Program Educational Objectives   (PEOs)

I. Preparation

To provide opportunity **to learn and acquire knowledge** of basic mathematical, professional and technical fundamentals, so as to **prepare students** to succeed in technical **profession** at global level and to enable them to excel in **further education**.

II.Core competence

To **develop ability** among students to innovate, communicate, analyze, interpret and apply technical concepts to solve real life problems and **to create novel products**.

III.Breadth

To aware and **achievescientific and engineering breadth** amongst student through various curricular, co-curricular and extra-curricular activities.

IV. Professionalism

To inculcate professional and ethical attitude in students, enable them to excel in engineering profession.

V. Learning Environment

To accomplish overall development of the students; with the aid of **activity and project based learning environment**.

PROGRAM OUTCOMES (POs)

PO1 Engineering knowledge:

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

PO2 Problem analysis:

Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of solutions:

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems:

Use research - based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern tool usage:

Create , select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6 The engineer and society:

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and sustainability:

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work:

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication:

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11 Project management and finance:

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning:

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological Change

COURSE	CODE	SUBJECT	Course OUTCOMES
First Year Engineering Science Syllabus 2019 Course W.E.F. A.Y. 2019-20			

COURSE	CODE	SUBJECT	Course OUTCOMES
107001 SEM I	**C101**	**Engineering Mathematics-I**	CO1: Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems.
			CO2: the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
			CO3: to deal withderivative of functions of several variables that are essential in various branches of
			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
			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
			CO4: Use different electronics measuring instruments to measure various electrical parameters.
			CO5: Select sensors for specific applications.
110005	C107	Programming and Problem	
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,
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
			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
			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
			CO4: Use different electronics measuring instruments to measure various electrical parameters.
			CO5: Select sensors for specific applications.
110005	C116	Programming and Problem	CO1: Inculcate and apply various skills in problem solving.
			CO2: Choose most appropriate programming constructs and features to solve the problems in diversified
			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,
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)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

COURSE	CODE	SUBJECT	Course Outcomes
SE ELECTRICAL 2015 COURSE W.E.F. FROM 2016-17			
203141SE M L	C201	Power Generation Technologies	1. Identify operations of thermal power plant with all accessories and cycles.
			2.Be aware of the principle of operation, components, layout, location, environmental and social issues of nuclear, diesel and gas power plant.
			3.Identify and demonstrate the components of hydro power plant and calculation of turbine required based on catchment area.
			4.Find the importance of wind based energy generation along with its design, analysis and comparison.
			5. Apply solar energy in thermal and electrical power generation considering energy crisis, environmental and social benefits.
			6. Understand the operation of electrical energy generation using biomass, tidal, geothermal, hydel plants, fuel cell and interconnection with grid.
207006	C202	Engineering Mathematics- III	1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
			2. Solve problems related to Laplace transform, Fourier transform, Z-Transform and applications to Signal processing and Control systems.
			3. Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic
			4.Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
203142	C203	Material Science	1. Categorize and classify different materials from Electrical Engineering applications point of view.
			2. Explain and summarize various properties and characteristics of different classes of materials.
			3. Choose materials for application in various electrical equipment.
			4. Explain and describe knowledge of nanotechnology, batteries and solar cell materials.
			5.Test different classes of materials as per IS
203143	C204	Analog and Digital Electronics	1.Understand conversion of number system, perform binary arithmetic and reduce Boolean expressions by K-
			2. Demonstrate basics of various types of Flip flops, design registers and counter.
			3. Analyze parameter of Op-amp and its applications.
			4. Apply the knowledge of Op-amp as wave form generators & filters.
			5.Use BJT as amplifier with various configurations.
			6.Analysis of uncontrolled rectifier.
203144	C205	Electrical Measurements and Ins	1.Understand various characteristics of measuring instruments, their classification and range extension technique.
			2. Classify resistance, apply measurement techniques for measurement of resistance, inductance.
			3.Explain construction, working principle and use of dynamometer type wattmeter for measurement of power under balance and unbalance condition.
			4.Explain Construction, working principle of 1-phase and 3-phase induction, static energy meter and calibration procedures.
			5.Use of CRO for measurement of various electrical parameters, importance of transducers, their classification, selection criterion and various applications.
			6. Measurement of various physical parameters using transducers.
203151	C206	Soft Skills	1. Do SWOT analysis.
			2. Develop presentation and take part in group discussion.
			3.Understand and Implement etiquettes in workplace and in society at large.
			4.Work in team with team spirit.
			5.Utilize the techniques for time management and stress management

203145SEM II	C207	Power System I	1. Recognize different patterns of load curve, calculate different factors associated with it and tariff structure for LT and HT consumers.
			2. Aware of features, ratings, application of different electrical equipment in power station and selection of overhead line insulators.
			3.Analyze and apply the knowledge of electrical and mechanical design of transmission lines.
			4.*Identify and analyze the performance of transmission lines.*
203146	C208	Electrical Machines I	1. Apply energy conversion principles to different machines.
			2.Select machine for specific applications.
			3.Test the various machine for performance calculation.
203147	C209	Network Analysis	1. Developing strong basics for network theory.
			2. Develop the problem solving technique for networks by application of theorems.
			3.Understand the behavior of the network by analyzing its transient response.
			4. Apply their knowledge of network theory for designing special circuits like filters.
203148	C210	Numerical Methods and Comput	1. Develop algorithms and implement programs using C language for various numerical methods.
			2.Demonstrate types of errors in computation and their causes of occurrence.
			3. Identify various types of equations and apply appropriate numerical method to solve different equations.
			4.Apply different numerical methods for interpolation, differentiation and numerical integration.
			5.Apply and compare various numerical methods to solve first and second order ODE.
			6.Apply and compare various numerical methods to solve linear simultaneous equations.
203149	C211	Fundamentals of Microcontroller	1. Differentiate between microprocessor and microcontroller.
			2. Describe the architecture and features of various types of microcontroller.
			3.Demonstrate programming proficiency using the various addressing modes and all types of instructions of the target microcontroller.
			4.Program using the capabilities of the stack, the program counter the internal and external memory, timer and interrupts and show how these are used to execute a programme.
			5. Write assemble assembly language programs on PC and download and run their program on the training
			6. Design electrical circuitry to the Microcontroller I/O ports in order to interface with external devices.
			7.Write assembly language programs and download the machine code that will provide solutions real-world control problems such as fluid level control, temperature control, and batch processes.

