Program Educational Objectives   (PEOs)
I. Preparation
To provide opportunity **to learn and acquire knowledge** of basic mathematical, professional and technical fundamentals, so as to **prepare students** to succeed in technical **profession** at global level and to enable them to excel in **further education**.
II.Core competence
To **develop ability** among students to innovate, communicate, analyze, interpret and apply technical concepts to solve real life problems and **to create novel products**.
III.Breadth
To aware and **achievescientific and engineering breadth** amongst student through various curricular, co-curricular and extra-curricular activities.
IV. Professionalism
To inculcate professional and ethical attitude in students, enable them to excel in engineering profession.
V. Learning Environment
To accomplish overall development of the students; with the aid of **activity and project based learning environment**.

PROGRAM OUTCOMES (POs)
PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2 Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4 Conduct investigations of complex problems: Use research - based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5 Modern tool usage: Create , select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and sustainability:	
Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	
PO8 Ethics:	
Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	
PO9 Individual and team work:	
Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	
PO10 Communication:	
Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions	
PO11 Project management and finance:	
Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	
PO12 Life-long learning:	
Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological Change	

First Year Engineering Science Syllabus 2019 Course W.E.F. A.Y. 2019-20			
COURSE	**CODE**	**SUBJECT**	**Course OUTCOMES**
107001 SEM I	C101	**Engineering Mathematics-I**	CO1: Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems.
			CO2: the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
			CO3: to deal withderivative of functions of several variables that are essential in various branches of Engineering
			CO4: to apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.
			CO5: the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equations, finding linear and orthogonal transformations, Eigen values and Eigen vectors applicable to engineering problems
107002	C102	Engineering Physics	
107009	C103	Engineering Chemistry	CO1: Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.
			CO2: Select appropriate electro-technique and method of material analysis
			CO3: Demonstrate the knowledge of advanced engineering materials for various engineering applications.
			CO4: Analyze fuel and suggest use of alternative fuels.
			CO5: Identify chemical compounds based on their structure.
			CO6: Explain causes of corrosion and methods for minimizing corrosion.
102003	C104	Systems in Mechanical Engineering	CO1: Describe and compare the conversion of energy from renewable and non-renewable energy sources
			CO2: Explain basic laws of thermodynamics, heat transfer and their applications
			CO3: List down the types of road vehicles and their specifications

				CO4: Illustrate various basic parts and transmission system of a road vehicle
				CO5: Discuss several manufacturing processes and identify the suitable process
				CO6: Explain various types of mechanism and its application
103004	C105		Basic Electrical Engineering	CO1: Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
				CO2: Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic
				CO3: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
				CO4: Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions
				CO5: Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.
				CO6: Evaluate work, power, energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.
104010	C106		Basic Electronics Engineering	CO1: Explain the working of P-N junction diode and its circuits.
				CO2: Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET.
				CO3: Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops.
				CO4: Use different electronics measuring instruments to measure various electrical parameters.
				CO5: Select sensors for specific applications.
110005	C107		Programming and Problem Solving	
101011	C108		Engineering Mechanics	CO1: Determine resultant of various force systems
				CO2: Determine centroid, moment of inertia and solve problems related to friction
				CO3:Determine reactions of beams, calculate forces in cables using principles of equilibrium
				CO4: Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space
				CO5: Calculate position, velocity and acceleration of particle using principles of kinematics
				CO6: Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy
111006	C109		Workshop@	CO1: Familiar with safety norms to prevent any mishap in workshop.
				CO2: Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job.
				CO3: Able to understand the construction, working and functions of machine tools and their parts.
				CO4: Able to know simple operations (Turning and Facing) on a centre lathe
101007	C110		Audit Course 1& Environmental Studies	CO1:Demonstrate an integrative approach to environmental issues with a focus on sustainability.
				CO2: Explain and identify the role of the organism in energy transfers in different ecosystems.
				CO3: Distinguish between and provide examples of renewable and nonrenewable resources & analyze personal consumption of resources.
				CO4: Identify key threats to biodiversity and develop appropriate policy options for conserving biodiversity in different settings.

107008 SEM II	C111	**Engineering Mathematics-II**		CO1: the effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.
				CO2: advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.
				CO3: to trace the curve for a given equation and measure arc length of various curves.
				CO4: the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
				CO5: evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.
107002	C112	Engineering Physics/		
107009	C113	Engineering Chemistry		CO1: Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.
				CO2: Select appropriate electro-technique and method of material analysis.
				CO3: Demonstrate the knowledge of advanced engineering materials for various engineering applications.
				CO4: Analyze fuel and suggest use of alternative fuels.
				CO5: Identify chemical compounds based on their structure.
				CO6: Explain causes of corrosion and methods for minimizing corrosion.
103004	C114	Basic Electrical Engineering		
104010	C115	Basic Electronics Engineering		CO1: Explain the working of P-N junction diode and its circuits.
				CO2: Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET.
				CO3: Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops.
				CO4: Use different electronics measuring instruments to measure various electrical parameters.
				CO5: Select sensors for specific applications.
110005	C116	Programming and Problem Solving		CO1: Inculcate and apply various skills in problem solving.
				CO2: Choose most appropriate programming constructs and features to solve the problems in diversified domains.
				CO3: Exhibit the programming skills for the problems those require the writing of well- documented programs including use of the logical constructs of language, Python.
				CO4: Demonstrate significant experience with the Python program development environment
101011	C117	Engineering Mechanics		CO1: Determine resultant of various force systems
				CO2: Determine centroid, moment of inertia and solve problems related to friction
				CO3:Determine reactions of beams, calculate forces in cables using principles of equilibrium
				CO4: Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space
				CO5: Calculate position, velocity and acceleration of particle using principles of kinematics
				CO6: Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy
102012	C118	Engineering Graphics Ω		CO1: Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.
				CO2: Construct the various engineering curves using the drawing instruments.

COURSE	CODE	SUBJECT	Course Outcomes
			CO3: Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.
			CO4: Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.
			CO5: Draw the development of lateral surfaces for cut section of geometrical solids.
			CO6: Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools.
110013	C119	Project Based Learning	CO1: Project based learning will increase their capacity and learning through shared cognition
			CO2: Students able to draw on lessons from several disciplines and apply them in practical way.
			CO3: Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning
101014	C120	Audit Course 2[&]	CO1: Have an understanding of environmental pollution and the science behind those problems and potential solutions.
107015			CO2: Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules.
			CO3: Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources.
			CO4: Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.

Program Specific Outcomes (PSOs)Computer dept.
1. Professional Skills-The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexities.
2. Problem-Solving Skills- The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
3. Successful Career and Entrepreneurship- The ability to employ modern computer languages, environments and platforms in creating innovative career paths to be an entrepreneur and to have a zest for higher studies.

SE COMPUTER ENGINEERING 2019 COURSE W.E.F.A.Y. 2020-21)			
COURSE	CODE	SUBJECT	Course Outcomes
210241-SEM.I	C201	Discrete Mathematics	On completion of the course, learner will be able to–
			CO1: Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.
			CO2: Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
			CO3: Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.
			CO4: Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems

				CO5: Calculate numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using combinatorics
				CO6: Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.
				CO7: Analyze the properties of binary operations, apply abstract algebra in coding theory and evaluate the algebraic structures.
210242	C202		Fundamentals of Data Structures	On completion of the course, learner will be able to–
				CO1: Design the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.
				CO2: Discriminate the usage of various structures, Design/Program/Implement the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution
				CO3: Demonstrate use of sequential data structures- Array and Linked lists to store and process data.
				CO4: Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application
				CO5: Compare and contrast different implementations of data structures (dynamic and static
				CO6: Understand, Implement and apply principles of data structures-stack and queue to solve computational problems
210243	C203		Object Oriented Programming (OOP)	On completion of the course, learner will be able to
				CO1: Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing softwa
				CO2: Design object-oriented solutions for small systems involving multiple objects.
				CO3: Use virtual and pure virtual function and complex programming situations
				CO4: Apply object-oriented software principles in problem solving
				CO5: Analyze the strengths of object-oriented programming
				CO6: Develop the application using object oriented programming language(C++).
210244	C204		Computer Graphics	On completion of the course, learner will be able to–
				CO1: Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics
				CO2: Apply mathematics to develop Computer programs for elementary graphic operations.
				CO3: Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.
				CO4: Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.
				CO5: Understand the concepts of color models, lighting, shading models and hidden surface elimination
				CO6: Create effective programs using concepts of curves, fractals, animation and gaming
210245	C205		Digital Electronics and Logic Design	On completion of the course, learner will be able to–
				CO1: Simplify Boolean Expressions using K Map
				CO2: Design and implement combinational circuits
				CO3: Design and implement sequential circuits.
				CO4: Develop simple real-world application using ASM and PLD
				CO5: Differentiate and Choose appropriate logic families IC packages as per the given design specifications.

				CO6: Explain organization and architecture of computer system
210246		C206	Data Structures Laboratory	On completion of the course, learner will be able to–
				CO1: Use algorithms on various linear data structure using sequential organization to solve real life problems.
				CO2: Analyze problems to apply suitable searching and sorting algorithm to various applications
				CO3: Analyze problems to use variants of linked list and solve various real life problems
				CO4: Designing and implement data structures and algorithms for solving different kinds of problems.
210247		C207	OOP and Computer Graphics Laboratory	On completion of the course, learner will be able to–
				CO1: Understand and apply the concepts like inheritance, polymorphism, exception handling and generic structures for implementing reusable programming codes.
				CO2: Analyze the concept of file and apply it while storing and retrieving the data from secondary storages.
				CO3: Analyze and apply computer graphics algorithms for line-circle drawing, scan conversion and filling with the help of object oriented programming concepts
				CO4: Understand the concept of windowing and clipping and apply various algorithms to fill and clip polygons.
				CO5: Apply logic to implement, curves, fractals, animation and gaming programs
210248		C208	Digital Electronics Laboratory	On completion of the course, learner will be able to–
				CO1: Understand the working of digital electronic circuits
				CO2: Apply the knowledge to appropriate IC as per the design specifications
				CO3: Design and implement Sequential and Combinational digital circuits as per the specifications.
210249		C209	Business Communication Skills	On completion of the course, learner will be able to–
				CO1: Express effectively through verbal/oral communication and improve listening skills
				CO2: Write precise briefs or reports and technical documents.
				CO3: Prepare for group discussion / meetings / interviews and presentations
				CO4: Explore goal/target setting, self-motivation and practicing creative thinking.
				CO5: Operate effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership qualities.
210250		C210	Humanity and Social Science	On completion of the course, learner will be–
				CO1: Aware of the various issues concerning humans and society.
				CO2: Aware about their responsibilities towards society.
				CO3: Sensitized about broader issues regarding the social, cultural, economic and human aspects, involved in social changes
				CO4: Able to understand the nature of the individual and the relationship between self and the community.
				CO5: Able to understand major ideas, values, beliefs, and experiences that have shaped human history and cultures
210251		C211	Audit Course 3	On completion of the course, learner will be able to–
				CO1: Understand the importance of environment friendly society.
				CO2: Apply primary measures to reduce carbon emissions from their surroundings.
				CO3: Learn role of IT solutions in design of green buildings.

				CO4: Understand the use of software systems to complete statutory compliances involved in the design of a new home or office building through green construction
207003- SEM.II	C212	Engineering Mathematics III		On completion of the course learner will able to-
				CO1: Solve Linear differential equations, essential in modelling and design of computer-based systems.
				CO2: Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing
				CO3: Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.
				CO4: Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.
				CO5: Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.
210252	C213	Data Structures and Algorithms		On completion of the course, learner will be able to–
				CO1: Identify and articulate the complexity goals and benefits of a good hashing scheme for real- world applications.
				CO2: Apply non-linear data structures for solving problems of various domain.
				CO3: Design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.
				CO4: Analyze the algorithmic solutions for resource requirements and optimization
				CO5: Use efficient indexing methods and multiway search techniques to store and maintain data.
				CO6: Use appropriate modern tools to understand and analyze the functionalities confined to the secondary
210253	C214	Software Engineering		On completion of the course, learner will be able to-
				CO1: Analyze software requirements and formulate design solution for a software.
				CO2: Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
				CO3: Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.
				CO4: Model and design User interface and component-level.
				CO5: Identify and handle risk management and software configuration management.
				CO6: Utilize knowledge of software testing approaches, approaches to verification and validation.
				CO7: Construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.
210254	C215	Microprocessor		After successful completion of the course, the learner will be able to-
				CO1 Exhibit skill of assembly language programming for the application
				CO2: Classify Processor architectures
				CO3: Illustrate advanced features of 80386 Microprocessor.
				CO4: Compare and contrast different processor modes.
				CO5: Use interrupts mechanism in applications
				CO6: Differentiate between Microprocessors and Microcontrollers.

				CO7: Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems
210255	C216	Principles of Programming Languages		On completion of the course, learner will be able to–
				CO1: Make use of basic principles of programming languages.
				CO2: Develop a program with Data representation and Computations.
				CO3: Develop programs using Object Oriented Programming language : Java
				CO4: Develop application using inheritance, encapsulation, and polymorphism
				CO5: Demonstrate Multithreading for robust application development.
				CO6: Develop a simple program using basic concepts of Functional and Logical programming paradigm.
210256	C217	Data Structures and Algorithms Laboratory		On completion of the course, learner will be able to–
				CO1: Understand the ADT/libraries, hash tables and dictionary to design algorithms for a specific problem.
				CO2: Choose most appropriate data structures and apply algorithms for graphical solutions of the problems.
				CO3: Apply and analyze non linear data structures to solve real world complex problems.
				CO4: Apply and analyze algorithm design techniques for indexing, sorting, multi-way searching, file organization and compression
				CO5: Analyze the efficiency of most appropriate data structure for creating efficient solutions for engineering design situations.
210257	C218	Microprocessor Laboratory		On completion of the course, learner will be able to–
				CO1. Understand and apply various addressing modes and instruction set to implement assembly language programs
				CO2. Apply logic to implement code conversion
				CO3. Analyze and apply logic to demonstrate processor mode of operation
210258	C219	Project Based Learning II		CO1: Identify the real life problem from societal need point of view
				CO2: Choose and compare alternative approaches to select most feasible one
				CO3: Analyze and synthesize the identified problem from technological perspective
				CO4: Design the reliable and scalable solution to meet challenges
				CO5: Evaluate the solution based on the criteria specified
				CO6: Inculcate long life learning attitude towards the societal problems
210259	C220	Code of Conduct		On completion of the course, learner will be able to–
				CO1: Understand the basic perception of profession, professional ethics, various moral and social issues, industrial standards, code of ethics and role of professional ethics in engineering field
				CO2: Aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis
				CO3: Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development
				CO4: Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives
210260	C221	Audit Course 4		On completion of the course, learner will be able to–
				CO1: Understand the global water cycle and its various processes
				CO2: Understand climate change and their effects on water systems
				CO3: Understand Drinking treatment and quality of groundwater and surface water
				CO4: Understand the Physical, chemical, and biological processes involved in water treatment and distribution

	Program Specific Outcomes (PSOs) Mechanical dept.		
	1. Ability to critical analysis and problem-solving skills required in the field of Thermal, Production and design engineering for carrying out research activities.		
	2. Ability to conduct experiment and simulate the real life situations involved in engineering using computational techniques and instrumentation; and can work independently in research or industrial environments.		

COURSE	CODE	SUBJECT	Course Outcomes
SE Mechanical and Automobile Engineering 2019 Course W.E.F.A.Y.2020-21
202041 -SEM.I	C201	**Solid Mechanics**	On completion of the course, learner will be able to
			CO1. DEFINE various types of stresses and strain developed on determinate and indeterminate members.
			CO2. DRAW Shear force and bending moment diagram for various types of transverse loading and support
			CO3. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam
			CO4. CALCULATE torsional shear stress in shaft and buckling on the column.
			CO5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element
			CO6. UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems
202042	C202	Solid Modeling and Drafting	On completion of the course, learner will be able to
			CO1. UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management
			CO2. UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry
			CO3. CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system
			CO4. APPLY geometric transformations to simple 2D geometries
			CO5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.
			CO6. USE PMI & MBD approach for communication
202043	C203	Engineering Thermodynamics	On completion of the course, learner will be able to
			CO1. DESCRIBE the basics of thermodynamics with heat and work interactions.
			CO2. APPLY laws of thermodynamics to steady flow and non-flow processes.
			CO3. APPLY entropy, available and non available energy for an Open and Closed System,
			CO4. DETERMINE the properties of steam and their effect on performance of vapour power cycle.
			CO5. ANALYSE the fuel combustion process and products of combustion.
			CO6. SELECT various instrumentations required for safe and efficient operation of steam generator
202044	C204	Engineering Materials and Metallurgy	On completion of the course, learner will be able to
			CO1. COMPARE crystal structures and ASSESS different lattice parameters
			CO2. COMPARE crystal structures and ASSESS different lattice parameters
			CO3.DIFFERENTIATE and DETERMINE mechanical properties using destructive and non- destructive testing of materials
			CO4 IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. Etc

				CO5. ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.
				CO6. SELECT appropriate materials for various applications
203156	C205	Electrical and Electronics Engineering		On completion of the course, learner will be able to
				CO1. APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems
				CO2. DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board
				CO3.UNDERSTAND the operation of DC motor, its speed control methods and braking
				CO4. DISTINGUISH between types of three phase induction motor and its characteristic features
				CO5. EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems
				CO6. CHOOSE energy storage devices and electrical drives for EVs
202045	C206	Geometric Dimensioning and Tolerancing Lab		On completion of the course, learner will be able to
				CO1. SELECT appropriate IS and ASME standards for drawing CO2. READ & ANALYSE variety of industrial drawings
				CO2. READ & ANALYSE variety of industrial drawings
				CO3. APPLY geometric and dimensional tolerance, surface finish symbols in drawing
				CO4. EVALUATE dimensional tolerance based on type of fit, etc.
				CO5. SELECT an appropriate manufacturing process using DFM, DFA, etc
207002 -SEM.II	C207	**Engineering Mathematics - III**		On completion of the course, learner will be able to
				CO1. SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems.
				CO2. APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications
				CO3.APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control.
				CO4. PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems.
				CO5.SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.
202047	C208	Kinematics of Machinery		On completion of the course, learner will be able to
				CO1. APPLY kinematic analysis to simple mechanisms
				CO2. ANALYZE velocity and acceleration in mechanisms by vector and graphical method
				CO3. SYNTHESIZE a four bar mechanism with analytical and graphical methods
				CO4. APPLY fundamentals of gear theory as a prerequisite for gear design
				CO5. CONSTRUCT cam profile for given follower motion
202048	C209	Applied Thermodynamics		On completion of the course, learner will be able to
				CO1.DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.
				CO2.DISCUSS basics of engine terminology,air standard, fuel air and actual cycles.
				CO3.IDENTIFY factors affecting the combustion performance of SI and CI engines.
				CO4.DETERMINE performance parameters of IC Engines and emission control
				CO5.EXPLAIN working of various IC Engine systems and use of alternative fuels.

