instructions.</p> <p>CO2 : Develop an arithmetic and logic unit and a control unit.</p> <p>CO3 : Illustrate the various memory systems and I/O communication.</p>

CO4 : Illustrate the operating system functions, types and system calls.
CO5 : Analyze process and various scheduling algorithms.
<b>Course:Basics of Computer Networks-[BX22202]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Illustrate the flow of information from one node to another node in the network
CO2 : Identify the components required to build different types of networks.
CO3 : Illustrate the functionalities needed for data communication into layers
CO4 : Identify the required functionality at each layer for given application.
CO5 : Apply the working principles of various application protocols and fundamentals of security issues and services available.
<b>Course:Full Stack Web Development-[MC22201]</b>
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 : Make use of express framework in web development.
CO4 : Build database systems in both NoSQL and SQL environments.
CO5 : Make use of ReactJS library in front end web development.
CO6 : Develop a full-stack Single Page Application using React, NodeJS and MongoDB and deploy on Cloud
<b>Course:Research Methodology and IPR-[MC22202]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Identify the criteria and characteristics of a good research problem.
CO2 : Develop research ethics in professional life.
CO3 : Develop technical report writing, research paper writing and presentation skills.
CO4 : Identify various IPR components, copyrights and process of filing.
CO5 : Develop awareness on the patent law and procedural mechanism in obtaining a patent.
<b>Course:Data Science-[MC22203]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply statistical testing to real-world problems that are converted into hypotheses.
CO2 : Apply data analysis using R.
CO3 : Develop efficient modeling of very large data and work with big data platforms.
CO4 : Make use of suitable data analysis for stream data.
CO5 : Develop efficient MapReduce programmes for small problem solving methods.
<b>Course:Mobile Application Development-[MC22204]</b>
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 application that manage memory dynamically.
CO4 : Design an application based on mobile OS like Android,iOs.
CO5 : Build web based mobile application using event handling and location based services.
<b>Course:Advances in Operating System-[MC22205]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 :Discuss various synchronization, scheduling and deadlock issues.
CO2 :Demonstrate mutual exclusion and deadlock detection of Distributed Operating System.
CO3 :Discuss various resource management techniques for distributed systems.
CO4 :Identify the different features of real time and mobile operating systems.

CO5 : Perform administrative tasks on Linux Servers, iOS and Android.
<b>Course:Full Stack Web Development Laboratory-[MC22206]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Design client-side web applications using HTML, CSS and JavaScript
CO2 : Develop server-side applications using NodeJS
CO3 : Create web applications using Express framework.
CO4 : Design 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.
<b>Course:Data Science Laboratory-[MC22207]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Experiment with installing analytical tools and configuring a distributed file system.
CO2 : Develop and execute analytical procedures in various distributed frameworks and databases.
CO3 : Develop, implement and deploy simple applications on very large datasets.
CO4 : Develop simple-to-complex data modelling in NoSQL databases.
CO5 : Develop and deploy simple applications in cloud.
<b>Course:Cyber Security-[MC22219]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply the principles of cyber security and to identify threats, risks and security requirements in an organization's security practices.
CO2 : Apply system security controls to secure physical assets.
CO3 : Apply security for Business applications and Network Communications.
CO4 : Develop the managerial, operational and technical means for effective cyber security.
CO5 : Develop security measures to monitor, audit process and to device improvements.

Semester:3

<b>Course:Mathematical Foundations of Computer Science-[BX4005]</b>
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 and 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 the concepts and properties of groups, rings, fields and lattices using algebraic structures and Boolean algebra.
<b>Course:Basics of Computer Networks-[BX4006]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the flow of information from one node to another node in the network
CO2 : Identify the components required to build different types of networks
CO3 : Illustrate the functionalities needed for data communication into layers
CO4 : Identify the required functionality at each layer for given application
CO5 : Apply the working principles of various application protocols and fundamentals

of security issues and services available
<b>Course:Big Data Analytics-[DS4015]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 :Illustrate the basics of big data analytics
CO2 :Interpret the Hadoop, Map Reduce Framework
CO3 :Apply big data analytics for increasing the business outcome
CO4 :Illustrate the concepts of R language
CO5 :Build a model to integrate and correlate large amounts of information to gain faster insights
<b>Course:DevOps and Microservices-[MC4009]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Apply the Microservices design principles.
CO2 : Apply Microservices in DevOps.
CO3 : Use DevOps tools to build and test softwares.
CO4 : Develop and integrate projects using DevOps.
CO5 : Deploy and monitor projects using DevOps.
<b>Course:Data Mining and Data Warehousing Techniques-[MC4020]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Identify data mining techniques in building intelligent model.
CO2 : Apply association mining techniques on transactional databases.
CO3 : Apply classification and prediction techniques in real world applications.
CO4 : Evaluate clustering techniques on complex data objects.
CO5 : Design, create and maintain data warehouses
<b>Course:Software Quality and Testing-[MC4026]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Choose the software testing techniques to cater to the need of the project
CO2 : Identify the components of software quality assurance systems
CO3 : Apply various software testing strategies
CO4 : Develop software quality models
CO5 : Examine statistical methods in software quality.
<b>Course:Machine Learning-[MC4301]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Describe data preprocessing and dimensionality reduction techniques
CO2 : Apply proper models and feature engineering techniques for the given problem
CO3 : Make use of Probability Technique to solve the given problem.
CO4 : Analyze the working model and features of Decision tree
CO5 : Apply appropriate algorithm to learn and classify the data
<b>Course:Internet of Things-[MC4302]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Use the infrastructure for supporting IoT deployments
CO2 : Build the usage of IoT protocols for communication between various IoT devices
CO3 : Design portable IoT using Arduino/Raspberry Pi /equivalent boards.
CO4 : Develop the basic concepts of security and governance as applied to IoT
CO5 : Analyze the applications of IoT in real time scenarios
<b>Course:Machine Learning Laboratory-[Mc4311]</b>
Upon completion of the course, the students will.../ will be able to...

- |   |
|---|
| CO1 : Apply data preprocessing technique and explore the structure of data to prepare for predictive modeling |
| CO2 : Apply the proper model and measure the performance.   |
| CO3 : Apply feature selection techniques in Machine Learning.   |
| CO4 : Construct Bayesian Network for appropriate problem.   |
| CO5 : Implement parametric and non-parametric machine learning algorithms for practical situations.           |

<b>Course:Internet of Things Laboratory-[MC4312]</b>
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Upon completion of the course, the students will.../ will be able to...
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CO1 : Learn about the various IoT protocols
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CO2 : Experiment the different sensors for application development
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CO3 : Develop applications using Arduino/Raspberry Pi/ Equivalent boards.
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CO4 : Design the applications that would read the sensor data and post it in Cloud
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CO5 : Develop IOT applications with different platforms and frameworks.
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