Program Name	Course code	Course name	Course Outcomes (COs)
Civil Engineering(SE) 2019 Course	201001	Building Technology and Architectural Planning	CO1:Identify types of building and basic requirements of building components.
			CO2: Make use of Architectural Principles and Building byelaws for building construction.
			CO3: Plan effectively various types of Residential Building forms according to their utility, Functions with reference to National Building Code.
			CO4: Plan effectively various types of Public Buildings according to their utility functions with Reference to National Building Code.
			CO5: Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects
			CO6: Understand different services and safety aspects
	201002	Mechanics of structure	CO1: Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures
			CO2: Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram..
			CO3:Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.
			CO4: Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.
			CO5: Analyze axially loaded and eccentrically loaded column
			CO6: Determine the slopes and deflection of determinate beams and trusses.
	201003	Fluid Mechanics	CO1: Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure, buoyancy & floatation and its application for solving practical problems.
			CO2: Understand the concept of fluid kinematics with reference to Continuity equation and fluid dynamics with reference to Modified Bernoulli's equation and its application to practical problems of fluid flow
			CO3: Understand the concept of Dimensional analysis using Buckingham's π theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow.
			CO4: Understand the concept of laminar and turbulent flow and flow through pipes and its application to determine major and minor losses and analyze pipe network using Hardy Cross method
			CO5: Understand the concept of open channel flow, uniform flow and depth-Energy relationships in open channel flow and make the use of Chezy's and Manning's formulae for uniform flow computation and design of most economical channel section
			CO6: Understand the concept of gradually varied flow in open channel and fluid flow around submerged objects, compute GVF profile and calculate drag and lift force on fully submerged body.

	207001	Engineering Mathematics III	CO1: Solve Higher order linear differential equations and its applications to modelling and analysing Civil engineering problems such as bending of beams, whirling of shafts and mass spring systems.
			CO2: Solve System of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods applied to hydraulics, geotechnics and structural systems.
			CO3: Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.
			CO4: Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flow problems.
			CO5: Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.
Civil Engineering(SE) 2019	207009	Engineering Geology	CO1: Explain about the basic concepts of engineering geology, various rocks, and minerals both in lab and on the fields and their inherent characteristics and their uses in civil engineering constructions.
			CO2: Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability
			CO3 :Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities
			CO4: Incorporate the various methods of survey, to evaluate and interpret geological nature of the rocks present at the foundations of the dams, percolation tanks, tunnels and to infer site / alignment/ level free from geological defects
			CO5: Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.
			CO6: Explain geological hazards and importance of ground water and uses of common building stones.
	201008	Geotechnical Engineering	CO1: Identify and classify the soil based on the index properties and its formation process
			CO2: Explain permeability and seepage analysis of soil by construction of flow net.
			CO3: Illustrate the effect of compaction on soil and understand the basics of stress distribution.
			CO4: Express shear strength of soil and its measurement under various drainage conditions.
			CO5: Evaluate the earth pressure due to backfill on retaining structures by using different theories.
			CO6: Analysis of stability of slopes for different types of soils.
	201009	Survey	CO1 Define and Explain basics of plane surveying and differentiate the instruments used for it.
			CO2 Express proficiency in handling surveying equipment and analyze the surveying data from these equipment.
			CO3 Describe different methods of surveying and find relative positions of points on the surface of earth.
			CO4 Execute curve setting for civil engineering projects such as roads, railways etc.
			CO5 Articulate advancements in surveying such as space based positioning systems

			CO6 Differentiate map and aerial photographs, also interpret aerial photographs.
	201010	Concrete Technology	CO1 Able to select the various ingredients of concrete and its suitable proportion to achieved desired strength
			CO2 Able to check the properties of concrete in fresh and hardened state.
			CO3 Get acquainted to concreting equipment's, techniques and different types of special concrete.
			CO4 Able to predict deteriorations in concrete and get acquainted to various repairing methods and techniques.
	201011	Structural Analysis	CO1 Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.
			CO2 Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.
			CO3 Implement application of the slope deflection method to beams and portal frames.
			CO4 Analyze beams and portal frames using moment distribution method.
			CO5 Determine response of beams and portal frames using structure approach of stiffness matrix method.
			CO6 Apply the concepts of plastic analysis in the analysis of steel structures.
	201012	Project management	CO1 Describe project life cycle and the domains of Project Management.
			CO2 Explain networking methods and their applications in planning and management
			CO3 Categorize the materials as per their annual usage and also Calculate production rate of construction equipment
			CO4 Demonstrates resource allocation techniques and apply it for manpower planning.
			CO5 Understand economical terms and different laws associated with project management
			CO6 Apply the methods of project selection and recommend the best economical project.
	201017	Project Based Learning	CO1: Identify the community/ practical/ societal needs and convert the idea into a product/ process/service.
			CO2: Analyze and design the physical/ mathematical/ ICT model in order to solve identified problem/project.
			CO3: Create; work in team and applying the solution in practical way to specific problem.
			CO4: Improve road safety together leading to casualty reduction

Civil Engineering(TE) 2019 Course	301001	Hydrology and Water Resources Engineering	CO01 Understand government organizations, apply & analyze precipitation & its abstractions.
			CO02 Understand, apply & analyze runoff, runoff hydrographs and gauging of streams.
			CO03 Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
			CO04 Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
			CO05 Understand water logging & water management, apply & analyze ground water hydrology
			CO06 Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement
	301002	Water Supply Engineering	CO01 Define identify, describe reliability of water sources, estimate water requirement for various sectors
			CO02 Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
			CO03 Design various components of water treatment plant and distribution system.
			CO04 Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.
			CO05Design elevated service reservoir capacity and understand the rainwater harvesting.
			CO06 Understand the requirement of water treatment plant for infrastructure and Government scheme
	301003	Design of Steel Structures	CO01 Demonstrate knowledge about the types of steel structures, steel code provisions and design of the adequate steel section subjected to tensile force.
			CO02 Determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening.
			CO03 Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending.
			CO04 Design of laterally restrained and unrestrained beam with and without flange plate using rolled steel section
			CO05 Analyze the industrial truss for dead, live and wind load and design of gantry girder for moving load
			CO06 Understand the role of components of welded plate girder and design cross section for welded plate girder including stiffeners and its connections.

Civil Engineering(TE) 2019 Course	301004	Engineering Economics and Financial	CO1: Understand basics of construction economics.
			CO2: Develop an understanding of financial management in civil engineering projects.
			CO3: Prepare and analyze the contract account.
			CO4: Decide on right source of fund for construction projects.

			CO5:Understand working capital and its estimation for civil engineering projects.
	301005 C	Elective I: Construction Management	CO1: Understand the overview of construction sector.
			CO2: Illustrate construction scheduling, work study and work measurement.
			CO3: Acquaint various labor laws and financial aspects of construction projects.
			CO4: Explain elements of risk management and value engineering.
			CO5: State material and human resource management techniques in construction
			CO6: Understand basics of artificial intelligence techniques in civil engineering.
	301011 A	Audit Course I: Professional Ethics and Etiquettes	CO1: Understand the basic perception of profession, professional ethics, various moral issues and uses of ethical theories
			CO2: Understand various social issues, industrial standards, code o ethics and role of professional ethics in engineering field.
			CO3: Follow ethics as an engineering professional and adopt good standards and norms of engineering practice.
			CO4: Apply ethical principles to resolve situations that arise in their professional lives
	301012	Waste Water Engineering	CO1: Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
			CO2: Design preliminary and primary unit operations in waste water treatment plant
			CO3: Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
			CO4: Understand and design suspended and attached growth wastewater treatment systems
			CO5: Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
			CO6: Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment.
	301013	Design of Reinforced Concrete Structures	CO1: Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete
			CO2: Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.
			CO3: Design & detailing of rectangular one way and two-way slab with different boundary conditions
			CO4: Design & detailing of dog legged and open well staircase
			CO5: Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
			CO6: Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.

Civil Engineering(TE) 2019 Course	301014	Remote Sensing and Geographic Information System	CO1: Articulate fundamentals and principles of RS techniques.
			CO2: Demonstrate the knowledge of remote sensing and sensor characteristics.
			CO3: Distinguish working of various spaces-based positioning systems.
			CO4: Analyze the RS data and image processing to utilize in civil engineering
			CO5: Explain fundamentals and applications of RS and GIS
			CO6: Acquire skills of data processing and its applications using GIS
	301015 e	Elective II: Architecture and Town Planning	CO1: Apply the principles of architectural planning and landscaping for improving quality of life
			CO2: Understand the confronting issues of the area and apply the acts.
			CO3: Evaluate and defend the proposals.
			CO4: Appraise the existing condition and to develop the area for betterment.

Civil Engineering(TE) 2019 Course	301006	Employability Skills development	CO1: Understand various Employability Skills, what skills do employers expect from graduates and Career planning with action plan.
			CO2: Know Skills-Critical Thinking, Assertiveness, Decision Making, Problem Solving, Negotiation, Building Confidence, Time Management, Personal Presentation, Assertiveness, Negotiation and Avoiding Stress.
			CO3: Learn Presentation Skills.
			CO4: Know Skills-Verbal Communication, Written Communication, Difference between C.V. Bio data and Resume.
			CO5: Awareness-Professional etiquettes and manners, Global negotiating and Persuading, Integrity. Global trends and statistics about civil engineering businesses.
			CO6: Understand Skills-Leadership, Ability to work in a team, Conceptual ability, Subject Knowledge and competence, Analyzing and investigating, Planning, Flexibility, Self, Lifelong Learning, Stress Tolerance, Creativity
	301007	Advanced Surveying	CO1: Understand the introduction of geodetic surveying, triangulation; classify the triangulation system and triangulation figure. Students will able to select suitable station for geodesic surveying. Students will able to understand the working of Space base positioning system.
			CO2: Understand all terms used in hydrographic surveying, use sounding Equipment's. Students will also able to method of locating sounding.
			CO3: Understand the basic concept, introduction, necessity, importance, use of remote sensing.
			CO4: Classify different types of error and find most probable values by using suitable method.
			CO5: Understand all terms used in aerial photogrammetry, flight planning and also able to solve the numerical on it.