			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
			SE E&TC 2015 COURSE W.E.FROM 2016-17
COURSE	**CODE**	**SUBJECT**	**Course Outcomes**
204181SE M I	C201	Signals & Systems	1. Understand mathematical description and representation of continuous and discrete time signals and systems.
			2. Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.
			3. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
			4. Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.
			5. Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
204182	C202	Electronic Devices & Circuits	1.Comply and verify parameters after exciting devices by any stated method.
			2. Implement circuit and test the performance.
			3.Analyze small signal model of FET and MOSFET.
			4.Explain behavior of FET at low frequency.
			5.Design an adjustable voltage regulator circuits.
204183	C203	Electrical Circuits and Machines	1. Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, andnetwork theorems.
			2. Explain the working principle of different electrical machines.
			3. Select proper electrical motor for given application.
			4.Design and analyze transformers.
204184	C204	Data Structures and Algorithms	1. Discuss the computational efficiency of the principal algorithms such as sorting & searching.
			2. Write and understand the programs that use arrays & pointers in C
			3. Describe how arrays, records, linked structures are represented in memory and use them in algorithms.
			4. Implement stacks & queues for various applications.
			5. Understand various terminologies and traversals of trees and use them for various applications.
			6. Understand various terminologies and traversals of graphs and use them for various applications.
204185	C205	Digital Electronics	1. Use the basic logic gates and various reduction techniques of digital logic circuit in detail.
			2. Design combinational and sequential circuits.
			3. Design and implement hardware circuit to test performance and application.
			4.Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation so
204186	C206	Electronic Measuring Instruments & Tools	1. Understand fundamental of various electrical measurements.
			2. Understand and describe specifications, features and capabilities of electronic instruments.
			3. Finalize the specifications of instrument and select an appropriate instrument for given measurement.
			4. Carry out required measurement using various instruments under different setups.
			5. Able to compare measuring instruments for performance parameters
			6.Select appropriate instrument for the measurement of electrical parameter professionally
204192	C207	Audit Course 1	1.Changes in awareness levels, knowledge and understanding
			2.A change in attitudes / behavior e.g. against drink-drive;
			3.Casualty Reduction;
			4. That remedial education for those who make mistakes and for low level offences where this is more effective than financial penalties and penalty points;
			5. Improving Road Safety Together
207005 SIM II	C208	Engineering Mathematics III	1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.
			2. Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing.
			3. 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
			4. Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.

			5. Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
204187	C209	Integrated Circuits	1. Understand the characteristics of IC and Op-Amp and identify the internal structure.
			2. Understand and identify various manufacturing techniques.
			3. Derive and determine various performances based parameters and their significance for Op-Amp.
			4. Comply and verify parameters after exciting IC by any stated method.
			5. Analyze and identify the closed loop stability considerations and I/O limitations.
			6. Analyze and identify linear and nonlinear applications of Op-Amp.
			7. Understand and verify results (levels of V & I) with hardware implementation.
			8. Implement hardwired circuit to test performance and application for what it is being designed.
			9.Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulat
204188	C210	Control Systems	1.Determine and use models of physical systems in forms suitable for use in the analysis and design of control s
			2. Determine the (absolute) stability of a closed-loop control system.
			3.Perform time domain and frequency domain analysis of control systems required for stability analysis.
			4.Perform time domain and frequency domain correlation analysis.
			5.Apply root-locus, Frequency Plots technique to analyze control systems.
			6.Express and solve system equations in state variable form
204189	C211	Analog Communication	1. Understand and identify the fundamental concepts and various components of analogcommunication systems
			2. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communi
			3. Describe analog pulse modulation techniques and digital modulation technique.
			4. Develop the ability to compare and contrast the strengths and weaknesses of variouscommunication systems
204190	C212	Object Oriented Programming	1. Describe the principles of object oriented programming.
			2. Apply the concepts of data encapsulation, inheritance in C++.
			3. Understand basic program constructs in Java
			4. Apply the concepts of classes, methods and inheritance to write programs Java
			5. Use arrays, vectors and strings concepts and interfaces to write programs in Java.
			6. Describe and use the concepts in Java to develop user friendly program,
204191	C213	Employability Skill Development	1. Have skills and preparedness for aptitude tests.
			2. Be equipped with essential communication skills (writing, verbal and non-verbal)
			3. Master the presentation skill and be ready for facing interviews.
			4. Build team and lead it for problem solving.
204193	C214	Audit Course 2	1. will have ability of basic communication.
			2.will have the knowledge of Japanese script.
			3. will get introduced to reading , writing and listening skills
			4.will develop interest to pursue professional Japanese Language course.

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 2015 COURSE W.E.F 2016	

COURSE	CODE	SUBJECT	Course Outcomes
207002	C201	Engineering Mathematics – III	1) Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems.
			2) Apply Laplace transform and Fourier transform techniques to solve differential equations involved in Vibration theory, Heat transfer and related engineering applications.
			3) Apply statistical methods like correlation, regression analysis in analyzing, interpreting experimental data and probability theory in testing and quality control.
			4) Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems
			5) Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
202041	C202	Manufacturing Process-I	1.Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects.
			2. Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.
			3. Understand different plastic molding processes, Extrusion of Plastic and Thermoforming
			4. Understand different Welding and joining processes and its defects
			5. Understand, Design and Analyze different sheet metal working processes
			6.Understand the constructional details and Working of Centre Lathe
202042	C203	Computer Aided Machine	1.Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM.
			2.Understand the significance of parametric technology and its application in 2D sketching
			3.Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling
			4. Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
			5.Ability to ensure manufacturability and proper assembly of components and assemblies
			6. Ability to communicate between Design and Manufacturing using 2D drawings.
202043	C204	Thermodynamics	1.Apply various laws of thermodynamics to various processes and real systems.
			2. Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes
			3. Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
			4.Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle
			5.Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants
			6.Use Psychromertic charts and estimate various essential properties related to Psychrometry and processes
202044	C205	Material Science	1. Understand the basic concepts and properties of Material.
			2.Understand about material fundamental and processing
			3.Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement
			4. Detect the defects in crystal and its effect on crystal properties
			5.Evaluate the different properties of material by studying different test
			6.Recognize how metals can be strengthened by cold-working and hot working
202051	C206	Strength of Materials	1. Apply knowledge of mathematics, science for engineering applications
			2.Design and conduct experiments, as well as to analyze and interpret data
			3.Design a component to meet desired needs within realistic constraints of health and safety
			4. Identify, formulate, and solve engineering problems
			5. Practice professional and ethical responsibility
			6.Use the techniques, skills, and modern engineering tools necessary for engineering practice
202054	C207	Value Education	1.Understood human values, their significance and role in life.
			2.Promote self-reflection and critical inquiry that foster critical thinking of one's value and the values of others
			3.Practice respect for human rights and democratic principles.
			4. Familiarized with various living and non-living organisms and their interaction with environment
			5. Understood the basics regarding the leadership and to become a conscious professional.

