

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 **achieve scientific 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:

knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. Apply the

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.

P010 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

P011 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.

P012 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 with derivative 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.
			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.

SE Mechanical and Automobile Engineering 2019 Course W.E.F.A.Y.2020-21

COURSE	CODE	SUBJECT	Course Outcomes
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	
		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	
SE -ELECTRICAL ENGINEERING 2019 COURSE W.E.F.A.Y. 2020-21)			
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 electrodynamic 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 steady 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: Apply knowledge 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 Engineering Course 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++.
			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	

TE COMPUTER ENGINEERING 2019 COURSE W.E.F.A.Y. 2021-22

COURSE	CODE	SUBJECT	Course Outcomes
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
			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
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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, V_{max}/V_{min} , length of transmission line 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/DDDL 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	
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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 System Elective-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 in transformer 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.
			CO6Implement 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	
			CO1Define cybernetics in terms of control and how is it used in controlling technical, biological, and other processes
			CO2Understand various matrix operations.
			CO3Describe different types of control system configurations and their applications.
			CO4Carry out mathematical modeling and simulation of simple processes.
			CO5Appreciate the essential requirements for computers and computer equipment that are intended to operate in dedicated applications and industrial environments
			CO6Know 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
			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 ^s	
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
			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 ^s	
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 of data 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
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 the world.
			CO2: Describe the challenges and problems associated with the use of various energy sources and its conservation.
			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 2015 COURSE W.E.F.A.Y. 2018-19

COURSE	CODE	SUBJECT	Course Outcomes
410241 SEM I	401	High Performance Computing	
			1 Describe different parallel architectures, inter-connect networks, programming models
			2 Develop an efficient parallel algorithm to solve given problem
			3 Analyze and measure performance of modern parallel computing systems
			4 Build the logic to parallelize the programming task
410242	402	Artificial Intelligence and Robotics	
			1 Identify and apply suitable Intelligent agents for various AI applications
			2 Design smart system using different informed search / uninformed search or heuristic approaches.
			3 Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
			4 Apply the suitable algorithms to solve AI problems
410243	403	Data Analytics	
			1. Write case studies in Business Analytic and Intelligence using mathematical models
			2. Present a survey on applications for Business Analytic and Intelligence
			3 Provide problem solutions for multi-core or distributed, concurrent/Parallel environments

410244 (A)	404	Digital Signal Processing	
			1. Understand the mathematical models and representations of DT Signals and System
			2. Apply different transforms like Fourier and Z-Transform from applications point of view
			3. Understand the design and implementation of DT systems as DT filters with filter structures and different transforms
			4. Demonstrate the knowledge of signals and systems for design and analysis of systems
			5. Apply knowledge and use the signal transforms for digital processing applications
410244 (B)	405	Software Architecture and Design	
			1. Express the analysis and design of an application
			2. Specify functional semantics of an application
			3. Evaluate software architectures
			4. Select and use appropriate architectural styles and software design patterns
410244 (C)	406	Pervasive and Ubiquitous Computing	
			1. Design and implement primitive pervasive applications
			2. Analyze and estimate the impact of pervasive computing on future computing applications and society
			3. Develop skill sets to propose solutions for problems related to pervasive computing system
			4. Design a preliminary system to meet desired needs within the constraints of a particular problem space
410244 (D)	407	Data Mining and Warehousing	
			1. Apply basic, intermediate and advanced techniques to mine the data
			2. Analyze the output generated by the process of data mining
			3. Explore the hidden patterns in the data
			4. Optimize the mining process by choosing best data mining technique
410245 (A)	408	Distributed Systems	
			1. Able to learn and apply the concept of remote method invocation and Remote Procedure Calls
			2. Able to analyze the mechanism of peer to peer systems and Distributed File Systems
			3. Demonstrate an understanding of the challenges faced by current and future distributed systems
410245 (B)	409	Software Testing and Quality Assurance	
			1. Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
			2. Design and develop project test plan, design test cases, test data, and conduct test operations
			3. Apply recent automation tool for various software testing for testing software
			4. Apply different approaches of quality management, assurance, and quality standard to software system
			5. Apply and analyze effectiveness Software Quality Tools
410245 (C)	410	Operations Research	
			1. Use appropriate decision making approaches and tools
			2. Build various dynamic and adaptive models
			3. Develop critical thinking and objective analysis of decision problems
			4. Apply the OR techniques for efficacy
410245 (D)	411	Mobile Communication	
			1. Justify the Mobile Network performance parameters and design decisions.
			2. Choose the modulation technique for setting up mobile network.
			3. Formulate GSM/CDMA mobile network layout considering futuristic requirements which conforms to the technology.
			4. Use the 3G/4G technology based network with bandwidth capacity planning.
			5. Percept to the requirements of next generation mobile network and mobile applications.
410246	412	Laboratory Practice I	

			1. Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses
410247	413	Laboratory Practice II	
			Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses. Enough choice is provided to the learner to choose an elective of one's interest.
410248	414	Project Work Stage I	
			1. Solve real life problems by applying knowledge.
			2. Analyze alternative approaches, apply and use most appropriate one for feasible solution.
			3. Write precise reports and technical documents in a nutshell.
			4. Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.
410249	415	Audit Course 5	
		AC5-I Entrepreneurship Development	
			1. Understand the legalities in product development
			2. Undertake the process of IPR, Trademarks, Copyright and patenting
			3. Understand and apply functional plans
			4. Manage Entrepreneurial Finance
			5. Inculcate managerial skill as an entrepreneur
		AC5-II: Botnet of Things	
			1. Implement security as a culture and show mistakes that make applications vulnerable to attacks.
			2. Understand various attacks like DoS, buffer overflow, web specific, database specific, web - spoofing attacks.
			3. Demonstrate skills needed to deal with common programming errors that lead to most security problems and to learn how to develop secure applications
		AC5-III 3D Printing	
			1. Apply models for 3D printing
			2. Plan the resources for 3D printing
			3. Apply principles in 3D printing in real world
		AC5-IV: Industrial Safety and Environment Consciousness	
			1. Formulate the plan for Safety performance
			2. Formulate the action plan for accidents and hazards
			3. Follow the safety and security norms in the industry
			4. Consider critically the environmental issues of Industrialization
		AC5-V: Emotional Intelligence	
			1. Expand your knowledge of emotional patterns in yourself and others
			2. Discover how you can manage your emotions, and positively influence yourself and others
			3. Build more effective relationships with people at work and at home
			4. Positively influence and motivate colleagues, team members, managers
			5. Increase the leadership effectiveness by creating an atmosphere that engages others
		AC5-VI: MOOC- Learn New Skills	
			On completion of the course, learner will acquire additional knowledge and skill.
410250 SEM II	418	Machine Learning	
			1. Distinguish different learning based applications
			2. Apply different preprocessing methods to prepare training data set for machine learning.
			3. Design and implement supervised and unsupervised machine learning algorithm.
			4. Implement different learning models