			CO6: Understand the application of terrestrial refraction and curvature correction, axis signal correction to the observed reading in geodetic surveying. Students will able to set out building plan on ground.
Civil Engineering(TE) 2015/19 Course	301008	Project Management andEngineering	CO1: Understand the functions, objective and principles of management.
			CO2: Understand the Work Breakdown Structure, Gantt/Bar Charts and its Limitations.
			CO3: Explain Networking methods and their applications, planning and management.
			CO4: Identify the Critical path and solve problems related to CPM and PERT.
			CO5: Understand the concept of network crashing, resource allocation and resource Optimization.
			CO6: Summarize the project economics and laws related it.
			CO7: Understand the Project Feasibility Report and Detailed Project Report (DPR).
	301009	Foundation Engineering	CO1: Understand the methods and planning of subsurface investigation.
			CO2: Develop an understanding of consolidation settlement and bearing capacity.
			CO3: Determine the coefficient of consolidation using different methods.
			CO4: Develop an understanding related to shallow and deep foundation and also determining the allowable soil pressure.
			CO5: Understand the soil reinforcement, earthquake geo-techniques and principles of earthquake resistant design.
			CO6: Study about the cofferdams, foundation on black cotton soil and measuring the swelling pressure.
Civil Engineering(TE) 2015/19 Course	301010	Structural Design II	CO1: Ability to know the various design philosophies and aware of different standards, material specifications used at the time of design.
			CO2: Ability to know the section design using WSM and LSM.
			CO3: Ability to know the design of one-way slab , two-way slab and staircases.
			CO4: Ability to know the analysis and design of flexural elements subjected to Bending, shear and torsion.
			CO5: Ability to analyze and design of compression member and its footing.
			CO6: Knowledge of design of reinforced concrete structure and Engineers having the ability to perform post-graduation in the subject and to use the knowledge in competitive examinations.
			CO1: To the knowledge of various types of Environmental pollution and its measure

			to control
			CO2: To acquire analytical skills in assessing environmental impacts through a Multidisciplinary approach.
			CO3: To identify environmental problems in treatment of water and solutions Through organized research.
			CO4: To develop the practical, efficient and cost effective solutions on problems and challenges on treatment of water
			CO5: To provide an overview of both the theoretical and practical aspects of Conventional and advanced water technology for surface water treatment.
			CO6: Select an appropriate treatment process for a specific application, and be able to identify appropriate pre-treatment and post treatment schemes, and cleaning protocols for these processes.
	301016	Internship	CO01 To develop professional competence through industry internship
			CO02 To apply academic knowledge in a personal and professional environment
			CO03 To build the professional network and expose students to future employees
			CO04 Apply professional and societal ethics in their day to day life
			CO05 To become a responsible professional having social, economic and administrative considerations
			CO06 To make own career goals and personal aspirations.

Civil Engineering(B	401001	Environmental Engineering -	CO1: Understand the sewage treatment process and design of different treatment units.
			CO2: Develop an understanding of low cost treatment methods.
			CO3: Determine the sludge volume index and understand sludge buckling and modifications.
			CO4: Develop an understanding related to aerated lagoons and theory of phytoremediation techniques.
			CO5: Understand the single stage and two stage filters and solve problems related to design of filters.
			CO6: Study about the onsite sewage and package sewage treatment system.
	401002	Transportation Engineering	CO1: Understand the history of road development in India and Rod development plan
			CO2: Design vertical and horizontal alignment including super elevation
			CO3: Understand the factors influencing road vehicle performance
			CO4: Design basic traffic signal phasing and timing plan
			CO5: To understand construction and maintenance methods of flexible and rigid pavement
			CO6: Learn and understand modern trends in highway material, construction and maintenance
Civil Engineering(BE)	401003	Structural Design and Drawing III	CO1: Understand the difference between the structural behavior of reinforced concrete structure and Pre-stressed Concrete and it's terminology
			CO2: Be able to analyze and design of pre-stressed concrete member for flexure and shear.
			CO3: Be able to analyze and design post tensioned pre-stressed concrete Flat slab and its application in construction industry.
			CO4: Be able to analyze and design earth retaining structure with different type of backfill conditions.
			CO5: Be able to analyze and design different forms of water retaining structure.
			CO6: Be able to Estimate of earthquake forces with suitable methods for earth quake resisting building and understand SDOF and MDOF system
	401004 B	Architecture and Town Planning	CO1 :Make use of principles of architectural planning and understand futuristic need of users
			CO2: Improve the status of existing structure by proposing sustainable architectural planning
			CO3 :Understand and demonstrate planning strategy with their utility with reference to different acts, guidelines, norms and design a new area.

			CO4 :Analyze the organization of different planning agencies and use various types of civic survey for preparation of any plan.
			CO5: Identify issues and challenges of highly urbanized area and resolve issues by intelligent multidimensional functional levels.
			CO6: Use different planning strategy with respect to their function, application and limitation.
Civil Engineering(BE)	401005 C	TQM&MISinCivil Engineering	CO1: Understand prerequisites of evolution of total quality management and to study the significance of quality gurus.
			CO2: Understand and apply QFD and Six sigma techniques for achieving Quality in various activities involved in project.
			CO3: Understand ISO 9001 principles and quality manual for various constructing activities
			CO4: Understand Benchmarking in TQM, COQ & CONQAS, and CIDCCQRA certifications.
			CO5: Applying Concept of Kaizen's 5S technique FMEA & Zero Defects
			CO6: Understand Management Information systems associated with building works.
	401006 A	Project Phase I	CO1: Knowledge Application & Independent Learning: Solve real life problems by applying knowledge and skills keeping eye on current technologies and inculcating the practice of lifelong learning
			CO2: Problem Solving Skills: Analyze alternative approaches, apply and use most appropriate one for feasible solution exhibiting project management skills
			CO3: Communication: Demonstrate effective communication at various levels and write precise reports and technical documents in a nutshell
			CO4: Collaboration: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality
			CO5: Ethics: Provide solution to problems considering social, safety, environmental, ethical and legal issues
	401007	Dams and Hydraulic	CO1: Apply technical knowledge of dam and importance of Dam safety
			CO2: Analysis of stresses induced in Gravity dam and knowledge of Arch dams and buttress dam
			CO3: Classify Spillway and Spillway gates and design of spillway profile.
			CO4: Classify and apply knowledge of Earth dam and diversion head work
			CO5: Classify and design canal and working of canal structures
			CO6: Classify and functioning of C.D. works and river training structures
		ying, Contr acts	CO1: The students will make an approximate estimate of various items of work Involved in building by using various methods.

			CO2: Thestudentswill makedetailedestimateof variousitemsof work involvedin Building by using various methods.
			CO3: Thestudentswillbepreparingrateanalysisasper specificationsofvarious Items of works.
			CO4: The valuation of the building will be done by the student
			CO5:Thestudentwillbegettingknowledgetopreparetenderandexecutionofwork
			CO6: The student will be getting knowledge of a contracts and arbitration.
	401009 D	Air pollution and control	CO1: Identify the major sources and sinks of air pollutants.
			CO2: Understand the key chemical transformations of air pollution.
			CO3: Relate air pollution regulation and its scientific basis.
			CO4: Describe engineering solutions to air pollution problems.
			CO5: Describe general air pollution problems, meteorological definitions, air transport equations and pollution control matters and devices.
			CO6: Identify air pollution problems and interpret air quality data on chemical characteristic
Civil Engineering(BE)	401010 A	Construction Management	CO1: Get Knowledge about construction industry related terms.
			CO2: Understand the scheduling technique and work measurement.
			CO3: Apply various labor laws to construction sector and financial aspects to construction industry.
			CO4: Prioritize the risks associated with construction projects and value engineering.
			CO5: Evaluate material management and human resource management.
			CO6: Understand the concept of artificial intelligence.
	401006 B	Project Phase II	CO1: Knowledge Application & Independent Learning: Solve real life problems by applying knowledge and skills keeping eye on current technologies and inculcating the practice of lifelong learning
			CO2: Problem Solving Skills: Analyze alternative approaches, apply and use most appropriate one for feasible solution exhibiting project management skills
			CO3: Communication: Demonstrate effective communication at various levels and write precise reports and technical documents in a nutshell
			CO4: Collaboration: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality
			CO5: Ethics: Provide solution to problems considering social, safety, environmental, ethical and legal issues

Program Name	Course code	Course name	Course Outcomes (COs)
Computer Engineering(SE) 2019 Course	210241	Discrete Mathematics	CO1: Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.
			CO2: Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
			CO3: Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.
			CO4: Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems.
			CO5: calculate numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using combinatory.
			CO6: Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.
	210245	Digital Electronics and Logic Design	CO1: Realize and simplify Boolean Algebraic assignments for designing digital circuits using K-Maps.
			CO2: Design and implement Sequential digital circuits as per the specifications.
			CO3: Design and implement Combinational digital circuits as per the specifications.
			CO4: Apply the knowledge to appropriate IC as per the design specifications
			CO5: Design simple digital systems using VHDL.
			CO6: Develop simple embedded system for simple real world applications.
	210242	Fundamentals of Data Structures	CO1: To demonstrate a detailed understanding of behavior of data structures like arrays, linked list, stack, and queue by developing programs.
			CO2: To use appropriate algorithmic strategy for better efficiency
			CO3: To summarize data searching and sorting techniques.
			CO4: To discriminate the usage of various structures in approaching the problem solution.
			CO5: To analyze and use effective and efficient data structures in solving various Computer Engineering domain problems.
			CO6: To design the algorithms to solve the programming problems.
	210244	Computer Graphics	CO1: Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os
			CO2: Recognize and manipulate representations of numbers stored in digital computer
			CO3: Distinguish the organization of various parts of a system memory hierarchy and understand I/O organization
			CO4: Explain addressing modes, instruction formats and program control statements
			CO5: Evaluate various design alternatives in processor organization
			CO6: Analyze hardwired control and micro-programmed control unit design

	210243	Object Oriented Programming	CO1: Understand evolution of software & data and analyze the strength of OOP in Problem Solving as well as importance of software quality as per industry standards
			CO2: Apply and analyze OOP principles for effective programming, to build enterprise applications and real time software
			CO3: Understand and apply concept of pointers in OOP to develop advanced & commercial applications
			CO4: Apply exception handling to enhance quality of software and create generic programs by exploring power of templates and build libraries
			CO5: Develop applications for file handling and I/O operations using OOP principles and C++ programming
			CO6: Understand and utilize STL to create and improve program optimization

Program Name	**Course code**	**Course name**	**Course Outcomes (COs)**
Computer Engineering(SE) 2019 Course	210248	Digital Electronics Laboratory	CO1: Convert different type of codes and number systems which are used in digital communication and computer systems.
			CO2: Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.
			CO3: Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.
			CO4: Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.
			CO5: Apply the fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with different changing circumstances.
			CO6: Assess the technology in the area of memory devices and apply the memory devices in different types of digital circuits for real world applications.
	210246	Data Structures Laboratory	CO1: Use algorithms on various linear data structure using sequential organization to solve real life problems by communicating with engineering community.
			CO2: Analyze problems to apply suitable searching and sorting methods in complex engineering problems.
			CO3: Analyze problems and design experiments to use variants of linked list and solve complex problems.
			CO4: Design and implement data structures and develop algorithms for solving various kinds of problems by applying norms of engineering practices.
			CO5: Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.
			CO6: Demonstrate practical knowledge and recognize the need for the applications of data structures in multidisciplinary environments and engage in independent learning for lifetime.

