ADITYA COLLEGE OF ENGINEERING
Approved by AICTE, Permanently Affiliated to JNTUK, Accredited by NBA & NAAC
Recognized by UGC under Sections 2(f) and 12(B) of UGC Act, 1956
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Course Outcomes

Class: I Year I Semester

Course Name with Code		Course Outcome
Mathematics-I C112	CO1	Discuss the Ratio test and Mean value theorems
	CO2	Solve First order Linear differential equations
	CO3	Solve the Higher order non-homogeneous Differential Equations
	CO4	Model physical phenomena of LCR series circuit and Simple Harmonic Motion.
	CO5	Determine the extreme values for the function of two variables.
	CO6	Compute double and triple integrals to find Area and Volume.
Engineering Physics C112	CO1	Summarize the concepts of interference, diffraction and polarization.
	CO2	Explain Construction, working of lasers and the principle behind the propagation of light through an optical fibre.
	CO3	Describe basics of dielectrics and magnetism.
	CO4	Organisesound level disruptors and their use in architectural acoustics.
	CO5	Summarize production and detection of Ultrasonics.
	CO6	Determine Crystal Structure by X-Ray diffraction techniques.
Programming for Problem Solving using C C113	CO1	To discuss machine language with the help of numbering system and recognize different variables different statements and different storages to write a program
	CO2	To predict for which problem we have to use which type of decision statements and which type of loop
	CO3	To classify the data by storing data in different formats like arrays structures and unions
	CO4	To analyze diff application of pointers to access values of memory locations through address and variable
	CO5	To subdivide the problem into functions and retrieving file information using file operations
	CO6	To operate data in file information using file operations
Communicative English C114	CO1	Understand past culture, tradition, speaking English in real life situations
	CO2	Infer and interpret the admonitions of a father to his daughter answering a series of questions, greetings and leave takings
	CO3	Apply mechanics of writing inwrting letters on various contexts, cover letters, CVs, E-mail etiquette, **acamdemic proposals, research articles and biographies.**
	CO4	Understanding societal problems and finding the suitable solution with reference to Wangari Maathai
	CO5	Compare and contrast racial discrimination, better listening for better speaking and using right vocabulary

	CO6	Understand the importance of soft skills, effective communication skills, usage of functional grammar in communication.
Engineering Drawing C115	CO1	Draw the polygons by using general method.
	CO2	Draw simple curves of ellipse, cycloid and involutes and construction of scales.
	CO3	**Construct projections** of points, straight lines & planes inclined to one or both the planes.
	CO4	**Construct** Projections of planes inclined to one or both the planes.
	CO5	Construct projection of solids on different orientations
	CO6	Transform multi-views to isometric views and vice-versa
Engineering Physics Lab C116	CO1	Determine wavelength, Thickness, Radius of curvature of lens and dispersive power by using interference, diffraction concepts.
	CO2	Apply the mechanics concepts/equations to obtain quantitative results like rigidity modulus, Youngs modulus and velocity of sound.
	CO3	Identify the behavioural aspects of magnetic and electric fields.
	CO4	Estimate Planck's constant through photoelectric effect.
Programming for Problem Solving using C Lab C117	CO1	Knowledge on various concepts of C language.
	CO2	Design and development of C program using loops
	CO3	Design and development of C problem solving skills using arrays
	CO4	Design and develop programs on functions
English Communication Skills Lab C118	CO1	Identify 44 sounds of language and develop correct pronunciation learning Phonetics
	CO2	Demonstrate language functions: LSRW Skills
	CO3	Develop and practice correct accent, intonation, and rhythm to get acquaintance with language.
	CO4	Develop speaking skills through participation in activities and vocabulary