				CO6.CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors
202049	C210	Fluid Mechanics		On completion of the course, learner will be able to
				CO1.DETERMINE various properties of fluid
				CO2.APPLY the laws of fluid statics and concepts of buoyancy
				CO3.IDENTIFY types of fluid flow and terms associated in fluid kinematics
				CO4.APPLY principles of fluid dynamics to laminar flow
				CO5.ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface
				CO6.CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws
202050	C211	Manufacturing Processes		On completion of the course, learner will be able to
				CO1.SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process
				CO2.UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling
				CO3.DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations
				CO4.CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics
				CO5.DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques
				CO6.UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites
202051	C212	Machine Shop		On completion of the course, learner will be able to
				CO1.PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique
				CO2.MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques
				CO3.PERFORM cylindrical/surface grinding operation and CALCULATE its machining time
				CO4.DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine
				CO5.PREPARE industry visit report
				CO6.UNDERSTAND procedure of plastic processing
202052	C213	Project Based Learning - II		On completion of the course, learner will be able to
				CO1.IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives
				CO2.ANALYZE the results and arrive at valid conclusions.
				CO3.PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.
				CO4.CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.
				CO5.USE of technology in proposed work and demonstrate learning in oral and written form
				CO6.DEVELOP ability to work as an individual and as a team member.
		Program Specific Outcomes (PSOs) ITdept		

COURSE	CODE	SUBJECT	Course Outcomes
			1.An ability to apply the theoretical concepts and practical knowledge of Information Technology in analysis, design, development and management of information processing systems and applications in the interdisciplinary domain.
			2.An ability to analyze a problem, and identify and define the computing infrastructure and operations requirements appropriate to its solution. IT graduates should be able to work on large-scale computing systems.
			3.An understanding of professional, business and business processes, ethical,legal, security and social issues and responsibilities
		SE -INFORMATION TECHNOLOGY (INFO.TECH 2019 COURSE W.E.F.A.Y. 2020-21)	
COURSE	**CODE**	**SUBJECT**	**Course Outcomes**
214441 SEM.I	C201	Discrete Mathematics	On completion of the course, students will be able to–
			CO1: Formulate and apply formal proof techniques and solve the problems with logical reasoning.
			CO2: Analyze and evaluate the combinatorial problems by using probability theory
			CO3: Apply the concepts of graph theory to devise mathematical models.
			CO4: Analyze types of relations and functions to provide solution to computational problems.
			CO5: Identify techniques of number theory and its application.
			CO6: Identify fundamental algebraic structures
214442	C202	Logic Design and ComputerOrganization	On completion of the course, students will be able to–
			CO1: Perform basic binary arithmetic & simplify logic expressions.
			CO2: Grasp the operations of logic ICs and Implement combinational logic functions using ICs.
			CO3: Comprehend the operations of basic memory cell types and Implement sequential logic functions using ICs.
			CO4: Elucidate the functions & organization of various blocks of CPU.
			CO5: Understand CPU instruction characteristics, enhancement features of CPU.
			CO6: Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices
214443	C203	Data Structures and Algorithms	On completion of the course, students will be able to–
			CO1: Perform basic analysis of algorithms with respect to time and space complexity.
			CO2: Select appropriate searching and/or sorting techniques in the application development.
			CO3: Implement abstract data type (ADT) and data structures for given application.
			CO4: Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc
			CO5: Apply implement learned algorithm design techniques and data structures to solve problems.
			CO6: Design different hashing functions and use files organizations.
214444	C204	Object Oriented Programming	On completion of the course, students will be able to–
			CO1: Differentiate various programming paradigms.
			CO2: Identify classes, objects, methods, and handle object creation, initialization, and Destruction to model real-world problems
			CO3: Identify relationship among objects using inheritance and polymorphism principles.
			CO4: Handle different types of exceptions and perform generic programming
			CO5: Use of files for persistent data storage for real world application.
			CO6: Apply appropriate design patterns to provide object-oriented solutions.
214445	C205	Basics of Computer Network	On completion of the course, students will be able to–

				CO1: Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.
				CO2: Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.
				CO3: Compare different access techniques, channelization and IEEE standards.
				CO4: Apply the skills of subnetting, supernetting and routing mechanisms
				CO5: Differentiate IPv4 and IPv6.
				CO6: Illustrate services and protocols used at transport layer.
214446		C206	Logic Design Computer Organization Lab	On completion of the course, students will be able to–
				CO1: Use logic function representation for simplification with K-Maps and design Combinational logic circuits using SSI & MSI chips.
				CO2: Design Sequential Logic circuits: MOD counters using synchronous counters.
				CO3: Understand the basics of simulator tool & to simulate basic blocks such as ALU & memory
214447		C207	Data Structures and Algorithms Lab	On completion of the course, students will be able to–
				CO1: Analyze algorithms and to determine algorithm correctness and time efficiency class.
				CO2: Implement abstract data type (ADT) and data structures for given application.
				CO3: Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.).
				CO4: Solve problems using algorithmic design techniques and data structures.
				CO5: Analyze of algorithms with respect to time and space complexity
214448		C208	Object Oriented Programming Lab	On completion of the course, students will be able to–
				CO1: Differentiate various programming paradigms.
				CO2: Identify classes, objects, methods, and handle object creation, initialization, and destruction to model real-world problems.
				CO3: Identify relationship among objects using inheritance and polymorphism.
				CO4: Handle different types of exceptions and perform generic programming.
				CO5: Use file handling for real world application.
				CO6: Apply appropriate design patterns to provide object-oriented solutions
214449		C209	Soft Skill Lab	On completion of the course, students will be able to–
				CO1:Introspect about individual's goals, aspirations by evaluating one's SWOC and think creatively.
				CO2: Develop effective communication skills including Listening, Reading, Writing and Speaking.
				CO3:Constructively participate in group discussion, meetings and prepare and deliver Presentations.
				CO4: Write precise briefs or reports and technical documents.
				CO5:Practice professional etiquette, present oneself confidently and successfully handle personal interviews .
				CO6:Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and
				leadership quality.
214450		C210	Mandatory Audit Course 3	On completion of this course students will be able to-
				CO1: Adapt the global ethical principles and modern ethical issues.
				CO2: Apprehend ethics in the business relationships and practices of IT.
				CO3: Implement trustworthy computing to manage risk and security vulnerabilities.

				CO4: Analyse concerns of privacy, privacy rights in information-gathering practices in IT
207003 SEM. II	C211	Engineering Mathematics- III		On completion of this course student will be able to –
				CO1: Solve Linear differential equations, essential in modelling and design of computer-based systems.
				CO2: Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
				CO3: Apply Statistical methods like correlation& regression analysis and probability theory for data analysis and predictions in machine learning.
				CO4: Solve Algebraic &Transcendental equations and System of linear equations using numerical techniques
				CO5: Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing
214451	C212	Processor Architecture		On completion of this course student will be able to –
				CO1: Apprehend architecture and memory organization of PIC 18 microcontroller.
				CO2: Implement embedded C programming for PIC18
				CO3: Use concepts of timers and interrupts of PIC 18.
				CO4: Demonstrate real life applications using PIC 18.
				CO5: Analyze architectural details of ARM processor
214452	C213	Database Management System		On completion of this course student will be able to --
				CO1: Apply fundamental elements of database management systems.
				CO2: Design ER-models to represent simple database application scenarios.
				CO3: Formulate SQL queries on data for relational databases.
				CO4: Improve the database design by normalization & to incorporate query processing.
				CO5: Apply ACID properties for transaction management and concurrency control.
				CO6: Analyze various database architectures and technologies
214453	C214	Computer Graphics		On completion of the course, students will be able to–
				CO1: Apply mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines, circle, and apply it for problem solving.
				CO2: Employ techniques of geometrical transforms to produce, position and manipulate Objects in 2 dimensional and 3-dimensional space respectively.
				CO3: Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device
				CO4: Apply concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications.
				CO5: Perceive the concepts of virtual reality.
214454	C215	Software Engineering		On completion of the course, students will be able to --
				CO1: Classify various software application domains.
				CO2: Analyze software requirements by using various modeling techniques.
				CO3: Translate the requirement models into design models.
				CO4: Apply planning and estimation to any project.
				CO5: Use quality attributes and testing principles in software development life cycle.
				CO6: Discuss recent trends in Software engineering by using CASE and agile tools

214455	C216	Programming Skill Development Lab	On completion of this course student will be able to --
			CO1: Apply concepts related to embedded C programming.
			CO2: Develop and Execute embedded C program to perform array addition, block transfer, sorting operations
			CO3: Perform interfacing of real-world input and output devices to PIC18FXXX microcontroller.
			CO4: Use source prototype platform like Raspberry-Pi/Beagle board/Arduino.
214456	C217	Database Management System Lab	On completion of this course student will be able to
			CO1: Install and configure database systems.
			CO2: Analyze database models & entity relationship models.
			CO3 : Design and implement a database schema for a given problem-domain
			CO4: Implement relational database systems.
			CO5: Populate and query a database using SQL DDL / DML / DCL commands.
			CO6 :Design a backend database of any one organization: CASE STUDY
214457	C218	Computer Graphics Lab	On completion of this course student will be able to --
			CO1: Apply line& circle drawing algorithms to draw the objects.
			CO2: Apply polygon filling methods for the object.
			CO3: Apply polygon clipping algorithms for the object.
			CO4: Apply the 2D transformations on the object.
			CO5: Implement the curve generation algorithms.
			CO6: Demonstrate the animation of any object using animation principles
214458	C219	Project Based Learning	On completion of the course, student will be able to --
			CO1: Design solution to real life problems and analyze its concerns through shared cognition.
			CO2: Apply learning by doing approach in PBL to promote lifelong learning.
			CO3: Tackle technical challenges for solving real world problems with team efforts.
			CO4: Collaborate and engage in multi-disciplinary learning environments
214459	C220	Mandatory Audit Course 4	On completion of the course, learner will be able to --
			CO1:Relate the relations between the environment and ecology, estimating water requirement for public water supply scheme.
			CO2:Assess the quality of water as per BIS and select the appropriate treatment method required for the water source.
			CO3: Analyze the suitable distribution system for a locality and know the appurtenances used.
			CO4: Summarize the arrangement of water supply and fittings in a building.
			CO5: Determine the need of conservation of water and rural water supply.
			CO6: Identify the sources of water pollution and suitable control measures.

Program Specific Outcomes (PSOs)Electrical dept.

1.Able to apply the knowledge gained during the course of the program from Mathematics, Basic Computing, Basic Sciences and Social Sciences in general and all electrical courses in particular to identify, formulate and solve real life problems faced in industries and/or during research work.

2. Able to provide practically/socially acceptable technical solutions to electrical engineering problems with the application of appropriate techniques.

| | | 3.Able to apply the knowledge of ethical and management principles required to work in a team as well as to lead a team. | |
| | | 4.Recognize the need for professionalism, excellence, and continuous improvement | |

<table>
<tr><td colspan="4" style="background:yellow;text-align:center">SE -ELECTRICAL ENGINEERING 2019 COURSE W.E.F.A.Y. 2020-21)</td></tr>
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COURSE	CODE	SUBJECT	Course Outcomes
207006 SEM- I	C201	Engineering Mathematics-III	At the end of this course, students will be able to:
			CO1:Solve higher order linear differential equation using appropriate techniques to model and analyze electrical circuits.
			CO2: Apply Integral transforms such as Laplace transform, Fourier transform and Z-Transform to solve problems related to signal processing and control systems
			CO3: Apply Statistical methods like correlation, regression and Probability theory as applicable to analyze and interpret experimental data related to energy management, power systems, testing and quality control
			CO4: Perform Vector differentiation and integration, analyze the vector fields and apply to wave theory and electro-magnetic fields.
			CO5: Analyze Complex functions, conformal mappings, and perform contour integration in the study of electrostatics, signal and image processing.
203141	C202	Power Generation Technologies	Upon successful completion of this course, the students will be able to:
			CO1: Identify components and elaborate working principle of conventional power plants.
			CO2: Recognize the importance and opportunities of renewable energies.
			CO3: Calculate and control power output of wind solar, and hydro power plant.
			CO4: Describe process of grid interconnection of distributed generation and requirements.
			CO5: Interpret the environmental and social impact of various generation technologies
203142	C203	Material Science	Upon successful completion of this course, the students will be able to :
			CO1: Discuss classification,properties and characteristics of different electrical engineering materials
			CO2: State various applicationsmeasuring methods for parameters of different classes of electrical engineering materials.
			CO3: Solve simple problems based on dielectric, magnetic and conducting materials.
			CO4: Apply knowledge of Nano-technology to electrical engineering.
			CO5: Execute tests ondielectric, insulating, magnetic, conducting, resistive materials as per IS to decide the quality of thematerials.
			CO6: Create learning resource material ethically to demonstrate self learning leading to lifelong learning skills and usage of ICT/ online technology through collaborative/active learning activities.
203143	C204	Analog and Digital Electronics	Upon successful completion of this course, the students will be able to :-
			CO1: Design logical, sequential and combinational digital circuit using K-Map. .
			CO2: Demonstrate different digital memories and programmable logic families
			CO3: Apply and analyze applications of OPAMP in open and closed loop condition.
			CO4: Design uncontrolled rectifier with given specifications
203144	C205	Electrical Measurement & Instrumentation	After completion of this course, the students will be able to:
			CO1: Define various characteristic and classify measuring instruments along with range extension techniques.

			CO2: Apply measurement techniques for measurement of resistance, inductance and capacitance
			CO3: Demonstrate construction, working principle of electrodynamo type and induction type instruments for measurement of power and energy
			CO4: Make use of CRO for measurement of voltage, current and frequency.
			CO5: Classify transducer and apply it for measurement of physical parameters in real time
203150	C206	Applications of Mathematics in Electrical Engineering	At the end of this course, learner will be able to
			CO1: Apply fundamentals of mathematics in solving electrical engineering problem mathematical techniques.
			CO2: Analyze complex electrical engineering problem using
			CO3: Implement program and simulation for problems in electrical engineering.
			CO4: Demonstrate self lifelong learning skills with applications of mathematics in electrical engineering through software.
203151	C207	Soft Skill	Students will be able to :-
			CO1: DoSWOC analysis.
			CO2: Develop presentation and take part in group discussion.
			CO3: Understand and implement etiquette in workplace and in society at large.
			CO4: Work in team with team spirit.
			CO5: Utilize the techniques for time management and stress management.
203152	C208	Audit Course-III	Student will be able to
			CO1: Differentiate between types of solar Concentrators
			CO2: Apply software tool for solar concentrators
			CO3: Design different types of Solar collectors and balance of plant
203145 SEM- II	C209	Power System-I	Upon successful completion of this course, the students will be able to:
			CO1: Recognize different patterns of load curve and calculate associated different factors with it and tariff.
			CO2: Draft specifications of electrical equipment in power station.
			CO3: Design electrical and mechanical aspects in overhead transmission and underground cables.
			CO4: Evaluate the inductance and capacitance of different transmission line configurations.
			CO5: Analyse the performance of short and medium transmission lines
203146	C210	Electrical Machines-I	Upon successful completion of this course, the students will be able to:
			CO1: Evaluate performance parameters of transformer with experimentation and demonstrate construction along with specifications as per standards.
			CO2: Distinguish between various types of transformer connections as per vector groups with application and to perform parallel operation of single/three phase transformers
			CO3: Select and draft specifications of DC machines and Induction motors for various applications along with speed control methods.
			CO4: Justify the need of starters in electrical machines with merits and demerits.
			CO5: Test and evaluate performance of DC machines and Induction motors as per IS standard
203147	C211	Network Analysis	Upon successful completion of this course, the students will be able to
			CO1: Calculate current/voltage in electrical circuits using simplification techniques, Mesh, Nodal analysis and network theorems.

			CO2: Analyze the response of RLC circuit with electrical supply in transient and stead state.
			CO3: Apply Laplace transform to analyze behaviour of an electrical circuit.
			CO4: Derive formula and solve numerical of two port network and Design of filters
			CO5: Applyknowledge of network theory to find transfer function, poles and zeroes location to perform stability analysis and parallel resonance
203148	C212	Numerical Methods & Computer Programming	On completion of the course, student will be able to
			CO1:Demonstrate types of errors in computation and their causes of occurrence.
			CO2: Calculate root of algebraic and transcendental equations using various methods.
			CO3: Apply numerical methods for various mathematical problems such as interpolation, numerical differentiation, integration and ordinary differential equation.
			CO4: Solve linear simultaneous equation using direct and indirect method.
			CO5:Develop algorithms and write computer programs for various numerical methods
203149	C213	Fundamental of Microcontroller and Applications	Upon successful completion of this course, the students will be able to:-
			CO1: Describe the architecture and features of various types of the microcontroller.
			CO2: Illustrate addressing modes and execute programs in assembly language for the microcontroller.
			CO3: Write programs in C language for microcontroller 8051.
			CO4: Elaborate interrupt structure of 8051 and program to handle interrupt and ADC809
			CO5: Define the protocol for serial communication and understand the microcontroller development systems.
			CO6: Interface input output devices and measure electrical parameters with 8051 in real time
203152	C214	Project Based Learning	At the end of this project-based learning, students will be able to
			CO1: Identify, formulate, and analyze the simple project problem.
			CO2: Apply knowledge of mathematics, basic sciences, and electrical engineering fundamentals to develop solutions for the project.
			CO3: Learn to work in teams, and to plan and carry out different tasks that are required during a project.
			CO4: Understand their own and their team-mate's strengths and skills.
			CO5: Draw information from a variety of sources and be able to filter and summarize the relevant points.
			CO6: Communicate to different audiences in oral, visual, and written forms
203153	C215	Audit Course-IV	Students will be able to
			CO1: design of Solar PV system for small and large installations
			CO2: handle software tools for Solar PV systems
		Program Specific Outcomes (PSOs)E&TC dept.	
		1.Apply the fundamental concepts of electronics and telecommunication engineering to design a variety of systems for applications including embedded systems, VLSI, signal processing, image processing, communication, networking and control system.	
		2.An ability to isolate and solve complex problems in the domain of Electronics and Communication using latest hardware and software tools, along with analytical and managerial skills to arrive at cost effective and optimum solutions	

		S.E (Electronics & Telecommunication EngineeringCourse 2019) (w.e.f. June 2020)	
COURSE	**CODE**	**SUBJECT**	**Course Outcomes**
207005 SEM.I	**C201**	Engineering Mathematics III	On completion of the course, learner will be able to –

				CO1: Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems.
				CO2: Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems
				CO3: Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing
				CO4: Perform vector differentiation & integration, analyze the vector fields and apply to electro- magnetic fields & wave theory.
				CO5: Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.
204181	C202	Electronic Circuits		On completion of the course, learner will be able to -
				CO1: Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.
				CO2: Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications.
				CO3: Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.
				CO4: Explain internal schematic of Op-Amp and define its performance parameters.
				CO5: Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.
				CO6: Understand and compare the principles of various data conversion techniques and PLL with their applications.
204182	C203	Digital Circuits		On completion of the course, learner will be able to
				CO1: Identify and prevent various hazards and timing problems in a digital design.
				CO2: Use the basic logic gates and various reduction techniques of digital logic circuit
				CO3: Analyze, design and implement combinational logic circuits.
				CO4: Analyze, design and implement sequential circuits.
				CO5: Differentiate between Mealy and Moore machines
				CO6: Analyze digital system design using PLD.
204183	C204	Electrical Circuits		On completion of the course, learner will be able to
				CO1: Analyze the simple DC and AC circuit with circuit simplification techniques.
				CO2: Formulate and analyze driven and source free RL and RC circuits
				CO3: Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.
				CO4: Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.
				CO5: Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.
				CO6: Analyze and select a suitable motor for different applications.
204184	C205	Data structures		On completion of the course, learner will be able to
				CO1: Solve mathematical problems using C programming language.
				CO2: Implement sorting and searching algorithms and calculate their complexity
				CO3: Develop applications of stack and queue using array
				CO4: Demonstrate applicability of Linked List

				CO5: Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity
				CO6: Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.
204185	**C206**	Electronic Circuit Lab		
204186	**C207**	Digital circuits Lab		
204187	**C208**	Electrical Circuit Lab		
204188	**C209**	Data Structures Lab		
204189	**C210**	Electronic Skill Development		
204190	**C211**	Mandatory Audit Course 3		
204191 SEM.II	**C212**	**Signals & Systems**		On completion of the course, learner will be able to
				CO1: Identify, classify basic signals and perform operations on signals
				CO2: Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals.
				CO3: Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform
				CO4: Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.
				CO5: Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF
				CO6: Compute the mean, mean square, variance and standard deviation for given random variables using PDF.
204192	**C213**	Control Systems		On completion of the course, learner will be able to -
				CO1: Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
				CO2: Determine the (absolute) stability of a closed-loop control system.
				CO4: Perform frequency domain analysis of control systems required for stability analysis.
				CO5: Apply root-locus, Frequency Plots technique to analyze control systems.
				CO6: Express and solve system equations in state variable form.
				CO7: Differentiate between various digital controllers and understand the role of the controllers in Industrial automation.
204193	**C214**	Principles of Communication Systems		On completion of the course, learner will be able to
				CO1: To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.
				CO2: Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.
				CO3: Explain generation and detection of FM systems and compare with AM systems.
				CO4: Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).
				CO5: Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).
				CO6: Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission
204194	**C215**	Object Oriented Programming		On completion of the course, learner will be able to -
				CO1: Describe the principles of object oriented programming. CO2: Apply the concepts of data encapsulation, inheritance in C++.

