

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

2020 -- 2021

**Course Outcomes**

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

**Semester:1**

<p style="text-align: center;"><b>Course:Physics and Chemistry Laboratory-[BS8161]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Determine different moduli of elasticity used in day to day engineering applications</p> <p>CO2 : Estimate the optical parameters of visible and laser sources along with their applications in various fields</p> <p>CO3 : Calculate the bandgap of semiconducting materials</p> <p>CO4 : Determine the water quality parameters(DO, Chloride, Cu content, Alkalinity and hardness) of the given water sample</p> <p>CO5 : Analyse quantitatively the metals (Fe, Na, Cu) in the given sample using potentiometer, flame photometer and Understand how conductometric titrations are better than volumetric titrations and the skill to do the experiment.</p>
<p style="text-align: center;"><b>Course:Engineering Chemistry-[CY8151]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : describe the methods of water purification</p> <p>CO2 : define the terms in phase rule and adsorption</p> <p>CO3 : explain the types of energy resources</p> <p>CO4 : determine the composition and characteristics of fuels and alloys</p> <p>CO5 : classify the types of water, fuels and alloys</p>
<p style="text-align: center;"><b>Course:Problem Solving and Python Programming-[GE8151]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 :Describe the concepts of algorithm, data types, operators, conditional statements and files.</p> <p>CO2 :Write and execute simple Python programs.</p> <p>CO3 :Develop Python programs for complex problems.</p> <p>CO4 :Apply basic and compound data types, functions and files to implement Python programs</p> <p>CO5 :Design and analyse algorithms, modules and packages.</p>
<p style="text-align: center;"><b>Course:Engineering Graphics-[GE8152]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Exposed to existing national standards related to technical drawings</p> <p>CO2 : Understand the given Engineering drawing and interpret a three dimensional drawing</p> <p>CO3 : Apply the fundamentals and standards in engineering drawing through drafting exercises of geometrical solids</p> <p>CO4 : Identify methods of development of surfaces of different solids and understand some of the hidden geometry of the cut object</p> <p>CO5 : Analyze the three dimensional view of objects as perceived by the human eye</p>
<p style="text-align: center;"><b>Course:Problem Solving and Python Programming Laboratory-[GE8161]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Write and execute simple Python programs.</p> <p>CO2 : Implement Python programs with conditional and looping statements</p> <p>CO3 : Develop Python programs by defining functions and calling them</p> <p>CO4 : Use Python lists, tuples, dictionaries for representing compound data.</p> <p>CO5 : Read and write data from/to files and write their own programs using Python packages</p>

<b>Course:Communicative English-[HS8151]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Learn vocabulary, skim and scan passages and share information related to one/oneself/family and friends.
CO2 :	Improve their telephonic conversation skills, general reading and free writing skills and language skills through preposition and conjunction.
CO3 :	Acquire language skills through degrees of comparison, pronouns and direct indirect questions, comprehend short and long passages, describe products and express opinions.
CO4 :	Improve their language skills through reading, draft e-mails and personal letters and use correct tenses in the language usage.
CO5 :	Write short essays and dialogues and participate in group activities.
<b>Course:Engineering Mathematics - I-[MA8151]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Explain the representation of a function, limit and continuity of a function.
CO2 :	Describe the techniques of differentiation, partial differentiation, integration and D.E.
CO3 :	Solve maxima and minima of one variable and two variables
CO4 :	Compute proper integral, improper integral and multiple integrals.
CO5 :	Apply various techniques in solving differential equations.
<b>Course:Engineering Physics-[PH8151]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Students will be describe the basics of Properties of matter, Waves, Laser, Optical fibers and Thermal behavior of materials to improve their engineering knowledge
CO2 :	mention the Advanced Physics concepts of quantum theory and the Characteristics of crystalline materials
CO3 :	illustrate Bending of beams, Oscillations, Thermal expansion joints and Fiber optic sensors to assess societal and safety issues
CO4 :	summarize the Types of optical fibers and losses associated with them, Wave equations, Crystal growth techniques and imperfections of crystals

## Semester:2

<b>Course:Basic Electrical, Electronics and Instrumentation Engineering-[BE8253]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	analyze the basic circuit laws and theorems
CO2 :	analyze various types of Ac circuits
CO3 :	understand the construction and operation of electrical machines
CO4 :	Explain the basic semiconductor devices and circuits
CO5 :	understand the principle of Tansducers and measuring instruments .