Class: I Year II Semester

Course Name with Code		Course Outcome
Mathematics -II C121	CO1	Explain system of linear algebraic equations using Gauss Elimination method
	CO2	Use Cayley-Hamilton theorem to find the inverse and power of a matrix problems
	CO3	Solve the approximate roots of polynomial and transcendental equations by using Iterative methods
	CO4	Solve the system of linear equations using Gauss Jacobi and Gauss-Seidal methods
	CO5	Apply Newton's forward and backward interpolation for equal intervals and Lagrange's formula for unequal intervals
	CO6	Apply Numerical Integral techniques to different Engineering problems
Engineering Chemistry C122	CO1	Explain the advantages and limitations of plastics materials and recycling of e-waste.
	CO2	outline the differences between primary and secondary cell and Discuss the reasons for corrosion and some methods of corrosion control.
	CO3	Determine the preparation of nano materials and its applications

	CO4	Determine the applications of commonly used industrial materials.
	CO5	Discuss the fuels which are used commonly and their economics, advantages and limitations
	CO6	Explain the impurities present in raw water, problems associated with them.
Engineering Mechanics C123	CO1	Understand concepts of force and friction, direction and its application.
	CO2	Apply the static equilibrium equations for the coplanar and non-coplanar system. Analysis of truss .
	CO3	Apply the concept of centroid and centre of gravity to determine the moment of inertia
	CO4	Understand the concepts of Rectilinear and Curvilinear motion of a particle with and without considering the forces.
	CO5	Analyze the rigid bodies under translation and rotation with and without considering the forces.
	CO6	Understand the concepts of Work Energy method and Impulse momentum method
Basic Electrical And Electronics Engineering C124	CO1	Understand the basic circuit laws like kvl and kcl, nodel, mesh analysis
	CO2	Understand operation of DC generators,3-point starter and DC machine testing by Swinburne's Test and Brake test.
	CO3	Analyze performance of single-phase transformer and losses.
	CO4	Analyze and acquire proper knowledge and working of3-phase alternator and 3-phase induction motors.
	CO5	Analyze operation of half wave, full wave bridge rectifiers and OP-AMPs.
	CO6	Understanding operations of CE amplifier and basic concept of feedback amplifier.
Thermodynamics C125	CO1	Understand and differentiate between the thermodynamic systems and processes
	CO2	Understand the importance of thermodynamic properties related to conversion of heat energy into work.
	CO3	Apply the first law of thermodynamics on closed and control volume system.
	CO4	Apply the laws of thermodynamics to boilers, heat pumps, refrigerators & heat engines.
	CO5	Analyze thermodynamic relations and Carnot cycles
	CO6	Demonstrate the importance of phase change diagrams of various pure substances
Engineering Workshop Practice Lab C126	CO1	Understand the basic manufacturing processes and apply the Carpentry operations such as Middle lap T joint, cross lap joint.
	CO2	Apply the Fitting and tin smithy operations such as Square joint, V joint, Tray, and Funnel .
	CO3	Apply the smithy operations such as upsetting, drawing down, punching, bending, swaging and fullering
	CO4	Apply the House-wiring: wiring for ceiling rose and two lamps (bulbs) with independent switch control
Engineering Chemistry Lab C127	CO1	Explain volumetric analysis with different indicators
	CO2	Calculate the Hardness of water by EDTA
	CO3	Calculate the Alkalinity of water sample by HCl solution
	CO4	Analyze the quantity of ions in organic solutions
Basic Electrical & Electronics	CO1	Determine the performance characteristics of DC motor
	CO2	Determine the performance characteristics of AC machines

Engineering Lab C128	CO3	Analyze the Speed control characteristics of DC motor
	CO4	Determine the forward biased and reverse biased PN Diode
	CO5	Evaluate Input characteristics and Output characteristics of a Transistor
	CO6	Characterize the Half wave and Full wave rectifiers