Code	CO	Subject	Course Outcome
202054 A		Innovations in Engineering Field/ Agric	1. Understand what is thinking, its tools and process and its application to innovation
			2.Practice application of innovation in engineering
			3. Understand important terms like national productivity, sustainable development and inclusive growth
			4.Throw a light on developing technologies in agriculture
			5. Learn Interdisciplinary Engineering applications in Agriculture
202054 B		Road Safety	1. Generate awareness about number of people dyeing every year in road accidents, traffic rules and characteristics of accident
			2.Gain information and knowledge about people responsible for accidents and their duties
			3.Understand the importance of multidisciplinary approach to planning for traffic safety and rehabilitation
			4. Acquire a certificate of coordination/ participation in compulsory events based on the topic under study
202045 SEM II	C208	Fluid Mechanics	1.Use of various properties in solving the problems in fluids
			2. Use of Bernoulli's equation for solutions in fluids
			3.Determination of forces drag and lift on immersed bodies
202047	C209	Soft Skills	1.Improved communication, interaction and presentation of ideas
			2.Right attitudinal and behaviouralchange
			3.Developed right-attitudinal and behavioral change
202048	C210	Theory of Machines – I	1.Identify mechanisms in real life applications.
			2.Perform kinematic analysis of simple mechanisms.
			3.Perform static and dynamic force analysis of slider crank mechanism.
			4.Determine moment of inertia of rigid bodies experimentally.
			5.Analyze velocity and acceleration of mechanisms by vector and graphical methods.
202049	C211	Engineering Metallurgy	1. describe how metals and alloys formed and how the properties change due to microstructure
			2.apply core concepts in Engineering Metallurgy to solve engineering problems.
			3.conduct experiments, as well as to analyze and interpret data
			4. select materials for design and construction
			5. possess the skills and techniques necessary for modern materials engineering practice
			6. recognize how metals can be strengthened by alloying, cold-working, and heat treatment
202050	C212	Applied Thermodynamics	1. Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out various losses in real cycles
			2.Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. Engines and Theory of Detonation, Pre-ignition and factors affecting detonation.
			3.Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Theory of Detonation in CI Engines and Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion chamber and types
			4. Carry out Testing of I. C. Engines and analyze its performance.
			5. Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Starting) also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control.
			6. Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors
203152	C213	Electrical and Electronics Engineering	1. Develop the capability to identify and select suitable DC motor / induction motor / special purpose motor and its speed control method for given industrial application.
			2. Program Arduino IDE using conditional statements
			3. Interfacing sensors with Arduino IDE

		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	

COURSE	CODE	SUBJECT	Course Outcomes
214441SE ML	C201	Discrete Structures	1. Use set, relation and function to formulate a problem and solve it
			2. Use graph theory and trees to formulate the problems and solve them
			3. Use mathematical propositions and proof techniques to check the truthfulness of a real life situation.
214442	C202	Computer Organization & Architecture	1. Solve problems based on computer arithmetic.
			2. Explain processor structure & its functions.
			3. Obtain knowledge about micro-programming of a processor.
			4. Understand concepts related to memory & IO organization.
			5. Acquire knowledge about instruction level parallelism & parallel organization of multi- processors & multi core systems.
214443	C203	Digital Electronics and Logic Design	1. Spectacle an awareness and apply knowledge of number systems, codes, Boolean algebra and use necessary A.C, D.C Loading characteristics as well as functioning while designing with logic gates.
			2. Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips.
			3. Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table), their conversion & design the applications
			4. Identify the Digital Circuits, Input/Outputs to replace by FPGA
			5. Use VHDL programming technique with different modeling styles for any digital circuits
214444	C204	Fundamentals of Data Structures	1. Apply appropriate constructs of C language, coding standards for application development
			2. Use dynamic memory allocation concepts and file handling in various application developments.
			3. Perform basic analysis of algorithms with respect to time and space complexity
			4. Select appropriate searching and/or sorting techniques in the application development
			5. Select and use appropriate data structures for problem solving and programming
			6. Use algorithmic foundations for solving problems and programming
214445	C205	Problem Solving and Object Oriented programming	1. Develop algorithms for solving problems by using modular programming concepts
			2. Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies
			3.Discover, explore and apply tools and best practices in object-oriented programming
			4. Develop programs that appropriately utilize key object-oriented concepts
214446	C206	Digital Laboratory	1. Spectacle an awareness and apply knowledge and concepts and methods of digital system design techniques as hands-on experiments with the use of necessary A.C, D.C Loading characteristics
			2. Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips
			3. Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table) & design the applications like Asynchronous and Synchronous Counters
			4. Design Sequential Logic circuits: Sequence generators, MOD counters with registers/Counters using synchronous /asynchronous counters.
			5. Understand the need of skills, techniques and learn state-of-the-art engineering tools through hands-on experimentation on the Xilinx tools for design as well as the basics of VHDL
			6. Understand and implement the design Steps, main programming technique with different modeling styles for any digital circuits with VHDL Programming.
214447	C207	Programming Laboratory	1. Apply appropriate constructs of C language, coding standards for application development
			2. Use dynamic memory allocation concepts and file handling in various application developments
			3. Perform basic analysis of algorithms with respect to time and space complexity
			4. Select appropriate searching and/or sorting techniques in the application development
			5. Select and use appropriate data structures for problem solving and programming

SE IT 2015 COURSE WITHEFFECT FROM 2016-17

		Object Oriented programming Lab	6. Use algorithmic foundations for solving problems and programming
214448	C208		1. Develop and implement algorithms for solving simple problems using modular programming concept
			2. Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies
			3. Discover, explore and apply tools and best practices in object-oriented programming.
			4. Develop programs that appropriately utilize key object-oriented concepts
			5. Create a data base using files
214449	C209	Communication Skills	1. Provides an ability to understand, analyze and interpret the essentiality of grammar and its proper usage.
			2. Build the students' vocabulary by means of communication via web, direct Communication and indirect communication
			3. Improves Students' Pronunciation skills and understanding between various phonetic sounds during communication
			4. Understanding the various rules and means of written communication
			5. Effective communication with active listening, facing problems while communication and how to overcome it.
207003 SEM II	C210	Engineering Mathematics -III	1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits
			2. Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing
			3. Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.
			4. Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals
			5. Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.
214450	C211	Computer Graphics	1. Apply mathematics and logic to develop Computer programs for elementary graphic operations
			2. Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
			3. Develop the competency to understand the concepts related to Computer Vision and Virtual reality
			4. Apply the logic to develop animation and gaming programs
214451	C212	Processor Architecture and Interfacing	1. Learn architectural details of 80386 microprocessor
			2. Understand memory management and multitasking of 80386 microprocessor
			3. Understand architecture and memory organization of 8051microcontroller
			4. Explain timers and interrupts of 8051 microcontroller and its interfacing with I/O devices
214452	C213	Data Structures & Files	1. Analyze algorithms and to determine algorithm correctness and time efficiency class
			2. Understand different advanced abstract data type (ADT) and data structures and their implementations
			3. Understand different algorithm design techniques (brute -force, divide and conquer, greedy, etc.) and their implementation
			4. Apply and implement learned algorithm design techniques and data structures to solve problems
214453	C214	Foundations of Communication and Computer Network	1. Understand data/signal transmission over communication media
			2. Recognize usage of various modulation techniques in communication
			3. Analyze various spread spectrum and multiplexing techniques
			4. Use concepts of data communication to solve various related problems
			5. Understand error correction and detection techniques
			6. Acquaint with transmission media and their standards
214454	C215	Processor Interfacing	1.Learn and apply concepts related to assembly language programming
			2. Write and execute assembly language program to perform array addition, code conversion, block transfer, sorting and string operations
			3. Learn and apply interfacing of real world input and output devices to 8051 microcontroller
214455	C216	Data Structure and Files	1. Apply and implement algorithm to illustrate use of linear data structures such as stack, queue
			2. Apply and implement algorithms to create/represent and traverse non-linear data structures such as trees, graphs etc
			3. Apply and implement algorithms to create and manipulate database using different file organizations
			4. Learn and apply the concept of hashing in database creation and manipulation
214456	C217	Computer Graphics Laboratory	1. Apply and implement line drawing and circle drawing algorithms to draw specific shape given in the problem
			2. Apply and implement polygon filling algorithm for a given polygon
			3. Apply and implement 2-D and 3-D transformation algorithms for given input shape
			4. Apply and implement polygon clipping algorithm for given input polygon
			5. Apply and implement fractal generation algorithm for a given input
			6. Apply and implement animation concepts for generating simple animation without using any animation tool