<b>Course:Basic Electrical, Electronics and Instrumentation Engineering Laboratory-[BE8261]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	analyze circuit laws and theorems
CO2 :	Analyze Ac circuits
CO3 :	Evaluate the performance of various electrical machines

CO4 : construct simple circuits using electronic devices
CO5 : Evaluate the characteristics of transducers and sensors
<b>Course:Engineering Practices Lab-[GE8261]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand wiring procedures practically
CO2 : Understand all the fundamental concepts involving electrical Engineering
CO3 : Handle basic electrical and electronics equipments
CO4 : Understand all the fundamental concepts involving Electronics Engineering
CO5 : Assemble basic electronic Components
<b>Course:Environmental Sciences and Engineering-[GE8291]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Outline the importance of environmental education and ecosystem
CO2 : Explain the environmental pollution and its prevention
CO3 : Discuss the conservation of natural resources
CO4 : Categorize the social and environmental problems
CO5 : Summarise the need to control population for sustainable development
<b>Course:Engineering Mechanics-[GE8292]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Illustrate the vectorial and scalar representation of forces and moments
CO2 : Analyse the rigid body in equilibrium
CO3 : Evaluate the properties of surface and solids
CO4 : Calculate dynamic forces exerted in rigid body
CO5 : Students will able to determine the friction and their effects
<b>Course:Technical English-[HS8251]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Read technical texts and write area- specific texts effortlessly.
CO2 : Listen and comprehend lectures and talks in their area of specialization successfully.
CO3 : Speak appropriately and effectively in varied formal and informal contexts.
CO4 : Write reports and winning job applications.
CO5 : Participate in Group discussions
<b>Course:Engineering Mathematics II-[MA8251]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Define the basic concepts of matrices, vectors, analytic function and Laplace transform
CO2 : Explain the properties of matrices and vector differential operators
CO3 : Understand the basics of Laplace transform for elementary functions and line integral of analytic functions
CO4 : Apply diagonalization of matrices in quadratic form and Laplace transform in differential equations
CO5 : Evaluate analytic function, vector and complex integration using various methods
<b>Course:Material Science-[PH8251]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Mention the various types of phase diagram, microconstituents of ferrous alloys and mechanical properties of engineering materials
CO2 : List out the properties of magnetic ,dielectric,superconducting and new engineering materials
CO3 : Illustrate the phase diagram of various system,phase transformation in ferrous alloys and

	mechanical testing methodes
CO4 :	Describe the behaviour of magnetic,dielectric,superconductng and new engineering materials using various theories
CO5 :	Demonstrate different mechanical testing methodes and application of engineering materiasl

### Semester:3

<b>Course:Electrical Drives and Controls-[EE8353]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Understand the thermal rating of various electrical machines
CO2 :	Explain the performance characteristics of electrical machines.
CO3 :	Classify the starting methods of D.C motors and Induction motors.
CO4 :	Compare conventional and solid state speed control of DC drives.
CO5 :	Compare conventional and solid state speed control of AC drives.
<b>Course:Electrical Engineering Laboratory-[EE8361]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Analyze the characteristics of DC machines
CO2 :	Examine the speed control of DC shunt motor
CO3 :	Analysis the characteristics of single phase transformer
CO4 :	Analyze the performance of synchronous machines.
CO5 :	Examine the performance characteristics of Induction motor.
<b>Course:Interpersonal Skills / Listening &amp; Speaking-[HS8381]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Listen and respond appropriately
CO2 :	Speak clearly with proper stress and intonation
CO3 :	Make effective presentations
CO4 :	Participate in group discussions
CO5 :	Participate confidently and appropriately in conversations both formal informal
	Participate in group discussions
<b>Course:Transforms and Partial Differential Equations-[MA8353]</b>	
Upon completion of the course, the students will.../ will be able to...	
CO1 :	Describe the formation of PDE and difference equation
CO2 :	Find the fourier series of a given function satisfying Dirichlet's condition
CO3 :	Solve first, second order homogeneous and non-homogeneous PDE using standard methods and fourier series methods
CO4 :	Determine fourier transform and z-transform of standard functions
CO5 :	Apply z-transforms to solve difference equations and fourier transform to solve definite integrals
<b>Course:Fluid Mechanics and Machinery-[CE8394]</b>	
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 :	Analyze fluid properties using dimensional analysis.
CO4 :	Determine the performance of pumps for specific applications.