Class: II Year I Semester

Course Name with Code		Course Outcome
Vector Calculus & Fourier Transforms C211	CO1	Compute Line, Surface, Volume integrals using Green's, Stoke's and Divergence theorems.
	CO2	Use Laplace Transform methods to solve initial value problems for constant coefficient linear ordinary differential equations.
	CO3	Discuss the expansion of a given periodic function by Fourier series in the given interval.
	CO4	Solve engineering problems using Fourier Transforms and Inverse Fourier Transforms.
	CO5	Apply a range of techniques to solve first and second order linear partial differential equations.
	CO6	Model physical phenomena of Heat and Wave equations by using Partial differential equations.
Mechanics Of Solids C212	CO1	Compute the fundamentals of stress and strain concepts
	CO2	Solve the concept of stress and strain and design structural members and machine parts under axial, shear and bending loads, moment and torsional moment.
	CO3	Analyze beams and draw shear and bending moment diagrams for beams.
	CO4	Analyze the stresses and strains in members subjected to combined loading
	CO5	Determine the deflections and the stresses and strains in members subjected to torsion.
	CO6	Examine the stresses and strains associated with thick and thin cylinders and the bucking and stability of columns.
Fluid Mechanics & Hydraulic Machines C213	CO1	Explain about the fluid properties and the distinct manometers.
	CO2	Determine the metacentric height of a submerged body
	CO3	Classify the types of flow and analyze concepts of Fluid dynamics.
	CO4	Explain the boundary layer concepts and dimensional analysis.
	CO5	Solve the hydrodynamic force of jet on vanes.
	CO6	Evaluate the performance characteristics of hydraulic turbines and pumps.
Production Technology C214	CO1	Design pattern and cores for metal casting process.
	CO2	Design gating system and riser for different metallic components

	CO3	Explain melting and solidification process in metal casting process and working procedure of different casting processes.
	CO4	Discuss different types of welding processes and their applications.
	CO5	Analyze the forces in different forming operations.
	CO6	Explain different sheet metal forming operations and high energy rate forming processes.
Kinematics of Machinery C215	CO1	Contrive a mechanism for a given plane motion with single degree of freedom.
	CO2	Suggest and analyze a mechanism for a given straight line motion and automobile steering motion.
	CO3	Analyze the motion (velocity and acceleration) of a plane mechanism
	CO4	Suggest and analyze mechanisms for a prescribed intermittent motion like opening and closing of IC engine valves etc
	CO5	Select a belt drive system system for a given application
	CO6	Analyze gear drive and its components.
Computer Aided Engineering Drawing Practice C216	CO1	Sketch and represent Projection of Solids inclined to planes in auxiliary planes and intersection of solids.
	CO2	Sketch the Sectional Views of Regular Solids, Development of surfaces solids.
	CO3	Drafting using AutoCAD and to understand the tools
	CO4	Sketch 2D surfaces in AutoCAD
	CO5	Sketch the models in 2D in 3D view – isometric and orthographic views
	CO6	Sketch 3D models and development using editing tools
Fluid Mechanics & Hydraulic Machines Lab C217	CO1	Apply Bernoulli's principle in determining the coefficient of discharge of various flow meters.
	CO2	Determine the performance efficiences of the Hydraulic Pumps.
	CO3	Calculate the performance characteristics of Hydraulic turbines.
	CO4	Explain the forces and efficiency of two types of vane shapes for turbines.
	CO5	Calculate the head losses causing decrease in energy of flow experimentally.
	CO6	Compute the friction factor for fluid flow through set of pipes.
Production Technology Lab C218	CO1	Create a single piece pattern and split pattern by using a wood turning lathe machine and tools.
	CO2	Test and control the sand properties in foundry.
	CO3	Create the mould by using sprue, runner, pattern, raisers.
	CO4	Select a suitable welding method to prepare the butt joint and lap joint of mild steel.

Course Name with Code		Course Outcome
Drafting and Modeling Lab C219	CO1	Understand the AUTOCAD commands.
	CO2	Create 3D views using AUTOCAD
	CO3	Develop part drawings of various components in the form of orthographic and isometric.
	CO4	Gain knowledge on modelling methods and procedures.
	CO5	Create various 3D models through Pad, revolve, shell, sweep, parent child relation, Boolean operations and various standard translators.
	CO6	Create 3D part and assembled views of various mechanical components.
Essence of Indian Traditional Knowledge C21A	CO1	To understand the Indian traditional knowledge
	CO2	Analyze the traditional knowledge system
	CO3	Analyze the need of Indian traditional knowledge
	CO4	Understand the Recognition of forest rights, Biological diversity act and Geographical indications
	CO5	Understand the protection of Indian traditional knowledge
	CO6	Analyze the traditional knowledge connects with agriculture, biotechnology and medicine system

	CO5	Select a suitable forming process to prepare the beverage can with sheet metal.
	CO6	Select a suitable plastic moulding method to prepare a water bottle and toys.