			5. Learn Meta classifiers and deep learning concepts
410251	419	Information and Cyber Security	
			1. Gauge the security protections and limitations provided by today's technology.
			2. Identify information security and cyber security threats.
			3. Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
			4. Build appropriate security solutions against cyber-attacks.
410252 (A)	420	Advanced Digital Signal Processing	
			1. Understand and apply different transforms for the design of DT/Digital systems
			2. Explore the knowledge of adaptive filtering and Multi-rate DSP
			3. Design DT systems in the field/area of adaptive filtering, spectral estimation and multi-rate DSP
			4. Explore use of DCT and WT in speech and image processing
			5. Develop algorithms in the field of speech , image processing and other DSP applications
410252 (B)	421	Compilers	
			1. Design and implement a lexical analyzer and a syntax analyzer
			2. Specify appropriate translations to generate intermediate code for the given programming language construct
			3. Compare and contrast different storage management schemes
			4. Identify sources for code optimization
410252 (C)	422	Embedded and Real Time Operating Systems	
			1. Recognize and classify embedded and real-time systems
			2. Explain communication bus protocols used for embedded and real-time systems
			3. Classify and exemplify scheduling algorithms
			4. Apply software development process to a given RTOS application
			5. Design a given RTOS based application
410252 (D)	423	Soft Computing and Optimization Algorithms	
			1. Apply soft computing methodologies, including artificial neural networks, fuzzy sets, fuzzy logic, fuzzy inference systems and genetic algorithms
			2. Design and development of certain scientific and commercial application using computational neural network models, fuzzy models, fuzzy clustering applications and genetic algorithms in specified applications.
410253 (A)	424	Software Defined Networks	
			1. Interpret the need of Software Defined Networking solutions.
			2. Analyze different methodologies for sustainable Software Defined Networking solutions.
			3. Select best practices for design, deploy and troubleshoot of next generation networks.
			4. Develop programmability of network elements.
			5. Demonstrate virtualization and SDN Controllers using OpenFlow protocol
410253 (B)	425	Human Computer Interface	
			1. Evaluate the basics of human and computational abilities and limitations.
			2. Inculcate basic theory, tools and techniques in HCI.
			3. Apply the fundamental aspects of designing and evaluating interfaces.
			4. Apply appropriate HCI techniques to design systems that are usable by people
410253 (C)	426	Cloud Computing	
			1. To install cloud computing environments.
			2. To develop any one type of cloud
			3. To explore future trends of cloud computing
410253 (D)	427	Open Elective	
410254	428	Laboratory Practice III	

			Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.
410255	429	Laboratory Practice IV	
			Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the elective courses. Enough choice is provided to the learner to choose an elective of one"s interest.
410256	430	Project Work Stage II	
			1.Show evidence of independent investigation
			2.Critically analyze the results and their interpretation.
			3. Report and present the original results in an orderly way and placing the open questions in the right perspective.
			4.Link techniques and results from literature as well as actual research and future research lines with the research.
410257	431	Audit Course 6	
			1. Apply the concepts of Business Intelligence in real world applications
			2. Explore and use the data warehousing wherever necessary
			3. Design and manage practical BI systems
410257		AC6-I:Business Intelligence	
			1. Apply the concepts of Business Intelligence in real world applications
			2. Explore and use the data warehousing wherever necessary
			3. Design and manage practical BI systems
410257		AC6-II:Gamification	
			1. To write survey on the gamification paradigms.
			2. To write programs to solve problems using gamification and open source tools.
			3. To solve problems for multi-core or distributed, concurrent/Parallel environments
410257		Usability Engineering	
			1. Describe the human centered design process and usability engineering process and their roles in system design and development.
			2. Discuss usability design guidelines, their foundations, assumptions, advantages, and weaknesses.
			3. Design a user interface based on analysis of human needs and prepare a prototype system.
			4.Assess user interfaces using different usability engineering techniques.
410257		AC6-V:Conversational Interfaces	
			1.Develop an effective interface for conversation
			2.Explore advanced concepts in user interface
BE	BE Final Year of Mechanical Engineering (2015 COURSE W.E.F.A.Y. 2018-19)		
COURSE	CODE	SUBJECT	Course Outcomes
402041 SEM-I	401	Hydraulics and Pneumatics	
			1. Understand working principle of components used in hydraulic & pneumatic systems
			2. Identify various applications of hydraulic & pneumatic systems
			3. Selection of appropriate components required for hydraulic and pneumatic systems
			4. Analyse hydraulic and pneumatic systems for industrial/mobile applications
402042	402	CAD CAM Automation	
			1. Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations.
			2. Use analytical and synthetic curves and surfaces in part modeling.