COURSE	CODE	SUBJECT	Course Outcomes
			CO3: Understand Operator overloading and friend functions in C++.
			CO4: Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.
			CO5: Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.
			CO6: Describe and use of File handling in C++.
204195	**C216**	Signals & Control System Lab	
204196	**C217**	Principle of Communication Systems Lab	
204197	**C218**	Object Oriented Programming Lab	
204198	**C219**	Data Analytics Lab	
204199	**C220**	Employability Skill Development	On completion of the course, learner will be able to
			CO1: Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.
			CO2: Develop effective communication skills (listening, reading, writing, and speaking), self- management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace
			CO3: Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills
			CO4: Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career.
			CO5: Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment.
204200	**C221**	Project Based Learning	On completion of the course, learner will be able to -
			CO1: Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives
			CO2: Contribute to society through proposed solution by strictly following professional ethics and safety measures.
			CO3: Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.
			CO4: Analyze the results and arrive at valid conclusion.
			CO5: Use of technology in proposed work and demonstrate learning in oral and written form.
			CO6: Develop ability to work as an individual and as a team member.
204201	**C222**	Mandatory Audit Course 4	

COURSE	CODE	SUBJECT	Course Outcomes
			TE COMPUTER ENGINEERING 2019 COURSE W.E.F.A.Y. 2021-22
310241 SEM-I	**301**	**Database Management Systems**	After completion of the course, students should be able to
			CO1: Analyze and design database management system using different data models
			CO2: Implement database queries using database languages
			CO3: Normalize the database design using normal forms
			CO4: Design & develop transaction processing approach for relational databases.
			CO5: Use NoSQL databases for processing unstructured data
			CO6: Understand advances in databases
310242	302	Theory of Computation	After completion of the course, students should be able to

			CO1: Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants
			CO2: Construct regular expression to present regular language and understand pumping lemma for RE
			CO3: Design Context Free Grammars and learn to simplify the grammar
			CO4: Construct Pushdown Automaton model for the Context Free Language
			CO5: Design Turing Machine for the different requirements outlined by theoretical computer science
			CO6: Understand different classes of problems, classify and analyze them and study concepts of NP completeness
310243	303	Systems Programming and Operating System	On completion of the course, students should be able to
			CO1: Analyze basic system software
			CO2: Design & implement system software
			CO3: Analyze different schemes for designing loader and linker
			CO4: Use language translation tools like LEX & YACC
			CO5: Understand Operating System concepts
			CO6: Analyze the organization of memory and memory management
310244	304	Computer Networks and Security	On completion of the course, students should be able to
			CO1: Analyze computer networks, architectures, protocols and technologies
			CO2: Illustrate the working and functions of data link layer
			CO3: Analyze the working of different routing protocols and mechanisms
			CO4: Implement client-server applications using sockets
			CO5: Illustrate role of application layer with its protocols, Client-Server architectures
			CO6: Comprehend the basics of information security
310245A	305	Elective I- Internet of Things and Embedded Systems	On completion of the course, students should be able to
			CO1: Understand the fundamentals and need of embedded system for the Internet of Things
			CO2: Apply IoT enabling technologies for developing IoT systems
			CO3: Apply design methodology for designing and implementing IoT applications
			CO4: Analyze IoT protocols for making IoT devices communication
			CO5: Design cloud based IoT systems
			CO6: Design and Develop secured IoT applications
310245B	306	Elective I- Human Computer Interface	On completion of the course, students should be able to
			CO1: Design effective human-computer-interfaces for all kinds of users
			CO2: Apply and analyze the user-interface with respect to golden rules of interface
			CO3: Analyze and evaluate the effectiveness of a user-interface design
			CO4: Implement the interactive designs for feasible data search and retrieval
			CO5: Analyze the scope of HCI in various paradigms like ubiquitous computing, virtual reality, multi-media, World Wide Web related environments
			CO6: Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems
310245C	307	Elective I- Distributed Systems	On completion of the course, students should be able to

			CO1: Analyze distributed system types and architectural styles.
			CO2: Implement communication mechanism in distributed system
			CO3: Implement the synchronization algorithms in distributed system applications
			CO4: Develop the components of distributed file system
			CO5: Apply replication techniques and consistency model in distributed system
			CO6: Build fault tolerant distributed system
310245D	308	Elective I- Software Project Management	On completion of the course, students should be able to
			CO1: Understand Software Project Management concepts
			CO2: Use various tools of software project management
			CO3: Schedule various activities in software projects
			CO4: Track a project and manage changes
			CO5: Apply Agile Project Management
			CO6: Analyse staffing process for team building and decision making in software projects and Management
310246	309	Database Management Systems Laboratory	On completion of the course, learner will be able to–
			CO1: Design E-R Model for given requirements and convert the same into database tables
			CO2: Design schema in appropriate normal form considering actual requirements
			CO3: Implement SQL queries for given requirements , using different SQL concepts
			CO4: Implement PL/SQL Code block for given requirements
			CO5: Implement NoSQL queries using MongoDB
			CO6: Design and develop Application considering actual requirements and using Database concepts
310247	310	Computer Networks and Security Laboratory	On completion of the course, learner will be able to–
			CO1: Analyze the requirements of network types, topology and transmission media
			CO2: Demonstrate error control, flow control techniques and protocols and analyze them
			CO3: Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms
			CO4: Develop Client-Server architectures and prototypes
			CO5: Implement web applications and services using application layer protocols
			CO6: Use network security services and mechanisms
310248	311	Laboratory Practice I	On completion of the course, learner will be able to
		Systems Programming and Operating System	CO1: Implement language translators
			CO2: Use tools like LEX & YACC
			CO3: Implement internals and functionalities of Operating System
		Internet of Things and Embedded Systems	CO4: Design the IoT & embedded system based application
			CO5: Develop smart applications using IoT
			CO6: Develop IoT applications based on cloud environment
		OR	
		Human Computer Interface	CO4: Implement the interactive designs for feasible data search and retrieval
			CO5: Analyze the scope of HCI in various paradigms like ubiquitous computing, virtual reality, multi-media, World wide web related environments
			CO6: Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems

		OR	
		Distributed Systems	CO4: Demonstrate knowledge of the core concepts and techniques in Distributed Systems
			CO5: Apply the principles of state-of-the-Art Distributed Systems in real time applications
			CO6: Design, build and test application programs on Distributed Systems
		OR	
		Software Project Management	CO4: Apply Software Project Management tools
			CO5: Implement software project planning and scheduling
			CO6: Analyse staffing in software project
310249	312	Seminar and Technical Communication	On completion of the course, learner will be able to
			CO1: Analyze a latest topic of professional interest
			CO2: Enhance technical writing skills
			CO3: Identify an engineering problem, analyze it and propose a work plan to solve it
			CO4: Communicate with professional technical presentation skills
310250	313	Audit Course 5	
310251 SEM-II	**314**	**Data Science and Big Data Analytics**	After completion of the course, students should be able to
			CO1: Analyze needs and challenges for Data Science Big Data Analytics
			CO2: Apply statistics for Big Data Analytics
			CO3: Apply the lifecycle of Big Data analytics to real world problems
			CO4: Implement Big Data Analytics using Python programming
			CO5: Implement data visualization using visualization tools in Python programming
310252	315	Web Technology	After completion of the course, students should be able to
			CO1: Implement and analyze behavior of web pages using HTML and CSS
			CO2: Apply the client side and server side technologies during web development
			CO3: Analyze the Web services and frameworks
			CO4: Create the effective web applications for business functionalities using latest web development platforms
310253	316	Artificial Intelligence	After completion of the course, students should be able to
			CO1: Identify and apply suitable Intelligent agents for various AI applications
			CO2: Build smart system using different informed search / uninformed search or heuristic approaches
			CO3: Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem
			CO4: Apply the suitable algorithms to solve AI problems
			CO5: Implement ideas underlying modern logical inference systems
			CO6: Represent complex problems with expressive yet carefully constrained language of Representation
310254A	317	Elective II- Information Security	On completion of the course, students should be able to
			CO1: Model the cyber security threats and apply formal procedures to defend the attacks.
			CO2: Apply appropriate cryptographic techniques by learning symmetric and asymmetric key cryptography.
			CO3: Design and analyze web security solutions by deploying various cryptographic techniques along with data integrity algorithms
			CO4: Identify and Evaluate information security threats and vulnerabilities in Information systems and apply security measures to real time scenarios.

			CO5: Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection
310254B	318	Elective II- Augmented and Virtual Reality	On completion of the course, students should be able to
			CO1: Illustrate Augmented Reality and Virtual Reality system and applications
			CO2: Use interface to the Virtual World for Augmented Reality and Virtual Reality systems
			CO3: Use rendering tools in the context of Virtual Reality
			CO4: Analyze manipulation, navigation and interaction with elements in the virtual world.
			CO5: Use Augmented Reality hardware
			CO6: Create Mobile Augmented Reality using various Augmented Reality techniques
310254C	319	Elective II- Cloud Computing	On completion of the course, students should be able to
			CO1: Understand the different Cloud Computing environment
			CO2: Use appropriate data storage technique on Cloud, based on Cloud application
			CO3: Analyze virtualization technology and install virtualization software
			CO4: Develop and deploy applications on Cloud
			CO5: Integrate security in Cloud applications
			CO6: Use advance techniques in Cloud Computing
310254D	320	Elective II- Software Modeling and Architectures	On completion of the course, students should be able to
			CO1: Analyze the problem statement (SRS) and choose proper design technique for designing web-based/ desktop application
			CO2: Design and analyze an application using UML modeling as fundamental tool
			CO3: Evaluate software architectures
			CO4: Use appropriate architectural styles and software design patterns
			CO5: Apply appropriate modern tool for designing and modeling
310255	321	Internship	On completion of the course, students should be able to
			CO1: Develop professional competence through industry internship
			CO2: Apply academic knowledge in a personal and professional environment
			CO3: Build the professional network and expose students to future employees
			CO4: Apply professional and societal ethics in their day to day life
			CO5: Develop professional approach for social, economic and administrative considerations.
			CO6: Develop own career goals and personal aspirations
310256	322	Data Science and Big Data Analytics Laboratory	On completion of the course, learner will be able to
			CO1: Apply principles of data science for the analysis of real time problems.
			CO2: Implement data representation using statistical methods
			CO3: Implement and evaluate data analytics algorithms
			CO4: Perform text preprocessing
			CO5: Implement data visualization techniques
			CO6: Use cutting edge tools and technologies to analyze Big Data
310257	323	Web Technology Laboratory	On completion of the course, learner will be able to–
			CO1: Understand the importance of website planning and website design issues
			CO2: Apply the client side and server side technologies for web application development

COURSE	CODE	SUBJECT	Course Outcomes
			CO3: Analyze the web technology languages, frameworks and services
			CO4: Create three tier web based applications
310258	324	Laboratory Practice II	On completion of the course, learner will be able to
		• Artificial Intelligence	CO1: Design system using different informed search / uninformed search or heuristic approaches
			CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
			CO3: Design and develop an expert system
		• Information Security	CO4: Use tools and techniques in the area of Information Security
			CO5: Use the knowledge of security for problem solving
			CO6: Apply the concepts of Information Security to design and develop applications
		OR	
		• Augmented and Virtual Reality	CO4: Use tools and techniques in the area of Augmented and Virtual Reality
			CO5: Use the knowledge of Augmented and Virtual Reality for problem solving
			CO6: Apply the concepts of Augmented and Virtual Reality to design and develop applications
		OR	
		• Cloud Computing	CO4: Use tools and techniques in the area of Cloud Computing
			CO5: Use the knowledge of Cloud Computing for problem solving
			CO6: Apply the concepts Cloud Computing to design and develop applications
		OR	
		• Software Modeling and Architectures	CO4: Use tools and techniques in the area Software Modeling and Architectures
			CO5: Use the knowledge of Software Modeling and Architectures for problem solving
			CO6: Apply the concepts Software Modeling and Architectures to design and develop applications
310259	325	Audit Course 6	On completion of the course, learner will be able to–
			CO1: Understand the fundamentals and importance of digital marketing
			CO2: Use the power of social media for business marketing
			CO3: Analyze the effectiveness of digital marketing and social media over traditional process
		T.E (Electronics & TC Engineering 2019 COURSE W.E.F.A.Y. 2021-22	
COURSE	CODE	SUBJECT	Course Outcomes
304181 SEM-I	C301	**Digital Communication**	On completion of the course, learner will be able to -
			CO1: Apply the statistical theory for describing various signals in a communication system.
			CO2: Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.
			CO3: Describe and analyze the digital communication system with spread spectrum modulation.
			CO4: Analyze a communication system using information theoretic approach
			CO5: Use error control coding techniques to improve performance of a digital communication system.
304182	C302	Electromagnetic Field Theory	On completion of the course, learner will be able to -
			CO1: Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.
			CO2: Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides

				CO3: State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential
				CO4: Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.
				CO5: Interpret and Apply the transmission line equation to transmission line problems with load impedance to
				determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, Vmax/Vmin, length of transmission l ine using Smith Chart.
				CO6: Carry out a detailed study, interpret the relevance and applications of Electromagnetics
304183		C303	Database Management	On completion of the course, learner will be able to -
				CO1: Ability to implement the underlying concepts of a database system.
				CO2: Design and implement a database schema for a given problem-domain using data model.
				CO3: Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems.
				CO4: Implement transactions, concurrency control, and be able to do Database recovery.
				CO5: Able to understand various Parallel Database Architectures and its applications.
				CO6: Able to understand various Distributed Databases and its applications
304184		C304	Microcontrollers	**:** On completion of the course, learner will be able to -
				CO1: Understand the fundamentals of microcontroller and programming. .
				CO2: Interface various electronic components with microcontrollers
				CO3: Analyze the features of PIC 18F XXXX.
				CO4: Describe the programming details in peripheral support.
				CO5: Develop interfacing models according to applications.
				CO6: Evaluate the serial communication details and interfaces
304185 A		C305	Digital Signal Processing Elective - I	On completion of the course, student will be able to -
				CO1: Interpret and process discrete/ digital signals and represent DSP system.
				CO2: Analyze the digital systems using the Z-transform techniques.
				CO3: Implement efficient transform and its application to analyze DT signals.
				CO4: Design and implement IIR filters.
				CO5: Design and implement FIR filters.
				CO6: Apply DSP techniques for speech/ biomedical/ image signal processing
304185 B		C306	Electronic Measurements	On completion of the course, learner will be able to:
				CO1: Understand the metrics for the measurement system
				CO2: Select and use the instruments for measurement & analysis of basic electronic parameters
				CO3: Identify and use the different signal generators for specific applications
				CO4: Understand the principles of different Oscilloscopes for specific applications
				CO5: Identify the use of other display devices, recorders and timer/counter in measurement systems
304185 C		C307	Fundamentals of JAVA Programming	On completion of the course, learner will be able to
				CO1: Understand the basic principles of Java programming language
				CO2: Apply the concepts of classes and objects to write programs in Java
				CO3: Demonstrate the concepts of methods & Inheritance
				CO4: Use the concepts of interfaces & packages for program implementation

				CO5: Understand multithreading and Exception handling in Java to develop robust programs
				CO6: Use Graphics class, AWT packages and manage input and output files in Java
304185	C308		Computer Networks	On completion of the course, learner will be able to
				CO1: Design LAN using appropriate networking architecture, topologies, transmission media, and networking devices
				CO2: Understand the working of controlling techniques for flawless data communication using data link layer protocols.
				CO3: Learn the functions of network layer, various switching techniques and internet protocol addressing.
				CO4: Explore various interior and exterior, unicasting and multicasting protocols.
				CO5: Analyze data flow using TCP/UDP Protocols, congestion control techniques for QoS.
				CO6: Illustrate the use of protocols at application layer.
304186	C309		Digital Communication Lab	
304187	C310		Database Management Lab	
304188	C311		Microcontroller Lab	
304189	C312		Elective I Lab	
304190	C313		Skill Development	After Successfully completing the course
				CO1: Student should recognize the need to engage in independent and life-long learning in required skill sets
				CO2: Student needs to experience the impact of industries on society by visiting different industries and understand the importance of industrial products for analog and digital circuits and systems.
				CO3: Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems.
				CO4: Student would be able to communicate effectively at different technical and administrative levels.
				CO5: Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.
304191A	C314		Mandatory Audit Course 5 &	
304192 SEM-II	C315		**Cellular Networks**	On completion of the course, learner will be able to -
				CO1: Understand fundamentals of wireless communications.
				CO2: Discuss and study OFDM and MIMO concepts.
				CO3: Elaborate fundamentals mobile communication.
				CO4: Describes aspects of wireless system planning.
				CO5: Understand of modern and futuristic wireless networks architecture.
				CO6: Summarize different issues in performance analysis
304193	C316		Project Management	On completion of the course, learner will be able to -
				CO1: Apply the fundamental knowledge of project management for effectively handling the projects.
				CO2: Identify and select the appropriate project based on feasibility study and undertake its effective planning
				CO3: Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.
				CO4: Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.
				CO5: Identify and assess the project risks and manage finances in line with Project Financial Management Process.