	210248	OOP and Computer Graphics Laboratory	CO1: Underst and and Apply C++ programming languages to make use to data structures, classes and objects, and overloading of Operators
			CO2: Implementation of Type conversions and multiple Inheritance to develop advanced applications
			CO3: Demonstrate the use of constructors, destructors, dynamic memory allocation, static member functions, friend class, Copy constructors & Inline functions in C++
			CO4: Identify and execute applications using Generic Programming
			CO4: Develop applications for file handling and I/O operations using OOP principles and C++ programming
			CO5: Design & develop applications using STL
	210249	Business Communication Skills	CO6: Effectively communicate through verbal/oral communication and improve the listening skills
			CO1: Write precise briefs or reports and technical documents
			CO2: Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
			CO3: Become more effective individual through goal/target setting, self-motivation and practicing creative thinking
			CO4: Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
			CO6: Prepare a good curriculum vitae.
Program Name	**Course code**	**Course name**	**Course Outcomes (COs)**
Computer Engineering(SE) 2019 Course	210251	Social Awareness and Governance Program	CO1: Identify safe and unsafe practices of pedestrians, passengers and cyclists.
			CO2: Students demonstrate knowledge of traffic law relevant to them, and to other road users they may encounter.
			CO3: Able tounderstandthenatureof theindividual andthe relationship between theself and the community
			CO4: Comprehend the importance of ecosystem and biodiversity
			CO5: Identify different types of environmental pollution and control measures
			CO6: Knowledgeaboutdata-informedapproachesforthedevelopmentofthefuturecity, based on crowd sourcing and sensing
	207003	Engineering Mathematics - III	CO1: Solve higher order linear differential equation using appropriate techniques for modeling, analyzing of electrical circuits and control systems.
			CO2:Applyconceptof Fouriertransform&Z-transformanditsapplicationstocontinuous& discrete systems, signal & image processing and communication systems.
			CO3: Apply statistical methods like correlation, regression analysis and prediction of a given data as applied to machine intelligence.
			CO4:Applyprobabilityandprobabilitydistributionandpredictionofagivendataasapplied to a machine intelligence.

			CO5: Performvector differentiationand integrationto analyze the vectorfields, compute line, surface and volume integrals.
			CO6: Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.
	210253	Software Engineering	CO1: Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.
			CO2: Apply mathematics to develop Computer programs for elementary graphic operations.
			CO3: Illustrate theconceptsofwindowingandclippingandapplyvariousalgorithmstofill and clip polygons.
			CO4: Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.
			CO5: Understand the concepts of color models, lighting, shading models and hidden surface elimination.
			CO6: Create effective programs using concepts of curves, fractals, animation and gaming.
	210252	Data Structures and Algorithms	CO1:Toidentify&articulatethecomplexitygoalsandbenefitsofagoodhashingschemefor real world applications.
			CO2: To apply non-linear data structures for solving problems of various domain.
			CO3: Todesign andspecifytheoperationsofa nonlinear-based abstract datatypeand implement them in a high-level programming language.
			CO4: To analyze the algorithmic solutions for resource requirements and optimization.
			CO5: To use efficient indexing methods and multi-way search techniques to store and maintain data.
			CO6: To use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.
	210254	Microprocessor	CO1: Write assembly language programs to solve real life problems.
			CO2: Understand the processor architecture.
			CO3: Understand building of protection and multitasking mechanism
			CO4:applyinterrupts,input-outputinstructionstoresolverun-timeerrorsbyhandlingthem Efficiently.
			CO5: Understand and use debugging features ,initialization of process and operating modes of 80386
			CO6: learn higher processor architectures as descendants of 80387.
Computer Engineering(SE) 2019 Course	210250	Humanity & Social Science	**CO1:** Aware of the various issues concerning humans and society.
			CO2: Aware about their responsibilities towards society.
			CO3: Sensitized about broader issues regarding the social, cultural, economic and human aspects, involved in social changes.
			CO4: Able to understand the nature of the individual and the relationship between self and the community.
			CO5: Able to understand major ideas, values, beliefs, and experiences that have shaped human history and cultures.

Program Name	Course code	Course name	Course Outcomes (COs)
Computer Engineering (SE) 2019 Course	210255	Principles of Programming Languages	CO1: Analyze the strengths and weaknesses of programming languages for effective and efficient program development.
			CO2: Understand data representations and computations to apply these to create new programming languages
			CO3: Explore and evaluate structuring of programs plus programming paradigms and execute it using existing language as case study
			CO4: Classify and apply Object Oriented Programming (OOP) principles using C++ and Java for effective application development
			CO5: Explain and design advanced robust applications using Applet and Multithreading of Java
			CO6: Compare and analyze the exceptions occurring in programming languages and understand it's importance in software development
	210257	Microprocessor Laboratory	CO1: Understand and apply various addressing mode and instruction set to implement assembly language programming
			CO2: Apply logic to implement code conversion
			CO3: Analyze and apply logic to demonstrate processor mode of operation
			CO4: Apply logic to get the address from protected mode using GDTR, IDTR, LDTR register
			CO5: Apply logic to implement FAR PROCEDURE
			CO6: Apply logic and implement OS commands
	210256	Data Structures and Algorithms Laboratory	CO1: Use algorithms on various linear data structure using sequential organization to solve real life problems by communicating with engineering community.
			CO2: Analyze problems to apply suitable searching and sorting methods in complex engineering problems.
			CO3: Analyze problems and design experiments to use variants of linked list and solve complex problems.
			CO4: Design and implement data structures and develop algorithms for solving various kinds of problems by applying norms of engineering practices.
			CO5: Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.
			CO6: Demonstrate practical knowledge and recognize the need for the applications of data structures in multidisciplinary environments and engage in independent learning for lifetime.
	210260	Audit Course 2: Water Management	CO1: Understanding of Drinking treatment and quality of groundwater and surface water
			CO2: Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
			CO3: Ability to understand what happiness is and why it matters to you
			CO4: Understanding of the power of social connections and the science of empathy
			CO5: Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed.
			CO6: Powers of concentration, focus, and awareness will be heightened.

Computer Engineering(TE) 2015/19 Course	310242	Theory of Computation	CO1: Use basic concepts of formal languages of Finite Automata Techniques
			CO2: Design Finite Automata's for different Regular Expressions and Languages
			CO3: Construct Context Free Grammar for various languages
			CO4: Solve various problems of applying Normal Form Techniques, Push Down Automata and Turing Machines
			CO5:Model,CompareandAnalyzeDifferent Computational ModelsusingCombinatorial Methods
			CO6:Understandhowthetheoreticalstudyinthiscourseisapplicabletoand Engineering Application like designing the compilers
	310241	Database Management Systems	CO1: Design E-R Model for given requirements and convert the same into database tables.
			CO2: Learn database techniques such as SQL & PL/SQL.
			CO3: Understand modern database techniques such as NOSQL.
			CO4: Understand transaction Management in relational database System.
			CO5: Describe different database architecture and analyze the use of appropriate architecture in real time environment.
			CO6: Understand advanced database Programming concepts
	310245 D	Software Project management	CO1: Choose process model for a developing a software project
			CO2: Classify software applications and Identify unique features of various domains
			CO3: Design test cases of a software system.
			CO4: Understand basics of IT Project management.
			CO5: Learn to Plan, schedule and execute a project considering the risk management.
			CO6: Apply quality attributes in software development life cycle.
	310243	Systems Programming and Operating System	CO1: Understand various forms of Information Systems and their application in organizations.
			CO2: Understand the managerial issues related to information systems, identify, and evaluate various options in Information Systems.
			CO3: Analyze cost/revenue data and perform economic analysis in the decision-making process to justify or reject alternatives/projects on an economic basis for an organization.
			CO4: Analyze benefit/cost, life cycle, and breakeven on one or more economic alternatives.
			CO5: Understand various Information System solutions like ERP, CRM, Data warehouses and the issues in the successful implementation of these technology solutions in any organizations
			CO6: Manage, design, plan, implement and deploy the computerized information system in an organization.
	310244	Computer Networks and Security	CO1:ToestablishcommunicationamongthecomputingnodesinP2PandClient-Server architecture
			CO2: Configurethecomputingnodeswithunderstandingofprotocolsandtechnologies.