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.

COURSE	CODE	SUBJECT	Course Outcomes
SE COMPUTER 2015 COURSE WITH EFFECT FROM 2016
210241 SEMI	C201	Discrete Mathematics	1. Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context
			2.Analyze and synthesize the real world problems using discrete mathematics.
210242	C202	Digital Electronics and Logic D	1. Realize and simplify Boolean Algebraic assignments for designing digital circuits using K- Maps.
			2.Design and implement Sequential and Combinational digital circuits as per the specifications.
			3.Apply the knowledge to appropriate IC as per the design specifications.
			4.Design simple digital systems using VHDL.
			5. Develop simple embedded system for simple real world application.
210243	C203	Data Structures and Algorithms	1. To discriminate the usage of various structures in approaching the problem solution.
			2. To design the algorithms to solve the programming problems.
			3. To use effective and efficient data structures in solving various Computer Engineering domain problems.
			4.To analyze the problems to apply suitable algorithm and data structure
			5.To use appropriate algorithmic strategy for better efficiency
210244	C204	Computer Organization and Ar	1. Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
			2.Analyze the principles of computer architecture using examples drawn from commercially available computers
			3.Evaluate various design alternatives in processor organization.
210245	C205	Object Oriented Programming	1. Analyze the strengths of object oriented programming
			2. Design and apply OOP principles for effective programming
			3.Develop programming application using object oriented programming language C++
			4. Percept the utility and applicability of OOP
210249	C206	Soft Skills	1.Effectively communicate through verbal/oral communication and improve the listening skills
			2. Write precise briefs or reports and technical documents.
			3.Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
			4. Become more effective individual through goal/target setting, self motivation and practicing creative thinking
			5. Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality
210250	C207	AC1-II: Humanities and Social Sci	1.Making engineering and technology students aware of the various issues concerning man and society
			2. These issues will help to sensitize students to be broader towards the social, cultural, economic and human issues, involved in social changes
			3.Able to understand the nature of the individual and the relationship between the self and the community
			4.Understanding major ideas, values, beliefs, and experiences that have shaped human history and cultures
210250	C208	AC1-III: Environmental Studies	1.Comprehend the importance of ecosystem and biodiversity
			2.To correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and prevention
			3.Identify different types of environmental pollution and control measures
			4.To correlate the exploitation and utilization of conventional and non-conventional resources
210250	C209	AC1-IV: Smart Cities	1. *Better understanding of the dynamic behavior of the urban system by going beyond the physical appearance and by focusing on representations, properties and impact factors*
			2. Exploration of the city as the most complex human-made organism with a metabolism that can be modeled in terms of stocks and flows
			3. Knowledge about data-informed approaches for the development of the future city, based on crowd sourcing and sensing
			4.Knowledge about the latest research results in for the development and management of future cities

			5. Understanding how citizens can benefit from data-informed design to develop smart and responsive cities
207003 SEM II	C210	Engineering Mathematics III	1.Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits
			2. Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing
			3.Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.
			4.Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals
			5.Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.
210251	C211	Computer Graphics	1.Apply mathematics and logic to develop Computer programs for elementary graphic operations.
			2. Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics.
			3. Develop the competency to understand the concepts related to Computer Vision and Virtual reality.
			4. Apply the logic to develop animation and gaming programs.
210252	C212	Advanced Data Structures	1.To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain
			2.To design the algorithms to solve the programming problems.
			3. To use effective and efficient data structures in solving various Computer Engineering domain problems
			4.To analyze the algorithmic solutions for resource requirements and optimization
			5. To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
210253	C213	Microprocessor	1. To apply the assembly language programming to develop small real life embedded application.
			2. To understand the architecture of the advanced processor thoroughly to use the resources for programming.
			3.To understand the higher processor architectures descended from 80386 architecture.
210254	C214	Principles of Programming Languages	1. To analyze the strengths and weaknesses of programming languages for effective and efficient program development.
			2. To inculcate the principles underlying the programming languages enabling to learn new programming language
			3.To grasp different programming paradigms.
			4. To use the programming paradigms effectively in application development.
210258	C215	AC2-I: Water Management	1.Understanding of the global water cycle and its various processes.
			2.Understanding of climate change and their effects on water systems.
			3. Understanding of Drinking treatment and quality of groundwater and surface water
			4. Understanding of the Physical, chemical, and biological processes involved in water treatment and distribution
210258	C216	AC2-II: Intellectual Property Ri	1.Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
			2.Identify, apply and assess principles of law relating to each of these areas of intellectual property
			3.Apply the appropriate ownership rules to intellectual property you have been involved in creating
210258	C217	AC2-III : The Science of Happi	1.Ability to understand what happiness is and why it matters to you
			2.Ability to learn how to increase your own happiness
			3. Understanding of the power of social connections and the science of empathy
			4.Ability to understand what is mindfulness and its real world applications
210258	C218	AC2-IV: Stress Relief: Yoga an	1.Students understanding of philosophy and religion as well as daily life issues will be challenged and enhanced
			2.Enhances the immune system.
			3.Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed
			4. Powers of concentration, focus, and awareness will be heightened.