				CO6: Develop new products assessing their commercial viability and develop skillsets for becoming successful entrepreneurs while being fully aware of the legal issues related to Product development and Entrepreneurship.
304194		C317	Power Devices & Circuits	On completion of the course, learner will be able -
				CO1: To differentiate based on the characteristic parameters among SCR, GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings.
				CO2: To design triggering / driver circuits for various power devices
				CO3: To evaluate and analyze various performance parameters of the different converters and its topologies.
				CO4: To understand significance and design of various protections circuits for power devices.
				CO5: To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.
304195 A		C318	Digital Image Processing Elective-II	On completion of the course, learner will be able to -
				CO1: Apply knowledge of mathematics for image understanding and analysis.
				CO2: Implement spatial domain image operations.
				CO3: Design and realize various algorithms for image segmentation.
				CO4: Design and realize various algorithms for image Compression
				CO5: Apply restoration to remove noise in the image.
				CO6: Describe the object recognition system.
304195 B		C319	Sensors in Automation	On completion of the course, learner will be able to -
				CO1: Understand the Concepts of Sensors/Transducers, classify and evaluate static and Dynamic Characteristics of Measurement Systems
				CO2: Choose the proper sensor comparing different standards and guidelines for measurements of Temperature and Humidity.
				CO3: Choose the proper sensor comparing different standards and guidelines for measurements of Force, Pressure, Stress and Flow
				CO4: Choose the proper sensor comparing different standards and guidelines for measurements of Displacement, Vibration, Acceleration and Level
				CO5: Explore sensors to profound areas like environmental, Agricultural and bio-medical equipment and sustainability.
				CO6: Explore IoT based applications of Sensors and Transducers
304195 C		C320	Advanced JAVA Programming	On completion of the course, learner will be able to –
				CO1: Design and develop GUI applications using Applets.
				CO2: Apply relevant AWT/ swing components to handle the given event.
				CO3: Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
				CO4: Learn to access database through Java programs, using Java Database Connectivity (JDBC)
				CO5: Invoke the remote methods in an application using Remote Method Invocation (RMI)
				CO6: Develop program for client /server communication using Java Networking classes
304195 D		C321	Embedded Processors	On completion of the course, learner will be able to
				CO1: Understand basics of Embedded C Programming and usage of Embedded C and study different software tools for programming microcontrollers
				CO2: Get acquainted with various Embedded Processor architectures related to industrial application.
				CO3: Know about the programming of ARM 7 based microcontroller with on chip peripherals and external peripherals.

				CO4: Understand the architectures of ARM Cortex M4 Microcontrollers and its advantages over ARM 7 Microcontrollers.
				CO5: Implement the real world programming of ARM 7 based microcontroller with on chip peripherals and external peripherals.
				CO6: Recognize the interfacing of real world sensors and standard buses. Will also able to design different case studies.
304195 E	C322	Network Security		On completion of the course, learner will be able to -
				CO1: Analyze attacks on computers and computer security.
				CO2: Demonstrate knowledge of cryptography techniques.
				CO3: Illustrate various Symmetric and Asymmetric keys for Ciphers
				CO4: Evaluate different Message Authentication Algorithms and Hash Functions
				CO5: Get acquainted with various aspects of E-Mail Security
				CO6: Assimilate various aspects of Web Security
304196	C323	Cellular Networks Lab		
304197	C324	Power Devices & Circuits Lab		
304198	C325	Elective-II Lab		
		TE -ELECTRICAL ENGINEERING 2019 COURSE W.E.F.A.Y. 2021-22)		
303141 SEM I	C301	Industrial and Technology Management		At the end of this course, student will be able to
				CO1.Differentiate between different types of business organizations and discuss the fundamentals of economics and management.
				CO2 Explain the importance of technology management and quality management.
				CO3Explain the importance of IPR and role of Human Resource Management.
				CO4Understand the importance of Quality and its significance.
				CO5Describe the characteristics of marketing & its types and overview of financial Management.
303142	C302	Power Electronics		
				CO1Develop characteristics of different power electronic switching devices
				CO2Reproduce working principle of power electronic converters for different types of loads
				CO3Choose the appropriate converter for different applications
303143	C303	Electrical Machines-II		
				CO1Learn construction, working principle of three phase Synchronous Machines, Induction Motors, A.C. Series Motor and Special Purpose Motors
				CO2Understand characteristics of three phase Synchronous Machines, Induction Motors, A.C. Series Motor and Special Purpose Motors.
				CO3 Select the above machines in Power System, industrial, household & Military Engineering applications
				CO4 Testing of machines to evaluate the performance through experimentation.
303144	C304	Electrical Installation Design and Condition Based Maintenance		

			CO1 Classify different types of distribution supply system and determine economics of distribution system. compare and classify various substations, bus-bars and Earthing systems
			CO2Demonstrate the importance and necessity of maintenance
			CO3Analyse and test different condition monitoring methods.
			CO4Carry out estimation and costing of internal wiring for residential and commercial installations
			CO5Apply electrical safety procedures.
303145A	C305	Advanced Microcontroller and Embedded SystemElective-I	
			CO1Explain architecture of PIC 18F458 microcontroller, its instructions and the addressing modes.
			CO2Use Ports and timers for peripheral interfacing and delay generation
			CO3Interface special and generate events using CCP module.
			CO4Effectively use interrupt structure in internal and External interrupt mode.
			CO5Effectively use ADC for parameter measurement and also understand LCD interfacing.
			CO6Use Serial Communication and various serial communication protocols
303145B	C306	Digital Signal Processing	
			CO1 Analyse discrete time signals and systems.
		Open Elective	CO2Construct frequency response of LTI system using Fourier Transform.
			CO3Design and realize IIR and FIR filters.
			CO4Apply concepts of DSP in applications of electrical engineering.
303146	C308	Seminar	
			1Relate with the current technologies and innovations in Electrical engineering.
			2Improve presentation and documentation skill
			3Apply theoretical knowledge to actual industrial applications and research activity.
			4Communicate effectively.
303147A	C310	Audit course-V	
			CO1Explain and differentiate various types of energy storage for suitable applications
			CO2Understand battery recycling techniques
303147B	C312	Start-up & Disruptive innovation	
			CO1Describe role of incubation for Startup and recent national policy.
			CO2Identify various types of Startups.
			CO3Explain impacts of disruptive innovation and Differentiate between disruptive innovation and disruptive technology
303148 SEM II	C313	**Power System-II**	
			CO1Solve problems involving modelling, design and performance evaluation of HVDC and
			CO2EHVAC power transmission lines.
			CO3 Calculate per unit values and develop Y bus for solution power flow equations in power
303149	C314	Computer Aided Design of Electrical Machines	
			CO1Summarize temperature rise, methods of cooling of transformer and consider IS 2026 intransformer design
			CO2.Design the overall dimensions of the transformer.
			CO3Analyze the performance parameters of transformer.
			CO4Design overall dimensions of three phase Induction motor

				CO5Analyze the performance parameters of three phase Induction motor.
				CO6mplement and develop computer aided design of transformer and induction motor.
303150		C315	Control System Engineering	
				CO1Construct mathematical model of Electrical and Mechanical system using differential equations and transfer function and develop analogy between Electrical and Mechanical systems.
				CO2Determine time response of systems for a given input and perform analysis of first and second order systems using time domain specifications
				CO3Investigate closed loop stability of system in s-plane using Routh Hurwitz stability criteria and root locus.
				CO4Analyze the systems in frequency domain and investigate stability using Nyquist plot and Bode plot
				CO5Design PID controller for a given plant to meet desired time domain specifications
303151		C316	IoT and its Applications in Electrical Engineering	
			Elective-II	CO1Build circuits for signal acquisition and conditioning
				CO2Experiment with sensors and actuators and choose the right sensor for application
				CO3Determine the performance of IoT based automated process
				CO4Design and develop IoT based applications
303151 A)		C317	Electrical Mobility	
				CO1Analyze the concepts of Hybrid and Electric vehicles
				CO2Describe the different types of energy storage systems
				CO3Comprehend the knowledge of the battery charging and management systems
				CO4Classify the different mode of operation for hybrid vehicle.
				CO5Apply the different Charging standards used for electric vehicles
				CO6Differentiate between Vehicle to home & Vehicle to grid concepts
303151 C)		C319	Cybernetic Engineering	
				C01Define cybernetics in terms of control and how is it used in controlling technical, biological, and other processes
				C02Understand various matrix operations.
				C03Describe different types of control system configurations and their applications.
				C04Carry out mathematical modeling and simulation of simple processes.
				C05Appreciate the essential requirements for computers and computer equipment that are intended to operate in dedicated applications and industrial environments
				C06Know intelligent optimization techniques.
303151 D)		C320	Energy Management	
				CO1Describe BEE Energy policies, Energy ACT.
				CO2List and apply demand side management measures for managing utility systems
				CO3Explore and use simple data analytic tools
				CO4Use various energy measurement and audit instruments
				CO5Evaluate economic feasibility of energy conservation projects
				CO6Identify appropriate energy conservations methods for electric and thermal utilities.
303152		C321	Internship	
				CO1Understand the working culture and environment of the Industry and get familiar with various departments and practices in the industry

COURSE	CODE	SUBJECT	Course Outcomes
			CO2Operate various meters, measuring instruments, tools used in industry efficiently and develop technical competence
			CO3Apply internship learning in other course completions and final year project management, i.e. topic finalization, project planning, hardware development, result interpretations, report writing, etc
			CO4Create a professional network and learn about ethical, safety measures, and legal practices
			CO5Appreciate the responsibility of a professional towards society and the environment
			CO6Identify career goals and personal aspirations.
303153 A)	C322	303153A: Ethical Practices for Engineers	
			CO1Understand for their professional responsibilities as Engineers.
			CO2Recognize and think through ethically significant problem situations that are common in Engineering
			CO3Evaluate the existing ethical standards for Engineering Practice
303153 B)	C323	303153B :Project Management	
			CO1Elaborate importance of project management and its process
			CO2Learn about the role of high performance teams and leadership in project management.
	TE Mechanical Engineering ((2019 Course W.E.F.A.Y.2021-22)		
COURSE	CODE	SUBJECT	Course Outcomes
302041 SEM-I	C301	Numerical & Statistical Methods	
			CO1: SOLVE system of equations using direct and iterative numerical methods.
			CO2: ESTIMATE solutions for differential equations using numerical techniques
			CO3: DEVELOP solution for engineering applications with numerical integration.
			CO4: DESIGN and CREATE a model using a curve fitting and regression analysis
			CO5: APPLY statistical Technique for quantitative data analysis.
			CO6: DEMONSTRATE the data, using the concepts of probability and linear algebra
302042	C302	Heat & Mass Transfer	
			CO1. ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system.
			CO2. DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction
			CO3. EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results.
			CO4. INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces
			CO5. ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems.
			CO6. DESIGN & ANALYSIS of heat transfer equipments and investigation of its performance
302043	C303	Design of Machine Elements	
			CO1. DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.
			CO2. DESIGN shafts, keys and couplings under static loading conditions
			CO3. ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
			CO4. EVALUATE dimensions of machine components under fluctuating loads.
			CO5.EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.

				CO6.APPLY the design and development procedure for different types of springs.
302044	C304		Mechatronics	
				CO1. DEFINE key elements of mechatronics, principle of sensor and its characteristics.
				CO2. UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
				CO3. DETERMINE the transfer function by using block diagram reduction technique.
				CO4. EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system.
				CO5. APPLY the concept of different controller modes to an industrial application.
				CO6. DEVELOP the ladder programming for industrial application
302045-A	C306		Advanced Forming & Joining Processes	
				CO1. ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations
				CO2. ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications
				CO3. ANALYSE the effect of HAZ on microstructure and mechanical properties of materials
				CO4. CLASSIFY various solid state welding process and SELECT suitable welding processes for particular application
				CO5. CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications.
				CO6. INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry.
302045-B	C307		Machining Science & Technology	
				CO1. DEFINE metal cutting principles and mechanics of metal cutting and tool life.
				CO2. DESCRIBE features of gear and thread manufacturing processes
				CO3. SELECT appropriate grinding wheel and demonstrate the various surface finishing processes.
				CO4. SELECT appropriate jigs/fixtures and to draw the process plan for a given component.
				CO5. SELECT & EVALUATE various parameters of process planning.
				CO6. GENERATE CNC program for Turning / Milling processes and generate tool path using
302046	C308		Digital Manufacturing Laboratory	
				CO1.DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques.
				CO2.ANALYZE cutting tool parameters for machining given job
				CO3.DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools.
				CO4.SELECT and DESIGN jigs and Fixtures for a given component.
				CO5.DEMONESTRATE different parameters for CNC retrofitting and reconditioning
302047	C309		Skill Development	
				CO1.APPLY& DEMONSTRATE procedure of assembly & disassembly of various machines. CO2.DESIGN & DEVELOP a working/model of machine parts or any new product.
				CO3.EVALUATE fault with diagnosis on the machines, machine tools and home appliances.
				CO4.IDENTIFY & DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection

302048	C310	Audit course - V$^\$$	
302049 SEM-II	C311	**Artificial Intelligence &Machine Learning**	
			CO1. DEMONSTRATE fundamentals of artificial intelligence and machine learning.
			CO2. APPLY feature extraction and selection techniques.
			CO3. APPLY machine learning algorithms for classification and regression problems.
			CO4. DEVISE AND DEVELOP a machine learning model using various steps.
			CO5. EXPLAIN concepts of reinforced and deep learning.
			CO6. SIMULATE machine learning model in mechanical engineering problems
302050	C312	Computer Aided Engineering	
			CO1: DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.
			CO2: APPLY the various meshing techniques for better evaluation of approximate results
			CO3: APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
			CO4: ANALYZE and APPLY various numerical methods for different types of analysis
			CO5: EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.
			CO6: GENERATE the results in the form of contour plot by the USE of CAE tools
302051	C313	Design of Transmission Systems	
			CO1.APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T
			CO2.EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards.
			CO3.SELECT&DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters
			CO4.DEFINE and DESIGN various types of Clutches, Brakes, used in automobile
			CO5.APPLY various concept to DESIGN Machine Tool Gear box, for different applications
			CO6.ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles
302052-A	C314	Composite Materials	
			CO1. DEFINE & COMPARE composites with traditional materials.
			CO2. IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
			CO3. CATEGORISE and APPLY Metal Matrix Process from possessions landscape.
			CO4. DETERMINE volume/weight fraction and strength of Composites.
			CO5. SELECT appropriate testing and inspection method for composite materials.
			CO6. SELECT composites materials for various applications
302052-B	C315	Surface Engineering	
			CO1. DEFINE the basic's principle & mechanism of surface degradation.
			CO2. ANALYSE & SELECT correct corrosion prevention techniques for a different service condition.
			CO3. DEMONSTRATE the role of surface engineering of materials to modify/improve the surface properties.
			CO4. SELECT the suitable surface heat treatments to improve the surface properties

COURSE	CODE	SUBJECT	Course Outcomes
			CO5. APPLY the surface modification technique to modify surface properties.
			CO6. ANALYSE & EVALUTE various surface coating defects using various testing/characterization method.
302053	C316	Measurement Laboratory	
			CO1. EVALUATE causes of errors in Vernier calipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in measurement
			CO2. ANALYZE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations
			CO3. EXAMINE surface Textures, surface finish using equipment's like Talysurf and analyze surface finish requirements of metrological equipment's like gauges, jaws of vernier calipers, micrometers, magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement
			CO4. MEASURE the dimensional accuracy using Comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time.
			CO5. PERFORM Testing of Flow rate, speed and temperature measurements and their effect on performance in machines and mechanisms like hydraulic or pneumatic trainers, lathe machine etc. to increase repeatability and reproducibility.
			CO6. COMPILE the information of opportunities of entrepreneurships/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report.
302054	C317	Fluid Power &Control Laboratory	
			CO1.DEFINE working principle of components used in hydraulic and pneumatic systems.
			CO2.IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems.
			CO3.SELECT an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.
			CO4.SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications.
			CO5.DESIGN a hydraulic and pneumatic system for the industrial applications.
			CO6.DESIGN & DEMONESTRATE various IoT, PLC based controlling system using hydraulics and pneumatics.
302055	C318	Internship/Mini project *	
			CO1. DEMONSTRATE professional competence through industry internship.
			CO2. APPLY knowledge gained through internships to complete academic activities in a professional manner.
			CO3. CHOOSE appropriate technology and tools to solve given problem.
			CO4. DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life.
			CO5. DEVELOP network and social circle, and DEVELOPING relationships with industry people.
			CO6. ANALYZE various career opportunities and DECIDE career goals.
302056	C319	Audit course - VI$	
TE -INFORMATION TECHNOLOGY 2019 COURSE W.E.F.A.Y. 2021-22			
COURSE	CODE	SUBJECT	Course Outcomes
314441 SEM I	C301	Theory of Computation	
			CO1: Construct finite automata and its variants to solve computing problems
			CO2: Write regular expressions for the regular languages and finite automata.
			CO3: Identify types of grammar, design and simplify Context Free Grammar.
			CO4: Construct Pushdown Automata machine for the Context Free Language.

				CO5: Design and analyze Turing machines for formal languages.
				CO6: Understand decidable and undecidable problems, analyze complexity classes
314442	C302	Operating Systems		
				CO1: Explain the role of Modern Operating Systems.
				CO2: Apply the concepts of process and thread scheduling.
				CO3: Illustrate the concept of process synchronization, mutual exclusion and the deadlock.
				CO4: Implement the concepts of various memory management techniques.
				CO5: Make use of concept of I/O management and File system.
				CO6: Understand Importance of System software
314443	C303	Machine Learning		
				CO1: Apply basic concepts of machine learning and different types of machine learning algorithms.
				CO2: Differentiate various regression techniques and evaluate their performance.
				CO3: Compare different types of classification models and their relevant application.
				CO4: Illustrate the tree-based and probabilistic machine learning algorithms.
				CO5: Identify different unsupervised learning algorithms for the related real-world problems.
				CO6: Apply fundamental concepts of ANN
314444	C304	Human Computer Interaction		
				CO1: Explain importance of HCI study and principles of user-centered design (UCD) approach.
				CO2: Develop understanding of human factors in HCI design.
				CO3: Develop understanding of models, paradigms, and context of interactions.
				CO4: Design effective user-interfaces following a structured and organized UCD process.
				CO5: Evaluate usability of a user-interface design.
				CO6: Apply cognitive models for predicting human-computer-interactions
314445A	C305	Design and Analysis of Algorithm		
				CO1: Calculate computational complexity using asymptotic notations for various algorithms.
				CO2: Apply Divide & Conquer as well as Greedy approach to design algorithms.
				CO3: Understand and analyze optimization problems using dynamic programming.
				CO4: Illustrate different problems using Backtracking.
				CO5: Compare different methods of Branch and Bound strategy.
				CO6: Classify P, NP, NP-complete, NP-Hard problems
314445B	C306	Advanced Database and Management System		
				CO1: Differentiate relational and object-oriented databases.
				CO2: Illustrate parallel & distributed database architectures.
				CO3: Apply concepts of NoSQL Databases.
				CO4: Explain concepts ofdata warehouse and OLAP technologies.
				CO5: Apply data mining algorithms and various software tools.
				CO6: Comprehend emerging and enhanced data models for advanced applications
314445C	C307	Design Thinking		
				CO1: Identify need and features of design thinking.
				CO2: Identify the opportunities and challenges for design thinking innovation.