			CO3: Use different communicating modes and standards for communication
			CO4: Use modern tools for network traffic analysis
			CO5: To learn network programming.
			CO6: To learn modern open source packet tracer and analyzer tools
	310246	Skills Development Lab	CO1:Evaluateproblemsandanalyzedatausingcurrenttoolsand Industrystandardsina wide variety of business and enterprise applications.
			CO2:Understandandapplyknowledgecurrenttechnologiesfordatadrivenapplications.
			CO3:Demonstratebestpracticesforproblemsolvinganddesignenterpriseapplications.
			CO4:IdentifyandanalyzeskillstoemployIntegrated Development Environment(IDE)for implementing and testing of software solution.
			CO5: Demonstrate and Design alternate architectural solutions.
			CO6: Synthesize and evaluate software for quality/correctness, usability and optimization.
	310246	DBMS Lab	CO1: Construct simple and moderately advanced database queries using Structured Query Language (SQL)
			CO2: Use SQL & PL/SQL for specific application.
			CO3: Use NOSQL for specific application.
			CO4: Use advanced database Programming concepts
			CO5: Design database for applications with varying complexities
			CO6: Design and build a GUI application using a MySQL

Program Name	**Course code**	**Course name**	**Course Outcomes (COs)**
Computer Engineering(TE) 2015/19 Course	310254D	Software Modeling and Architecture	CO1: Analyzetheproblemstatement(SRS) andchooseproperdesigntechniquefor designing web-based/ desktop application.
			CO2: Design an application using UML modeling as fundamental tool.
			CO3: Apply design patterns to understand reusability in OO design.
			CO4: Apply different architectural designs and to transform them into proper model.
			CO5: Choose and apply appropriate modern tool for designing and modeling.
			CO6: Chooseand applyappropriatemoderntestingtoolfortestingweb-based/desktop application.
	3 1 0	Web Technolo	CO1: Understand the principles and methodologies of the web-based applications development process.
			CO2: Understand current client-side and server-side web technologies
			CO3: Understand current client-side and server-side frameworks

			CO4: Understand web services and content management
			CO5: Learn frameworks, web services, and content management
			CO6: Learn open source technology for sustainable web development
	310255	Internship	CO1: To demonstrate professional competence through industry internship.
			CO2: To apply knowledge gained through internships to complete academic activities in a professional manner.
			CO3: To choose appropriate technology and tools to solve given problem.
			CO4: To demonstrate abilities of a responsible professional and use ethical practices in day to day life.
			CO5:Creating network and social circle, and developing relationships with industry people
			CO6: To analyze various career opportunities and decide carrier goals.
	310257	Web Technology Lab	CO1: Use current client-side and server-side web technologies for various applications
			CO2: Implement communication among the computing nodes using current client-side and server-side technologies
			CO3: Design and implement web services with content management
			CO4: Solve complex problems using appropriate methods and suitable technologies.
			CO5: Understand modern frameworks and web services
			CO6: Learn modern open source technology for web development
	310257	Data Science and Big Data Analytics Laboratory	CO1: Develop system software's like- assembler and macro pre-processor
			CO2: Use tools LEX & YACC for developing solution to real life problems
			CO3: Understand the Operating System internals and functionalities
			CO4:Understandandanalyzeprocessschedulingtechniquestosolverealworldproblem
			CO5:Analyze the memory management and its allocation policies.
			CO6:Analyze disk scheduling algorithms and implement disk scheduling techniques.
	310258	Laboratory Practice II	CO1:Acquaint with the concepts, hardware and software components used in embedded system and Internet of Things (IOT)
			CO2:Apply design methodology to construct the IOT system
			CO3:Implement secure infrastructure for IoT
			CO4:Implement an architectural design for IoT for specified requirement
			CO5:Solve the given societal issues and challenges using IoT
			CO6:Choose between available technologies and devices for stated IoT challenge

	310259 A	Digital and Social Media	CO1:Understand the Social Media space and tools and Connect business objectives to appropriate Social Media tactics.

			CO2: Analyze the effectiveness of your company's and competitors' social media programs and reate Social Media policies that combine business objectives with appropriate use of social media channels and content
			CO3: Understand the concept of green IT and relate it to sustainable development and Applythe green computing practices to save energy.
			CO4: To demonstrate an overview of the main sources of renewable energy. To understand benefits of renewable and sustainable energy systems. To Inspires people to reduce, reuse and recycle.
			CO5: To develop communication and problem solving skills. Able to use a process for decision making characters.
			CO6: To manage and lead 'adaptive challenges' and ambiguity. Building High Performance Teams & Organisations.
Computer Engineering(BE) 2015 Course	410441	High Performance Computing	CO1:Understand principles of Parallel Algorithm Design
			CO2: Understand and design different parallel architectures, inter-connect networks, programming models
			CO3:Analyze computational complexities of parallel algorithms
			CO4:Develop and analyze an efficient parallel algorithm to solve given problem
			CO5: Develop, test, apply administration, scheduling, code portability and data management in an HPC environment
			CO6: Design HPC applications, Measure, analyze and assess the performance of HPC applications and their supporting hardware
	410442	Artificial Intelligence and Robotics	CO1: Identify and apply suitable Intelligent agents and its environments for different AI applications
			CO2:Identify and apply different searching algorithms to design smart system
			CO3:Apply different rules and facts to design rule based expert system
			CO4:Identify knowledge to plan a strategy to solve given problem
			CO5:Apply natural language processing to solve real life problems
			CO6:Identify and apply different techniques and sensors to solve AI problems
	410443	Data Analytics	CO1:Demonstrate proficiency with statistical analysis of data
			CO2:Build and assess data-based models efficiently
			CO3: Integrate data from disparate sources, can transform data from one format to another, and can program data management in relational databases.
			CO4: Select and implement machine learning techniques and computing environments that are suitable for the applications under consideration.
			CO5: Understand and apply to scale up machine learning techniques and associated computing techniques and technologies.
			CO6: Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively.
	410445	Elective I-B	CO1:Understand, Identify and design elements of an application
			CO2:Generate architectural alternatives for a problem and selection among them

			CO3:Choose and use appropriate architectural styles
			CO4:Select and use appropriate software design patterns
			CO5:Understand and apply the execution of Client and Server side Technology
			CO6: Evaluate the current trends and technologies such as model-driven and service-oriented architectures.

Computer Engineering(BE) 2015 Course	410444	Elective I-D	CO1:Understand the process, functions of each step and applications of data mining
			CO2:Understand pre-processing techniques in data mining
			CO3:Apply the association rules for mining the data.
			CO4:Design and deploy appropriate classification techniques
			CO5:Cluster the high dimensional data for better organization of the data.
			CO6:Evaluate various mining techniques on complex data objects
	410445	Elective II	CO1:Understand various generations of mobile Communications
			CO2:Understand the concept of Cellular communication
			CO3:Learn design of cellular mobile system.
			CO4: Learn GSM mobile communication standard, its architecture, logical channels, advantages and limitations.
			CO5: Identify the requirements of mobile communication as compared to static Communication
			CO6: Search,select,organizeandpresentinformationonnewtechnologiesinmobileand cellular communications.
	410446	Laboratory Practice I	CO1: Understand necessity of Practical hands on to enhance the competency by undertaking the laboratory assignments
			CO2: Understandandapplyparallelreduction, parallelsortingandparallelsearchingon various algorithms
			CO3:Understand and apply classifier algorithm in applications
			CO5:Apply heuristic Search algorithm A* for various applications
			CO4:Understand and apply artificial intelligence logic to design expert systems
			CO5:Understand and apply different programming to design data analytics
	410447	Laboratory Practice II	CO6:Understand, analyze , design and implement signal processing algorithm
			CO1: Identify criteria for the design of a software system and select patterns, create frameworks, and Analyze soundness of a software design
			CO2:Design and build Multifunctional Application‟ in the Mobile and Pervasive domain"
			CO3:Write and construct test for application and Understand Selenium tool
			CO4: Well suits for beginners as well as manual testers who want to have automation exposure
			CO5: Demonstrate classification,and clusteringinlargedatasets, Understandandapply various mining techniques and tools for realistic data
	410448	Project Work I	CO1:Solve real life problems by applying knowledge.

			CO2: Analyze alternative approaches, apply and use most appropriate one for feasible solution
			CO3: Demonstrateeffectivecommunicationatvariouslevelsandwriteprecisereportsand technical documents in a nutshell.
			CO4: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.
			CO5: Provide solution to problems considering social, safety, environmental, ethical and legal issues.

Computer Engineering(BE) 2015	410249	Entrepreneurship Development	CO1:Understand aspects of Entrepreneurship, IPR, Trademarks, Copyright and patenting
			CO2:Understand and apply functional plans and Manage Entrepreneurial Finance
			CO3: Implement security as a culture Understand various attacks like DoS, buffer overflow, web specific, database specific, web -spoofing attacks.
			CO4:Apply models, Plan the resources and Apply principles in 3D printing
			CO5: Formulate the plan for Safety performance and the action plan for accidents and hazards
			CO6:Follow the safety and security norms in the industry.
	410450	Machine Learning	CO1:Distinguish different learning based applications.
			CO2: Apply different preprocessing methods to prepare training data set for machine learning.
			CO3:Design and implement supervised and unsupervised machine learning algorithm.
			CO4:Implement different learning models.
			CO5:Learn Meta classifiers and deep learning concepts.
			CO6: Recognizethe characteristicsof machinelearningthat makeitusefultoreal-world problems.
	410451	Information and Cyber Security	CO1:Measure the security protections and limitations provided by today's technology.
			CO2:Identify information security and cyber security threats.
			CO3:Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
			CO4:Build appropriate security solutions against cyber-attacks.
			CO5:Evaluate and communicate the human role in security systems.
			CO6:Interpret and forensically investigate security incidents.
	410452	Elective III	CO1:Recognize and classify embedded and real-time systems
			CO2:Understand embedded system and network embedded system
			CO3:Classify and use scheduling algorithms
			CO4:Apply software development process to a given RTOS application
			CO5:Understand and use various inter process communication
			CO6:Design RTOS application for given problem
	410453	Elective - IV	CO1:Understand and apply core concepts of the cloud computing paradigms.

			CO2:Understand and analyze the Data Storage Techniques and security issues
			CO3:Understand , design and apply Virtualization
			CO4: An understanding of when and where to use techniques using the appropriate industry models
			CO5: Understand,Identify trendsanddesigntechnologiesandapplicationsof Ubiquitous Clouds and the Internet of Things
			CO6:Explore future trends of cloud computing
	410454	Laboratory Practice III	CO1: Implement suitable machine learning algorithm for the applications under consideration.
			CO2:Analyzeaproblem, identifyanddefinethecomputingrequirementsappropriatetoits solution.
			CO3: Apply Suitable machine learning toolboxes for application under consideration.
			CO4: Gauge the security protections and limitations provided by today's technology.
			CO5: Build appropriate security solutions against cyber-attacks.
			CO6: Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.