CO5 : Estimate the performance of turbines.

**Course:Manufacturing Technology - I-[ME8351]**

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

**Course: Manufacturing Technology Laboratory - I-[ME8361]**

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

CO1 : Demonstrate taper turning using centre lathe

CO2 : Demonstrate external and internal thread cutting using centre lathe.

CO3 : Demonstrate eccentric turning and knurling operation in centre lathe.

CO4 : Make use of milling machine to fabricate polygon.

CO5 : Make use of the shaper to fabricate polygon.

**Course:Computer Aided Machine Drawing-[ME8381]**

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

CO1 : Follow the drawing standards, Fits and Tolerances

CO2 : Re-create part drawings, sectional views and assembly drawings as per standards

CO3 : Make use of 2D drafting commands for 2D drawing

CO4 : Develop 3D Part models using different features

CO5 : Develop 3D assembly models using different features

**Course:Engineering Thermodynamics-[ME8391]**

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

CO1 : List the fundamental concepts in Thermodynamics and classify the thermodynamic processes around them.

CO2 : Classify and apply Laws of Thermodynamics in practical situations when called for.

CO3 : Apply mathematical fundamentals to analyse the properties of steam, gas and gas mixtures.

CO4 : Evaluate various thermodynamic relations, tables and charts for problem solving.

CO5 : Analyze different psychrometric process and adapt the same for computing the properties of air-vapour mixture.

**Semester:4**

**Course:Strength of Materials for Mechanical Engineers-[CE8395]**

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

CO1 : Define stress, strain, Principal stresses and plane, Torsion, Thick and thin Cylinder

CO2 : Compute Stress,shear force , bending moment, slope and deflection for beam.

CO3 : Draw the Shear force , Bending moment diagram and conjugated beam Diagram.

CO4 : Analyze and design thin and thick shells for the applied internal and external pressures.

CO5 : Apply basic equation of simple torsion in designing of shafts and helical Spring.

**Course:Advanced Reading and Writing-[HS8461]**

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

CO1 : Read and Comprehend texts

CO2 : Read and Evaluate texts
CO3 : Write different types of essays
CO4 : Write winning job applications
CO5 : Display critical thinking in various professional contexts
<b>Course:Statistics and Numerical Methods-[MA8452]</b>
Upon completion of the course, the students will.../ will be able to... This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology
CO1 : To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
CO2 : To introduce the basic concepts of solving algebraic and transcendental equations.
CO3 : To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines
CO4 : To acquaint the knowledge of various techniques and methods of solving ordinary differential equations
CO5 :
<b>Course:Engineering Metallurgy-[ME8491]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Infer properties of metal and alloys using phase diagram and its applications.
CO2 : Evaluate the importance of heat treatment processes and its applications.
CO3 : Analyze the properties, composition and applications of ferrous and non-ferrous alloys.
CO4 : Analyze the properties, composition and applications of non-metallic materials
CO5 : Evaluate different deformation mechanism, mechanical testing, and their importance for engineering materials
<b>Course:Kinematics of Machinery-[ME8492]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the principles of kinematic links, pairs, chains, mechanisms and its inversions, Degree of freedom of mechanisms
CO2 : Analyze the planar mechanisms for position, velocity and acceleration.
CO3 : Design cams and followers for specified motion profiles
CO4 : Evaluate gear tooth geometry and select appropriate gears for the required applications.
CO5 : Solve problems on friction in various machine elements like belt, chain, ropes, brakes and clutches
<b>Course:Manufacturing TechnolagnLab II-[ME8462]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Illustrate various machine tool operations to manufacture gears.
CO2 : Illustrate finishing operations using various machine tools.
CO3 : Demonstrate manufacture of cutting tools using cutter grinder.
CO4 : Infer the cutting forces in milling and turning process.
CO5 : Develop CNC part programming for machining process.
<b>Course:Manufacturing TechnolagnLab II-[CE8381]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Make use of different destructive testing machines for material characterization.
CO2 : Analyse different mechanical properties of metal and alloys.
CO3 : Estimate the frictional losses in pipes and fittings.

CO4 : Estimate the performance of pumps and turbines for specific applications.  
CO5 : Choose measuring devices and machineries for specific needs.