			CO3: Learn the process of design thinking using various tools.
			CO4: Summarize and learn the various prototyping techniques.
			CO5: Enlist the activities carried out in Test and reflect phase of design thinking.
			CO6: Interpret the design thinking disruptive innovations through case studies
314445D	C308	Internet of Things	
			CO1: Discuss fundamentals, architecture and framework of IoT.
			CO2: Select suitable sensors and actuators for real time scenarios.
			CO3: Justify the significance of protocol for wireless communication and IoT challenges
			CO4: Understand the Python programming for development of IoT applications.
			CO5: Understand the cloud interfacing technologies.
			CO6: Design and Implement real time IoT applications.
314446	C309	Operating Systems Lab	
			CO1: Apply the basics of Linux commands.
			CO2: Build shell scripts for various applications.
			CO3: Implement basic building blocks like processes, threads under the Linux.
			CO4: Develop various system programs for the functioning of OS concepts in user space like concurrency control, CPU Scheduling, Memory Management and Disk Scheduling in Linux.
			CO5: Develop system programs for Inter Process Communication in Linux
314447	C310	Human Computer Interaction- Lab	
			CO1: Differentiate between good design and bad design.
			CO2: Analyze creative design in the surrounding.
			CO3: Assess design based on feedback and constraint.
			CO4: Design paper-based prototypes and use wire frame.
			CO5: Implement user-interface design using web technology.
			CO6: Evaluate user-interface design using HCI evaluation techniques
314448	C311	Laboratory Practice-I Machine Learning)	
			CO1: Implement different supervised and unsupervised learning algorithms.
			CO2: Evaluate performance of machine learning algorithms for real-world applications
314448A	312	Laboratory Practice-I (Design and Analysis of Algorithm	
			CO1: Implement the various algorithmic design strategies and use it to solve real time problems/ applications
			CO2: Apply Divide & Conquer as well as Greedy approach to design algorithms.
			CO3: Analyze optimization problems using dynamic programming
314448B	313	Laboratory Practice-I (ADBMS	
			CO1: Apply advanced Database Programming Languages.
			CO2: Apply the concepts of NoSQL Databases.
			CO3: Install and configure database systems.
			CO4: Populate and query a database using MongoDB commands.
			CO5: Design data warehouse schema of any one real-time: CASE STUDY

				CO6: Develop small application with NoSQL Database for back-end
314448C		314	Laboratory Practice-I (Design Thinking	
				CO1: Frame and Design Challenge by performing STEEP Analysis, Conduct Interviews, design and ask 5x Why and 5W+H questions
				CO2: Demonstrate the activities to empathize with the users by creation of Empathy Map, Persona Development, Customer Journey Map.
				CO3: Define and ideate process of design thinking and perform brainstorming, selection of ideas, create a storyboard and design paper prototyping or digital prototyping for chosen design challenge.
314448D		315	Laboratory Practice-I (Internet of Things	
				CO1: Design and implement real time applications with sensors and actuators.
				CO2: Design and develop real time IoT based application by cloud interfacing
314449	C316		Seminar	
				CO1: Understand, interpret and summarize technical literature.
				CO2: Demonstrate the techniques used in the paper.
				CO3: Distinguish the various techniques required to accomplish the task.
				CO4: Identify intended future work based on the technical review.
				CO5: Prepare and present the content through various presentation tools and techniques in effective manner.
				CO6: Keep audience engaged through improved interpersonal skills
314450A	C317		Banking and Insurance	
				CO1: Differentiate between types of banks and their working.
				CO2: Carry out banking transactions on their own.
				CO3: Decide which insurance policy they should buy.
				CO4: Handle investing in annuities and claim settlements
314450B	C318		Startup Ecosystems	
				CO1: Identify Startup opportunities
				CO2: Explain legal and other requirements for new ventures
				CO3: Analyze financial Issues of startups
314450C	C319		Foreign Language –(Japanese Language- III)	
				CO1: Do basic communication.
				CO2: Demonstrate knowledge of Japanese script (reading, writing and listening skills).
				CO3: Demonstrate knowledge about Japanese culture, life style, manners and etiquettes.
				CO4: Pursue professional Japanese Language course.
314451 SEM II	C320		**Computer Networks & Security**	
				CO1: Explain Responsibilities, services offered and protocol used at application layer of network
				CO2: Apply concepts of wireless network and different wireless standards.
				CO3: Recognize the Adhoc Network's MAC layer, routing protocol and Sensor network architecture.

				CO4: Implement the principal concepts of network security and Understand network security threats, security services, and countermeasures
				CO5: Apply basic cryptographic techniques in application development.
				CO6: Gain a good comprehension of the landscape of cyber security
				Vulnerabilities & describe typical threats to modern digital systems
314452	C321	Data Science and Big Data Analytics		
				CO1: Understand Big Data primitives.
				CO2: Learn and apply different mathematical models for Big Data.
				CO3: Demonstrate Big Data learning skills by developing industry or research applications.
				CO4: Analyze and apply each learning model comes from a different algorithmic approach and it will perform differently under different datasets.
				CO5: Understand, apply and analyze needs, challenges and techniques for big data visualization.
				CO6: Learn different programming platforms for big data analytics
314453	C322	Web Application Development		
				CO1: Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap.
				CO2: Demonstrate the use of web scripting languages.
				CO3: Develop web application with Front End & Back End Technologies.
				CO4: Develop mobile website using JQuery Mobile.
				CO5: Deploy web application on cloud using AWS.
314454A	C323	Artificial Intelligence Elective-II		
				CO1: Apply the fundamental concepts of Artificial Intelligence
				CO2: Choose appropriate search strategies for any AI problem
				CO3: Illustrate knowledge reasoning and knowledge representation methods (for solving real world problems)
				CO4: Analyze the suitable techniques of NLP to develop AI applications
				CO5: Correlate the appropriate methods of Game Theory to design AI applications
				CO6: Understand the concept of deep learning and AI applications
314454B	C324	Cyber Security		
				CO1: Develop basic understanding of cyber security.
				CO2: Differentiate among different types of cyber threats and cyber-crimes.
				CO3: Illustrate cyber forensic techniques to identify the criminal activities.
				CO4: Apply forensic analysis tools to recover important evidence for identifying computercrime
				CO5 Distinguish and classify the forms of cybercriminal activity and the technological and Social engineering' methods used to undertake such crimes
				CO6: Evaluate the effectiveness of cyber-security, cyber-laws and other countermeasures against cybercrime
314454C	C325	Cloud Computing		
				CO1: Articulate the main concepts, key technologies and fundamentals of cloud computing.
				CO2: Understand cloud enabling technologies and virtualization.
				CO3: Analyze various cloud programming models and apply them to solve problems on the cloud.
				CO4: Explain data storage and major security issues in the cloud.

				CO5: Understand trends in ubiquitous cloud and internet of things.
				CO6: Explore future trends of cloud computing
314454D	C326	Software Modeling and Design		
				CO1: Understand basics of object oriented methodologies and Unified Modeling Language (UML).
				CO2: Apply analysis process, use case modeling, domain/class modeling
				CO3: Design and apply interaction and behavior modeling on a given system.
				CO4: Comprehend OO design process and business, access and view layer class design.
				CO5: Recognize the software design principles and patterns to be applied on system.
				CO6: Illustrate architectural design principles and guidelines in the various type of applicationdevelopment.
314455	C327	Internship		
				CO1: Develop professional competence through industry internship.
				CO2: Apply academic knowledge in a personal and professional environment
				CO3: Build the professional network and expose students to future employees.
				CO4: Apply professional and societal ethics in their day-to-day life.
				CO5: Become a responsible professional having social,economic and administrative considerations.
				CO6: Make own career goals and personal aspirations.
314456	C328	Computer Networks& Security-Lab		
				CO1: Design and configure small size network and associated networking commands.
				CO2: Understand various client/server environments to use application layer protocols.
				CO3: Use basic cryptographic techniques in software and system design.
				CO4: Apply methods for authentication, access control, intrusion detection
314457	C329	DS & BDA-Lab		
				CO1: Apply Big data primitives and fundamentals for application development.
				CO2: Explore different Big data processing techniques with use cases.
				CO3: Apply the Analytical concept of Big data using Python.
				CO4: Visualize the Big Data using Tableau.
				CO5: Design algorithms and techniques for Big data analytics.
				CO6: Design and develop Big data analytic application for emerging trends
314458	C330	Laboratory Practice-II		
				CO1: Develop Static and Dynamic responsive website using technologies HTML, CSS, Bootstrapand AJAX.
				CO2: Create Version Control Environment.
				CO3: Develop an application using front end and backend technologies.
				CO4: Develop mobile website using JQuery Mobile.
				CO5: Deploy web application on cloud using AWS
314458	331	Lab Practice – II (Artificial Intelligence		
				CO1: Evaluate and apply core knowledge of AI on various real world problems.
				CO2: Illustrate and demonstrate AI tools for different dynamic applications

COURSE	CODE	SUBJECT	Course Outcomes
314458	332	Lab Practice –II (Cyber Security	
			CO1: To know the different guidelines for Packet Sniffing in networking and internetworking environment.
			CO2: To know the different types of cyber-attacks and will be able analyze theattacks.
			CO3: Apply the knowledge of IDS to secure network and performing analysis of IDS attack on network.
314458	333	Laboratory Practice-II (Cloud Computing	
			CO1: To design and develop cloud-based applications.
			CO2: To Simulate a cloud scenario using CloudSim.
			CO3: To design and deploy web applications in cloud environment
314458	334	Laboratory Practice-II (Software Modeling Design	
			CO1: Develop use case model with the help of UML notations.
			CO2: Develop and implement analysis model and design model.
			CO3: Develop and implement Interaction and behavior Model.
314459A	C335	Green and Unconventional Energy	
			CO1: List and explain the main sources of energy and their primary applications in the India, and theworld.
			CO2: Describe the challenges and problems associated with the use of various energy sources and itsconservation.
			CO3: List and describe the primary renewable energy resources and technologies.
			CO4: Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation
314459B	C336	Leadership and Personality Development	
			CO1: Practice responsible decision-making and personal accountability.
			CO2: Demonstrate an understanding of group dynamics and effective teamwork.
			CO3: Develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others.
			CO4: Develop multi-dimensional personality.
314459C	C337	Foreign Language-(Japanese Language- IV)	
			CO1: Do Better Communication in Japanese language.
			CO2: Demonstrate knowledge of Japanese Language Scripts (Reading, Writing, etc).
			CO3: Demonstrate knowledge of Japanese culture, lifestyle, etc.
			CO4: Pursue advanced Professional Japanese Language course

BE FINAL YEAR COMPUTER ENGINEERING 2019 Course W.E.F.A.Y. 2022-23			
COURSE	CODE	SUBJECT	Course Outcomes
410241- SEMI	401	Design and Analysis of Algorithms	CO1: Formulate the problem
			CO2: Analyze the asymptotic performance of algorithms
			CO3: Decide and apply algorithmic strategies to solve given problem
			CO4: Find optimal solution by applying various methods
			CO5: Analyze and Apply Scheduling and Sorting Algorithms.

				CO6: Solve problems for multi-core or distributed or concurrent environments
410242	402	Machine Learning		CO1: Identify the needs and challenges of machine learning for real time applications.
				CO2: Apply various data pre-processing techniques to simplify and speed up machine learning algorithms.
				CO3: Select and apply appropriately supervised machine learning algorithms for real timeapplications.
				CO4: Implement variants of multi-class classifier and measure its performance.
				CO5 :Compare and contrast different clustering algorithms.
				CO6: Design a neural network for solving engineering problems.
410243	403	Blockchain Technology		CO1: Interpret the fundamentals and basic concepts in Blockchain
				CO2: Compare the working of different blockchain platforms
				CO3: Use Crypto wallet for cryptocurrency based transactions
				CO4: Analyze the importance of blockchain in finding the solution to the real-world problems.
				CO5: Illustrate the Ethereum public block chain platform
				CO6: Identify relative application where block chain technology can be effectively used andimplemented.
410244(A)	404	Pervasive Computing		CO1.Demonstrate fundamental concepts in pervasive computing.
				CO2.Explain pervasive devices and decide appropriate one as per the need of real timeapplications.
				CO3.Classify and analyze context aware systems for their efficiency in different ICT systems.
				CO4.Illustrate intelligent systems and generic intelligent interactive applications.
				CO5.Design HCI systems in pervasive computing environment.
				CO6.Explore the security challenges and know the role of ethics in the context of pervasivecomputing.
410244(B)	405	Multimedia Techniques		CO1: Describe the media and supporting devices commonly associated with multimedia information andsystems.
				CO2: Demonstrate the use of content-based information analysis in a multimedia information system.
				CO3: Critique multimedia presentations in terms of their appropriate use of audio, video, graphics, color,and other information presentation concepts.
				CO4: Implement a multimedia application using an authoring system.
				CO5: Understanding of technologies for tracking, navigation and gestural control. CO6: Implement Multimedia Internet of Things Architectures.
410244(C)	406	Cyber Security and Digital Forensics		CO1: Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
				CO2: Build appropriate security solutions against cyber-attacks.
				CO3:Underline the need of digital forensic and role of digital evidences.
				CO4: Explain rules and types of evidence collection
				CO5: Analyze, validate and process crime scenes
				CO6: Identify the methods to generate legal evidence and supporting investigation reports.
410244(D)	407	Object oriented Modeling and Design		CO1: Describe the concepts of object-oriented and basic class modelling.
				CO2: Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
				CO3: Choose and apply a befitting design pattern for the given problem
				CO4: To Analyze applications, architectural Styles & software control strategies
				CO5: To develop Class design Models & choose Legacy Systems.
				CO6:To Understand Design Patterns
410244(E)	408	Digital Signal Processing		CO1: Understand the mathematical models and representations of DT Signals and Systems

			CO2: Apply different transforms like Fourier and Z-Transform from applications point of view.
			CO3: Understand the design and implementation of DT systems as DT filters with filter structuresand different transforms.
			CO4: Demonstrate the knowledge of signals and systems for design and analysis of systems
			CO5: Apply knowledge and use the signal transforms for digital processing applications
			CO6: To understand Filtering and Different Filter Structures
410245(A)	409	Information Retrieval	CO1:Implement the concept of Information Retrieval
			CO2:Generate quality information out of retrieved information
			CO3:Apply techniques such as classification, clustering, and filtering over multimedia to analyzethe information
			CO4:Evaluate and analyze retrieved information
			CO5:Understand the data in various Application and Extensions of information retrieval
			CO6: Understand Parallel information retrieving and web structure.
410245(B)	410	GPU Programming and Architecture	CO1: Describe GPU architecture
			CO2: Write programs using CUDA, identify issues and debug them.
			CO3: Implement efficient algorithms in GPUs for common application kernels, such as matrix multiplication
			CO4: Write simple programs using OpenCL
			CO5: Identify efficient parallel programming patterns to solve problems
			CO6: Explore the modern GPUs architecture and it's Applications.
410245(C)	411	Mobile Computing	CO1: Develop a strong grounding in the fundamentals of mobile Networks
			CO2: Apply knowledge in MAC, Network, and Transport Layer protocols ofWireless Network
			CO3: Illustrate Global System for Mobile Communications
			CO4: Use the 3G/4G technology based network with bandwidth capacity planning,VLR and HLR identification algorithms
			CO5: Classify network and transport layer of mobile communication
			CO6: Design & development of various wireless network protocols using simulationtools
410245 (D)	412	Software Testing and Quality Assurance	CO1: Describe fundamental concepts in software testing such as manual testing, automation testingand software quality assurance.
			CO2: Design and Develop project test plan, design test cases, test data, and conduct test operations.
			CO3: Apply recent automation tool for various software testing for testing software.
			CO4: Apply different approaches of quality management, assurance, and quality standard to softwaresystem.
			CO5: Apply and analyze effectiveness Software Quality Tools.
			CO6: Apply tools necessary for efficient testing framework.
410245(E)	413	Compilers	CO1: Design and implement a lexical analyzer using LEX tools
			CO2: Design and implement a syntax analyzer using YACC tools
			CO3:Understand syntax-directed translation and run-time environment
			CO4 : Generate intermediate codes for high-level statements.
			CO5 :Construct algorithms to produce computer code.
			CO6: Analyze and transform programs to improve their time and memory efficiency
410246	414	Laboratory Practice III	CO1: Apply preprocessing techniques on datasets.

			CO2: Implement and evaluate linear regression and random forest regression models.
			CO3: Apply and evaluate classification and clustering techniques.
			CO4: Analyze performance of an algorithm.
			CO5: Implement an algorithm that follows one of the following algorithm design strategies: divide and conquer, greedy, dynamic programming, backtracking, branch and bound.
			CO6: Interpret the basic concepts in Blockchain technology and its applications
410247	415	Laboratory Practice IV	CO1: Apply android application development for solving real life problems
			CO2: Design and develop system using various multimedia components.
			CO3: Identify various vulnerabilities and demonstrate using various tools.
			CO4: Apply information retrieval tools for natural language processing
			CO5: Develop an application using open source GPU programming languages
			CO6: Apply software testing tools to perform automated testing
410248	416	Project Work Stage I	• Solve real life problems by applying knowledge.
			• Analyze alternative approaches, apply and use most appropriate one for feasible solution.
			• Write precise reports and technical documents in a nutshell.
			• Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work
			· Inter-personal relationships, conflict management and leadership quality.
410249	417	Audit Course 7	
		AC7-I : MOOC- Learn New Skills	CO1: To acquire additional knowledge and skill.
		AC7 – II: Entrepreneurship Development	CO1: Understand the legalities in product development
			CO2: Undertake the process of IPR, Trademarks, Copyright and patenting
			CO3: Understand and apply functional plans
			CO4: Manage Entrepreneurial Finance
			CO5: Inculcate managerial skill as an entrepreneur
		AC7 – III: Botnet of Things	CO1: Implement security as a culture and show mistakes that make applications vulnerable to attacks.
			CO2: Understand various attacks like DoS, buffer overflow, web specific, database specific, web -spoofing attacks
			CO3: Demonstrate skills needed to deal with common programming errors that lead to most securityproblems and to learn how to develop secure applications
		AC7 – IV: 3D Printing	CO1: Understand the basic knowledge of Shop Floor Safety rules and regulations basics of Machinetools and 3D printing machines
			CO2: Understand the concept of concept of technical sketching, multi-view drawings, Lettering,tolerance, and metric construction
			CO3:Identify and Distinguish drafting terminologies and construction of geometrical figures using drawing instruments, procedure to prepare a drawing sheet as per SP-46:2003
			CO4:Describe and Explain practical aspects to generate detailed and assembly views with dimensions,annotations, in 3D Modeling software.
			CO5: Apply concepts and Fabricate the simple mechanical parts, prototype/ end use product for 3D Printing
		AC7 – V: Industrial Safety and Environment Consciousness	CO1: Develop the plan for Safety performance

				CO2: Demonstrate the action plan for accidents and hazards
				CO3: Apply the safety and security norms in the industry
				CO4: Evaluate the environmental issues of Industrialization
410250 SEM-II	418	High Performance Computing		CO1: Understand various Parallel Paradigm
				CO2: Design and Develop an efficient parallel algorithm to solve given problem
				CO3: Illustrate data communication operations on various parallel architecture
				CO4: Analyze and measure performance of modern parallel computing systems
				CO5: Apply CUDA architecture for parallel programming
				CO6: Analyze the performance of HPC applications
410251	419	Deep Learning		CO1: Understand the basics of Deep Learning and apply the tools to implement deep learningapplications
				CO2: Evaluate the performance of deep learning models (e.g., with respect to the bias-variance trade- off, overfitting and underfitting, estimation of test error).
				CO3: To apply the technique of Convolution (CNN) and Recurrent Neural Network (RNN) forimplementing Deep Learning models
				CO4: To implement and apply deep generative models.
				CO5: Construct and apply on-policy reinforcement learning algorithms
				CO6:To Understand Reinforcement Learning Process
410252(A)	420	Natural Language Processing		CO1: Describe the fundamental concepts of NLP, challenges and issues in NLP
				CO2: Analyze Natural languages morphologically, syntactical and semantically OR Describe the concepts of morphology, syntax, semantics of natural language
				CO3: Illustrate various language modelling techniques
				CO4: Integrate the NLP techniques for the information retrieval task
				CO5: Demonstrate the use of NLP tools and techniques for text-based processing of natural languages
				CO6: Develop real world NLP applications
410252 (B)	421	Image Processing		CO1: Apply Relevant Mathematics Required for Digital Image Processing.
				CO2: Apply Special and Frequency Domain Method for Image Enhancement.
				CO3: Apply algorithmic approaches for Image segmentation.
				CO4: Summarize the Concept of Image Compression and Object Recognition.
				CO5: Explore the Image Restoration Techniques.
				CO6: Explore the Medical and Satellite Image Processing Applications.
410252(C)	422	Software Defined Networks		CO1: Interpret the need of Software Defined networking solutions.
				CO2: Analyze different methodologies for sustainable Software Defined Networkingsolutions.
				CO3: Select best practices for design, deploy and troubleshoot of next generation networks.
				CO4: Develop programmability of network elements.
				CO5: Demonstrate virtualization and SDN Controllers using Open Flow protocol
				CO6: Design and develop various applications of SDN
410252(D)	423	Advanced Digital Signal Processing		CO1: Understand and apply different transforms for the design of DT/Digital systems
				CO2: Explore the knowledge of adaptive filtering and Multi-rate DSP
				CO3: Design DT systems in the field/area of adaptive filtering, spectral estimation and multi-rateDSP
				CO4: Explore use of DCT and WT in speech and image processing