			3. Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software.
			4. Generate CNC program for Turning / Milling and generate tool path using CAM software.
			5. Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology.
			6. Understand the robot systems and their applications in manufacturing industries
402043	403	Dynamics of Machinery	
			1. Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
			2. Estimate natural frequency for single DOF undamped & damped free vibratory systems.
			3. Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
			4. Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems.
			5. Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
			6. Explain noise, its measurement & noise reduction techniques for industry and day today life problems.
402044 A	404	Finite Element Analysis	
			1. Understand the different techniques used to solve mechanical engineering problems.
			2. Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses.
			3. Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results.
			4. Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
			5. Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer.
			6. Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical (round-off) errors.
402044 B	405	Computational Fluid Dynamics	
			1. Analyze and model fluid flow and heat transfer problems.
			2. Generate high quality grids and interpret the correctness of numerical results with physics.
			3. Conceptualize the programming skills.
			4. Use a CFD tool effectively for practical problems and research
402044 C	406	Heating Ventilation and Air Conditioning	
			1. Determine the performance parameters of trans-critical & ejector refrigeration systems
			2. Estimate thermal performance of compressor, evaporator, condenser and cooling tower.
			3. Describe refrigerant piping design, capacity & safety controls and balancing of vapour compressor system.
			4. Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system.
			5. Estimate heat transmission through building walls using CLTD and decrement factor & time lag methods with energy-efficient and cost-effective measures for building envelope.
			6. Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
402045 A	407	Automobile Engineering	
			1. To compare and select the proper automotive system for the vehicle.
			2. To analyse the performance of the vehicle.
			3. To diagnose the faults of automobile vehicles.
			4. To apply the knowledge of EVs, HEVs and solar vehicles

402045 B	408	Operation Research	
			1. Apply LPP and Decision Theory to solve the problems
			2. Apply the concept of transportation models to optimize available resources.
			3. Decide optimal strategies in conflicting situations.
			4. Implement the project management techniques.
			5. Minimize the process time
			6. Optimize multi stage decision making problems
402045 C	409	Energy Audit and Management	
			1. Compare energy scenario of India and World.
			2. Carry out Energy Audit of the Residence / Institute/ Organization.
			3. Evaluate the project using financial techniques
			4. Identify and evaluate energy conservation opportunities in Thermal Utilities.
			5. Identify and evaluate energy conservation opportunities in Electrical Utilities.
			6. Identify the feasibility of Cogeneration and WHRU Use a CFD tool effectively for practical problems and research.
402046	411	Project Stage-I	
			1. Find out the gap between existing mechanical systems and develop new creative new mechanical system.
			2. Learn about the literature review
			3. Get the experience to handle various tools, tackles and machines.
402047 SEM-II	412	Energy Engineering	
			1. Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle
			2. Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
			3. Recognize the layout, component details of hydroelectric power plant and nuclear power plant
			4. Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle
			5. Emphasize the fundamentals of non-conventional power plants
			6. Describe the different power plant electrical instruments and basic principles of economics of power generation
402048	413	Mechanical System Design	
			1. Understand the difference between component level design and system level design.
			2. Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
			3. Learn optimum design principles and apply it to mechanical components.
			4. Handle system level projects from concept to product.
402049	414	Elective-III	
402049 A	415	Tribology	
			1. The course will enable the students to know the importance of Tribology in Industry.
			2. The course will enable the students to know the basic concepts of Friction, Wear, Lubrications and their measurements
			3. This course will help students to know the performance of different types of bearings and analytical analysis thereof.
			4. This course will help students to apply the principles of surface engineering for different applications of tribology.
402049 B	416	Industrial Engineering	
			1. Apply the Industrial Engineering concept,
			2. Understand, analyze and implement different concepts involved in method study.
			3. Design and Develop different aspects of work system and facilities.
			4. Understand and Apply Industrial safety standards, financial management practices.
			5. Undertake project work based on modeling & simulation area.
402049 C	417	Robotics	
			1. Identify different type of robot configuration with relevant terminology.
			2. Select suitable sensors, actuators and drives for robotic systems.
			3. Understand kinematics in robotic systems.

			4.Design robot with desired motion with suitable trajectory planning.
			5.Select appropriate robot programming for given application.
			6.Understand need of IoT, machine learning, simulation in robotics.
402050	418	Elective-IV	
402050 A	419	Advanced Manufacturing Processes	1. Classify and analyze special forming processes
			2.Analyze and identify applicability of advanced joining processes
			3. Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
			4. Select appropriate micro and nano fabrication techniques for engineering applications
			5. Understand and apply various additive manufacturing technology for product development
			6.Understand material characterization techniques to analyze effects of chemical composition, composition variation, crystal structure, etc.
402050 B	420	Solar & Wind Energy	1.Design of solar food drier for domestic purpose referring existing system
			2.Design of parabolic dish solar cooker for domestic purpose referring existing system
			3.Design of solar photovoltaic system for domestic purpose referring existing system
			4.Design miniature wind mill for domestic purpose referring existing system
402050 C	421	Product Design and Development	1.Understand essential factors for product design
			2. Design product as per customer needs and satisfaction
			3. Understand Processes and concepts during product development
			4. Understand methods and processes of Forward and Reverse engineering
			5.Carry various design processes as DFA, DFMEA, design for safety
			6.Understand the product life cycle and product data management
BE	BE Final Year of Electrical Engineering (2015 COURSE W.E.F.A.Y. 2018-19)		
COURSE	CODE	SUBJECT	Course Outcomes
403141 SEM-I	401	Power System Operation and Control	1. Identify and analyze the dynamics of power system and suggest means to improve stability of system.
			2. Comprehend the effect of reactive power on Power system and suggest the suitable means of reactive power management.
			3. Selection of appropriate FACTS devices
			4. Analyze the generation-load balance in real time operation and its effect on frequency and develop automatic control strategies with mathematical relations.
			5. Formulate objective functions for optimization tasks such as unit commitment and economic load dispatch and get solution using computational techniques.
			6. Evaluate reliability indices of Power system
403142	402	PLC and SCADA Applications	1. Develop block diagram of PLC and explain the working.
			2. Classify input and output interfacing devices with PLC.
			3. Develop architecture of SCADA and explain the importance of SCADA in critical infrastructure.
			4. Execute, debug and test the programs developed for digital and analog operations.
			5. Describe various SCADA protocols along with their architecture.
			6. Observe development of various industrial applications using PLC and SCADA.
403143	403	Elective I	
403143 A)	404	Fundamentals of Microcontroller MSP430 and its Applications	1. Explain architecture of MSP430 microcontroller, its instructions and the addressing modes.
			2. Develop and debug program in C language for specific applications.
			3. Use of Code Composer Studio IDE for simulating the functionalities of MSP430 microcontroller
			4. Interface microcontroller MSP430 to various sensing devices.
			5. Develop IoT based application using MSP430.
403143 B)	405	Power Quality	1. Identify importance of various power quality issues.
			2. Carry out power quality monitoring
			3. List and explain various causes and effects of power quality problems
			4. Analyze power quality parameters and carry out power quality analysis