COURSE	CODE	SUBJECT	Course Outcomes
		TE Electrical Engineering (2015 COURSE W.E.F.A.Y. 2017-18)	
311121 SEM-I	**C301**	**Industrial and Technology Management**	1. Differentiate between different types of business organization and discuss the fundamentals of economics and management.
			2.Explain the importance of technology management and quality management.
			3.Describe the characteristics of marketing and its types.
			4. Discuss the qualities of a good leader.
303141	C302	Advance Microcontroller and its Ap	1.Explain architecture of PIC18F458 microcontroller, its instructions and the addressing modes.
			2.Develop and debug program in assembly language or C language for specific applications
			3. Use of an IDE for simulating the functionalities of PIC microcontroller and its use for software and hardware development
			4. Interface a microcontroller to various devices.
			5.Effectively utilize advance features of microcontroller peripherals.
303142	C303	Electrical Machines II	1. Learn construction & working principle of three phase synchronous machines.
			2.Define regulation of alternator & calculate it by direct and indirect methods.
			3. Study the methods of starting 3- phase synchronous motor, & its operation under Different conditions.
			4. Learn Speed control methods of three phase induction motor.
			5.Develop phasor diagram & circle diagram of a c series motor.
			6.Develop equivalent circuit of single phase induction motor.
303143	C304	Power Electronics	1. Develop characteristics of different power electronic switching devices.
			2. Reproduce working principle of power electronic converters for different types of loads.
			3.Analyse the performance of power electronic converters.
303144	C305	Electrical Installation,Maintenance	1. Classify distribution systems, its types and substations.
			2.Design of different earthing systems for residential and industrial premises.
			3.Select methods of condition monitoring and testing of various Electrical Equipments.
			4.Estimate and Costing of residential and industrial premises.
303145	C306	Seminar and Technical Communica	1. Relate with the current technologies and innovations in Electrical engineering.
			2.Improve presentation and documentation skill.
			3.Apply theoretical knowledge to actual industrial applications and research activity.
			4. Communicate effectively.
303146 SEM-I	**C308**	**Power System II**	1.Solve problems involving modelling, design and performance evaluation of HVDC and EHVAC power transmission lines.
			2.Evaluate power flow in power transmission networks and apply power flow results to solve simple planning problems.
			3. Calculate currents and voltages in a faulted power system under both symmetrical and asymmetrical faults, and relate fault currents to circuit breaker ratings.
303147	C309	Control System I	1.Model physical system,
			2.Determine time response of linear system,
			3.Analyse stability of LTI system,
			4.Design PID controller for LTI system
303148	C310	Utilization of Electrical Energy	1.Ensure that the knowledge acquired can be applied in various fields such as electric heating, illumination, chemical processes, and electric traction.
			2. Make the students aware about the importance of maximizing the energy efficiency by optimum utilization of electrical energy.
			3. Develop ability amongst the students to design -heating element for resistance furnaces and design- illumination schemes. To develop ability amongst the students to analyze the performance of arc furnaces, electric traction, different sources of light, illumination schemes
			4.Provide know how about Refrigeration, Air Conditioning
			5. Provide know about electrochemical processes and applications of these in practical world, modern welding techniques.
			6. Develop self and lifelong learning skills, introduce professionalism for successful career.
303149	C311	Design of Electrical Machines	1.Calculate main dimensions and Design of single phase and three phase transformer.
			2.Calculate main dimensions of three phase Induction motor.
			3.Determine the parameters of transformer.
			4.Determine parameters of three phase Induction motor.
303150	C312	Energy Audit and Management	1.To get knowledge of BEE Energy policies, Electricity Acts.

COURSE	CODE	SUBJECT	Course Outcomes
			2.Use various energy measurement and audit instruments.
			3.Carry out preliminary energy audit of various sectors
			4. Enlist energy conservation and demand side measures for electrical, thermal and utility Systems.
			5.Solve simple problems on cost benefit analysis.
303151	C313	Electrical Workshop	1.Integrate electrical/electronic circuits for useful applications
			2.Acquire hardware skills to fabricate circuits designed.
			3.Read data manuals/data sheets of different items involved in the circuits.
			4. Test and debug circuits.
			5. Produce the results of the testing in the form of report.
		TE Information Tecgnology (2015 COURSE W.E.F.A.Y. 2017-18)	
COURSE	**CODE**	**SUBJECT**	**Course Outcomes**
314441 SEM	**C301**	**Theory of Computation**	1. To construct finite state machines to solve problems in computing.
			2. To write mathematical expressions for the formal languages
			3. To apply well defined rules for syntax verification.
			4. To construct and analyze Push Down, Post and Turing Machine for formal languages.
			5. To express the understanding of the decidability and decidability problems.
			6. To express the understanding of computational complexity.
314442	C302	Database Management Systems	1. To define basic functions of DBMS & RDBMS.
			2. To analyze database models & entity relationship models.
			3. To design and implement a database schema for a given problem-domain.
			4. To populate and query a database using SQL DML/DDL commands.
			5. Do Programming in PL/SQL including stored procedures, stored functions, cursors and packages.
			6.To appreciate the impact of analytics and big data on the information industry and the external ecosystem for analytical and data services.
314443	C303	Software Engineering & Project Ma	1. To identify unique features of various software application domains and classify software applications.
			2. To choose and apply appropriate lifecycle model of software development.
			3. To describe principles of agile development, discuss the SCRUM process and distinguish agile process model from other process models.
			4. To analyze software requirements by applying various modeling techniques.
			5. To list and classify CASE tools and discuss recent trends and research in software engineering.
			6. To understand IT project management through life cycle of the project and future trends in IT Project Management.
314444	C304	Operating System	1. Fundamental understanding of the role of Operating Systems.
			2. To understand the concept of a process and thread.
			3. To apply the cons of process/thread scheduling.
			4. To apply the concept of process synchronization, mutual exclusion and the deadlock.
			5. To realize the concept of I/O management and File system.
			6. To understand the various memory management techniques
314445	C305	Human -Computer Interaction	1. To explain importance of HCI study and principles of user-centred design (UCD) approach.
			2. To develop understanding of human factors in HCI design.
			3. To develop understanding of models, paradigms and context of interactions.
			4. To design effective user-interfaces following a structured and organized UCD process.
			5. To evaluate usability of a user-interface design.
			6. To apply cognitive models for predicting human-computer-interactions.
314446	C306	Software Laboratory- I	1. Understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
			2. To provide a strong formal foundation in database concepts, recent technologies and best industry practices.
			3. To give systematic database design approaches covering conceptual design, logical design and an overview of physical design.
			4. To learn the SQL and NoSQL database system.
			5. To learn and understand various Database Architectures and its use for application development.
			6. To programme PL/SQL including stored procedures, stored functions, cursors and packages.
314447	C307	Software Laboratory- II	1. To understand the basics of Linux commands and program the shell of Linux.
			2. To develop various system programs for the functioning of operating system.
			3. To implement basic building blocks like processes, threads under the Linux.
			4. To develop various system programs for the functioning of OS concepts in user space like concurrency control and file handling in Linux.