				CO5: Develop algorithms in the field of speech , image processing and other DSP applications
				CO6:Identify Image Processing Techniques
410252(E)			Open Elective I	
410253(A)	424		Pattern Recognition	CO1: Analyze various type of pattern recognition techniques
				CO2: Identify and apply various pattern recognition and classification approaches to solvethe problems
				CO3: Evaluate statistical and structural pattern recognition
				CO4: Percept recent advances in pattern recognition confined to various applications
				CO5:Implement Bellman's optimality principle and dynamic programming
				CO6:Analyze Patterns using Genetic Algorithms & Pattern recognition applications.
410253(B)	425		Soft Computing	CO1: Understand requirement of soft computing and be aware of various soft computing techniques.
				CO2: Understand Artificial Neural Network and its characteristics and implement ANN algorithms.
				CO3: Understand and Implement Evolutionary Computing Techniques.
				CO4: Understand the Fuzzy logic and Implement fuzzy algorithms for solving real life problems.
				CO5: Apply knowledge of Genetic algorithms for problem solving.
				CO6: Develop hybrid systems for problem solving.
410253(C)	426		Business Intelligence	CO1: Differentiate the concepts of Decision Support System & Business Intelligence
				CO2:Use Data Warehouse & Business Architecture to design a BI system.
				CO3:Build graphical reports
				CO4:Apply different data preprocessing techniques on dataset
				CO5:mplement machine learning algorithms as per business needs
				CO6:Identify role of BI in marketing, logistics, and finance and telecommunication sector
410253(D)	427		Quantum Computing	CO1: To understand the concepts of Quantum Computing
				CO2: To understand and get exposure to mathematical foundation and quantum mechanics
				CO3: To understand and implement buiding blocks of Quantum circuits
				CO4: To understand quantum information, its processing and Simulation tools
				CO5: To understand basic signal processing algorithms FT, DFT and FFT
				CO6 : To study and solve examples of Quantum Fourier Transforms and their applications
410253(E)			Open Elective II	
410255	428		Laboratory Practice V	CO1: Analyze and measure performance of sequential and parallel algorithms.
				CO2: Design and Implement solutions for multicore/Distributed/parallel environment.
				CO3: Identify and apply the suitable algorithms to solve AI/ML problems.
				CO4: Apply the technique of Deep Neural network for implementing Linear regression andclassification.
				CO5: Apply the technique of Convolution (CNN) for implementing Deep Learning models.
				CO6: Design and develop Recurrent Neural Network (RNN) for prediction.
410256	429		Laboratory Practice VI	CO1: Apply basic principles of elective subjects to problem solving and modeling.
				CO2: Use tools and techniques in the area of software development to build mini projects
				CO3: Design and develop applications on subjects of their choice.
				CO4: Generate and manage deployment, administration & security.
410256			Project Work Stage II	CO1: Show evidence of independent investigation
				CO2: Critically analyze the results and their interpretation.

COURSE	CODE	SUBJECT	Course Outcomes
			CO3: Report and present the original results in an orderly way and placing the open questions in the rightperspective.
			CO4: Link techniques and results from literature as well as actual research and future research lines withthe research.
			CO5: Appreciate practical implications and constraints of the specialist subject
410257	430	Audit Course 8	
		AC8 – I: Usability Engineering	CO1: Describe the human centered design process and usability engineering process and theirroles in system design and development.
			CO2: Discuss usability design guidelines, their foundations, assumptions, advantages, andweaknesses.
			CO3: Design a user interface based on analysis of human needs and prepare a prototype system.
			CO4: Assess user interfaces using different usability engineering techniques.
			CO5: Present the design decisions
		AC8 – II: Conversational Interfaces	CO1: Develop an effective interface for conversation
			CO2: Explore advanced concepts in user interface
		AC8–III: Social Media And Analytics	CO1: Develop a far deeper understanding of the changing digital land scape.
			CO2: Identify some of the latest digital marketing trends and skill sets needed for today's marketer.
			CO3: Successful planning, prediction, and management of digital marketing campaigns
			CO4: Assessuserinterfacesusingdifferentusabilityengineeringtechniques.
			CO5: Implement smart management of different digital assets for marketing needs.
			CO6: Assess digital marketing as a long term career opportunity.
		AC8 – IV: MOOC-learn New Skill	CO1: To acquire additional knowledge and skill.
		AC8 – V: Emotional Intelligence	CO1: Expand your knowledge of emotional patterns in yourself and others
			CO2: Discover how you can manage your emotions, and positively influence yourself and others
			CO3: Build more effective relationships with people at work and at home
			CO4: Positively influence and motivate colleagues, team members, managers
			CO5: Increase the leadership effectiveness by creating an atmosphere that engages others
		BE FINAL YEAR Information Technology 2019 Course W.E.F.A.Y. 2022-23	
COURSE	CODE	SUBJECT	Course Outcomes
414441 SEM-I	401	Information Storage and Retrieval	CO1. Understand the concept of Information retrieval and to apply clustering in information retrieval.
			CO2. Use an indexing approach for retrieval of text and multimedia data.
			CO3. Evaluate performance of information retrieval systems.
			CO4. Apply the concepts of multimedia and distributed information retrieval.
			CO5. Use appropriate tools in analyzing the web information
			CO6. Simulate the working of a search engine and recommender system.
414442	402	Software Project Management	CO1. Apply the practices and methods for successful Software Project Management
			CO2. Create Design and Evaluate Project
			CO3. Analyze Project Schedule and calculate Risk Management with help of tools.
			CO4. Demonstrate different tools used for Project Tracking, Monitoring & Control.
			CO5. Identify Staff Selection Process and the issues related to Staff Management.

				CO6. Discuss and use modern tools for Software Project Management.
414443	403		Deep Learning	CO1. Understand the theoretical foundations, algorithms, and methodologies of Deep Learning.
				CO2. Apply the concepts of Convolution Neural Networks and use of popular CNN architectures.
				CO3. Compare Feed Forward Neural Network and Recurrent Neural Network and learn modeling the time dimension using RNN and LSTM.
				CO4. Elaborate unsupervised deep learning algorithms like Autoencoders.
				CO5. Explore Representation Learning and Transfer Learning techniques using variants of CNN architecture.
				CO6. Evaluate the performance of deep learning algorithms and to provide solution for various real-world applications
		Elective – III		
414444 (A)	404		Mobile Computing	CO1. understand the basic concepts of mobile computing, MAC and different multiplexing technics.
				CO2. understand Protocols, Connection Establishment, Frequency Allocation, Routing of mobile telecommunication system like GSM, GPRS, UMTS.
				CO3. understand the Generations of Mobile Communication Technologies
				CO4. learn mobile IP , Adhoc – Network, Reactive Routing protocols, Multicast Routing.
				CO5. obtaining knowledge of transport layer protocol TCP, File System, and different application layer protocols.
				CO6. gain knowledge about different mobile platforms, operating Systems, Software Development Kit,Security Issues.
414444 (B)	405		High Performance Computing	CO1.Understand concepts of parallel computing, its application areas and parallel computing platforms
				CO2.Apply different Parallel programming paradigm and Decomposition Techniques.
				CO3.Correlate various communication calls.
				CO4.Analyze and Measure different Performance Metrics.
				CO5.Perform CUDA Programming.
				CO6.Build the logic to develop parallel algorithms for high performance computing.
414444 (C)	406		Multimedia Technology	CO1. Understand basic building block and applications of Multimedia.
				CO2. Solve and analyze different algorithms for text and image compression.
				CO3. Classify different audio and video file formats of Multimedia.
				CO4. Apply open-source authoring tools of animation.
				CO5. List various devices used in virtual reality and its use in daily life.
				CO6. Recognize emerging trends in Multimedia.
414444 (D)	407		Smart Computing	CO1. Demonstrate the knowledge of design of smart computing and its applications.
				CO2. Describe different generations of mobile and mobile computing projects
				CO3. Demonstrate the knowledge of design of Ubicomp and its applications.
				CO4. Explain smart devices and services used Ubicomp.
				CO5. Implement interfacing of various sensors, actuators to the development boards
				CO6. Compare various IoT communication technologies and smart computing applications.
		Elective – IV		
414445 (A)	408		Bioinformatics	CO1. Integrate biological concepts with information technologies to study the biological system.

				CO2. Study Gene structure, various biological database, and methods to manage the different types of biological data.
				CO3. Describe principles and algorithms of pairwise and multiple alignments.
				CO4. Study various bioinformatics tools and Algorithm.
				CO5. Understand modeling and simulation in bioinformatics, drug discovery process. and Protein Structure.
				CO6. To Gain awareness in field of System Biology and Human Disease.
414445 (B)	409	Introduction to DevOps		CO1. Understand the fundamental concepts of DevOps
				CO2. Link the background of DevOps with other technologies
				CO3. Comprehend the concept of continuous integration and continuous delivery
				CO4. Compare various stages of continuous deployment and test strategies
				CO5. Justify the importance of monitoring system and reliability engineering
				CO6. Use the latest tools in DevOps
414445 (C)	410	Computer Vision		CO1. Implement fundamental image processing techniques required for computer vision.
				CO2. Apply feature extraction techniques.
				CO3. Apply Hough Transform for line, circle, and ellipse detections.
				CO4. Understand three-dimensional analysis techniques.
				CO5. Develop skills to develop applications using computer vision techniques.
414445 (D)	411	Wireless Communication		CO1: Articulate the fundamental concept of cellular system.
				CO2: Analyse the fundamentals of cellular systems.
				CO3: Illustrate multiple access technique for effective utilization of spectrum.
				CO4: Design and analyse the WAP Programming Model in networking environment.
				CO5: Learn and understand security issues, challenges and tools in wireless communication.
				CO6: Explore the emerging trends and applications in wireless communication.
414446	412	Lab Practice III		CO1. Understand the concept of Information retrieval and to apply clustering in information retrieval.
				CO2. Use appropriate indexing approach for retrieval of text and multimedia data. Evaluate performance of information retrieval systems.
				CO3. Apply appropriate tools in analyzing the web information.
				CO4. Map the concepts of the subject on recent developments in the Information retrieval field.
414447	413	Lab Practice IV		CO1. Learn and Use various Deep Learning tools and packages.
				CO2. Build and train a deep Neural Network models for use in various applications.
				CO3. Apply Deep Learning techniques like CNN, RNN Auto encoders to solve real word Problems.
				CO4. Evaluate the performance of the model build using Deep Learning.
414448	414	Project Stage I		CO1. To apply knowledge of mathematics, science, and engineering to formulate the Problem statement.
				CO2. To design and conduct experiments, as well as to analyze and interpret data.
				CO3. Understand the professional and ethical responsibility.
				CO4. To communicate effectively.
				CO5. Get broad education which is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

				CO6. Recognition of the need for, and an ability to engage in life-long learning.
				CO7. To use the techniques, skills, and modern engineering tools necessary for engineering practices.
				CO8. To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
		Audit Course 7		
414449 (A)	415	Copyrights and Patents		CO1.Understand the concepts of Intellectual Property Rights.
				CO2.Understand the knowledge about Copyrights and Trademark.
				CO3.Understand the knowledge how to protect trade secrets.
414449 (B)	416	Stress Management By Yoga		CO1.Understand the reasons for Stress.
				CO2.Understand the role of Yoga.
				CO3.Develop healthy mind in a healthy body.
				CO4.Develop overall efficiency
414449 (C)	417	English for Research Paper Writing		CO1. Understand that how to improve writing skills and level of readability.
				CO2. Identify and categorize about what to write in each section.
				CO3. Ensure the good quality of paper at very first-time submission.
414450 SEM-II	418	Distributed Systems		CO1. Demonstrate the core concepts of distributed systems.
				CO2. Understand the concept of middleware of distributed systems.
				CO3. Understand Inter-process communication methods and analyze different coordination algorithms.
				CO4. Comprehend the importance of replication to achieve fault tolerance in distributed systems.
				CO5. Analyze the design and functioning of existing distributed file systems, distributed multimedia, and distributed web-based systems.
				CO6. Understand various Recent Trends in distributed systems.
		Elective-V		
414451(A)	419	Software Defined Network		CO1. Acquire fundamental knowledge of SDN exploring the need, characteristics, and architecture of SDN and methods of API's in SDN.
				CO2. Recognize Open Flow protocols and its forwarding, pipeline model and use cases of SDN controller.
				CO3. Demonstrate virtualization and Cloud computing services of SDN.
				CO4. Comprehend IT Infrastructure and understand the data center in SDN.
				CO5. Analyse various security issues and challenges in SDN.
				CO6. Comprehend SDN application areas and future.
414451(B)	420	Social Computing		CO1. Understand basics of Social Media Analytics
				CO2. Correlate Network Measures for Social Media Data
				CO3. Visualize mining in social media data
				CO4. Discuss the Social Similarities
				CO5. Interpret social media behavior
				CO6. Apply Social Media Computations for Google+
414451(C)	421	Natural Language Processing		CO1. Understand and analyze the natural language text and model.
				CO2. Analyze the natural language syntactically.

			CO3. Analyze and study natural language logically.
			CO4. Process the natural language text based on relations and knowledge.
			CO5. Evaluate the natural language text using models and apply modeling techniques for automatic document separation and text mining.
			CO6. Apply information retrieval techniques.
414451(D)	422	Soft Computing	CO1. Learn soft computing techniques and their roles in problem solving.
			CO2. Understand and Analyze various Artificial neural network techniques
			CO3. Understand and define the fuzzy systems for problem solving.
			CO4. Understand and apply the concepts of genetic algorithms for problem solving.
			CO5. Identify and select a suitable Soft Computing method to solve the problem
			CO6. Identify and understand the role of soft computing models in various applications
414451(E)	423	Game Engineering	CO1. Describe fundamentals of game engineering and the social- ethical issues in game development.
			CO2. Develop creative and critical thinking skills for designing compelling games.
			CO3. Apply game mechanics to make game more enjoyable.
			CO4. Analyze Games over Networks and Peer Effects.
			CO5. Demonstrate an understanding of various tools that are used in game development.
			CO6. Apply mathematical and game programming knowledge and skills to solve development tasks.
		ElectiveVI	
414452 (A)	424	Ethical Hacking and Security	CO1. Identify Ethical hacking processes and become acquainted with Penetration testing.
			CO2. Recognize Foot printing techniques and apply in real time applications
			CO3. Build knowledge about Meta sploit tool with Kali Linux
			CO4. Differentiate Privilege Escalation in Windows and Linux
			CO5. Construct Secure Web Applications to understand Hacking Techniques.
			CO6. Recognize Wifi Hacking and Security techniques.
414452 (B)	425	Augmented and Virtual Reality	CO1. Analyze how Virtual Reality systems work.
			CO2. Understand the representation of Virtual world.
			CO3. Describe the importance of motion and tracking in VR systems.
			CO4. Analyze how AR systems work and list the applications of AR.
			CO5. Identify the working of various AR components and AR devices.
			CO6. Make use of computer vision concepts for AR.
414452 (C)	426	Business Analytics and Intelligence	CO1. Apply conceptual knowledge on how Business Intelligence is used in decision making process
			CO2. Use modelling concepts in Business Intelligence
			CO3. Understand and apply the concepts of business reports and analytics with the help of visualization for business performance management
			CO4. Comprehend the model-based decision making using prescriptive analytics
			CO5. Analyze the role of analytics and intelligence in Business
			CO6. Comprehend different Business Intelligence trends and its future impacts
414452 (D)	427	Blockchain Technology	CO1. Understand the concept of cryptography and decentralization.
			CO2. Acquire fundamental knowledge of blockchain with issues associated with it.
			CO3. Acquire knowledge of Ethereum blockchain platform.

				CO4. Understand hyper ledger fabric platform.
				CO5. Acquire the knowledge regarding working of tokenization.
				CO6. Describe the applications and risk involved
414453	428		Startup and Entrepreneurship	1. Able to understand key concepts and framework of innovation and start-up ecosystem.
				2. Gain knowledge of how to develop start up ecosystem, its key components and how to influence and manage dynamics between them and increase the productivity of ecosystem.
				3. Understand the role of different stakeholders in ecosystem in building and supporting growth of start-ups.
				4. have insight into global trend in start-up ecosystem and product development.
				5. mapping different start-up ecosystems and developing performance indicators.
414454	429		Lab Practice - V	1. Demonstrate knowledge of the core concepts and techniques in distributed systems.
				2. Learn how to apply principles of state-of-the-Art Distributed systems in practical application.
				3. Design, build and test application programs on distributed systems
			Lab Practice VI	
414455(A)	430		Ethical Hacking and Security	CO1. Perform internal and external vulnerability analysis on web application and network.
				CO2. Comprehend the hacker's mindset while conducting reconnaissance and system hacking.
				CO3. Implement industry standard security protocols to prevent cyber-attacks.
				CO4. Carry-out the same tactics, techniques, and procedures as actual hackers.
414455(B)	431		Augmented and Virtual Reality	
414455(C)	432		Business Analytics and Intelligence)	CO1. Compare and analyze different analytical tools used by businesses
				CO2. Understand the application of critical notion of KPI using real time case studies
				CO3. Design and implement the analytical models using suitable tools
				CO4. Create visualizations using suitable tools
414455(D)	433		Blockchain Technology	1.To implement small blockchain experimentations.
				2. Identify Consensus mechanism for Blockchain Application.
414456	434		Project-II	1. To apply engineering and mathematical knowledge to investigate / select proper technology / Algorithm suitable to solve the problem in hand.
				2. To apply knowledge of statistics for analysis of results and express conclusion and justification for the same.
				3. To design and conduct experiments, as well as to analyze and interpret data or develop prototype model of the application.
				4. To communicate effectively.
				5. Get broad education which is necessary to understand the impact of engineering solutions in a global, economic, environmental, ethically and societal context.
				6. Recognition of the need for, and an ability to engage in life-long learning.
			Audit Course8	
414457 (A)	435		Functional Programming in Haskell	CO1. Understand the correctness of programs.
				CO2. Make use of higher-order functions.
				CO3. Make use of the data encapsulation and parametric polymorphism for functional programming.