			5. Select cost effective mitigation technique for various power quality problems
			6. Use IEEE 519-2014 power quality standard for harmonic compliance
403143 C)	406	Renewable Energy Systems	1. Describe various renewable energy sources such as Solar Photovoltaic, Biomass, Wind, Fuel cell and Solar thermal.
			2. Explain different renewable energy sources as an alternate for conventional power sources in any application of energy.
			3. Identify and locate the use of renewable energy sources as per the requirement of the location.
			4. Analyze, assess and design renewable energy systems such as solar and wind sources.
			5. Compare the various storage sources for electrical energy.
			6. Describe the standards for renewable energy source integration and evaluate economics related to these sources.
403143 D)	407	Digital Signal Processing	1. Sample and reconstruct any analog signal.
			2. Construct frequency response of LTI system.
			3. Evaluate Fourier Transform of discrete signals.
			4. Design IIR filter and its implementation.
			5. Design FIR filter and implementation.
			6. Develop block diagram for DSP applications to electrical engineering.
403144	403	Elective II	
403144 A)	404	Restructuring and Deregulation	1. Enlist the functions of various key entities in India and explain the implications of various policies and acts on restructuring and deregulation.
			2. Describe the regulatory process in India along with various methods of regulations.
			3. List the components involved in tariff determination.
			4. Explain different power sector restructuring models
			5. Explain different types of electricity markets.
			6. State different transmission pricing methods and discuss congestion management
403144 B)	405	Electromagnetic Fields	1. Describe time varying Maxwell's equations and their applications in electromagnetic problems
			2. Interpret electric and magnetic field with the help of associated laws
			3. Solve simple electrostatic and magnetic boundary conditions
			4. Determine the relationship between time varying electric and magnetic fields and electromotive force
			5. Solve electromagnetic problems with the help of mathematical tools
403144 C)	406	EHVAC Transmission	1. Highlight need for EHV ac transmission.
			2. Calculate line and ground parameters.
			3. Enlist problems encountered in EHV transmission.
			4. Describe effect of electric and magnetic field on human being
			5. Express issues related to UHV transmission discussed
403144 D)	407	Electric and Hybrid Vehicles	1. Review history, Social and environmental importance of Hybrid and Electric vehicles.
			2. Describe the performance and selection of energy storage systems and Analyze battery management system.
			3. Distinguish between the performance and architecture of various drive trains.
			4. Describe the different Instrumentation and Control used for electric vehicles.
			5. Differentiate between Vehicle to Home, Vehicle to Vehicle and Vehicle to Grid energy systems concepts
403144 E)	408	Special Purpose Machines	1. To explain operation and performance of synchronous reluctance motors.
			2. To describe operation and performance of stepping motors.
			3. To elaborate operation and performance of switched reluctance motors.
			4. To familiarize with operation and performance of permanent magnet brushless D.C. motors.
			5. To illustrate operation and performance of permanent magnet synchronous motors.
403145	409	Control System II	1. Recognize the importance of digital control system.
			2. Derive pulse transfer function.
			3. Analyze digital controllers.
			4. Convert system in state space format.

			5. Solve state equation.
			6. Design observer for system.
403146	410	Project I	
403152	411	Audit Course V	
		Hydro Energy Systems	1. Explain and differentiate various types of hydro electric generators; pico, micro and small hydro
403147 SEM II	412	Switchgear and Protection	1. Describe arc interruption methods in circuit breaker.
			2. Derive expression for restriking voltage and RRRV in circuit breaker
			3. Explain construction and working of different high voltage circuit breakers such as ABCB, SF6 CB, and VCB.
			4. Classify and Describe different type of relays such as over current relay, Reverse power relay, directional over current relay, Differential relay, Distance relay, Static relay and numerical relay
			5. Describe various protection schemes used for transformer, alternator and busbar
			6. Describe transmission line protection schemes.
403148	413	Power Electronic Controlled Drive	1. Explain motor load dynamics and multi quadrant operation of drives
			2. Analyze operation of converter fed and chopper fed DC drives.
			3. Describe braking methods of D.C. and induction motor drive.
			4. Explain vector control for induction motor drives
			5. Describe synchronous motor drive.
			6. Identify classes and duty cycles of motor and applications of drives in industries.
403149	414	Elective III	
403149 A)	415	High Voltage Engineering	1. Identify, describe and analyze the breakdown theories of solid, liquid and gaseous materials
			2. Describe as well as use different methods of generation of high AC, DC, impulse voltage and current.
			3. Demonstrate and use different methods of measurement of high AC, DC, impulse voltage and current.
			4. Identify the occurrence of overvoltage and to provide remedial solutions
			5. Demonstrate an ability to carry out different tests on high voltage equipment and devices as well as ability to design the high voltage laboratory with all safety measures
403149 B)	416	HVDC and FACTS	1. Compare HVDC and EHV AC systems for various aspects
			2. Reproduce the layout of HVDC system with various components including protective devices
			3. Differentiate VSC HVDC and conventional HVDC system
			4. Differentiate various types of Power Electronic Controllers
			5. Analyze modeling of FACTS Controllers
			6. Simulate various controllers and HVDC systems using softwares
403149 C)	417	Digital Control System	1. Analyze digital control system and its stability.
			2. Differentiate between various control systems
			3. Present system in state space format.
			4. Design observer for system.
			5. Understand digital controllers
			6. Elaborate applications such as digital temperature control and position control
403149 D)	418	Intelligent Systems and Applications in Electrical Engineering	1. Classify neural networks
			2. Compare various AI tools
			3. Develop algorithms for AI tools
			4. Apply AI tools for Applications in electrical engineering
403149 E)	419	Analog Electronics and Sensing Technology [Open Elective]	1. Develop various analog circuits using operational amplifiers.
			2. Design filters and waveform generators and various signal converter circuits.
			3. Find characteristics of sensors used for system monitoring and protection.
			4. Interface various position sensors to microcontrollers.
			5. Find characteristics of sensors used for light and image sensing.
403150	420	Elective IV	
403150 A)	421	Smart Grid	1. Apply the knowledge to differentiate between Conventional and Smart Grid.