			5. To design and implement Linux Kernel Source Code.
			6. To develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any Linux kernel
314448	C308	Software Laboratory- III	1. To identify the needs of users through requirement gathering.
			2. To apply the concepts of Software Engineering process models for project development.
			3. To apply the concepts of HCI for user-friendly project development.
			4. To deploy website on live webserver and access through URL.
			5. To understand, explore and apply various web technologies.
			6. To develop team building for efficient project development.
314449	C309	Audit Course 3	
		AC3- I : Green Construction & Desi	1. To understand the importance of environment friendly society.
			2. To apply primary measures to reduce carbon emissions from their surroundings.
			3. To learn role of IT solutions in design of green buildings.
			4. To understand the use of software systems to complete statutory compliancesinvolved in the design of a new home or office building through green construction.
		Audit Course 3 - II : Leadership and Personality Development	1. To exhibit responsible decision-making and personal accountability
			2. To demonstrate an understanding of group dynamics and effective teamwork
			3. To develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others.
			4. To develop overall personality.
		Audit Course 3 – III : Professional Ethics and	1. To summarize the principles of proper courtesy as they are practiced in the workplace.
			2. To describe ways to apply proper courtesy in different professional situations.
			3. To practice appropriate etiquettes in the working environment and day to day life.
			4. To learn and build proper practices for global corporate world.
		Audit Course 3 – IV : Digital & Social Media Marketing	1. Develop a far deeper understanding of the changing digital landscape.
			2. Identify some of the latest digital marketing trends and skill sets needed for today's marketer.
			3. Successful planning, prediction, and management of digital marketing campaigns.
			4. Implement smart management of different digital assets for marketing needs. Assess digital marketing as a long term career opportunity.
314450 SEM-	C310	Computer Network Technology	1. To know Responsibilities, services offered and protocol used at each layer of network.
			2. To understand different addressing techniques used in network.
			3. To know the difference between different types of network.
			4. To know the different wireless technologies and IEEE standards.
			5. To use and apply the standards and protocols learned, for application development.
			6. To understand and explore recent trends in network domain.
314451	C311	Systems Programming	1. To learn independently modern software development tools and creates novel solutions for language processing applications.
			2. To design and implement assemblers and macro processors.
			3. To use tool LEX for generation of Lexical Analyzer.
			4. To use YACC tool for generation of syntax analyzer.
			5. To generate output for all the phases of compiler.
			6. To apply code optimization in the compilation process.
314452	C312	Design and Analysis of Algorithms	1. To calculate computational complexity using asymptotic notations for various algorithms.
			2. To apply Divide & Conquer as well as Greedy approach to design algorithms.
			3. To practice principle of optimality.
			4. To illustrate different problems using Backtracking.
			5. To compare different methods of Branch and Bound strategy.
			6. To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.
314453	C313	Cloud Computing	1. To understand the need of Cloud based solutions.
			2. To understand Security Mechanisms and issues in various Cloud Applications
			3. To explore effective techniques to program Cloud Systems.
			4. To understand current challenges and trade-offs in Cloud Computing.
			5. To find challenges in cloud computing and delve into it to effective solutions.
			6. To understand emerging trends in cloud computing.

314454	C314	Data Science & Big Data Analytics	1. To understand Big Data primitives.
			2. To learn and apply different mathematical models for Big Data.
			3. To demonstrate their Big Data learning skills by developing industry or research applications.
			4. To analyze each learning model come from a different algorithmic approach and it will perform differently under different datasets.
			5. To understand needs, challenges and techniques for big data visualization.
			6. To learn different programming platforms for big data analytics.
314455	C315	Software Laboratory- IV	1. To implement small size network and its use of various networking commands.
			2. To understand and use various networking and simulations tools.
			3. To configure various client/server environments to use application layer protocols
			4. To understand the protocol design at various layers.
			5. To explore use of protocols in various wired and wireless applications.
			6. To develop applications on emerging trends.
314456	C316	Software Laboratory- V	1. To design and implement two pass assembler for hypothetical machine instructions.
			2. To design and implement different phases of compiler (Lexical Analyzer, Parser, Intermediate code generation)
			3. To use the compile generation tools such as "Lex" and "YACC".
			4. To apply algorithmic strategies for solving various problems.
			5. To compare various algorithmic strategies.
			6. To analyze the solution using recurrence relation.
314457	C317	Software Laboratory- VI	1. To apply Big data primitives and fundamentals for application development.
			2. To explore different Big data processing techniques with use cases.
			3. To apply the Analytical concept of Big data using R/Python.
			4. To visualize the Big Data using Tableau.
			5. To design algorithms and techniques for Big data analytics.
			6. To design Big data analytic application for emerging trends.
314458	C318	Project Based Seminar	1. To Gather, organize, summarize and interpret technical literature with the purpose of formulating a project proposal.
			2. To write a technical report summarizing state-of-the-art on an identified topic.
			3. Present the study using graphics and multimedia presentations.
			4. Define intended future work based on the technical review.
			5. To explore and enhance the use of various presentation tools and techniques.
			6. To understand scientific approach for literature survey and paper writing.
314459	C319	Audit Course 4	
		Audit Course 4 - I : Intellectual Property Rights and Patenting	1. To understand Intellectual Property Rights (IPR).
			2. To explore applications of Trademark, Industrial Designs, Copyright and Trade Secret.
			3. To understand function of USPTO, EPO.
			4. To know the process of filing patent with IPO.
			5. To understand the process of copyright and licensing.

COURSE	CODE	SUBJECT	Course Outcomes
TE Mechanical Engineering (2015 COURSE W.E.F.A.Y. 2017-18)
302041 SEM	**C301**	**Design of Machine Elements-I**	1. Ability to identify and understand failure modes for mechanical elements and design of machine elements based on strength.
			2. Ability to design Shafts, Keys and Coupling for industrial applications.
			3. Ability to design machine elements subjected to fluctuating loads.
			4. Ability to design Power Screws for various applications.
			5. Ability to design fasteners and welded joints subjected to different loading conditions.
			6. Ability to design various Springs for strength and stiffness.
302142	C302	Heat Transfer	CO 1: Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system.
			CO 2: Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction.
			CO 3: Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation.
			CO 4: Interpret heat transfer by radiation between objects with simple geometries. CO 5: Analyze the heat transfer equipment and investigate the performance.
302043	C303	Theory of Machines -II	1. Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear design.
			2. Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear.
			3. The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design.
			4. Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves.
			5. The student will synthesize a four bar mechanism with analytical and graphical methods.
			6. a. The student will analyze the gyroscopic couple or effect for stabilization of Ship Aeroplane and Four wheeler vehicle. b. Student will choose appropriate drive for given application (stepped / step-less).
302044	C304	Turbo Machines	1. Apply thermodynamics and kinematics principles to turbo machines.
			2. Analyze the performance of turbo machines.
			3. Ability to select turbo machine for given application.
			4. Predict performance of turbo machine using model analysis.
302045	C305	Metrology and Quality Control	1. Understand the methods of measurement, selection of measuring instruments / standards of measurement, carryout data collection and its analysis.
			2. Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design
			3. Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately.
			4. Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement.
302047 SEM	C307	Numerical Methods and Optimiza	1. Use appropriate Numerical Methods to solve complex mechanical engineering problems.
			2. Formulate algorithms and programming.
			3. Use Mathematical Solver.
			4. Generate Solutions for real life problem using optimization techniques.
			5. Analyze the research problem
302048	C308	Design of Machine Elements-II	CO 1: To understand and apply principles of gear design to spur gears and industrial spur gear boxes.
			CO 2 : To become proficient in Design of Helical and Bevel Gear
			CO 3: To develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalogue.
			CO 4: To learn a skill to design worm gear box for various industrial applications.
			CO 5: To inculcate an ability to design belt drives and selection of belt, rope and chain drives. CO 6: To achieve an expertise in design of Sliding contact bearing in industrial applications.
302049	C309	Refrigeration and Air Conditioning	1.Illustrate the fundamental principles and applications of refrigeration and air conditioning system
			2.Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems
			3.Present the properties, applications and environmental issues of different refrigerants.
			4.Calculate cooling load for air conditioning systems used for various.
			5. Operate and analyze the refrigeration and air conditioning systems.
302050	C310	Mechatronics	1. Identification of key elements of mechatronics system and its representation in terms of block diagram.
			2.Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O.
			3. Interfacing of Sensors, Actuators using appropriate DAQ micro-controller.