COURSE	CODE	SUBJECT	Course Outcomes
			CO4. Understand the importance of the 'type checking' of values/functions to develop programs relatively faster
414457(B)	436	Cyber Laws And Use Of Social Media	CO1. Understand the importance of IT Act.
			CO2. Understand the significance of cyber laws and its practices.
			CO3. Identify and Analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
			CO4. To study various privacy and security concerns of Online social media.
414457(C)	437	Constitution Of India	1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
			2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights.
			3. To address the role and functions of local administration.

<p style="text-align:center; color:red;">BE FINAL YEAR Mechanical Engineering 2019 Course W.E.F.A.Y. 2022-23</p>

COURSE	CODE	SUBJECT	Course Outcomes
402041 SEM-I	401	Heating, Ventilation, Air Conditioning and Refrigeration	CO1.ANALYSE different air-craft refrigeration systems and EXPLAIN the properties, applications and environmental issues of different refrigerants.
			CO2.ANALYSE multi pressure refrigeration system used for refrigeration applications.
			CO3.DISCUSS types of compressors, condensers, evaporators and expansion valves along with regulatory and safety controls and DESCRIBES Transcritical and ejector refrigeration systems.
			CO4.ESTIMATE cooling load for air conditioning systems used with concern of design conditions and indoor quality of air.
			CO5.DESIGN air distribution system along with consideration of ventilation and infiltration.
			CO6.EXPLAIN the working of types of desiccants, evaporative, thermal storage, radiant cooling, clean room and heat pump systems.
402042	402	Dynamics of Machinery	CO1. APPLY balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
			CO2. ANALYZE the gyroscopic couple or effect for stabilization of Ship, Airplane and Four wheeler vehicles.
			CO3. ESTIMATE natural frequency for single DOF un-damped & damped free vibratory systems.
			CO4. DETERMINE response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
			CO5. ESTIMATE natural frequencies, mode shapes for 2 DOF un-damped free longitudinal and torsional vibratory systems.
			CO6. DESCRIBE noise and vibration measuring instruments for industrial / real life applications along with suitable method for noise and vibration control.
402043	403	Turbomachinery	CO 1: VALIDATE impulse moment principle using flat, inclined and curved surfaces and INVESTIGATE performance characteristics of hydraulic turbines.
			CO 2: DETERMINE performance parameters of impulse and reaction steam turbine along with discussion of nozzles, governing mechanism & losses.
			CO 3: MEASURE performance parameters of single & multistage centrifugal pumps along with discussion of cavitation and selection.

				CO 4: EXPLAIN performance parameters of centrifugal compressor along with discussion of theoretical aspects of axial compressor.
402044 (A)	404	Automobile Design		CO1: DESIGN of Principal Engine Components
				CO2: DESIGN of Drive train
				CO3: DESIGN of brakes and Suspension
402044(B)	405	Design of Heat Transfer Equipments		CO1: EXPLAIN the design aspect of heat exchanger considering fouling factor for Heat Transfer
				CO2: SELECT and DESIGN the double tube heat exchangers for process industry
				CO3: DESIGN the Shell & Tube Heat Exchangers for specified conditions
				CO4: DESIGN the condensers and evaporators for refrigeration applications
				CO5: DESIGN the compact heat exchangers
				CO6: ANALYSE the performance of counter and cross flow cooling tower.
402044 (C)	406	Modern Machining Processes		CO1. UNDERSTAND and ANALYZE the mechanism, process parameters of mechanical assisted modern machining processes.
				CO2. UNDERSTAND the mechanism, construction and working of laser, plasma and electron beam assisted machining.
				CO3. CLASSIFY and ANALYZE the mechanism, process parameters of the chemical and electrochemical machining.
				CO4. RELATE and ANALYZE the mechanism and select process parameters Electrical Discharge Machining for an application.
				CO5. ILLUSTRATE the application of micromachining processes.
				CO6. SUGGEST appropriate nanomachining process for the specific application.
402044 (D)	407	Industrial Engineering		CO1. EVALUATE the productivity and IMPLEMENT various productivity improvement techniques.
				CO2. APPLY work study techniques and UNDERSTANDS its importance for better productivity.
				CO3. DEMONSTRATE the ability to SELECT plant location, appropriate layout and material handling equipment.
				CO4. USE of Production planning and control tools for effective planning, scheduling and managing the shop floor control.
				CO5. PLAN inventory requirements and EXERCISE effective control on manufacturing requirements.
				CO6. APPLY Ergonomics and legislations for human comfort at work place and UNDERSTANDS the role of value engineering in improving productivity.
402044 (E)	408	Internet of Things		CO1. EXPLAIN the Applications/Devices, Protocols and Communication Models of IoT
				CO2. DEMONSTARTE small Mechanical Engineering IoT oriented applications using Sensors, Actuators, Microcontrollers and Cloud
				CO3. SELECT commonly used IoT Simulation Hardware platforms
				CO4. APPLICATION of Interfacing and Communication Technologies for IoT
				CO5. ILLUSTRATE IoT Application Development and Security of IoT Ecosystem
				CO6. EVALUATE Present and Future Domain specific Applications of IoT Ecosystem
402044(F)	409	Computational Fluid Dynamics		CO1. DISTINGUISH and ANALYSE the governing equations of fluid mechanics and heat transfer in various formulations
				CO2. ANALYZE and MODEL the conduction and advection problems

				CO3. ANALYZE and MODEL the Convection-Diffusion problems
				CO4. IDENTIFY and EVALUATE the External/Internal flow and its simulation
				CO5. DISTINGUISH and COMPARE concepts of stability and turbulence.
				CO6. USE and APPLY a CFD tool for effectively solving practical Fluid-Structure Interaction problems
402045 (A)	410	Product Design and Development		CO1. UNDERSTAND Product design and Product development processes
				CO2. UNDERSTAND Processes, tools and techniques for Market Survey & Product Specification Finalization
				CO3. UNDERSTAND Processes, tools and techniques for Concept Inception, Verification and selection
				CO4. UNDERSTAND Processes, tools and techniques for Concept Exploration & Development
				CO5. UNDERSTAND Processes, tools and techniques for Design Verification and Validation
				CO6. UNDERSTAND Processes, tools and techniques for Robust Design and Development
402045(B)	411	Experimental Methods in Thermal Engineering		CO1. IDENTIFY the suitable instrument for measuring parameters as per performance characteristics
				CO2. ANALYZE experimental data by using different statistical techniques and estimate error
				CO3. DISTINGUISH different methods of temperature measurements and thermal radiation
				CO4. CLASSIFY various pressure measurement instruments and their comparison
				CO5. EXPLAIN different flow measurement methods and flow visualization techniques
				CO6. APPLY knowledge of modern engineering experimentation, including calibration, data acquisition, analysis and interpretation using different AI and ML techniques
402045(C)	412	Additive Manufacturing		CO1. USE and CLASSIFY the fundamentals of Additive Manufacturing Technologies for engineering applications.
				CO2. IDENTIFY and CATEGORIZE the methodology to manufacture the products using light-based photo-curing, LASER based technologies and STUDY their applications, benefits.
				CO3. IDENTIFY and CATEGORIZE the methodology to manufacture the products using extrusion-based deposition, inkjet-based technologies and STUDY their applications, benefits.
				CO4. SYNTHESIZE, RECOMMEND and DESIGN the suitable material and process for fabrication and build behavior of verities of product.
				CO5. DESIGN and CONSTRUCT the AM equipment's for appropriate applications and the input CAD model.
				CO6. DEVELOP the knowledge of additive manufacturing for various real-life applications.
402045(D)	413	Operations Research		CO1. EVALUATE various situations of Games theory and Decision techniques and APPLY them to solve them in real life for decision making.
				CO2. SELECT appropriate model for queuing situations and sequencing situations and FIND the optimal solutions using models for different situations.
				CO3. FORMULATE various management problems and SOLVE them using Linear programming using graphical method and simplex method.
				CO4. FORMULATE variety of problems such as transportation, assignment, travelling salesman and SOLVE these problems using linear programming approach.
				CO5. PLAN optimum project schedule for network models arising from a wide range of applications and for replacement situations find the optimal solutions using appropriate models for the situation.
				CO6. APPLY concepts of simulation and Dynamic programming

402045(E)	414	Augmented Reality and Virtual Reality	CO1. UNDERSTAND fundamental Computer Vision, Computer Graphics and Human- Computer Interaction Techniques related to VR/AR
			CO2. UNDERSTAND Geometric Modeling Techniques
			CO3. UNDERSTAND the Virtual Environment
			CO4. ANALYZE and EVALUATE VR/AR Technologies
			CO5. APPLY various types of Hardware and Software in Virtual Reality systems
			CO6. DESIGN and FORMULATE Virtual/Augmented Reality Applications
402046	415	Data Analytics Laboratory	CO1:UNDERSTAND the basics of data analytics using concepts of statistics and probability.
			CO2:APPLY various inferential statistical analysis techniques to describe data sets and withdraw useful conclusions from acquired data set.
			CO3:EXPLORE the data analytics techniques using various tools
			CO4:APPLY data science concept and methods to solve problems in real world context
			CO5:SELECT advanced techniques to conduct thorough and insightful analysis and interpret the results
402047	416	Project (Stage I)	CO1. Implement systems approach.
			CO2. To conceptualize a novel idea / technique into a product.
			CO3. To think in terms of a multi-disciplinary environment.
			CO4. To take on the challenges of teamwork, and document all aspects of design work.
			CO5. To understand the management techniques of implementing a project.
402048 SEM-II	417	Computer Integrated Manufacturing	CO1. EXPLAIN CIM and factory automation.
			CO2. UNDERSTAND the integration of hardware and software elements for CIM
			CO3. APPLY CNC program for appropriate manufacturing techniques.
			CO4. ANALYZE processes planning, quality and MRP integrated with computers.
			CO5. INTERPRET flexible, cellular manufacturing and group technology.
			CO6. ANALYZE the effect of IOT, Industry-4.0 and cloud base manufacturing.
402049	418	Energy Engineering	CO1:EXPLAIN the power generation scenario, the layout components of thermal power plant and ANALYZE the improved Rankine cycle.
			CO2:ANALYZE the performance of steam condensers, cooling tower system; RECOGNIZE an environmental impact of energy systems and methods to control the same.
			CO3:EXPLAIN the layout, component details of diesel engine plant, hydel and nuclear energy systems.
			CO4:ANALYZE gas and improved power cycles.
			CO5:EXPLAIN the fundamentals of renewable energy systems.
			CO6:EXPLAIN basic principles of energy management, storage and economics of power generation.
402050(A)	419	Quality & Reliability Engineering	CO1. UNDERSTAND basic concepts of quality and RELATE various quality tools
			CO2. DEVELOP analytical competencies to SOLVE problems on control charts and process capability.
			CO3. UNDERSTAND fundamental concepts of reliability.
			CO4. EVALUATE system reliability.
			CO5. IDENTIFY various failure modes and CREATE fault tree diagram.
			CO6. UNDERSTAND the concept of reliability centered maintenance and APPLY reliability tests methods.
402050(B)	420	Energy Audit and Management	CO1. EXPLAIN the energy need and role of energy management
			CO2. CARRY OUT an energy audit of the Institute/Industry/Organization

				CO3. ASSESS the ENCON opportunities using energy economics
				CO4. ANALYSE the energy conservation performance of Thermal Utilities
				CO5. ANALYSE the energy conservation performance of Electrical Utilities
				CO6. EXPLAIN the energy performance improvement by Cogeneration and WHR method
402050(C)	421	Manufacturing System and Simulation		CO1. UNDERSTAND the concepts of manufacturing system, characteristics, type, etc.
				CO2. UNDERSTAND the concepts of Facilities, manufacturing planning & control and Support System.
				CO3. UNDERSTAND the concepts of manufacturing towards solving productivity related problems.
				CO4. DEVELOP a virtual model to solve industrial engineering related issues such as capacity. utilization, line balancing.
				CO5. BUILDING tools to view and control simulations and their results.
				CO6. PLAN the data representation & Evaluate the results of the simulation.
402050(D)	422	Engineering Economics and Financial Management		CO1. UNDERSTAND the business environment, concepts of economics and demand-supply scenario.
				CO2. APPLY the concepts of costing and pricing to evaluate the pricing of mechanical components.
				CO3. UNDERSTAND accounting systems and analyze financial statements using ratio analysis
				CO4. SELECT and PREPARE the appropriate type of budget and understand the controlling aspects of budget.
				CO5. UNDERSTAND the international business and trade system functioning
				CO6. DEMONSTRATE understanding of financing decisions of new ventures and performance
402050(E)	423	Organizational Informatics		CO1. Demonstrate an understanding of the scope, purpose and value of information systems in an organization.
				CO2. Understand the constituents of the information system.
				CO3. Demonstrate the Understanding of the management of product data and features of various PLM aspects.
				CO4. Relate the basic concepts of manufacturing system and the ERP functionalities in context of information usage.
				CO5. Understand the manufacturing execution system and it's applications in functional areas.
				CO6. Outline the role of the information system in various types of business and allied emerging technologies.
402050(F)	424	Computational Multi Body Dynamics		CO1. APPLY the basic terminology and concepts used in Multibody Dynamics to solve varieties of motion related applications
				CO2. IDENTIFY and EVALUATE the types of joints, its kinematics and relevant transformations
				CO3. DISTINGUISH and COMPARE the formulation methods
				CO4. DERIVE equations of motion and EVALUATE the kinematics and dynamics of rigid Planar inter-connected bodies
				CO5. DERIVE equations of motion and EVALUATE the kinematics of rigid Spatial inter- connected bodies
				CO6. APPLY MBD tool effectively and SIMULATE it to solve and validate practical Multibody Dynamics problems and its solutions
402051(A)	425	Process Equipment Design		CO1. INTERPRET the different parameters involved in design of process Equipments.
				CO2. ANALYZE thin and thick walled cylinder
				CO3. DESIGN cylindrical vessel, spherical vessel, tall vessels and thick walled high pressure vessels
				CO4. DESIGN different process Equipments and select pump, compressor etc. and auxiliary services
				CO5. EVALUATE Process parameters and their correlation
				CO6. APPLY the concepts of process equipment design for specific applications

402051(B)	426	Renewable Energy Technologies	1. DESCRIBE fundaments, needs and scopes of renewable energy systems.
			2. EXPLAIN performance aspects of flat and concentric solar collectors along with applications.
			3. DESIGN solar photovoltaic system for residential applications.
			4. DESIGN AND ANALYSIS of wind energy conversion system.
			5. APPLY Installation practices of Wind and Solar Photovoltaic Systems for grid connection.
			6. DETERMINE performance parameters of bio-energy conversion systems.
402051(C)	427	Automation and Robotics	CO1. UNDERSTAND the basic concepts of Automation
			CO2. UNDERSTAND the basic concepts of Robotics
			CO3. IDENTIFY and EVALUATE appropriate Drive for Robotic Applications
			CO4. COMPARE and SELECT End-effectors and Sensors as per Application
			CO5. DEVELOPE the Mathematical Modeling Approaches of Robot
			CO6. EVALUATE the fundamentals of robot programming and CLASSIFY the Applications
402051(D)	428	Industrial Psychology and Organizational Behavior	CO1. DEMONSTRATE fundamental knowledge about need and scope of industrial - organizational psychology and behavior.
			CO2. ANALYZE the job requirement, have understanding of fatigue, boredom and improve the job satisfaction.
			CO3. UNDERSTAND the approaches to enhance the performance.
			CO4. KNOWLEDGE of theories of organizational behavior, learning and social-system.
			CO5. UNDERSTAND the mechanism of group behavior, various aspects of team, leadership and conflict management.
			CO6. EVALUATE the organizational culture, manage the change and understands organizational development approaches.
402051(E)	429	Electric and Hybrid Vehicle	CO1. UNDERSTAND the basics related to e-vehicle CO2. CLASSIFY the different hybrid vehicles
			CO3. IDENTIFY and EVALUATE the Prime Movers, Energy Storage and Controllers
			CO4. DISCOVER and CATAGORIZE the Electric Vehicle Configuration with respect to Propulsion, Power distribution and Drive-Train Topologies
			CO5. DEVELOP body frame with appropriate suspension system and TESTING of for e- Vehicles
			CO6. CLASSIFY and EVALUATE Battery Charging techniques and management
402052	430	Mechanical Systems Analysis Laboratory	CO1. DEVELOP an understanding of the Systems Engineering Process and the range of factors that influence the product need, problem-specific information collection, Problem Definition, Task Specification, Solution Concept inception, Concept Development, System's Mathematical Modelling, Synthesis, Analysis, final solution Selection, Simulation, Detailed Design, Construction, Prototyping, Testing, fault-finding, Diagnosis, Performance Analysis, and Evaluation, Maintenance, Modification, Validation, Planning,Production, Evaluation and use of a system using manual calculation, computational tools to automate product development process, redesign from customer feedback and control of technological systems
			CO2. ILLUSTRATE the concepts and USE the developed skill-set of use of computational tools (FEA, CFD, MBD, FSI, CAE) to automate the complete product development process.
			CO3. EVALUATE the knowledge of new developments and innovations in technological systems to carry forward to next stage of employment after passing your Undergraduate Degree Examination.

COURSE	CODE	SUBJECT	Course Outcomes
			CO4. APPRAISE how technologies have transformed people's lives and can be used to SOLVE challenges associated with climate change, efficient energy use, security, health, education and transport, which will be coming your ways in the coming future.
			CO5. PRIORITIZE the concept of quality and standards, including systems reliability, safety and fitness for the intended purpose.
			CO6. INVENT yourself to face the challenges of future technologies and their associated Problems.
402053	431	Project (Stage II)	CO1. Implement systems approach.
			CO2. To conceptualize a novel idea / technique into a product.
			CO3. To think in terms of a multi-disciplinary environment.
			CO4. To take on the challenges of teamwork, and document all aspects of design work.
			CO5. To understand the management techniques of implementing a project.
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COURSE	**CODE**	**SUBJECT**	**Course Outcomes**
404181 SEM-I	401	Radiation and Microwave Theory	CO1: Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of antenna.
			CO2: Identify various modes in the waveguide. Compare: coaxial line, rectangular waveguides & striplines and identify applications of the same.
			CO3: Explore construction and working of principles passive microwave devices/components.
			CO4: Explore construction and working of principles active microwave devices/components.
			CO5: Analyze the structure, characteristics, operation, equivalent circuits and applications of various microwave solid state active devices.
			CO6: Know the various microwave systems, device set ups of microwave measurement devices and Identify the effect of radiations on environmental sustainability.
404182	402	VLSI Design and Technology	CO1: Develop effective HDL codes for digital design.
			CO2: Apply knowledge of real time issues in digital design.
			CO3: Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
			CO4: Design CMOS circuits for specified applications.
			CO5: Analyze various issues and constraints in design of an ASIC.
			CO6: Apply knowledge of testability in design and Build In Self Test (BIST) circuit.
404183	403	Cloud Computing	CO1: Understand the basic concepts of Cloud Computing.
			CO2: Describe the underlying principles of different Cloud Service Models.
			CO3: Classify the types of Virtualization.
			CO4: Examine the Cloud Architecture and understand the importance of Cloud Security.
			CO5: Develop applications on Cloud Platforms.
			CO6: Evaluate distributed computing and the Internet of Things.
		(Elective - III)	
404184 (A)	404	Speech Processing	CO1: Understand basics of Human speech production mechanism.
			CO2: Classify speech sounds based on acoustic and articulatory phonetics.
			CO3: Analyse speech signal to extract the characteristic of vocal tract (formants) and vocal cords (pitch).