			2. Identify the need of Smart Grid, Smart metering, Smart storage, Hybrid Vehicles, Home Automation, Smart Communication, and GIS
			3. Comprehend the issues of micro grid
			4. Solve the Power Quality problems in smart grid
			5. Apply the communication technology in smart grid
403150 B)	422	Robotics and Automation	1. Differentiate between types of robots based on configuration, method of control, types of drives, sensors used etc.
			2. Choose a specific robot for specific application with given specifications.
			3. Analyze the robot arm dynamics for calculation of torques and forces required for different joints of robots for control of robot arm.
			4. Determine the D-H parameters for a robot configuration using concepts from robot arm kinematics which further leads to forward/inverse kinematics.
			5. Calculate the Jacobian matrix for robot arm velocity and decide the singular positions.
403150 C)	423	Illumination Engineering	1. Define and reproduce various terms in illumination.
			2. Identify various parameters for illumination system design.
			3. Design indoor and outdoor lighting systems.
			4. Enlist state of the art illumination systems.
403150 D)	424	VLSI Design[Open Elective]	1. To understand Modeling of Digital Systems Domains for different combinational and sequential circuits
			2. To understand Levels of Modeling using Modeling Language VHDL.
			3. To Understand Modeling and programming Concepts by Learning a New Language
			4. To develop of logic design and programming skills in HDL language.
			5. To study HDL based design approach.
			6. To learn digital CMOS logic design
403151	425	Project II	1. Work in team and ensure satisfactory completion of project in all respect.
			2. Handle different tools to complete the given task and to acquire specified knowledge in area of interest.
			3. Provide solution to the current issues faced by the society.
			4. Practice moral and ethical value while completing the given task.
			5. Communicate effectively findings in verbal and written forms.
403153	426	Audit Course VI	
		Energy Storage Systems	1. Explain and differentiate various types of energy storage systems
BE	BE Final Year of Electronics & Telecommunication (2015 COURSE W.E.F.A.Y. 2018-19)		
COURSE	CODE	SUBJECT	Course Outcomes
404181 SEM-I	401	VLSI Design & Technology	1. Write effective HDL coding for digital design.
			2. Apply knowledge of real time issues in digital design.
			3. Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
			4. Design CMOS circuits for specified applications.
			5. Analyze various issues and constraints in design of an ASIC
			6. Apply knowledge of testability in design and build self test circuit.
404182	402	Computer Networks & Security	1. Understand fundamental underlying principles of computer networking
			2. Describe and analyze the hardware, software, components of a network and their interrelations.
			3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
			4. Have a basic knowledge of installing and configuring networking applications.
			5. Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.
			6. Have a basic knowledge of the use of cryptography and network security.
404183	403	Radiation & Microwave Techniques	1. Differentiate various performance parameters of radiating elements.
			2. Analyze various radiating elements and arrays.
			3. Apply the knowledge of waveguide fundamentals in design of transmission lines.
			4. Design and set up a system consisting of various passive microwave components.
			5. Analyze tube based and solid state active devices along with their applications.

			6. Measure various performance parameters of microwave components.
404184	404	Elective I	
404184 1)	405	Digital Image and Video Processing	1. Develop and implement basic mathematical operations on digital images.
			2. Analyze and solve image enhancement and image restoration problems.
			3. Identify and design image processing techniques for object segmentation and recognition.
			4. Represent objects and region of the image with appropriate method.
			5. Apply 2-D data compression techniques for digital images.
			6. Explore video signal representation and different algorithm for video processing.
404184 2)	406	Industrial Drives and Control	1. Understand the basic principles of power electronics in drives and its control, types of drives and basic requirements placed by mechanical systems on electric drives for various applications
			2. Understand the operation of 1 ϕ & 3 ϕ converter drives for separately excited & series DC motors, dual converter drives, 2 quadrant and 4 quadrant DC chopper drives, Open-loop & closed-loop control of DC drives with transfer function, Dynamic and regenerative braking. Protection circuits for DC drives
			3. Learn speed control of induction motor drives in an energy efficient manner using power electronics. To study and understand the operation of both classical and modern induction motor drives like FOC or Vector control.
			4. Learn and understand working of various types of synchronous motors and their drive systems
			5. Learn stepper motors & drives, BLDC and SRM motors and drives
			6. Understand modern control techniques of Fuzzy logic and ANN in motor drive application
404184 3)	407	Embedded Systems & RTOS	1. Understand design of embedded system
			2. Use RTOS in embedded application
			3. Use modern architecture for embedded system
			4. Use Linux for embedded system development
			5. Use open platform for embedded system development
404184 4)	408	Internet of Things	1. On completion of the course, student will be able to
			2. Understand the various concepts, terminologies and architecture of IoT systems.
			3. Use sensors and actuators for design of IoT.
			4. Understand and apply various protocols for design of IoT systems
			5. Use various techniques of data storage and analytics in IoT
			6. Understand various applications of IoT
404185	409	Elective II	
404185 1)	410	Wavelets	1. On completion of the course, student will be able to
			2. Explore and learn the basics of linear algebra.
			3. Identify the need of Wavelet transform and its properties.
			4. Analyze the 1-D and 2-D signal using discrete wavelet transform.
			5. Analyze the signal using Multi resolution analysis
			6. Use wavelet transform in different applications like data compression, denoising, enhancement etc.
404185 2)	411	Electronics Product Design	1. Understand various stages of hardware, software and PCB design.
			2. Importance of product test & test specifications.
			3. Special design considerations and importance of documentation
404185 3)	412	Optimization Techniques	1. Describe clearly a problem, identify its parts and analyze the individual functions.
			2. Perform mathematical translation of the verbal formulation of an optimization problem.
			3. Design algorithms, the repetitive use of which will lead reliably to finding an approximate solution
			4. Discover, study and solve optimization problems.
			5. Investigate, study, develop, organize and promote innovative solutions for various applications.
404185 4)	413	Artificial Intelligence	1. Design and implement key components of intelligent agents and expert systems.
			2. To apply knowledge representation techniques and problem solving strategies to common AI applications.
			3. Apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of maintaining intelligent systems.
			4. Build rule-based and other knowledge-intensive problem solvers.