Class: II Year II Semester

Course Name with Code		Course Outcome
Material Science & Metallurgy C221	CO1	Explain the concepts of the structure of metals and mechanical behaviour under different loading conditions.
	CO2	Analyze the equilibrium diagrams of several metals andalloys.
	CO3	List out the composition, properties, and applications of ferrous and non-ferrous alloys.
	CO4	Apply the processes of heat treatment on several types of Castirons and Steels.
	CO5	Describe the Basic processes and methods involved in Powder Metallurgy.
	CO6	Illustrate the properties and applications of ceramic and composite materials.
Complex Variables & Statistical Methods C222	CO1	Determine whether a given continuous function is analytic and find the differentiation and integration of complex functions.
	CO2	Make use of the Cauchy residue theorem to evaluate certain integrals
	CO3	Explain the concept of probability and probability distributions
	CO4	Apply the concept of sampling distributions of sample mean and variance to identify unusual samples from a given population.

	CO5	Describe point and interval estimation and determine confidence limits for the population mean and proportion
	CO6	Explain the logic behind and process of hypothesis testing and Show conclusions by carry out hypothesis testing for the population proportion.
Dynamics Of Machinery C223	CO1	Compute the frictional losses and transmission in clutches, brakes and dynamometers.
	CO2	Determine the effect of gyroscopic couple in motor vehicles, ships and aeroplanes.
	CO3	Analyze the fources in four bar and slider crank mechanisms and design a flywheel.
	CO4	Determine the rotary unbalanced mass in reciprocating equipment.
	CO5	Determine the unbalanced forces and couples in reciprocating and radial engines.
	CO6	Determine the natural frequencies of discrete systems undergoing longitudinal, torsional and transverse vibrations.
Thermal Engineering-I C224	CO1	Derive the actual cycle from fuel-air cycle and air- standard cycle for all practical applications.
	CO2	Explain working principle and various components of IC engine.
	CO3	Explain combustion phenomenon of CI and SI engines and their impact on engine variables.
	CO4	Analyze the performance of an IC engine based on the performance parameters.
	CO5	Explain the cycles and systems of a gas turbine and determine the efficiency of gas turbine.
	CO6	Explain the applications and working principle of rockets and jet propulsion
Industrial Engineering and Management C225	CO1	Explain the basic concepts of industrial engineering
	CO2	Design of plant layout and the maintenance of plant layout
	CO3	Illustrate the importance of work study
	CO4	Choose proper techniques to improve the product quality
	CO5	Understanding the methods of performance of human resource management
	CO6	Apply suitable techniques for enterprise resource planning
Mechanics of Solids and Metallurgy Lab C226	CO1	Explain the concepts of the structure of metals and mechanical behavior under different loading conditions.
	CO2	Analyze the equilibrium diagrams of several metals and alloys.
	CO3	List out the composition, properties, and applications of ferrous and non-ferrous alloys.
	CO4	Apply the processes of heat treatment on several types of Cast irons and Steels.
	CO5	Describe the Basic processes and methods involved in Powder Metallurgy.