**Course:Manufacturing Technology ? II-[ME8451]**

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

CO1 : Explain the mechanism of material removal processes.  
CO2 : 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 types of grinding and other super finishing processes apart from gear manufacturing processes  
CO5 : Summarize numerical control of machine tools and write a part program.

**Course:Thermal Engineering- I-[ME8493]**

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

CO1 Understand the basic concepts of various cycles, analyse them and compare the performance among them  
CO2 Understand the concepts of IC engines, components, parts and the working and analyse the performance of the engine.  
CO3 Identify the properties of substances while flowing through the turbine and the performance of the turbine are analysed.  
CO4 Analyse the performance of the compressors with various configuration within and outside and under various atmospheric conditions.  
CO5 Compute the solutions of psychrometric problem with the application of the relation between temperature and humidity conditions

**Semester:5**

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

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

CO1 : To understand the fundamentals of the basic properties of Metrological equipment's  
CO2 : To understand the importance and learn performance of Metrological equipment's  
CO3 : To understand the various Metrological equipment available to measure the dimension of the components.  
CO4 : To understand the correct procedure to be adopted to measure the dimension of the components.  
CO5 : To provide knowledge the measurement and the dimension of the components.

**Course:Kinematics and Dynamics Laboratory-[ME8511]**

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

CO1 : Compare the kinematics of various gears and joints.  
CO2 : Determine mass moment of inertia of various mechanical system  
CO3 : Infer gyroscopic effect and couple  
CO4 : Classify various governors and construct cam profile  
CO5 : Compare the frequency and vibrations in various dynamic systems

**Course:Design of Machine Elements-[ME8593]**

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

CO1 : Explain the influence of steady and variable stresses in machine component design  
 CO2 : Apply the concepts of design to shafts, keys and couplings  
 CO3 : Apply the concept of design to temporary and permanent joint  
 CO4 : Apply the concept of design to energy absorbing member, connecting rod and crank shaft  
 CO5 : Apply the concepts of design to bearings

**Course:Internal Combustion Engines-[OAT552]**

Upon completion of the course, the students will.../ will be able to...  
 CO1 : Describe the principles of operation of different SI Engines and components.  
 CO2 : Implementing the principles of operation of different CI Engines and components.  
 CO3 : Analyze the pollutant formation and control.  
 CO4 : Acquire the knowledge about engine modification required for the usage of alternate fuels.  
 CO5 : Evaluate the principles and trends in recent IC engines.

**Course:Dynamics of Machines-[ME8594]**

Upon completion of the course, the students will.../ will be able to...  
 CO1 : Able to describe the force-motion relationship in components subjected to external forces and analysis of standard mechanisms  
 CO2 : Ability to take decisions by implementing the undesirable effects of unbalances resulting from prescribed motions in mechanism.  
 CO3 : Able to analyze the concepts of degrees of freedom  
 CO4 : Will acquire skills to take effect of dynamics of undesirable vibrations  
 CO5 : Able to evaluate principles in mechanisms used for speed control

**Course:Thermal Engineering- II-[ME8595]**

Upon completion of the course, the students will.../ will be able to...  
 CO1 : Classify and design steam nozzle  
 CO2 : Relate the functioning and features of different types of Boilers auxiliaries and calculate performance parameters  
 CO3 : Compare the types of steam turbines and calculate the performance  
 CO4 : Summarize the concept of Cogeneration, Working features of Heat pumps and Heat exchangers  
 CO5 : Explain and solve problems on refrigeration, air-conditioning, and psychometric processes

**Course:Thermal Engineering Laboratory-[ME8512]**

**Course Outcomes**

Upon completion of the course, the students will.../ will be able to...  
 CO1 : Illustrate the valve timing, port timing and actual p-v diagrams.  
 CO2 : Evaluate the performance and heat balance of petrol and diesel engine.  
 CO3 : Determine the thermal conductivity for various material profiles.  
 CO4 : Evaluate convective heat transfer coefficients for various modes.  
 CO5 : Analyze the performance of heat exchanger, refrigeration and air conditioning system.