404185 5)	414	Electronics in agriculture	1.Understand Role of computers & virtual instrumentation. 2. Provide communication solution for interpreting environmental parameters with Electronics systems. 3.Describe Instrument technology used in agriculture. 4. Apply knowledge of Electronics in Agriculture. 5. Understand Greenhouse Technology & Role of Electronics Governance.
		Audit Course 5	
		1. Green Energy	1. List and generally explain the main sources of energy and their primary applications in the India, and the world. 2. Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment. 3. Discuss remedies/potential solutions to the supply and environmental issues associated with fossil fuels and other energy resources. 4. List and describe the primary renewable energy resources and technologies. 5. Describe/illustrate basic electrical concepts and system components. 6. Convert units of energy—to quantify energy demands and make comparisons among energy uses, resources, and technologies. 7. Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.
		2. Human Behaviour	1. Change in awareness levels, knowledge and understanding of student 2. Change in attitudes / behavior of students with regards to their education improved teamwork, institutional leadership and other life skills 3. Improvement in social health and attitude.
404189 SEM-II	418	Mobile Communication	1. Apply the concepts of switching technique and traffic engineering to design multistage networks. 2. Explore the architecture of GSM. 3. Differentiate thoroughly the generations of mobile technologies.
404190	419	Broadband Communication Systems	1. Perform Link power budget and Rise Time Budget by proper selection of components and check its viability. 2. Perform Satellite Link design for Up Link and Down Link.
404191	420	Elective III	
404191 1)	421	Machine Learning	1. To compare and contrast pros and cons of various machine learning techniques and to get an in sight of when to apply a particular machine learning approach. 2. To mathematically analyze various machine learning approaches and paradigms. 3. To implement convolution neural networks in recognition applications.
404191 2)	422	PLC s and Automation	1. Understand PLC architecture 2. Develop PLC ladder programs for simple industrial applications 3. Design Automation systems for industrial applications 4. Implement the Engineering Automation using PLC approach.
404191 3)	423	Audio and Speech Processing	1. Design and implement algorithms for processing speech and audio signals considering the properties of acoustic signals and human hearing. 2. Analyze speech signal to extract the characteristic of vocal tract (formants) and vocal cords (pitch). 3. Analyze speech signal for extracting LPC and MFCC Parameters of speech signal. 4. Apply the knowledge of speech and audio signal analysis to build speech processing applications like speech coding, speech recognition, speech enhancement and speaker recognition/verification.
404191 4)	424	Software Defined Radio	1. Compare SDR with traditional Hardware Radio HDR. 2. Implement modern wireless system based on OFDM, MIMO & Smart Antenna. 3. Build experiment with real wireless waveform and applications, accessing both PHY and MAC, Compare SDR versus MATLAB and Hardware Radio 4. Work on open projects and explore their capability to build their own communication System.
404191 5)	425	Audio Video Engineering	1. Apply the fundamentals of Analog Television and Colour Television standards. 2. Explainthe fundamentals of Digital Television, DTV standards and parameters.

			3. Study and understand various HDTV standards and Digital TV broadcasting systems and acquainted with different types of analog, digital TV and HDTV systems.
			4. Understand acoustic fundamentals and various acoustic systems.
404192	426	Elective IV	
404192 1)	427	Robotics	1. Familiar with the history, concept development and key components of robotics technologies.
			2. Implement basic mathematics manipulations of spatial coordinate representation and transformation.
			3. Solve basic robot forward and inverse kinematic problems
			4. Understand and able to solve basic robotic dynamics, path planning and control problems
404192 2)	428	Biomedical Electronics	1. Model a biomedical system.
			2. Understand various methods of acquiring bio signals. Understand various sources of bio
			3. signal distortions and its remedial techniques.
			4. Get an Overview of major Devices currently used in Medical field
			5. The students will have an understanding of analyzing bio-signal and classifying them
404192 3)	429	Wireless Sensor Networks	1. Explain various concepts and terminologies used in WSN
			2. Describe importance and use of radio communication and link management in WSN
			3. Explain various wireless standards and protocols associated with WSN
			4. Recognize importance of localization and routing techniques used in WSN
			5. Understand techniques of data aggregation and importance of security in WSN
			6. Examine the issues involved in design and deployment of WSN
404192 4)	430	Renewable Energy Systems	1. Interpret energy reserves of India and potential of different energy sources.
			2. Measure the solar radiation parameters and performance of different solar collectors.
			3. Calculate different parameters of wind turbine rotor.
			4. Implicit the importance and applications of geothermal and ocean energy.
			5. Demonstrate knowledge in field of fuel cell and potential for power generation.
404192 5)	431	Open Elective*	
404193	432	Lab Practice –III	
404194	433	Lab Practice –IV	
404195	434	Project Stage II	
	435	Audit Course 6	
	436	1. Team Building, Leadership and Fitness	1. Change in awareness levels, knowledge and understanding of today's youth
			2. Change in attitudes / behavior of students with regards to their improved teamwork, institutional leadership and other life skills
			3. Increase in the body's fitness levels and also reduced health problems
			4. Improvement in social health and attitude.
	437	2. Environmental issues and Disaster Management	1. To learn the different environmental issues and disasters.
			2. To deal with problems associated with environment and effectively handle the disasters.
BE	BE INFORMATION TECHNOLOGY 2015 COURSE WITH EFFECT FROM 2018-19		
COURSE	CODE	SUBJECT	Course Outcomes
414453 SEM-I	C401	Information and Cyber Security	1. Use basic cryptographic techniques in application development.
			2. Apply methods for authentication, access control, intrusion detection and prevention.
			3. To apply the scientific method to digital forensics and perform forensic investigations.
			4. To develop computer forensics awareness.
			5. Ability to use computer forensics tools.
414454	C402	Machine Learning and Applications	1. Model the learning primitives.
			2. Build the learning model.
			3. Tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.