	CO6	Illustrate the properties and applications of ceramic and composite materials
Machine Drawing Practice C227	CO1	Categorize the attributes of Production Drawing and Limits, fits, tolerances.
	CO2	Distinguish Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
	CO3	Develop the sectional views for machine elements like Shaft coupling, spigot and socket pipe joint, Journal, pivot, collar and foot step bearings.
	CO4	Develop the assembly drawings using part drawings of engine Parts like Gear pump, Fuel pump Petrol Engine connecting rod, piston assembly.
	CO5	Develop the assembly drawings using part drawings of other machine Parts like Screws jacks, Machine Vices Plummer block, Tailstock.
	CO6	Develop the assembly drawings using part drawings of valves Parts like spring loaded safety valve, feed check valve and air cock, Control valves.
Theory of Machines Lab C228	CO1	Identify the critical speed of shafts and the moment of inertia of a flywheel.
	CO2	Analyze the centrifugal force in various governors and determine the gyroscopic couple in gyroscope.
	CO3	Analyze the frequency of undamped and damped free vibration of an equivalent spring mass system and evaluate coefficient of friction between belt and pulley
	CO4	Analyze the follower displacement vs cam rotation for various Cam Follower systems and evaluate the static and dynamic balancing using rigid blocks.
	CO5	Identify slider displacement, velocity and acceleration against crank rotation for single slide crank mechanism/Four bar mechanism.
	CO6	Identify the mechanical advantage, velocity ratio and efficiency and types of gears and evaluate simple and compound screw jack.
Python Programming Lab C229	CO1	Apply Bisection method, Newton Raphson's method to find the roots of non-linear equation
	CO2	Calculate Curve fitting by least – square approximations, numerically using Trapezoidal rule, Simpsons rule
	CO3	Solve the system of linear equations using Gauss - elimination method , Gauss - Siedal method, Gauss - Jordan method
	CO4	Determine numerical solution of ordinary differential equations by Euler's method, Runge-Kutta method, Milne's method
	CO5	Compute numerical solution of Laplace equation, Wave equation, tri-diagonal matrix using Thomas algorithm
	CO6	Calculate largest eigen value of a matrix by Power – method, fit a straight using least square technique

Class: III Year I Semester

Course Name with Code		Course Outcome
Thermal Engineering-II C311	CO1	Explain the Rankine cycle, different methods to increase the efficiency, Fuels and their combustion processes
	CO2	Classification of Boilers, Draught and analyzing their performances
	CO3	Calculate the flow through Nozzles, velocity at exit, velocity efficient, critical pressure ratio
	CO4	Sketch and analyze the tubine velocity diagram, compounding of turbines, condition for maximum discharge
	CO5	Explain reaction turbine properties, blade height, types of condensers, air leakages
	CO6	Evaluate gas turbines and their performance increasing methods
Design of Machine Members-I C312	CO1	Understand the design function in mechanical engineering, the steps involved in designing and the relation of design activity with manufacturing activity
	CO2	Identify proper materials to different machine elements based on their physical and mechanical properties.
	CO3	Analyze and design the riveted and welded joints.
	CO4	Analyze and design keys, cotters and knuckle joints.
	CO5	Analyze and design the shaft and shaft coupling
	CO6	Analyze and design the mechanical springs.
Machining, Machine Tools & Metrology C313	CO1	Describe the construction and working principles of measuring instruments for measurement of displacement and speed.
	CO2	Describe the construction and working principles of measuring instruments for strain, force,torque, power, acceleration and vibration.
	CO3	Apply shaft basis system and hole basis systems for fits and represent tolerances for a given fit and prepare limit gauges based on the tolerances for quality check in mass production
	CO4	Explain methods for linear, angle and flatness measurements and select a suitable method and its relevant instrument for a given application
	CO5	Calculate the surface finish and measure the parts with comparators
	CO6	Identify appropriate method and instrument for the inspection of gear elements, thread elements and alignment tests of machine tool
Nano Technology C314	CO1	Illustrate the basic principles and fundamentals of NT.
	CO2	Develop forecasts basic principles and fundamentals of Silicon Carbide NT and Nano Particles of Alumina and Zirconia.
	CO3	Discuss the basic principles and fundamentals of NT to detect Mechanical