Computer Engineering(BE) 2015 Course	410455	Laboratory Practice IV	CO1: To develop problem solving abilities using HPC.
			CO2: To Develop problem solving abilities using Business Analytics, OR and Mobile Programming.
			CO3:To develop time and space efficient algorithms
			CO4:Tostudyalgorithmicexamplesindistributed, concurrentandparallelenvironments
			CO5:To learn framework for BAI applications development
			CO6: To learn and understand Mobile Programming Technologies
	410456	Project Work -II	CO1: Solve real life problems by applying knowledge.
			CO2: Analyze alternative approaches, apply and use most appropriate one for feasible solution
			CO3:Demonstrateeffectivecommunicationatvariouslevelsandwriteprecisereportsand technical documents in a nutshell.
			CO4: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.
			CO5: Provide solution to problems considering social, safety, environmental, ethical and legal issues.
	410457	Audit Course 6v Business Intelligence	CO1:Understand aspects of Entrepreneurship, IPR, Trademarks, Copyright and patenting
			CO2:Understand and apply functional plans and Manage Entrepreneurial Finance
			CO3: Implement security as a culture Understand various attacks like DOS, buffer overflow, web specific, database specific, web -spoofing attacks.
			CO4:Apply models, Plan the resources and Apply principles in 3D printing
			CO5: Formulate the plan for Safety performance and the action plan for accidents and hazards
			CO6:Follow the safety and security norms in the industry

Program Name	Course Code	Course Name	Course Outcomes (COs)
Electrical Engineering(SE) 2019 Pattern	207006	Engineering Mathematics-III	CO1: Solve higher order linear differential equation using appropriate techniques to model and analyze electrical circuits. CO2: Apply Integral transforms such as Laplace transform, Fourier transform and Z-Transform to solve problems related to signal processing and control systems. CO3: Apply Statistical methods like correlation, regression and Probability theory as applicable to analyze and interpret experimental data related to energy management, power systems, testing and quality control. CO4: Perform Vector differentiation and integration, analyze the vector fields and apply to wave theory and electro-magnetic fields. CO5: Analyze Complex functions, conformal mappings, and perform contour integration in the study of electrostatics, signal and image processing
	203141	Power Generation Technologies	CO1: Explain basics of thermodynamics, cycles and elaborate working various components of thermal power plant with all accessories. CO2: Identify components and elaborate operation of various components, layout, location, environmental and social issues of nuclear, diesel and gas power plant. CO3: Explain the components of hydro power plant and calculation of turbine required, hydrological graphs. CO4: Demonstrate and the importance of wind-based energy generation along with its design, analysis and comparison. CO5: Use of solar energy in thermal and electrical power generation applications considering energy crisis, environmental and social benefits. CO6: Understand the operation and demonstrate of electrical energy generation using biomass, tidal, geothermal, fuel cell and interconnection with grid.
	203142	Material Science	CO1: Categorize and classify different dielectric materials from Electrical Engineering applications point of view. CO2: Summarize properties and characteristics of different classes of insulating material and determine its breakdown strength with experimentation. CO3: Classify magnetic materials and elaborate applications and latest manufacturing technologies. CO4: Choose conducting materials for application in various electrical equipment. CO5: Apply the knowledge of nanotechnology, batteries and solar cell materials for various applications. CO6: Test and measure dielectric loss tangent, strength of solid, liquid and gaseous insulating material and flux density as per IS.
	203143	g and Digital Electr	CO1: : Understand conversion of number system, perform binary arithmetic and reduce Boolean expressions by K- Map

			CO2: Demonstrate basics of various types of Flip flops, design registers and counter. CO3: Apply and Analyze applications of OPAMP in open and closed loop condition . CO4: : Apply the knowledge of Op-amp as wave form generators , filters & Voltage regulator IC CO5: : Understand BJT as amplifier with various configurations CO6: : Design uncontrolled rectifier with given specifications

Program Name	Course Code	Course Name	Course Outcomes (COs)
Electrical Engineering(SE) 2019 Corse	203144	Electrical Measurement & Instrumentation	CO1: Define various characteristic and classify measuring instruments along with range extension techniques. CO2: Apply measurement techniques for measurement of resistance and inductance. CO3: Demonstrate construction, working principle of electro- dynamo type instrument for measurement of power. CO4: Demonstrate construction, working principle of induction type instruments for measurement of energy. CO5: Make use of CRO for measurement of voltage, current and frequency and Classify transducer and apply it for measurement of physical parameters in real time. CO6: Apply measurement techniques for measurement of Level and displacement and also classify strain gauge.
	203145	Power System-I	CO1: : Recognize different patterns of load curve and calculate associated different factors with it and tariff CO2: : Draft specifications of electrical equipment in power station and detail study of overhead line insulators CO3: : Design electrical and mechanical aspects in overhead transmission and underground cables CO4: : Evaluate the inductance and capacitance of different transmission line configurations CO5: : Analyze the performance of short and medium transmission lines CO6: : Classify, model and analyze transmission line using ABCD constants
	203146	Electrical Machines-I	CO1: Evaluate the performance parameters of transformer with experimentation and demonstrate its construction along with specifications as per standards. CO2: Distinguish between various types of transformer connections as per vector groups with application and perform parallel operation of single/three phase transformers. CO3: Explain the construction and working of DC machines and induction motor. CO4: Select and draft specifications of DC machines and induction motors for various applications along with speed control methods. CO5: Justify the need of starters in electrical machines with merits and demerits. CO6: Test and evaluate performance of DC machines and induction motor as per IS standard.

	203147	Network Analysis	CO1: Developing strong basic for network theory. CO2: Develop the problem solving technique for network by application of different network theorems. CO3: Understand the behavior of network by analyzing its transient response using classical method. CO4: Understand the behavior of network by analyzing its transient response using Laplace transform. CO5: Analyze the two port network parameters and network functions. CO6: Apply knowledge of network theory foe designing special circuits like filters.
	203148	Numerical Methods & Computer Programming	CO1: Develop algorithm, draw flowchart and implement simple program using basics of C-programming. CO2: Able to use floating point algebra and techniques for high speed calculations, determine root of polynomial equation using various methods. CO3: Apply different methods for solution of algebraic and transcendental linear and nonlinear equation using appropriate numerical method and curve fitting using least square method. CO4: Apply different interpolation techniques for equally and unequally space data and numerical differentiation. CO5: Apply of different numerical methods differentiation methods for solving linear simultaneous equations and Eigen values. CO6: Apply of different numerical methods for solution of 1st order and 2nd order ordinary differential equation and numerical integration.

Program Name	**Course Code**	**Course Name**	**Course Outcomes (COs)**
Electrical Engineering(SE) 2019 Corse	203149	Fundamental of Microcontroller and Applications	CO1: Describe the architecture and features of 8051 microcontrollers. CO2: Illustrate addressing modes and execute programs in assembly language for the Micro controller. CO3: Write programs in C language for microcontroller 8051. CO4: : Elaborate interrupt structure of 8051 and program to handle interrupt and ADC809 CO5: Define the protocol for serial communication and understand the microcontroller development systems. CO6: Interface input output devices and measure electrical parameters with 8051 in real time.

Electrical Engineering(TE) 2015/19 Corse	311121	Industrial and Technology Management	CO1: Differentiate between different types of business organization and discuss the fundamentals of economics and management. CO2: Explain the importance of technology management. CO3: Define quality management and its assistance tools. CO4: Describe the characteristics of marketing and its types and understand the concept of financial management. CO5: : Discuss the qualities of a good leader and concepts of group dynamics and Motivation theories CO6: Explain the importance of Intellectual property rights and understand the concept of patents, copy rights and trademarks.
	303141	Advance Microcontroller and its Applications	CO1: Explain architecture of PIC18F458 microcontroller and arithmetic logical instructions. CO2: Describe the addressing modes of PIC18 microcontroller and debug assembly language programs. CO3: Develop and debug program in C language for specific applications. CO4: Analyze CCP module and debug program in c language for CCP applications. CO5: Understand and use advance features of microcontroller peripherals effectively. CO6: Demonstrate interfacing of microcontroller to various devices.
	303142	Electrical Machines-II	CO1: Understand the construction and working of synchronous machines and ac motors. CO2: Determine the voltage regulation and efficiency of ac machines by various methods. CO3: Examine the parallel operation of alternators. CO4: Evaluate the performance of synchronous motor under variable load and excitation. CO5: Demonstrate the speed control methods of three phase induction motor. CO6: Impart various applications of ac motors.
	303143	Power Electronics	CO1: : Develop characteristics of current controlled power electronics switching devices CO2: : Develop characteristics of voltage controlled power electronics switching devices and analyze the performance & working principle of DC to DC converter for different types of load CO3: : Analyze the performance & working principle of single phase AC to DC converter for different types of load CO4: : Analyze the performance & working principle of three phase AC to DC converter & AC Voltage regulator for different types of load CO5: : Analyze the performance & working principle of transistorized based single phase DC to AC converter for different types of load CO6: : Analyze the performance & working principle of transistorized based three phase DC to AC converter

Program Name	Course Code	Course Name	Course Outcomes (COs)
Electrical Engineering(TE) 2015/19 Corse	303144	Electrical Installation, Maintenance and Testing	CO1: Classify distribution systems, its types and select the economical conductor size for overhead system. CO2: Design of different earthing systems for residential and industrial premises. CO3: Identify the various maintenance strategies, concept of condition monitoring & its use in industry, advanced tools of condition monitoring. CO4: Select methods of condition monitoring and testing of various Electrical Equipment's. CO5: Estimate and costing of residential and industrial premises. CO6: Apply electrical safety rules and regulation in residential and industrial premises.
	303146	Power System-II	CO1: Evaluate generalized constants of transmission line, efficiency and regulation of different types of transmission lines. CO2: Solve problems involving design and performance evaluation of EHVAC power transmission lines and corona loss. CO3: Explain the concept of per unit system in a power system and Compute power flow in power transmission networks. CO4: Calculate currents and voltages in a power system under symmetrical fault condition and explain protective devices ratings, location in a power system. CO5: Calculate currents and voltages in a power system under unsymmetrical fault condition. CO6: Explain the basic concept, recent trends and control methods used in HVDC transmission.
	303147	Control System I	CO1: Differentiate between various controls system and obtain transfer function of simple mechanical and electrical systems by classical control theory. CO2: Apply standard test signals to verify time domain specification of various types of systems. CO3: Analyze stability of system in time domain technique. CO4: Calculate frequency domain specifications and find out stability by using different frequency domain techniques. CO5: : Design and tuning of P, PI and PID controller by various technique CO6: Apply of different numerical methods for solution of 1st order and 2nd order ordinary differential equation and numerical integration.
	303148	Utilization of Electrical Energy	CO1: : Analyze electric heating, welding methods and their applications CO2: : Analyze electrochemical process and electrical circuits used in refrigeration, air conditioning CO3: : Design residential illumination schemes CO4: : Understand the electrical traction system and equipment used in traction substation CO5: : Understand the traction mechanics behind the services CO6: : Describe control of traction motors, train lighting and signaling system

	303149	Design of Electrical Machines	CO1: : Calculate heating, cooling time constant & explain auxiliaries used in transformer CO2: Calculate dimensions of core, yoke, winding and main tank of transformer. CO3: : Determine the performance parameters of transformer CO4: Explain the procedure to design the stator core, slots & winding of three phase induction motor. CO5: Design of length of air-gap & rotor core, slots winding used in three phase induction motor. CO6: Calculate the performance parameters of three phase induction motor.