414455	C403	Software Design and Modeling	1. Understand object oriented methodologies, basics of Unified Modeling Language (UML).
			2. Understand analysis process, use case modeling, domain/class modeling
			3. Understand interaction and behavior modeling.
			4. Understand design process and business, access and view layer class design
			5. Get started on study of GRASP principles and GoF design patterns.
			6. Get started on study of architectural design principles and guidelines in the various type of application development.
414456	C404	Elective-I	
414456 A)	C405	Wireless Communications	1. Understand the basics of propagation of radio signals.
			2. Understand the basic concepts of basic Cellular System and the design requirements.
			3. Have an understanding of the basic principles behind radio resource management techniques such as power control, channel allocation and handoffs.
			4. Gain insights into various mobile radio propagation models and how the diversity can be exploited to improve performance.
			5. Gain knowledge and awareness of the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc.
			6. Have in-depth understanding of the design consideration and architecture for different Wireless Systems like GSM, CDMA, GPRS etc.
			7. Understanding of the emerging trends in Wireless communication like WiFi, WiMAX, Software Defined Radio (SDR) and related issues and challenges.
414456 B)	C406	Natural Language Processing	1. Understand automatic processing of human languages using computers.
			2. Understand various applications of natural language processing.
414456 C)	C407	Usability Engineering	1. Justify the theory and practice of usability evaluation approaches, methods and techniques.
			2. Compare and evaluate strengths and weaknesses of various approaches, methods and techniques for evaluating usability.
			3. Design and implement a usability test plan, based on modelling or requirements specification.
			4. Choose appropriate approaches, methods and techniques to evaluate the usability of a specified interactive system.
414456 D)	C408	Multicore and Concurrent Systems	1. Know types of parallel machine and to know multicore and concurrent systems in detail.
			2. Know the ways to measure the performance of multicore systems.
			3. Understand need of multicore and concurrent system programming.
			4. Know the different approaches for multicore and concurrent programming.
			5. Use and apply the approaches learned, for application development.
			6. Understand and explore recent trends in multicore and concurrent system programming.
414456 E)	C409	Business Analytics and Intelligence	1. Comprehend the Information Systems and development approaches of Intelligent Systems.
			2. Evaluate and rethink business processes using information systems.
			3. Propose the Framework for business intelligence.
			4. Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.
			5. Align business intelligence with business strategy.
			6. Apply the techniques for implementing business intelligence systems.
414457	C410	Elective -II	
414457 A)	C411	software Defined Networks	1. Acquire fundamental knowledge of SDN exploring the need, characteristics, and architecture of SDN.
			2. Recognize OpenFlow protocols and its forwarding, pipeline model.
			3. Understand different methodologies for sustainable SDN.
			4. Comprehend IT Infrastructure for SDN.
			5. Acquiring knowledge of OpenFlow protocols, visualization
414457 B)	C412	Soft Computing	1. Tackle problems of interdisciplinary nature.

			2. Find an alternate solution, which may offer more adaptability, resilience and optimization.
			3. Gain knowledge of soft computing domain which opens up a whole new career option.
			4. Tackle real world research problems
414457 C)	C413	Software Testing and Quality Assurance	1. Test the software by applying testing techniques to deliver a product free from bugs.
			2. Investigate the scenario and to select the proper testing technique.
			3. Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.
			4. Understand how to detect, classify, prevent and remove defects.
			5. Choose appropriate quality assurance models and develop quality.
			6. Ability to conduct formal inspections, record and evaluate results of inspections.
414457 D)	C414	Compiler Construction	1. Understand the structure of compilers.
			2. Understand the basic and advanced techniques used in compiler construction.
			3. Understand the basic data structures used in compiler construction such as abstract syntax.
			4. Cognitive skills (thinking and analysis)- Design and implement a compiler using a software engineering approach.
			5. Communication skills (personal and academic).
			6. Practical and subject specific skills (Transferable Skills) - Use generators (e.g. Lex and Yacc).
414457 E)	C415	Gamification	1. Write programs to solve problems using gamification and open source tools.
			2. Apply gamification for Mobile and Web Applications.
			3. Solve problems for multi-core or distributed, concurrent/Parallel environments.
414458	C416	Computer Laboratory-VII	1. The students will be able to implement and port controlled and secured access to software systems and networks.
			2. The students will be able to build learning software in various domains
414459	C417	Computer Laboratory-VIII	1. Draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects.
			2. Identify different software artifacts used to develop analysis and design model from requirements.
			3. Develop use case model.
			4. Develop, implement analysis model and design model.
			5. Develop, implement Interaction and behavior Model.
			6. Implement an appropriate design pattern to solve a design problem.
414460	C418	Project Phase-I	1. To show preparedness to study independently in chosen domain of Information Technology and programming languages and apply their acquired knowledge to variety of real time problem scenarios.
			2. To function effectively as a team to accomplish a desired goal.
			3. An understanding of professional, ethical, legal, security and social issues and responsibilities related to Information Technology Project.
414461	C419	Audit Course-V	
414461 A	C420	Emotional Intelligence	1) Expand your knowledge of emotional patterns in yourself and others.
			2) Discover how you can manage your emotions, and positively influence yourself and others.
			3) Build more effective relationships with people at work and at home.
			4) Positively influence and motivate colleagues, team members, and managers.
			5) Increase your leadership effectiveness by creating an atmosphere that engages others.
			6) Apply EI behaviours and supports high performance.
414461 B	C421	Green Computing	1) Understand the concept of green IT and relate it to sustainable development.
			2) Apply the green computing practices to save energy.
			3) Discuss how the choice of hardware and software can facilitate a more sustainable operation.
			4) Use methods and tools to measure energy consumption