COURSE	CODE	SUBJECT	Course Outcomes
			4. Time and Frequency domain analysis of system model (for control application)
			5.PID control implementation on real time systems
			6.Development of PLC ladder programming and implementation of real life system.
302051	C311	Manufacturing Process-II	1. Student should be able to apply the knowledge of various manufacturing processes.
			2. Student should be able to identify various process parameters and their effect on processes.
			3. Student should be able to figure out application of modern machining.
			4. Students should get the knowledge of Jigs and Fixtures for variety of operations.
302052	C312	MACHINE SHOP – II	1. Ability to develop knowledge about the working and programming techniques for various machines and tools
302053	C313	Mechanical & Automobile Semina	1. Establish motivation for any topic of interest and develop a thought process for technical presentation.
			2. Organize a detailed literature survey and build a document with respect to technical publications.
			3.Analysis and comprehension of proof-of-concept and related data.
			4.Effective presentation and improve soft skills.
			5. Make use of new and recent technology (e.g. Latex) for creating technical reports
302054	C314	Audit Course	
		Fire & Safety Technology	1. To create and sustain a community of learning in which students acquire knowledge in fire, safety and hazard management and learn to apply it professionally with due consideration for ethical, human life & property safety issues.
			2. To pursue research and development in fire safety engineering, hazard management and disseminate its
			3. To meet the challenges of today and tomorrow in the most effective, efficient and contemporary educational manner.
			4. To help in building national capabilities in fire safety engineering, disaster management, hazard management, industrial safety education through practical training to ensure a fire safe nation.
		Audit Course II - Entrepreneurship Development	1. Appreciate the concept of Entrepreneurship
			2. Identify entrepreneurship opportunity.
			3.Develop winning business plans
		Audit Course IV - Lean Manage	1. Will be able to do practice Lean Management at the workplace
			2.Will be able to contribute in Continuous Improvement program of the Organization
		Audit Course V - Smart Manufa	1. Comfortable with terminology and practices in Smart Manufacturing
			2.Able to face the challenges in Industry & also contribute towards advancement.
			3. Active part of Industry 4.0 (Fourth Industrial Revolution)
		TE E & TC (2015 COURSE W.E.F.A.Y. 2017-18)	
COURSE	**CODE**	**SUBJECT**	Course Outcomes
304181 SEM	**C301**	**Digital Communication**	1) Understand working of waveform coding techniques and analyse their performance.
			2) Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.
			3) Perform the time and frequency domain analysis of the signals in a digital communication system.
			4) Design of digital communication system.
			5) Understand working of spread spectrum communication system and analyze its performance.
304182	C302	Digital Signal Processing	1) Analyze the discrete time signals and system using different transform domain techniques.
			2) Design and implement LTI filters for filtering different real world signals.
			3) Develop different signal processing applications using DSP processor.
304183	C303	Electromagnetics	1) Understand the basic mathematical concepts related to electromagnetic vector fields.
			2) Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.
			3) Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.
			4) Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.
			5) Apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation.
304184	C304	Microcontrollers	1) Learn importance of microcontroller in designing embedded application.
			2) Learn use of hardware and software tools.
			3) Develop interfacing to real world devices.
304185	C305	Mechantronics	1 Identification of key elements of mechatronics system and its representation in terms of block diagram.
			2 Understanding basic principal of Sensors and Transducer.
			3. Able to prepare case study of the system given.

COURSE	CODE	SUBJECT	Course Outcomes
304193	C308	Electronics System Design	1. Apply the fundamental concepts and working principles of electronics devices to design electronics systems.
			2. Shall be able to interpret datasheets and thus select appropriate components and devices
			3. Select appropriate transducer and signal conditioning circuit to design prototype of Data Acquisition system.
			4. Design an electronic system/sub-system and validate its performance by simulating the same.
			5. Shall be able to use an EDA tool for circuit schematic and simulation.
			6. Create, manage the database and query handling using suitable tools.
304186 SEM	C310	**Power Electronics**	1.Design & implement a triggering / gate drive circuit for a power device
			2.Understand, perform & analyze different controlled converters.
			3.Evaluate battery backup time & design a battery charger.
			4. Design & implement over voltage / over current protection circuit.
304187	C311	Information Theory, Coding and Communication Network	1. Perform information theoretic analysis of communication system.
			2.Design a data compression scheme using suitable source coding technique.
			3. Design a channel coding scheme for a communication system.
			4. Understand and apply fundamental principles of data communication and networking.
			5.Apply flow and error control techniques in communication networks.
304188	C312	Business Management	1. Get overview of Management Science aspects useful in business.
			2.Get motivation for Entrepreneurship
			3.Get Quality Aspects for Systematically Running the Business
			4.To Develop Project Management aspect and Entrepreneurship Skills.
304189	C313	Advanced Processors	1.Describe the ARM microprocessor architectures and its feature.
			2. Interface the advanced peripherals to ARM based microcontroller
			3.Design embedded system with available resources.
			4.Use of DSP Processors and resources for signal processing applications.
304190	C314	System Programming and Operating Systems	1) Demonstrate the knowledge of Systems Programming and Operating Systems
			2) Formulate the Problem and develop the solution for same.
			3) Compare and analyse the different implementation approach of system programming operating system abstractions
			4) Interpret various OS functions used in Linux / Ubuntu
304196	C317	Employability Skill and Mini Project	1.Understand, plan and execute a Mini Project with team.
			2. Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshoo
			3. Prepare a technical report based on the Mini project.
			4.Deliver technical seminar based on the Mini Project work carried out.
			TE COMPUTE ENGINEERING (2015 COURSE W.E.F.A.Y. 2017-18)
COURSE	**CODE**	**SUBJECT**	**Course Outcomes**
310241 SEM	C301	**Theory of Computation**	1.design deterministic Turing machine for all inputs and all outputs
			2.subdivide problem space based on input subdivision using constraints
			3.apply linguistic theory
310242	C302	Database Management Systems (DBMS)	1.Design E-R Model for given requirements and convert the same into database tables.
			2. Use database techniques such as SQL & PL/SQL.
			3. Use modern database techniques such as NOSQL.
			4. Explain transaction Management in relational database System.
			5.Describe different database architecture and analyses the use of appropriate architecture in real time environment.
			6.Use advanced database Programming concepts
310243	C303	Software Engineering & Project Management	1. Decide on a process model for a developing a software project
			2.Classify software applications and Identify unique features of various domains
			3. Design test cases of a software system.
			4.Understand basics of IT Project management.
			5.Plan, schedule and execute a project considering the risk management.
			6.Apply quality attributes in software development life cycle.
310244	C304	Information Systems & Engineering Economics	1.Understand the need, usage and importance of an Information System to an organization.