**Course:Metrology and Measurements Laboratory-[ME8513]**

Upon completion of the course, the students will.../ will be able to...  
 CO1 : Check the dimensions and the dimensional deviations of given parts.  
 CO2 : Inspect the dimensions, angularity and parallelism of a given component  
 CO3 : Evaluate the straightness of surfaces and determine size of irregularities on a machined surface  
 CO4 : Measure the vertical distances or height of objects, taper angle of slope for a given component, various parameters of threads and gear wheel



CO5 : Construct the torque characteristic curves to various loads at various distances

**Semester:6**

**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
- CO5 : Develop a long term career plan -making career changes

**Course:Automobile Engineering-[ME8091]**

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

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

**Course:Design of Transmission Systems-[ME8651]**

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

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

**Course:Finite Element Analysis-[ME8692]**

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

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

**Course:CAD / CAM Laboratory-[ME8681]**

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

- CO1 : Understand and interpret the drawing views, symbols, standards and create a 2D drafting sketch using 3D modelling software.
- CO2 : Create 3D model of machine elements by bottom-up approach using 3D modelling software.
- CO3 : Develop an assembly of 3D model of machine elements using standard CAD modelling software.
- CO4 : Demonstrate manual part programming with G and M codes using CAM
- CO5 : Understand the application of CAPP in machining and turning centre and explain the basic concepts of CNC programming and machining.

**Course:Heat and Mass Transfer-[ME8693]**

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

- CO1 : Analyze steady & unsteady heat transfer in composite systems with & without heat generation and extended surfaces.
- CO2 : Calculate free and forced convection heat transfer in external and internal flows.
- CO3 : Describe film wise & drop wise condensation, pool & flow boiling and analyze heat exchanger using LMTD and NTU approaches.
- CO4 : Analyze radiation heat transfer between surfaces using shape factor algebra.
- CO5 : Analyze diffusion and convective mass transfer occurring in different applications.

**Course:Hydraulics and Pneumatics-[ME8694]**

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:Design and Fabrication Project-[ME8682]**

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

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

**Course:Computer Aided Design and Manufacturing [ME8691]**

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

- CO1 : Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics
- CO2 : Explain the fundamentals of parametric curves, surfaces and Solids
- CO3 : Summarize the different types of Standard systems used in CAD
- CO4 : Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines
- CO5 : Summarize the different types of techniques used in Cellular Manufacturing and FMS

**Semester:7**

**Course:Mechatronics-[ME8791]**

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

- CO1 : Gain knowledge about the fundamentals of sensors with its characteristics
- CO2 : Describe the working of microprocessor and microcontroller along with its components
- CO3 : Gain understanding about various programmable peripheral interface along with its applications
- CO4 : Comprehend the fundamentals of programmable logical control along with its characteristics and applications

CO5 : Understand the different actuator systems through various case studies

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

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

CO1 : Students will have an understanding of the principle of the various vital components of a thermal power plant and the cogeneration.

CO2 : Students will have knowledge about the functioning of Diesel ,Gas turbine , Combined cycle & IGCC power plants

CO3 : Students will have ideas about the various types of Nuclear reactors, and the safety aspects related to them

CO4 : Students will have an understanding of the functioning of other renewable energy systems like Hydro , Wind, Solar ,Tidal , Geothermal , Bio-gas and Fuel Cell power plants

. Students will have an understanding about the necessity and the methods of

CO5 : apportioning tariff and the different pollution control measures employed in thermal & Nuclear power plants

**Course:Robotics-[OIE751]**

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

CO1 : Describe the physical basic components of robot

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

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

CO4 : Compile kinematics equations in robot programming languages

CO5 : Analyze the economics of robot for implementation in industries

**Course:Mechatronics Laboratory-[ME8781]**

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

CO1 : Develop assembly language programming of 8085 microprocessor.

CO2 : Create interface to use microcontroller for various applications.

CO3 : Model basic hydraulic, pneumatic and electrical circuits using software.

CO4 : Develop interface with PID controller for various applications.

CO5 : Demonstrate programmable logic controller.

**Course:Process Planning and Cost Estimation-[ME8793]**

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

CO1 : Define the various components and functions of process planning.

CO2 : Estimate various production processes and its cost.

CO3 : Evaluate various methods of cost estimation.

CO4 : Evaluate the cost involved in various production process.

CO5 : Estimate machining time for various processes.

**Course:Simulation and Analysis Lab-[ME8711]**

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

CO1 : Define and illustrate the need for simulation and analysis for real world problems.