414461 C	C422	Critical Thinking	1) If students whole-heartedly participate in the course, they can expect to be smarter, stronger and more confident thinkers. 2) They can embark on a life-long journey of “self-directed learning”.
414461 D	C423	Statistical Learning Model Using R.	1) Students will be familiar with concepts related to “data science”, “analytics”, “machine learning”, etc. These are important topics, and will enable students to embark on highly rewarding careers. 2) Students will capable of learning “big data” concepts on their own
414462 SEM II	C424	Distributed Computing System	1. Understand the principles and desired properties of distributed systems based on different application areas. 2. Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving. 3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources. 4. Identify the challenges in developing distributed applications
414463	C425	Ubiquitous Computing	1. Demonstrate the knowledge of design of Ubicomp and its applications. 2. Explain smart devices and services used Ubiomp. 3. Describe the significance of actuators and controllers in real time application design. 4. Use the concept of HCI to understand the design of automation applications. 5. Classify Ubiomp privacy and explain the challenges associated with Ubiomp privacy. 6. Get the knowledge of ubiquitous and service oriented networks along with Ubiomp management.
414464	C426	Elective -III	
414464 A)	C427	Internet of Things (IoT)	1. Explain what is internet of things. 2. Explain architecture and design of IoT. 3. Describe the objects connected in IoT. 4. Understand the underlying Technologies. 5. Understand the platforms in IoT. 6. Understand cloud interface to IoT.
414464A	C428	Internet of Things Laboratory	1. To understand IoT platforms such as Raspberry-Pi/Beagle board/Arduino. 2. To understand operating systems for platforms such as Raspberry-Pi/Beagle board/Arduino. 3. To communicate with objects using IoT platforms such as Raspberry-Pi/Beagle board/Arduino. 4. To interface cloud environment for IoT application. 5. To implement IoT related protocols such as MQTT / CoAP etc. 6. To implement the web interface for IoT
414464 B)	C429	Information Storage and Retrieval	1. Understand the concept of Information retrieval. 2. Deal with storage and retrieval process of text and multimedia data 3. Evaluate performance of any information retrieval system. 4. Design user interfaces. 5. Understand importance of recommender system. 6. Understand concept of multimedia and distributed information retrieval.
	C430	Information Storage and Retrieval Laboratory	1. Understand the concept, data structure and preprocessing algorithms of Information retrieval. 2. Deal with storage and retrieval process of text and multimedia data. 3. Evaluate performance of any information retrieval system. 4. Design user interfaces. 5. Understand importance of recommender system (Take decision on design parameters of recommender system). 6. Understand concept of multimedia and distributed information retrieval. 7. Map the concepts of the subject on recent developments in the Information retrieval field.
414464 C)	C431	Multimedia Techniques	1. To create own file formats for specific application. 2. To do some projects based on current trends in multimedia. 3. To use open sources for authoring tool for animation and presentations. 4. Understand some research areas of current multimedia techniques.

	C432	Multimedia Techniques Laboratory	1. To create own file formats for specific application. 2. To do some projects based on current trends in multimedia. 3. To use open sources for authoring tool for animation and presentations.
414464 D)	C433	Internet and Web Programming	1. Demonstrate static website using basic tools. 2. Develop client side programming skills. 3. Develop server side programming skills. 4. Understand web services and handle content management tools. 5. Develop mobile website using mobile web development tools. 6. Understand aspects of web security and cyber ethics.
	C434	Internet and Web Programming Laboratory	1. Use fundamental skills to develop and maintain website and web application. 2. Apply scripting skills for Server side and Client-side Programming. 3. Develop web services to transfer data and add interactive components to website. 4. Combine multiple web technologies to create advanced web compon
414464 E)	C435	Computational Optimization	1. Learn and implement various optimization techniques. 2. Learn model real-world problems in optimization framework. 3. Apply various optimization models to solve optimization problems in computer-science & IT Engineering.
	C436	Computational Optimization Laboratory	1. Understand Transportation problem. 2. Learn different measures in shortest path algorithms. 3. Understand and learn Queuing Model.
414465	C437	Elective -IV	
414465 A)	C438	Rural Technologies and Community Development	1. Understand rural development model. 2. Learn different measures in rural development and its impact on overall economy. 3. Understand and learn importance of technologies in rural and community development. 4. Understand challenges and opportunities in rural development
414465 B)	C439	Parallel Computing	1. Understand fundamentals in parallel computing. 2. Understand and learn importance of technologies including different hardware structures used in parallel computing. 3. Understand challenges and opportunities in parallel computing.
414465 C)	C440	Computer Vision	1. Implement fundamental image processing techniques required for computer vision. 2. Implement boundary tracking techniques. 3. Apply Hough Transform for line, circle, and ellipse detections. 4. Implement motion related techniques. 5. Develop skills to develop applications using computer vision techniques.
414465 D)	C441	Social Media Analytics	1. Understand the basics of Social Media Analytics. 2. Explain the significance of Data mining in Social media. 3. Demonstrate the algorithms used for text mining. 4. Apply network measures for social media data. 5. Explain Behavior Analytics techniques used for social media data. 6. Apply social media analytics for Face book and Twitter kind of applications.
414465 E)	C442	Open Elective	
414466	C443	Computer Laboratory -XI	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.
414467	C444	Computer Laboratory -X	1. Set up the Android environment and explain the Evolution of cellular networks. 2. Develop the User Interfaces using pre-built Android UI components. 3. Create applications for performing CURD SQLite database operations using Android. 4. Create the smart android applications using the data captured through sensors. 5. Implement the authentication protocols between two mobile devices for providing. Security.

			6. Analyze the data collected through android sensors using any machine learning algorithm.
414468	C445	Project Work	1. Learn teamwork.
			2. Be well aware about Implementation phase.
			3. Get exposure of various types of testing methods and tools.
			4. Understand the importance of documentation
414469	C446	Audit Course-VI	
414469 A)	C447	IoT Application in Engineering Field	1. To get the detailed insight of Internet of Things.
			2. To learn the IoT terms in Engineering.
			3. To understand how IoT concepts can be implement.
			4. To know the protocols, Sensors and other elements for IoT implementation
414469 B)	C448	Entrepreneuship	1. Expand your knowledge of Entrepreneurship & Startups.
			2. Discover how you can use Entrepreneur Qualities.
			3. Expand the practical knowledge of Finance, Legal-Patents, Intellectual Property, and Business Associations.
			4. Expand the understanding of Deliverables & Achieving Target.
414469 C)	C449	Cognitive Computing	1. Understand and discuss what cognitive computing is, and how it differs from traditional approaches.
			2. Plan and use the primary tools associated with cognitive computing.
			3. Plan and execute a project that leverages cognitive computing.
			4. Understand and discuss the business implications of cognitive computing.
414469 D)	C450	AI and Robotics	1. The goal of this course is to familiarize the students with the basic concepts of robotics, artificial intelligence and intelligent machines.
			2. It will help students to understand and apply principles, methodology and techniques of intelligent systems to robotics.