Program Name	**Course Code**	**Course Name**	**Course Outcomes (COs)**
Electrical Engineering (TE) 2015/19 Corse	303150	Energy Audit and Management	CO1: To understand the significance of BEE Energy policies & knowledge of Electricity Acts. CO2: Demonstrate objectives, strategies & skills in energy management. CO3: Enlist energy conservation and demand side measures for electrical, thermal and utility Systems. CO4: Perform Preliminary energy audit of various sectors CO5: Solve simple problems to optimize the energy consumption. CO6: To design suitable energy monitoring system in an organization to perform cost benefit analysis.
Electrical Engineering(BE) 2015 Corse	403141	Power System Operation and Control	CO1: Identify and analyze the dynamics of power system and suggest means to improve stability of system. CO2: Identify the effect of reactive power on Power system and suggest the suitable means of reactive power management. CO3: Identify problems in AC transmission systems & Selection of appropriate FACTs technology. CO4: Analyze the generation-load balance in real time operation for voltage-frequency control and develop automatic control strategies. CO5: Formulate objective functions for optimization task of unit commitment, economic load dispatch and design solution using computational techniques. CO6: Identify the significance of inadvertent power exchange, energy control & Evaluate reliability indices of Power system.
	403142	PLC and SCADA Applications	CO1: Explain the working and types of PLC. CO2: Classify input and output interfacing devices with PLC. CO3: Develop architecture of SCADA and explain the importance of SCADA in critical infrastructure. CO4: Execute and test the programs developed for digital and analog operations. CO5: Describe SCADA protocols along with their architecture. CO6: Develop industrial applications using PLC and SCADA.
	403143	Elective I (Power Quality)	CO1: Apply the knowledge to differentiate between Conventional and Smart Grid. CO2: Identify the need of Smart Grid, Smart metering, Smart storage, Hybrid Vehicles, Home Automation, Smart Communication, and GIS. CO3: Comprehend the issues of micro grid. CO4: Solve the Power Quality problems in smart grid. CO5: Identify the need of smart substations and feeder automations. CO6: Apply the communication technology in smart grid.

	403144	Elective II (Electric and Hybrid Vehicles)	CO1: Understand the need and importance of Electric, Hybrid Electric Vehicles and Fuel cell vehicle. CO2: : Describe the performance and selection of various energy storage devices CO3: Differentiate and analyze the various battery charging and management systems. CO4: : Impart knowledge about architecture and performance of Electric and Hybrid Vehicles CO5: Classify the different drives and controls used in electric vehicles. CO6: Understand and distinguish between Vehicle to Home, Vehicle to Vehicle and Vehicle to Grid energy systems concepts.
	403145	Control System II	CO1: Recognize the importance of digital control system. CO2: Familiarize with Z-transform and Pulse-transfer-function. CO3: Analyze stability of system in digital controllers. CO4: Analyze state space analysis. CO5: Analyze Solution of state equations. CO6: Design observer for system.

Program Name	**Course Code**	**Course Name**	**Course Outcomes (COs)**
Electrical Engineering(BE) 2015 Corse	403147	Switchgear and Protection	CO1: Explain the purposes of protection, in relation to major types of apparatus, protection principle, dangers and criteria. CO2: Describe arc interruption methods in circuit breaker. CO3: Explain construction and working of different high voltage circuit breakers such as ACB, SF6 CB, and VCB. CO4: To understand the working principle of static and microprocessor based relays. CO5: Describe various protection schemes used for transformer, alternator and bus-bar. CO6: Describe transmission line protection schemes.
	403148	Power Electronic Controlled Drives	CO1: : Understand the basics of electrical drives and motor load dynamics, multi quadrant operation of drives CO2: : Analyze the operation of converter fed and chopper fed DC drives CO3: : Analyze the operation of inverter fed and ac voltage regulator fed AC drives CO4: : Apply vector control for induction motor drives and understand thermal model, duty cycles of motor CO5: Explain & analyze synchronous and BLDC motor drives along with its close loop control. CO6: : Choose drives for industrial applications
	403149	Elective III (High Voltage Engineering)	CO1: : Identify, describe and analyze the breakdown theories of solid, liquid and gaseous materials CO2: Explain different methods of generation of high AC, DC, impulse voltage and current. CO3: Demonstrate and use different methods of measurement of high AC, DC, impulse voltage and current. CO4: : Identify the causes of occurrence of overvoltage and apply remedial solutions CO5: Demonstrate different tests on high voltage equipment's. CO6: Design the high voltage laboratory with all safety measures.

	403150	Elective IV (Smart Grid)	CO1: Apply the knowledge to differentiate between Conventional and Smart Grid. CO2: Identify the need of Smart Grid, Smart metering, Smart storage, Hybrid Vehicles, Home Automation, Smart Communication, and GIS. CO3: Comprehend the issues of micro grid. CO4: Solve the Power Quality problems in smart grid. CO5: Identify the need of smart substations and feeder automations. CO6: Apply the communication technology in smart grid.

Program Name	Course Code	Course Name	Course Outcome (COs)
Information Technology (S.E) 2019 Course	214441	Discrete Structures	CO1: solve counting problems using permutation and combinations
			CO2: perform operations associated with set theory
			CO3: apply concepts of relation and function to solve the problems related to discrete objects
			CO4: apply concepts of tree and graph to solve real life problems
			CO5: perform operations associated with groups and rings
			CO6: Apply concepts of probability in solving real life problems
	214442	Computer Organization & Architecture	CO1: Analyze performance measurement of computer.
			CO2:Solve problems based on computer arithmetic.
			CO3:Explain processor structure & its functions
			CO4:Obtain knowledge about micro-programming of a processor.
			CO5:Identify and compare different methods for computer I/O mechanisms.
			CO6: Acquire knowledge about instruction level parallelism & parallel organization of multiprocessors & multi core systems.
	214443	Digital Electronics and Logic Design	CO1: Perform basic binary arithmetic & simplify logic expressions.
			CO2: Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips
			CO3: Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table) and perform their conversion
			CO4: Analyze and design sequential circuits
			CO5: Design digital circuits using programmable logic device
			CO6: Use VHDL programming technique with different modeling styles for digital circuits.
	214444	Fundamentals of Data Structures	CO1: Implement C language constructs and coding standards for application development
			CO2: Use appropriate searching and sorting technique for application development
			CO3: Construct linear data structures as per the given data
			CO4: Perform basic analysis with respect to time and space
			CO5: Use basic algorithm structures for problem solving and programming
			CO6: Select a precise data structure based upon real life application scenario
	214445	Problem Solving and Object Oriented Programming	CO1: Identify real life problems and apply problem solving concepts using computer programming
			CO2: Learn to use different logic structures to design a solution for given problem
			CO3: Exposure to fundamental concepts of object oriented programming using C++
			CO4: Apply concept of polymorphism and inheritance to implement simple solutions for given problems
			CO5: Define the importance of virtual functions and template classes to implement effective solutions

			CO6: Demonstrate the use of exception handling, and streaming input/output to manage problem solutions

Program Name	Course Code	Course Name	Course Outcome (COs)
Information Technology (S.E) 2019 Course	214446	Digital Lab	CO1: Use logic function representation for simplification with K-Maps and analyze, design as well as implement Combinational logic circuits using SSI & MSI chips
			CO2: Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table) & design and implement the applications like Asynchronous and Synchronous Counters
			CO3: Design and implement Sequential Logic circuits like Sequence generators and MOD counters
			CO4: Understand the need of skills, techniques and learn state-of-the-art engineering tools through hands-on experimentation on the Xilinx tools for design.
			CO5: Design, construct digital logic circuits and analyze their behavior through simulation
			CO6: Understand and implement the design steps, main programming technique with different modeling styles for digital circuits with VHDL Programming
	214447	Fundamentals of Data Structures Laboratory	CO1: Apply appropriate constructs of C language, coding standards for application development.
			CO2: Use dynamic memory allocation concepts and file handling in various application developments.
			CO3: Perform basic analysis of algorithms with respect to time and space complexity
			CO4: Select appropriate searching and/or sorting techniques in the application development
			CO5: Select and use appropriate data structures for problem solving and programming
			CO6: Use algorithmic foundations for solving problems and programming
	214448	Object Oriented Programming Lab	CO1: Develop and implement algorithms for solving simple problems using modular programming concept
			CO2: Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies
			CO3: Discover, explore and apply tools and best practices in object-oriented programming
			CO4: Develop programs that appropriately utilize key object-oriented concepts
			CO5: Study uses of function and class templates and implement operations on matrices using different data types
			CO6: Develop simple solution for managing student records using CRUD operations on file
	214449	Communication Language Laboratory	CO1: Communicate effectively with proper usage of grammar in communication
			CO2: Build vocabulary by direct and indirect communication ways
			CO3: Write and speak publically in proper grammatically correct norm
			CO4: apply effective reading and active listening skills during communication
			CO5: Overcome problems facing in communication
			CO6: Communicate and work efficiently in group activities

	207003	Engineering Mathematics III	CO1: Solve Linear differential equations, essential in modeling and design of computer-based systems.
			CO2: Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
			CO3: Apply statistical methods like correlation, regression analysis
			CO4: Apply probability theory for analysis and prediction of a given data as applied to machine intelligence.
			CO5: Performvectordifferentiationandintegrationtoanalyzethevectorfieldsandapplyto compute line, surface and volume integrals.
			CO6: Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.