		Properties.
	CO4	Select and use an appropriate basic principles and fundamentals of Electrical Properties and Optical Properties of NT
	CO5	Create and ability to Investigating and Manipulating Materials in the Nanoscale.
	CO6	Create and ability to engage in independent and life-long learning in the context of NT technological changes.
Renewable Energy Sources C315	CO1	Explain the importance of, solar energy collection and storage.
	CO2	Discuss the wind energy principles.
	CO3	Analyze about biomass energy concepts.
	CO4	Apply the principles of tidal energy.
	CO5	Utilize the concepts of geothermal energy.
	CO6	Understand the concepts of clean development mechanisms.
Machine Tools Lab C316	CO1	Select the suitable cutting tools to perform facing, chamfering, grooving, step turning, and drilling operations by using a lathe machine.
	CO2	Select the suitable cutting tools to perform turning, taper turning, knurling, thread cutting operation by using a lathe machine.
	CO3	Create holes using a radial drilling machine and do the internal threading operation.
	CO4	Create a V slot in the provided specimen and generate flat surfaces by using a shaping machine.
	CO5	Create a keyway inside the gear and create a slot on the external surface by using the slotting machine.
	CO6	Select a suitable milling cutter to prepare the Spur Gear for the given Gear Blank with help of the Dividing Head of a milling machine.
Thermal Engineering Lab C317	CO1	Sketch the valve and port diagrams of IC engines
	CO2	Evaluate the performance characteristics of IC engines.
	CO3	Demonstrate the different types of boilers and its operation.
	CO4	Assess the performance characteristics of an air compressor.
	CO5	Evaluate the brake power, Indicator power, Heat losses and frictional losses in IC engines.
	CO6	Discuss the various components and mechanisms of IC engines.
Advanced communicational skills lab C318	CO1	Develop speaking skills through participation in activities and acquire vocabulary for interpersonal communication.
	CO2	Demonstrate language functions: Reading Comprehension, Listening Skills and Technical Writing Skills
	CO3	Develop and practice correct accent, intonation, and rhythm to get acquaintance with language to give oral presentations.
	CO4	Identify the importance of English language and improve fluency in spoken

		English
	CO5	Respond appropriately in different socio cultural situtations
	CO6	Develop behavioural skills
Professional Ethics and Human values C319	CO1	Understand the morals, values and ethics.
	CO2	Understand the human rights and fundamental duties.
	CO3	Apply the ethical theories.
	CO4	Analyze the engineer's responsibilities towards safety and risk.
	CO5	Understand professional and individual rights.
	CO6	Apply the environmental, bio and research ethics

Class: III Year II Semester

Course Name with Code		Course Outcome
Heat Transfer C321	CO1	Explain the basic heat transfer fundamentals and their practical relevance in Planes, cylinders and spherical components.
	CO2	Compute rate of heat transfer for 1D, steady state composite systems without heat generation.
	CO3	Analyze the system with heat generation, variable thermal conductivity, fins and 1D transient conduction heat transfer problems.
	CO4	Develop the empirical equations for convection problems by using Buckingham's pi theorem.
	CO5	Compute the rate of heat transfer for forced and natural convection systems and design and analysis of heat exchangers.
	CO6	Solve the heat transfer systems with phase change and radiation.
Design of Machine Members-II C322	CO1	Select the suitable bearing based on the application of the loads and predict the life of the bearing.
	CO2	Explain the concepts in designing various engine parts.
	CO3	Justify the power transmission systems and to design pulleys.
	CO4	Calculate the power required to drive the power screws and determine the stresses in curved beams.
	CO5	Design spur and helical gears for different engineering applications.
	CO6	Apply the concepts in designing various machine tool elements.
Introduction to Artificial Intelligence and Machine Learning	CO1	Select an appropriate searching strategy for developing intelligent agents to find solution in optimized way using building blocks of AI.
	CO2	Apply prepositional and first order logic methods to resolve decisions for knowledge based agents.