CO2 : Interpret and make use of different features in the simulation and analysis tools.

CO3 : Make use of the simulation software to construct and execute mechanical engineering problems.

CO4 : Model real world problems and analyze the effect of various mechanical and thermal forces through simulation.

CO5 : Analyze the model and apply the results to resolve critical issues in real world engineering problems.

**Course:Unconventional Machining Processes-[ME8073]**

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

CO1 : Compare and contrast various unconventional machining processes

CO2 : Illustrate mechanical energy based process and the influence of process parameters.

CO3 : Illustrate electrical energy based process and the influence of process parameters.

CO4 : Illustrate chemical and electro-chemical energy based process and the influence of process parameters.

CO5 : Illustrate thermal chemical energy based process and the influence of process parameters.

**Course:Technical Seminar-[ME8712]**

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

CO1 : Acquired the basic skills for performing literature survey and paper presentation.

CO2 : Provide students better communication skills.

CO3 : Describe the current topics in Mechanical and related areas based on current publications.

CO4 : Prepare the report.

CO5 : Acquired the basic skills for performing literature survey and paper presentation.

**Course:Non Destructive Testing-[ME8097]**

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

CO1 : Explain the importance of material inspection in general and non-destructive testing methods.

CO2 : Explains nondestructive testing methods and types.

CO3 : Comprehend the properties of non-destructive testing methods and evaluate the importance of necessary properties

CO4 : Learn Eye Examination and Penetrant, Magnetic Particle, Eddy Flows, Acoustic Emission, Ultrasonic, X-ray Test Method

CO5 : Understands the importance of industrial applications (welding, casting), aviation industry and underwater applications.

**Semester:8**

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

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

Understand the meaning and purpose of profession, ethics and various civic virtues like sharnig, honesty, courage, commitment ,charaxter, time management and insights about yoga and how yoga could be used in stress management.

CO1 : sharnig, honesty, courage, commitment ,charaxter, time management and insights about yoga and how yoga could be used in stress management.

CO2 : Comprehend the senses of engineering ethics , moral issues , inquiries and dilemma, various theories about ethics and right action, awareness about customs and religion

CO3 : Apply ethics in the engineering profession and understand the code of ethics, how engineers could act as responsible experimenters and a balanced outlook of the law

Assess the safety and risk, analyse the risks, methods to mitigate it, understand concepts like collective bargaining ,occupational crime, conflict of interest, employee, professional and intellectual property rights

CO4 : like collective bargaining ,occupational crime, conflict of interest, employee, professional and intellectual property rights

Understand about Multi- National corporations, Corporate Social responsibility,

CO5 : analyse ethical issues related to the environment ,computer use and weapons development , how an engineer could act sensibly in the shoes of a manager, consultant , expert witness

**Course:Principles of Management-[MG8591]**

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

CO1 :To help the students gain understanding of the functions and responsibilities of managers.  
CO2 :To provide them tools and techniques to be used in the performance of the managerial job.  
CO3 :To enable them to analyze and understand the environment of the organization.  
CO4 :To help the students to develop cognizance of the importance of management principles.  
CO5 :Demonstrate the roles, skills and functions of management.