Program Name	**Course Code**	**Course Name**	**Course Outcome (COs)**
Information Technology (S.E) 2019 Course	214450	Computer Graphics	CO1: Learn to use mathematical and logical aspects for implementing elementary graphics operations
			CO2: Explore object filling methods and geometric transformations to apply on 2D graphics objects
			CO3: Derive the translations and projections to implement 3D graphics operations
			CO4: Ensure the logical aspects of segments, windowing, and clipping to produce graphics output
			CO5: Apply the logic to develop simple animations and gaming applications
			CO6: Develop competency to understand the concept of curves and fractals to create simple interactive graphics using animation tools.
	214451	PROCESSOR ARCHITECTURE AND INTERFACING	CO1: Apprehend architectural details of 80386 microprocessor
			CO2:Understand memory management of 80386 microprocessor
			CO3: Understand multitasking and interrupt structure of 80386 microprocessor
			CO4:Comparemicroprocessorandmicrocontrollerandunderstandthearchitectureand memory organization of 8051microcontroller
			CO5: Explain timers and interrupts of 8051 microcontroller
			CO6:Interfaceof8051withI/Odevicesanddesignasystemusing8051micro-controllerfor various applications
	214452	Data Structures and Files	CO1: Communicate effectively with proper usage of grammar in communication
			CO2: Build vocabulary by direct and indirect communication ways
			CO3: Write and speak publically in proper grammatically correct norm
			CO4: apply effective reading and active listening skills during communication
			CO5: Overcome problems facing in communication
			CO6: Communicate and work efficiently in group activities

	214453	Foundations of Communication and Computer Network	CO1: Understand data/signal transmission over communication media
			CO2: Recognize usage of various modulation techniques in communication
			CO3: Understand error correction and detection techniques
			CO4: Analyze various spread spectrum and multiplexing techniques
			CO5: Use concepts of data communication to solve various related problems
			CO6: Acquaint with transmission media and their standards.
	214454	Processor Laboratory	CO1: Learn and apply concepts related to assembly language programming
			CO2:Write and execute assembly language program to perform array addition
			CO3: Write and execute assembly language program to perform code conversion
			CO4: Write and execute assembly language program to perform block transfer
			CO5: Write and execute assembly language program to sorting and string operations
			CO6: Learn and apply interfacing of real world input and output devices to 8051 microcontroller

Program Name	**Course Code**	**Course Name**	**Course Outcome (COs)**
Information Technology (S.E) 2019 Course	214455	Data Structures and Files Laboratory	CO1: Apply and implement algorithm to illustrate use of linear data structures such as stack, queue
			CO2: Apply and implement algorithms to create/represent and traverse non-linear data structures such as trees and graphs
			CO3: .Apply and implement algorithms to create and manipulate database using different file organizations
			CO4: Learn and apply the concept of hashing in database creation and manipulation
			CO5: Implement the techniques of sorting and searching on records
			CO6: Use the learned algorithms to solve problems of real life scenarios
	214456	Computer Graphics Laboratory	CO1: Elaborate and apply line and circle drawing algorithms to draw different graphical shapes
			CO2: Apply and implement polygon filling algorithm for a given polygon
			CO3: Apply 2D and 3D transformation algorithms for any given input shapes
			CO4: Draw given input polygon using polygon clipping algorithms
			CO5: Apply the logic of fractal generation algorithms on given input
			CO6: Design simple animations using segmentations and animation concepts without using animation tool

Program Name	Course Code	Course Name	Course Outcome (COs)
Information Technology (S.E) 2019 Course	314441	Theory of computation	CO1: Design finite automata as language recognizer.
			CO2: Perform operations based on grammar, regular expressions and finite automata
			CO3: Construct different mathematical computation models
			CO4: Recognize different types of languages and problems in computation theory
			CO5: Classify the problems in the computation as solvable and unsolvable
			CO6: Analyzewhichproblemcanbecomputable andifsothenimplementitona machine
	314442	Database Management System	CO1: Define basic concepts and functionality of database, data models, DBMS, and RDBMS
			CO2: Apply normalization techniques, SQL queries on database tables
			CO3: Express the importance of query processing, transaction management, and PL/SQL
			CO4: Understand the basics of concurrency control and recovery methods of database
			CO5: Define the importance of emerging database technologies
			CO6: Study the use of data management using data warehousing and data mining

Program Name	Course Code	Course Name	Course Outcome (COs)
Information Technology (T.E) 2015/19 Course	314443	Software Engineering &Project Management	CO1: Identify suitable life cycle models to be used.
			CO2: Analyze a problem and identify and define the computing requirements to the problem.
			CO3: Translate a requirement specification to a design using an appropriate software engineering methodology.
			CO4: Formulate appropriate testing strategy for the given software system.
			CO5: Develop software projects based on current technology, by managing resources economically and keeping ethical values.
			CO6: Analyze & design the software models using unified modeling language (UML).
	314444	Operating System	CO1: Fundamental understanding of the role of Operating Systems.
			CO2: To understand the concept of a process and thread.
			CO3: To apply the cons of process/thread scheduling.
			CO4: To apply the concept of process synchronization, mutual exclusion and the deadlock.
			CO5: To realize the concept of I/O management and File system.
			CO6: To understand the various memory management techniques.
		Hu ma	CO1: Students will be able to explain importance of HCI study and human factors in HCI design..

			CO2: Students will be able to understand model, paradigm and context of interaction
			CO3: Students will be able to design effective user-interfaces following a structured and organized UCD process
			CO4: Students will be able to evaluate usability of a user-interaction design
			CO5: Students will be able to apply cognitive models for predicting human-computer-interactions
			CO6: Students will be able to Analyze and discuss HCI issues in groupware, ubiquitous computing, virtual reality, multimedia, and Word Wide Web-related environments.
	314446	Software Laboratory I	CO1: Learn to install and configure different types of database systems
			CO2: Design a simple database with suitable ER diagrams and apply DDL, DCL commands
			CO3: Design and implement different DML commands using SQL operators and aggregate functions
			CO4: Understand the basic concepts of PL/SQL and apply them to create procedures and triggers
			CO5: Apply different simple queries on any MongoDB database and demonstrate different querying techniques
			CO6: Analyze database project life cycle and implement any simple database-oriented application
	314447	SL-II	CO1: Students will be able to understand the basics of Linux commands and program the shell of Linux.
			CO2: Students will be able to develop various system programs for the functioning of operating system
			CO3: Students will be able to implement basic building blocks like processes, threads under the Linux
			CO4: Studentswillbeabletodevelopvarioussystemprogramsfor the functioningof OS concepts in user space like concurrency control and file handling in Linux
			CO5: Students will be able to design and implement Linux Kernel Source Code
			CO6: Students will be able to develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any Linux kernel.

Program Name	**Course Code**	**Course Name**	**Course Outcome (COs)**
Information Technology (T.E) 2015/19 Course	314448	Software Laboratory 3	CO1: identify the needs of users through requirement gathering
			CO2: apply the concepts of Software Engineering process models for project development.
			CO3: apply the concepts of HCI for user-friendly project development.
			CO4: deploy website on live webserver and access through URL.
			CO5: understand, explore and apply various web technologies.
			CO6: develop team building for efficient project development.
		er Networ k	CO1: To know Responsibilities, services offered and protocol used at each layer of network.
			CO2: To understand different addressing techniques used in network.

			CO3: To know the difference between different types of network.
			CO4: To know the different wireless technologies and IEEE standards.
			CO5: To use and apply the standards and protocols learned, for application development.
			CO6: To understand and explore recent trends in network domain.
	314451	Systems Programming	CO1: Students will be able to explain the concepts and different phases of compilation with compile time error handling.
			CO2: Students will be able to represent language tokens using regular expressions, context free grammar and finite automata and design lexical analyzer for a language.
			CO3: Students will be able to compare top down with bottom up parsers, and develop appropriate parser to produce parse tree representation of the input.
			CO4: Students will be able to generate intermediate code for statements in high level language.
			CO5: Students will be able to design syntax directed translation schemes for a given context free grammar
			CO6: Students will be able to apply optimization techniques to intermediate code and generate machine code for high level language program.
	314452	Design and Analysis of Algorithm	CO1: Students will be able to Analyze a given algorithm and express its time and space complexities in asymptotic notations.
			CO2: Students will be able to Solve recurrence equations using Iteration Method, Recurrence Tree Method and Master's Theorem.
			CO3: Students will be able to design algorithms using Divide and Conquer Strategy.
			CO4: Students will be able to compare Dynamic Programming and Divide and Conquer Strategies.
			CO5: Students will be able to solve Optimization problems using Greedy strategy.
			CO6: Students will be able to design efficient algorithms using Back Tracking and Branch Bound Techniques for solving problems.