C323	CO3	Practice uncertain knowledge and reasoning handling using Bayesian networks
	CO4	Identify and Apply appropriate Supervised Learning models.
	CO5	Explain the concepts and able to prepare the dataset for different Machine learning models.
	CO6	Perform Evaluation of Machine Learning algorithms and Model Selection.
Automobile Engineering C324	CO1	Explain the Engine Specifications, Power transmission and lubrication systems of four-wheeler automobile.
	CO2	Differentiate the functions of clutches, gear boxes and Suspension systems used in four-wheelers.
	CO3	Compute the steering geometry, steering linkages, steering gears and braking systems.
	CO4	Explain the Charging circuit, lightning and starting systems
	CO5	Demonstrate the safety systems and engine maintenance of four-wheeler.
	CO6	Evaluate the Engine Emissions Concentration measurement and exhaust gas treatment of automobile vehicles.
Industrial Robotics C325	CO1	Understand the concepts of robotics and its systems.
	CO2	Gain knowledge about the motion analysis and manipulator kinematics.
	CO3	Understand the differential transformations.
	CO4	Understand the dh notations.
	CO5	Acquire knowledge about the actuators, feedback components
	CO6	Gain knowledge about Robotic Applications
Heat Transfer Lab C326	CO1	Perform steady state conduction experiments to estimate thermal conductivity of different materials and heat transfer rate through rate through lagged pipe and concentric sphere.
	CO2	Determine the overall heat transfer coefficient for a composite slab and determine the efficiency and obtain variation of temperature along the length of the pin fin under forced and free convection.
	CO3	Estimate heat transfer coefficients in forced convection and free convection.
	CO4	Determine the effectiveness of parallel and counter flow heat exchangers and heat transfer rate in drop and film wise condensation
	CO5	Perform radiation experiments to determine surface emissivity of a test plate.
	CO6	Asses the performance of VCR system with capillary and thermal expansion valve and determine the critical heat flux in boiling heat transfer.
CAE /CAM Lab C327	CO1	Apply the commands in drafting and modeling of 2D & 3D components
	CO2	Develop the orthographic and isometric view by using modeling Software's.

	CO3	Analyze the structural behaviors of mechanical components using Ansys Software's.
	CO4	Analyze the Thermal behaviors of mechanical components using Ansys Software's.
	CO5	Explain the concepts of G-Codes & M- Codes of CNC machines.
	CO6	Develop the manual part programming for turning & milling operations using G-codes and M- codes.
Measurements and Metrology Lab C328	CO1	Demonstrate the measurement of Length,diameter,Bore daimerter by vernier caliper,micrometer,internal micrometers.
	CO2	Evaluate the straightness, flatness of given bed or surface by Autocollimator and spirit level
	CO3	Find the parameters of given screw threads by tool makers microscope and Gear tooth thickness using gear tooth vernier
	CO4	Calibration of Rotameter, Mcleod gauge, photo and magnetic speed pickups.
	CO5	Calibration of temperature measuring devices
	CO6	Measure the taper angle of a given compoenent using sinebar and bevel protractor machine.
Artificial Intelligence and Machine Learning Lab C329	CO1	Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction,)
	CO2	Understand the fundamentals of knowledge representation, inference
	CO3	Understand the fundamentals of theorem proving using AI tools.
	CO4	Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information
	CO5	Apply ML techniques and technologies to solve real world problems.
	CO6	Implementing basic machine learning algorithms
Research Methodology and IPR C32A	CO1	Understand objectives and characteristics of a research problem
	CO2	Analyze research related information and to follow research ethics.
	CO3	Understand the types of intellectual property rights.
	CO4	Learn about the scope of IPR.
	CO5	Understand the new developments in IPR.

Course Name with Code		Course Outcome
Industrial Management C411	CO1	Understand the basic concepts of industrial engineering
	CO2	Analyze the plant layout and the maintenance of plant layout
	CO3	Understand the importance of work study
	CO4	Analyze proper techniques to improve the product quality
	CO5	Understanding the methods of performance of human resource management
	CO6	Apply suitable techniques for enterprise resource planning
Finite Element Methods C412	CO1	Apply the concepts of Finite Element Methods and procedures to solve one dimensional problems
	CO2	Explain discretization procedures and treatment of boundary conditions
	CO3	Calculate stresses strains and reaction forces for trusses and beam elements
	CO4	Model two dimensional elements using CST and axisymmetric problems
	CO5	Solve higher order and iso-parametric elements using quadratic and cubic elements
	CO6	Analyze the heat transfer rate and natural frequency of one dimensional elements
Renewable Energy Sources C413	CO1	Explain the importance of, solar energy collection and storage.
	CO2	Discuss the wind energy principles.
	CO3	Analyze about biomass energy concepts.
	CO4	Apply the principles of tidal energy.
	CO5	Utilize the concepts of geothermal energy.
	CO6	Understand the concepts of clean development mechanisms.
Power Plant Engineering C414	CO1	Demonstrate the renewable energy sources and working of thermal power plant
	CO2	Explain plant layouts of Diesel engine power plant and Gas turbine power plant.
	CO3	Identify the components and terminology used in Hydroelectric power plants.
	CO4	Summarize the nuclear reactors used in nuclear power plant.
	CO5	Compare the working principles of combine power plants
	CO6	Explain about economic aspects and environmental impacts of a power plant.
	CO1	Illustrate the basic principles and fundamentals of NT.