				CO4: Evaluate speech signal for extracting LPC and MFCC Parameters of speech signal.
				CO5: Implement algorithms for processing of speech and audio signals considering the properties of acoustic signals.
				CO6: Design speech recognition application for speech signal analysis.
404184 (B)	405		PLC SCADA and Automation	CO1: Understand and Recognize Industrial Control Problems.
				CO2: Analyze & explain different hardware functions of PLC.
				CO3: Develop Ladder Programming in PLC and PLC Interface in real time applications.
				CO4: Explore and interpret functionality of SCADA.
				CO5: Identify and interpret the functionality of DCS.
				CO6: Define and explain CNC machines and Applications of Industrial Protocols.
404184 ©	406		Java Script	CO1: Use basic features of java script.
				CO2: Use relevant data types for developing application in java script.
				CO3: Use the function and objects as self-contained, with data passing in and out through well-defined interfaces in development of small systems.
				CO4: Apply the regular expression for Text matching and manipulation.
				CO5: Explore use of the various aspects of JavaScript object models that are fundamental to the proper use of the language.
				CO6: Develop the application using windows controlling and form handling.
404184 (D)	407		Embedded System & RTOS	CO1: Apply design metrics of Embedded systems to design real time applications to match recent trends in technology.
				CO2: Apply Real time systems concepts.
				CO3: Evaluate μCOS operating system and its services.
				CO4: Apply Embedded Linux Development Environment and testing tools.
				CO5: Analyze Linux operating system and device drivers.
				CO6: Analyze the hardware – software co design issues for testing of real time Embedded system.
404184 (E)	408		Modernized IoT	CO1: Comprehend and analyze concepts of sensors, actuators, IoT and IoE.
				CO2: Interpret IoT Architecture Design Aspects.
				CO3: Comprehend the operation of IoT protocols.
				CO4: Describe various IoT boards, interfacing, and programming for IoT.
				CO5: Illustrate the technologies, Catalysts, and precursors of IIoT using suitable use cases.
				CO6: Provide suitable solution for domain specific applications of IoT.
			(Elective - IV)	
404185 (A)	409		Data Mining	CO1: Understand the process of data mining and performance issues in data mining
				CO2: Apply data preprocessing techniques to the historical data collected in data warehouse
				CO3: Analyze various types of Frequent pattern analysis methods and advanced Pattern mining techniques
				CO4: Evaluate various data mining algorithms for developing effective data mining models
				CO5: Analyze different clustering and outlier detection methods
				CO6: Design data mining models in different mining application areas
404185 (B)	410		Electronics Product Design	CO1: Understand and explain design flow of design of electronics product.
				CO2: Associate with various circuit design issues and testing.

			CO3: Inferring different software designing aspects and the Importance of product test & test specifications.
			CO4: Summarizing printed circuit boards and different parameters.
			CO5: Estimating assorted product design aspects.
			CO6: Exemplifying special design considerations and importance of documentation.
404185 (B)	411	Deep Learning	CO1: Classify machine learning algorithms and its types.
			CO2: Discuss the concepts of deep learning and its Frameworks.
			CO3: Identify the deep learning architectures with respect to the applications.
			CO4: Demonstrate different architectures of Convolutional neural networks.
			CO5: Discuss natural language processing architectures.
			CO6: Make use of various case studies and deep learning applications.
404185 (D)	412	Low Power CMOS	CO1: Explain the sources of power dissipation in CMOS.
			CO2: Classify the special techniques to mitigate the power consumption in CMOS circuits.
			CO3: Summarize the power optimization and trade off techniques in digital circuits.
			CO4: Illustrate the power estimation at logic and circuit level.
			CO5: Explain the software design for low power in various level.
			CO6: Use the CAD tools for low power synthesis.
404185 (E)	413	Smart Antennas	CO1: Compare various linear wire antenna and uniform array in terms of antenna parameters and analyze them based on the current distribution and identify an appropriate wire antenna for given application.
			CO2: Classify Microstrip & re-configurable antenna and techniques.
			CO3: Describe smart antenna systems and discuss the beam steering and mutual coupling effects.
			CO4: Explain DOA estimation methods and classify.
			CO5: Classify the beam forming methods.
			CO6: Describe and Compare MIMO systems.
404188	414	Project Phase – I	CO1: Demonstrate a sound technical knowledge in field of E&TC in the form of project.
			CO2: Undertake real life problem identification, formulation and solution.
			CO3: Design engineering solutions to complex problems utilizing a systematic approach.
			CO4: Demonstrate the knowledge, effective communication skills and attitudes as professional engineer
404190 SEM-II	415	Fiber Optic Communication	CO1: Explain the working of components and measurement equipments in optical fiber networks.
			CO2: Calculate the important parameters associated with optical components used in fiber optic telecommunication systems.
			CO3: Compare and contrast the performance of major components in optical links.
			CO4: Evaluate the performance viability of optical links using the power and rise time budget analysis.
			CO5: Design digital optical link by proper selection of components and check its viability using simulation tools.
			CO6: Compile technical information related to state of art components, standards, simulation tools and current technological trends by accessing the online resources to update their domain knowledge.
		(Elective - V)	
404191 (A)	416	Biomedical Signal Processing	CO1: Describe the origin of various biomedical signals and Interpret the meaning of various parameters associated with biomedical signals
			CO2: Analyze ECG Signals with extraction of meaningful information
			CO3: Explain Processing of EEG signals for Diseases of Central Nervous System

				CO4: Analyze EMG signals for understanding Neuromuscular Diseases
				CO5: Analyze various Biomedical Signals
				CO6: Process the biomedical signals to remove adaptive interference and noise
404191 (B)	417		Industrial Drives & Control	CO1: Understand significance and design of various components of electrical drives.
				CO2: Develop, evaluate and analyze the performance of DC motor drives.
				CO3: Design, estimate and examine the performance of chopper controlled DC drives.
				CO4: Adapt, choose and categorize performance of PWM inverter drives for Induction motors.
				CO5: Elaborate, interpret and analyze the performance of Synchronous motor drive.
				CO6: Develop, explain and examine performance of stepper motor control.
404191 (C)	418		Android Development	CO1: Describe the process of developing mobile applications.
				CO2: Create mobile applications on the different android platform.
				CO3: Design and implement mobile applications involving data storage in databases.
404191 (D)	418		Embedded System Design	CO1: Apply the design aspects of Embedded system.
				CO2: Create and debug a firmware for the Embedded System using ARM Cortex M4.
				CO3: Develop a specific software code for the functionality of the Embedded System.
				CO4: Utilize an open source RTOS for embedded system design.
				CO5: Design an advanced embedded system.
				CO6: Explore Embedded Android system.
404191 (E)	419		Mobile Computing	CO1: Understand concepts of Mobile Communication.
				CO2: Analyse next generation Mobile Communication System.
				CO3: Understand network layers of Mobile Communication.
				CO4: Understand IP and Transport layers of Mobile Communication.
				CO5: Study of different mathematical models.
				CO6: Understand different mobile applications.
		(Elective - VI)		
404192 (A)	420		System on Chip	CO1: Understand the basic concepts and architecture of SOC.
				CO2: Understand the basic terminology of Verilog HDL programming.
				CO3: Apply the various Verilog modeling styles in writing the design and testbench codes.
				CO4: Understand the basic steps used in the VLSI Physical Design.
				CO5: Understand the basic architecture of various processors used in SOC.
				CO6: Understand the working principle of various Buses and memory used in SOC.
404192 (B)	421		Nanoelectronics	CO1: Understand the fundamental knowledge behind nanotechnology.
				CO2: Understand to Nano-CMOS technology.
				CO3: Explore various Nanoelectronics material.
				CO4: Understand the importance of carbon nanotubes.
				CO5: Understand Nanomaterial and Nanodevice fabrication.
				CO6: Understand various applications of Nanotechnology in Electronics.
404192(C)	422		Remote Sensing	CO1: Describe the concepts of remote sensing and electromagnetic radiation interaction.
				CO2: Explain the sensors characteristics and analyze its resolution.
				CO3: Classify different types of satellite data products and design various color composites.

COURSE	CODE	SUBJECT	Course Outcomes
			CO4: Describe the fundamentals of microwave remote sensing.
			CO5: Analyze GNSS signal structure and augmentation systems.
			CO6: Demonstrate and describe real life applications of remote sensing.
404192 (D)	423	Digital Marketing	CO1: Design websites using free tools like Wordpress and explore it for digital marketing.
			CO2: Apply various keywords for a website & to perform SEO.
			CO3: Understand the various SEM Tools and implement the Digital Marketing Tools.
			CO4: Illustrate the use of Facebook, Instagram and Youtube for Digital Marketing in real life.
			CO5: Use Linked in platform for various campaigning.
			CO6: Understand the importance of recent trends in digital marketing.
404193	424	Innovation and Entrepreneurship	CO1: Understand Innovation, Entrepreneurship and characteristics of an entrepreneur.
			CO2: Develop a strong understanding of the Design Process and its application in variety of business settings.
			CO3: Generate sustainable ideas.
			CO4: Explore various processes required to be an entrepreneur.
			CO5: Understand patents and its process of filing.
			CO6: Choose and use appropriate social media for marketing.
404194	425	Digital Business Management	CO1: Identify drivers of digital business.
			CO2: Illustrate various approaches and techniques for E-business and management.
			CO3: Prepare E-business plan.

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COURSE	CODE	SUBJECT	Course Outcomes
403141 SEM-I	401	Power System Operation and Control	CO1: Summarize angle, voltage and frequency stability in the power system control (UN).
			CO2: Illustrate various ways of interchange of power between interconnected utilities (AP).
			CO3: Analyze stability and optimal load dispatch using different techniques (AN).
			CO4: Select appropriate FACTS devices for stable operation of the system (EV). CO5: Evaluate the stability of the system and suggest the methods to improve it (EV).
403142	402	Advanced Control System	CO1: Explain compensation networks, common nonlinearities, the concept of state, sampling and reconstruction, and concepts of advanced controls (Understanding)
			CO2: Determine transfer function from state model (Applying)
			CO3: Test controllability and observability properties of the system (Evaluating)
			CO4: Design compensators, state feedback controls, and observers for the system (Creating)
403143(A)	403	PLC and SCADA	CO1:Develop and explain the working of a PLC with the help of a block diagram.
			CO2:Classify input and output interfacing devices with PLC.
			CO3:Design PLC based application by proper selection criteria, developing GUI and ladder program.
			CO4:Execute, debug, and test the programs developed for digital and analog operations.
			CO5:Develop the architecture of SCADA and explain the importance of SCADA in critical infrastructure.
			CO6:Describe the SCADA protocols and digital control systems, along with their architecture for automation.
403143(B)	404	Power Quality Management	CO1: Understand power quality and attribute of power quality
			CO2: Describe voltage flicker and mitigation of it

				CO3: Analyze the effect of power system events on voltage sag and its characteristics.
				CO4: Identify the sources of harmonics and harmonics produced
				CO5: Select proper method for harmonic mitigation along with methods of power quality monitoring.
				CO6: Carry out power quality monitoring using power quality analyzers.
403143(C)	405		High Voltage Engineering	CO1: Identify, describe and analyze the breakdown theories of gaseous, solid and liquid materials.
				CO2: Analyze the occurrence of over voltage and to provide remedial solutions
				CO3: Describe and use of various methods of generation of high AC, DC, impulse voltage and current.
				CO4: Demonstrate the methods of measurement of high AC, DC, impulse voltage and current, tests on high voltage equipment and devices
				CO5: Study design of high voltage laboratory with all safety measures.
403143(D)	406		Robotics and Automation	CO1: differentiate between types of robots based on configuration, method of control, types of drives, sensors used, etc.
				CO2: apply mathematical modeling of a robot for a specific application with given specifications.
				CO3: analyze the robot arm dynamics for calculation of torques and forces required for different joints of robots for control of the robot arm.
				C04 : apply knowledge of Robot for their various applications
403144(A)	407		Alternate Energy System	CO1:Analyze the performance of solar thermal and photovoltaic systems.
				CO2:Determine wind turbine performance.
				CO3:Explain and evaluate biomass resources in an Indian context.
				CO4:Illustrate the importance of storage systems.
				CO5:Analyze the economics of renewable energy sources.
403144(B)	408		Electric and Hybrid Vehicle	CO1: Analyze the Life Cycle Assessment of Li-ion battery.
				CO2 : Describe the different types of Li-ion charging methods
				CO3 : Comprehend the knowledge of drivetrain hybridization.
				CO4 : Evaluate EV motor sizing.
				CO5 : Classify Battery Recycling methods.
403144(C)	409		Special-Purpose Machines	CO1:Reproduce principal of operation of PMSM, Stepper motor, SRM, Switch reluctance and linear motors.
				CO2: Develop torque - speed and performance characteristics of above motors.
				CO3: Enlist application of above motors.
				CO4: Demonstrate various control strategies.
403144(D)	410		HVDC and FACTs	CO1:Choose a proper FACTS controller for the specific application based on system requirements.
				CO2:Analyze shunt, series, and combined controllers to explore different benefits.
				CO3:Compare EHVAC and HVDC systems and to describe various types of DC links.
				CO4:Describe various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems.
403145	411		Project Stage I	CO1:Define the project problem statement and identify the scope of the project.
				CO2:Search the appropriate research papers, standards and e-resources and write a literature survey.
				CO3:Identify tools, techniques, methods, concepts, measuring devices, and instruments required for the project to define the methodology of the project.
				CO4:Justify the selection of electrical, electronic and mechanical components for the project prototyping

				CO5:Simulate or develop a system for software or hardware verification.
				CO6:Write a project report with proper interpretation of results.
403146	412	MOOCs		CO1:Enables the students to directly engage and learn from the best faculty in the country in order to strengthen the fundamentals.
				CO2:Explore new areas of interest in a relevant field.
				CO3:Enable self learning initiative in learners..
				CO4:Develop critical thinking to solve complex problems in engineering, science and humanities.
				CO5:Improve communication skills by interacting with peers and course teachers.
403147(A)	413	German Language-I		CO1: Will have the ability of basic communication.
				CO2: Will have the knowledge of German script.
				CO3: Will get introduced to reading ,writing and listening skills
				CO4: Will develop interest to pursue profession in Indo-German Industry.
403147(B)	414	Engineering Economics-I		CO1:Discuss concepts related to business and its impact on enterprise.
				CO2:Illustrate time value of money in economic analysis.
403147(C)	415	Sustainability		CO1: Understand different types of environmental pollution problem.
				CO2: Suggest solutions for sustainable development.
				CO3: Develop a broader perspective in thinking for sustainable practices by utilizing engineering principle and knowledge
403148 SEM-II	416	Switchgear and Protection		CO1:Understand the fundamentals of protective relaying.
				CO2:Demonstrate the arc interruption and analyze the RRRV in circuit breakers
				CO3:Demonstrate the construction and working principle of air brake circuit breakers, SF6 circuit breakers, and a vacuum circuit breaker.
				CO4:Explain the characteristics of static and digital relays and their applications in power systems.
				CO5:Apply the differential protection scheme to large transformers, alternators, and induction motors.
				CO6:Apply distance protection, three stepped protection for transmission line.
403149	417	Advanced Electrical Drives and Control		CO1: Explain motor load dynamics and multi quadrant operation of drives.
				CO2: Analyze operation of converter fed and chopper fed DC drives.
				CO3: Apply different braking methods of D.C. and induction motor drive.
				CO4: Elaborate vector control for induction motor and BLDC drives.
				CO5: Elaborate synchronous motor, reluctance motor drive.
				CO6: Differentiate between classes and duty cycles of motors and select suitable drives in various industrial applications.
403150(A)	418	Digital Control System		CO1: Analyze digital control system and its stability.
				CO2: Differentiate between various control systems
				CO3: Present system in state space format.
				CO4: Design observer for system.
				CO5: Understand digital controllers
				CO6: Elaborate applications such as digital temperature control and position control
403150(B)	419	Restructuring and Deregulation		CO1: Identify the various institutions in the Indian power sector and explain their role in the Indian power sector .
				CO2: Explain the various fundamentals of power sector economics

				CO3: Describe the regulatory process in India and list the steps involved in tariff determination and explain the phases of tariff determination
				CO4: Describe and explain different power sector restructuring models and explain the concept of energy trading
				CO5: Explain the types of electricity markets and compare the types of electricity markets .
				CO6: State different transmission pricing methods and describe and compare various congestion management methods.
403150(C)	420	Smart Grid		CO1: Apply the knowledge to differentiate between Conventional and Smart Grid
				CO2: Describe importance of Supercapacitors.
				CO3: Identify the need of Smart metering.
				CO4: Apply the communication technology in smart grid. CO5: Comprehend the issues of micro grid.
		(Open Elective)		
403150(D)	421	Sensor Technology		CO1: Understand the characteristics of sensors used for system monitoring and protection.
				CO2: Interface the various position sensors to microcontrollers.
				CO3: Demonstrate the characteristics of sensors used for light and image sensing.
403151(A)	422	EHV AC Transmission		CO1:Highlight need for EHV ac transmission.
				CO2:Calculate line and ground parameters.
				CO3:Enlist problems encountered in EHV transmission.
				CO4:Describe the effect of electric and magnetic fields on human beings.
403151(B)	423	Illumination Engineering		CO1: Define and reproduce various terms in illumination.
				CO2: Identify various parameters for illumination system design.
				CO3: Design indoor and outdoor lighting systems.
				CO4: Enlist state of the art illumination systems.
403151(C)	424	Electromagnetic Fields		CO1: Describe time varying Maxwell's equations and their applications in electromagnetic problems
				CO2: Interpret electric and magnetic field with the help of associated laws
				CO3: Solve simple electrostatic and magnetic boundary conditions
				CO4: Determine the relationship between time varying electric and magnetic fields and electromotive force
				CO5: Solve electromagnetic problems with the help of mathematical tools.
403151(D)	425	Artificial Intelligence and Machine Learning		CO1: Evaluate Artificial Intelligence (AI) and Machine Learning(ML) methods and describe their foundations.
				CO2: Demonstrate knowledge of reasoning and knowledge representation for solving real world problems.
				CO3: Illustrate the construction of learning and expert system Discuss current scope and limitations of AI and societal implications
				CO4: Distinguish between different types of learning types.
				CO5: Apply the different supervised, unsupervised and reinforcement learning methods.
403152	426	Project Stage II		CO1: Identify tools, techniques, methods, concepts, measuring devices, and instruments required for the project to define the methodology of the project
				CO2: Justify the selection of electrical, electronic and mechanical components for the project prototyping
				CO3: Select the appropriate testing method for system performance evaluation
				CO4: Interpret results obtained by simulation, and hardware implementation and decide on further action or write a conclusion

			CO5: Write a project report and research paper on the project work
403153(A)	427	German Language-II	CO1: Will have the ability of advanced communication.
			CO2: Will develop reading, writing and listening skills.
			CO3: Will understand tenses in German Language.
			CO4: Will develop interest to pursue a German language course.
403153(B)	428	Engineering Economics-II	CO1:Apply various techniques for evaluation of engineering projects.
			CO2:Assess cash flow under risk with varying parameters.
403153(C)	429	GREEN BUILDING	CO1:Design green and sustainable techniques for both commercial and residential buildings.
			CO2:Design water, lighting, energy efficiency plan using renewable energy sources.
			CO3:Explain the principles of building planning, its bylaws and provide facilities for rainwater harvesting
			CO4:Understand the concepts of green buildings