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

2020 -- 2021 ODD Semester

**Course Outcomes, CO-PO and CO-PSO Mapping**

Program:M.E. Energy Engineering

Semester:1

<p style="text-align: center;"><b>Course:Bio Energy Conversion Techniques-[EY5003]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Understand and apply energy balances, and thermodynamics in biomass conversion</p> <p>CO2 : Understand unit processes/operations involved in biofuel/bioenergy production</p> <p>CO3 : learn techno-economic analysis of various biofuel conversion technologies and their environmental attributes</p> <p>CO4 : Develop experimental plan pertinent to biofuel production through gasification, pyrolysis and carbonisation</p> <p>CO5 : Acquire knowledge about various biofuel conversion technologies and their environmental attributes</p>
<p style="text-align: center;"><b>Course:Thermodynamic Analysis of Energy Systems-[EY5101]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Calculate the availability analysis of the energy systems and cycles</p> <p>CO2 : Analyse the engineering systems to improve and optimize its performance</p> <p>CO3 : Execute first and second law analysis of reacting systems, equilibrium constant and equilibrium composition of gaseous mixtures</p> <p>CO4 : Summarize the limits of various fuels with its properties</p> <p>CO5 : Relate thermodynamic systems with different combustion terminologies</p>
<p style="text-align: center;"><b>Course:Advanced Numerical Methods-[MA5153]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Define linear &amp; nonlinear equations, initial &amp; boundary value problems and difference methods</p> <p>CO2 : Understand the fundamental concepts of system of equations and identify the ODE</p> <p>CO3 : Classify the finite difference methods for parabolic, hyperbolic and elliptic equations</p> <p>CO4 : Apply various methods to solve system of equations and find the solution of ODE using IVP and BVP conditions</p> <p>CO5 : Solve two dimensional differential equations using finite element methods</p>
<p style="text-align: center;"><b>Course:Energy Laboratory-[EY5111]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Realize the principles of different renewable energy sources</p> <p>CO2 : Quantify the properties of various fuels</p> <p>CO3 : Adopt the procedure for performance analysis and optimization of energy utilities</p> <p>CO4 : Inquire the various energy storage systems</p>
<p style="text-align: center;"><b>Course:Fluid Mechanics and Heat Transfer-[EY5151]</b></p> <p>Upon completion of the course, the students will.../ will be able to...</p> <p>CO1 : Infer the concept of potential flow theory and boundary layer</p> <p>CO2 : Analyze the fluid flow behavior of incompressible and compressible fluids</p> <p>CO3 : Solve the equation and boundary condition of conduction and radiation heat transfer.</p> <p>CO4 : Analyse the concept and model of turbulent forced convective heat transfer</p> <p>CO5 : Infer the properties of phase change heat transfer and heat exchanger</p>

**Semester:2**

<b>Course:Power Generation, Transmission and Utilization-[EY5007]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Understand the Operation of Conventional Power Plants ( Steam, Hydro, Nuclear and Gas Turbine plants Power generation.
CO2 : Understand the Operation of Renewable Energy Power generation.
CO3 : Analyze the electrical power transmission of power plants.
CO4 : Analyze the utilization of electrical energy of power plants.
CO5 : The Economics of Power generation and Utilization of Electrical Energy for Various
<b>Course:Energy Conservation in Thermal Systems-[EY5201]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Identify the energy demand supply gap in the World & India and understand energy conservation opportunities available
CO2 : Quantify the energy conservation opportunities in different thermal systems
CO3 : Identify and evaluate the common energy conservation opportunities in different energy intensive industrial equipments
CO4 : improve the thermal efficiency by designing suitable systems for heat recovery and co-generation.
CO5 : guide the employees of the organization about the need and the methods of energy conservation.
<b>Course:Thermal Systems Simulation Laboratory-[TE5261]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : analyse the heat transfer effect in a heat exchanger using analysis software
CO2 : make use of different boundary condition for a convective heat transfer process using analysis
CO3 : solve the heat transfer effect by radiation using analysis software
CO4 : analyse the effect of conduction heat transfer using analysis software
CO5 : discover the efficiency of insulation using analysis software

**Semester:3**

<b>Course:Advanced Power Plant Engineering-[TE5074]</b>
Upon completion of the course, the students will.../ will be able to...
CO1 : Students will be able to get an idea about the Indian power scenario, and will have an understanding about the load curves for various applications, different types of power plants and the factors based on which a particular power plant could be selected for a particular location
CO2 : Students will have understanding about the thermal power plant utilities -like Boilers, Nozzles, Turbines, Condensers, Cooling Towers, Water Treatment and Piping system and methods to augment the thermodynamic efficiency
CO3 : Students will be able to understand the different thermodynamic cycles of Internal and External combustion engines, analyse the various cycles and evaluate methods to improve the cycles.
CO4 : Students will understand the concept of cogeneration and its types and performances, other methods like Binary Cycle, Combined cycle, IGCC, AFBC / PFBC cycles,

Thermionic steam power plant and MHD. CO5 : Students will be able to understand the power generation from renewable sources like hydro power, their types , nuclear power and. types of nuclear reactors
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**Semester:4**

<b>Course:Project work Phase II-[EY5411]</b>
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Upon completion of the course, the students will.../ will be able to...

CO1 : Identify solution to specific problems.

CO2 : identify the state of art for the specific problem

CO3 : Evaluate solution methodology to solve the specific problem

CO4 : Develop academic report writing skills

CO5 : Create communication skill to face review and interview