Course Name with Code		Course Outcome
Nano Technology C415	CO2	Develop forecasts basic principles and fundamentals of Silicon Carbide NT and Nano Particles of Alumina and Zirconia.
	CO3	Discuss the basic principles and fundamentals of NT to detect Mechanical Properties.
	CO4	Select and use an appropriate basic principles and fundamentals of Electrical Properties and Optical Properties of NT
	CO5	Create and ability to Investigating and Manipulating Materials in the Nanoscale.
	CO6	Create and ability to engage in independent and life-long learning in the context of NT technological changes.
Finite Element Simulation Lab C416	CO1	Solve linear equations and plot straight lines.
	CO2	Analyze displacement of Mass-Spring-Damper systems
	CO3	Model a simple mechanical system that connects rotational and translational motion
	CO4	Analyze mechanical system with translational friction and translational hard stop
	CO5	Analyze mechanical rotational system with stick-slip motion.
	CO6	Analyze linkage mechanism and steering mechanism.
Project-I C417	CO1	Identify the need for project work and finilize the title.
	CO2	Illustrate the literature relevant to project work.
	CO3	Determine the problem identified and plan of action.
	CO4	Design and fabricate the with relevant parameters.
	CO5	Analyze and interpret the results.
	CO6	Conclusion with future scope.

Class: IV Year II Semester

Course Name with Code		Course Outcome
Additive Manufacturing C421	CO1	Explain the principles and working of the additive manufacturing, liquid-based rapid prototyping systems
	CO2	Discuss the various solid-based rapid prototyping systems.
	CO3	Discuss the various powder-based rapid prototyping systems.
	CO4	Differentiate the conventional tooling Vs RT and Direct & Indirect rapid tooling
	CO5	Support is required to RT in Data formats and Software
	CO6	Demonstrate the application of RT.

Non Destructive Evaluation C422	CO1	Illustrate the applications of NDE methods in processing industries.
	CO2	Understand the concepts of various NDE techniques and the requirements of radiographytechniques and safety aspects.
	CO3	Interpret the principles and procedure of ultrasonic testing
	CO4	Understand the principles and procedure of Liquid penetration and eddy current testing.
	CO5	Illustrate the principles and procedure of Magnetic particle testing.
	CO6	Interpret the principles and procedure of infrared testing and thermal testing.
Green Energy systems C423	CO1	Explain the importance of, solar energy collection and storage.
	CO2	Discuss the wind energy principles.
	CO3	Analyze about biomass energy concepts.
	CO4	Apply the principles of tidal energy.
	CO5	Utilize the concepts of geothermal energy.
	CO6	Understand the concepts of clean development mechanisms.
Entrepreneurship C424	CO1	Explain Entrepreneurship concept, knowledge and skills of Entrepreneur.
	CO2	Show how the role of the family and society is effect on business environment.
	CO3	Describe the central and state Government Industrial Policies and Regulations to start a new business.
	CO4	Illustrate the preparation of the Business Plan and Capital Budgeting preparation.
	CO5	Discuss the Growth Strategies, Product Launching, Finance and Human Resource mobilization operations of small business.
	CO6	Explain the effective management of small business.
Project C426	CO1	Identify the need for project work and finilize the title.
	CO2	Illustrate the literature relevant to project work.
	CO3	Determine the problem identified and plan of action.
	CO4	Design and fabricate the with relevant parameters.
	CO5	Analyze and interpret the results.
	CO6	Conclusion with future scope.