			2.Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.
			3.Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations
			4.Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.
			5. Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
			6.Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
310245	C305	Computer Network (CN)	1. Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies
			2. Demonstrate design issues, flow control and error control
			3. Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.
			4.Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.
			5.Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.
			6.Demonstrate different routing and switching algorithms
310246	C306	Skill Development Lab	1. Evaluate problems and analyze data using current technologies in a wide variety of business and organizational contexts.
			2.Create data-driven web applications
			3.Incorporate best practices for building applications
			4. Employ Integrated Development Environment(IDE) for implementing and testing of software solution
			5. Construct software solutions by evaluating alternate architectural patterns.
310247	C307	Database Management System I	1.Develop the ability to handle databases of varying complexities
			2.Use advanced database Programming concepts
310248	C308	Computer Networks Lab	1.Demonstrate LAN and WAN protocol behavior using Modern Tools.
			2. Analyze data flow between peer to peer in an IP network using Application, Transport and Network Layer Protocols.
			3.Demonstrate basic configuration of switches and routers.
			4.Develop Client-Server architectures and prototypes by the means of correct standards and technology.
310249	C309	Audit Course 3	
	C310	AC3-I Cyber Security	1. Compare the interrelationships among security roles and responsibilities in a modern information-driven enterprise—to include interrelationships across security do mains (IT, physical, classification, personnel, and
			2. Assess the role of strategy and policy in determining the success of information security;
			3.Estimate the possible consequences of misaligning enterprise strategy, security policy, and security plans;
	C311	AC3-II Professional Ethics and Etiquettes	1.understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
			2.Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
			3.Follow Ethics as an engineering professional and adopt good standards & norms of engineering practice.
			4.apply ethical principles to resolve situations that arise in their professional lives
	C312	AC3 - III 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 your leadership effectiveness by creating an atmosphere that engages others
			6.Apply EI behaviors and supports high performance
310250 SEM-I	C315	Design & Analysis of Algorithms	1.Formulate the problem
			2.Analyze the asymptotic performance of algorithms
			3.Decide and apply algorithmic strategies to solve given problem
			4.Find optimal solution by applying various methods
310251	C316	Systems Programming & Operating Systems (SP & OS)	1.Analyze and synthesize system software
			2.Use tools like LEX & YACC.
			3.Implement operating system functions.

310252	C317	Embedded Systems & Internet of Things (ES & IoT)	1.Implement an architectural design for IoT for specified requirement
			2.Solve the given societal challenge using IoT
			3.Choose between available technologies and devices for stated IoT challenge
310253	C318	Software Modeling and Design	1. Analyze the problem statement (SRS) and choose proper design technique for designing web- based/ desktop application
			2.Design and analyze an application using UML modeling as fundamental tool
			3.Apply design patterns to understand reusability in OO design
			4.Decide and apply appropriate modern tool for designing and modeling
			5.Decide and apply appropriate modern testing tool for testing web-based/desktop application
310254	C319	Web Technology	1.analyze given assignment to select sustainable web development and design methodology
			2.develop web based application using suitable client side and server side web technologies
			3.develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
310255	C320	Seminar & Technical Communication	1.be able to be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
			2. be able to improve skills to read, understand, and interpret material on technology.
			3.improve communication and writing skills
310256	C321	Web Technology Lab	1.develop web based application using suitable client side and server side web technologies
			2.develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
310257	C322	System Programming & Operating System Lab	1. Understand the internals of language translators
			2.Handle tools like LEX & YACC.
			3.Understand the Operating System internals and functionalities with implementation point of view
310258	C323	Embedded Systems & Internet of Things Lab	1.Design the minimum system for sensor based application
			2.Solve the problems related to the primitive needs using IoT
			3.Develop full fledged IoT application for distributed environment
310259	C324	Audit Course 4	
	C325	AC4-I Digital and Social Media Marketing	1.Create editorial calendars to manage content distribution.
			2.Use Social Listening tools to create timely, relevant content.
			3.Create Social Media policies that combine business objectives with appropriate use of social media channels and content.
	C326	AC4-II 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
	C327	AC4 -III Sustainable Energy	1.Demonstrate an overview of the main sources of renewable energy.
			2.Understand benefits of renewable and sustainable energy systems.
	C328	AC4 -IV Leadership and Personality Development	1. Enhance holistic development of students and improve employability skills

BE FINAL YEAR COMPUTER ENGINEERING 2015 COURSE W.E.F.A.Y. 2018-19			
COURSE	CODE	SUBJECT	Course Outcomes
410241 SEM	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
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 SE	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	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
			4.Link techniques and results from literature as well as actual research and future research lines with the

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
			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

			5. Use commercial finite element analysis software to solve complex problems in solid mechanics and heat
			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	
			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	
			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 WHRUse a CFD tool effectively for practical problems and
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 fundaments 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 Process	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	401	Power System Operation and	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	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	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

COURSE	CODE	SUBJECT	Course Outcomes
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	**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 theirinterrelations.
			3. Analyze the requirements for a given organizational structure and select the most appropriatenetworking 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 betterprotocols.
			6. Have a basic knowledge of the use of cryptography and network security.
404183	403	Radiation & Microwave Technique	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 1φ & 3φ 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 PCBdesign.
			2. Importance of product test &testspecifications.
			3. Special design considerations and importance ofdocumentation
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 optimizationproblem.
			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. Applyand 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	**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 Syster	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. Understandacoustic 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 F	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 Disast	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	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	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	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 Ubicomp.
			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 Ubicomp privacy and explain the challenges associated with Ubicomp privacy.
			6. Get the knowledge of ubiquitous and service oriented networks along with Ubicomp 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	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	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 Fi	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	Enterpreneueship	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.