Program Name	**Course Code**	**Course Name**	**Course Outcome (COs)**
Information Technology (T.E) 2015/19 Course	314453	Cloud Computing	CO1: Learn the fundamental and basic concepts of cloud computing and cloud enabling technologies
			CO2: Express the virtualization mechanism and common standards used in cloud computing
			CO3: Analyze the programming and environments of cloud platforms and move applications on cloud
			CO4: Identify different threats and issue in cloud computing and implement different cloud security mechanisms
			CO5: Exposure to basic concepts of ubiquitous clouds and the internet of things
			CO6: Analyze and understand emerging trends in cloud computing
		D a t	CO1: Students will be able to understand big data primitives
			CO2: Students will be able to learn and apply different mathematical models for big data

			CO3: Students will be able to demonstrate their Big Data learning skills by developing industry or research applications
			CO4: Students will be able to analyze each learning model come from a different algorithmic approach and able to understand needs, challenges and techniques for big data visualization
			CO5: Students will be able be learn different programming platforms for big data analytics.
			CO6: Students will be able be Implement best practices for Hadoop development
	314455	Software Laboratory- IV	CO1: To implement small size network and its use of various networking commands.
			CO2: To understand and use various networking and simulations tools.
			CO3: To configure various client/server environments to use application layer protocols
			CO4: To understand the protocol design at various layers.
			CO5: To explore use of protocols in various wired and wireless applications.
			CO6: To develop applications on emerging trends.
	314456	Software Laboratory-V	CO1: To design and implement two pass assembler for hypothetical machine instructions.
			CO2: To design and implement different phases of compiler (Lexical Analyzer, Parser, Intermediate code generation)
			CO3: To use the compile generation tools such as "Lex" and "YACC".
			CO4: To apply algorithmic strategies for solving various problems.
			CO5: To compare various algorithmic strategies.
			CO6: To analyze the solution using recurrence relation.
	314457	SL-VI (DSBD Lab)	CO1: Students will be able to apply Big data primitives and fundamentals for application development.
			CO2: Students will be able to explore different Big data processing techniques with use cases
			CO3: Students will be able to apply the Analytical concept of Big data using R/Python.
			CO4: Students will be able to design algorithms and techniques for Big data analytics.
			CO5: Students will be able to design Big data analytic application for emerging trends
			CO6: Students will be able to perform operations on different big-data platforms

Program Name	**Course Code**	**Course Name**	**Course Outcome (COs)**
Information Technology (T.E) 2015/19 Course	314458	Project Based Seminar	CO1: Gather data and findings related to the specific topic
			CO2: write a technical report and synopsis based upon analysis
			CO3: apply the observation to find a solution and propose new work as solution
			CO4: Present the study with graphics and multimedia techniques
			CO5: Define and present the project statement based upon review
			CO6: make the literature survey and identify research gaps
Inf orm atio	414 453	Inf orm atio	CO1: Students will be able to use basic cryptographic techniques in application development

			CO2: Students will be able to apply methods for authentication, access control, intrusion detection and prevention.
			CO3: Students will be able to apply the scientific method to digital forensics and perform forensic investigations
			CO4: Students will be able to develop computer forensics awareness.
			CO5: Students will be able to use computer forensics tools.
			CO6: Students will be able to handle different security issues in internet protocols
	414454	Machine Learning and Applications	CO1: Students will be able to model the learning primitives.
			CO2: Students will be able to build the learning model.
			CO3: Students will be able to tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.
			CO4: Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
			CO5: Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
			CO6: Be able to design and implement various machine learning algorithms in a range of real-world applications.
	414455	Software Design and Modeling	CO1: Students will be able to Object oriented Methodologies and basics of Unified Modelling Language.
			CO2: Students will be able to Understand object oriented methodology
			CO3: Students will be able to use case modelling and class Modeling
			CO4: Students will be able to Understand design process and business, access and view layer class design.
			CO5:Students will be able study GRASP Principles and GoF design patterns
			CO6: Students will be able to study architectural design principles on different type of application development

Program Name	**Course Code**	**Course Name**	**Course Outcome (COs)**
Information Technology (B.E) 2015 Course	Elect- I 414456 (A)	Wireless . Communications	CO1: Understand the basics of propagation of radio signals.
			CO2: Understand the basic concepts of basic Cellular System and the design requirements.
			CO3: Have an understanding of the basic principles behind radio resource management techniques such as power control, channel allocation and handoffs.
			CO4: Gain insights into various mobile radio propagation models and how the diversity can be exploited to improve performance.
			CO5: Gain knowledge and awareness of the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc.
			CO6: Have in-depth understanding of the design consideration and architecture for different Wireless Systems like GSM, CDMA, GPRS etc.
	I 414456	al Language Proce	CO1: Students will be able to Understand automatic processing of human languages using computers

			CO2: Students will be able to Understand various applications of natural language processing
			CO3: Students will be able to Understand properties of natural language and use of algorithms.
			CO4:Students will be able processing linguistic information.
			CO5: Students will be able to abstract of text and use of modern tools for word and sentence embeddings
			CO6: Student will be able to predict a sequence of tags for a sequence of words in langguage modeling
	Elect- I 414456 (C)	Usability Engineering	CO1: Students will be able to Justify the theory and practice of usability evaluation approaches, methods and techniques
			CO2: Students will be able to Compare and evaluate strengths and weaknesses of various approaches, methods and techniques for evaluating usability
			CO3: Students will be able to Design and implement a usability test plan, based on modelling or requirements specification.
			CO4: Students will be able to Choose appropriate approaches, methods and techniques to evaluate the usability of a specified interactive system
			CO5: Students will be able to develop usability evaluation skills for software testing
			CO6: Students will be able design and evaluate user-interface for industrial applications
	Elect- I 414456 (D)	Multicore and Concurrent Systems	CO1: Know types of parallel machine and to know multicore and concurrent systems in detail.
			CO2: Know the ways to measure the performance of multicore systems.
			CO3: Understand need of multicore and concurrent system programming.
			CO4: Know the different approaches for multicore and concurrent programming.
			CO5: Use and apply the approaches learned, for application development.
			CO6: Understand and explore recent trends in multicore and concurrent system programming.

Program Name	**Course Code**	**Course Name**	**Course Outcome (COs)**
Information Technology (B.E) 2015 Course	Elect- I 414456 (E)	Business Analytics and Intelligence	CO1: Students will be able to Comprehend the Information Systems and development approaches of Intelligent Systems
			CO2: Students will be able to Evaluate and rethink business processes using information systems.
			CO3: Students will be able Align business intelligence with business strategy.
			CO4: Students will be able to Apply the techniques for implementing business intelligence systems
			CO5: Students will be able to select software tools for knowledge management systems in business organizations

			CO6:Students will be able to design systems to provide business intelligence.
	Elect- II 414457 (A)	Software Defined Network	CO1: Acquire fundamental knowledge of SDN exploring the need, characteristics, and architecture of SDN.
			CO2: Recognize OpenFlow protocols and its forwarding, pipeline model.
			CO3: Understand different methodologies for sustainable SDN.
			CO4: Comprehend IT Infrastructure for SDN.
			CO5: Acquiring knowledge of OpenFlow protocols, visualization.
			CO6: To understand network virtualization and network function virtualization
	Elect-II 414457 (B)	Soft Computing	CO1: Tackle problems of interdisciplinary nature.
			CO2: Find an alternate solution, which may offer more adaptability, resilience and optimization.
			CO3: Gain knowledge of soft computing domain which opens up a whole new career option.
			CO4: Tackle real world research problems.
			CO5: Conceptualize fuzzy logic and its implementation for various real world applications.
			CO6: Design soft computing systems by hybridizing various other techniques
	Elect-II 414457(C)	Software Testing and Quality Assurance	CO1: Test the software by applying testing techniques to deliver a product free from bugs.
			CO2: Investigate the scenario and to select the proper testing technique.
			CO3: Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.
			CO4: Understand how to detect, classify, prevent and remove defects.
			CO5: Choose appropriate quality assurance models and develop quality.
			CO6: Ability to conduct formal inspections, record and evaluate results of inspections.
	Elect-II 414457 (D)	Compiler Construction	CO1: Understand the structure of compilers.
			CO2: Understand the basic and advanced techniques used in compiler construction.
			CO3: Understand the basic data structures used in compiler construction such as abstract syntax.
			CO4: Cognitive skills (thinking and analysis)- Design and implement a compiler using a software engineering approach.
			CO5: Communication skills (personal and academic).
			CO6: Practical and subject specific skills (Transferable Skills) - Use generators (e.g. Lex and Yacc).

Program Name	Course Code	Course Name	Course Outcome (COs)
Information Technology (B.E) 2015 Course	Elect-II 414457 (E)	Gamification	CO1: Write programs to solve problems using gamification and open source tools.
			CO2: Apply gamification for Mobile and Web Applications.
			CO3: Solve problems for multi-core or distributed, concurrent/Parallel environments
			CO4: To develop problem solving abilities using gamification.
			CO5: To understand gamification paradigm
			CO6: To understand different open source tools of gamification
	414458	Computer Laboratory VII	CO1: Students will be able to Solve Problems using various Algorithms
			CO2: Students will be able to Identify Various Attacks and Formulate Defense Mechanism
			CO3: Students will be able to Identify Vulnerabilities in a Network
			CO4: The students will be able to implement and port controlled and secured access to software systems and networks
			CO5: Students will be able to identify the characteristics of datasets and compare the trivial data and big data for various applications
			CO6: Students will be able to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration
	414459	Computer Laboratory VIII	CO1: Used and draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects.
			CO2: Used different software artifacts used to develop analysis and design model from requirements
			CO3: Design the use case model.
			CO4: Design and Implement, perform analysis model and design model.
			CO5: Design and Implement, perform Interaction and behavior Model
			CO6: Understand and Implement an appropriate design pattern to solve a design problem
	414460	Project Phase-I	CO1: Solve real life problems by applying knowledge
			CO2: Analyze alternative approaches, apply and use most appropriate one for feasible solution
			CO3: Demonstrate effective communication at various levels and write precise reports and technical documents in a nutshell
			CO4: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting teamwork, Inter-personal relationships, conflict management and leadership quality
			CO5: Provide solution to problems considering social, safety, environmental, ethical and legal issues
			CO5: To function effectively as a team to accomplish a desired goal.

Program Name	Course Code	Course Name	Course Outcome (COs)
Information Technology (B.E)	414461D: Audit Course-V	Statistical Learning Model using Rl	CO1: Students will be familiar with concepts related to "data science"," analytics", "machine learning", etc.
			CO2: Students will capable of learning "big data" concepts on their own
			CO3: Understand explosion of "Big Data" problems, statistical learning /machine learning has become a very hot field.
			CO4: To learn statistical learning and modelling skills which are in high demand also cover basic concepts of statistical learning / modelling methods that have widespread use in business and scientific research.
			CO5: To get hands on the applications and the underlying statistical / mathematical concepts that are relevant to modelling techniques.
			CO6: Students will be able to implement the statistical learning methods using the highly popular statistical software package R.
	414462	Distribute Computing System	CO1: Students will be able to Distinguish distributed computing paradigm from other computing paradigms
			CO2: Students will be able to Identify the core concepts of distributed systems
			CO3: Students will be able to Illustrate the mechanisms of inter process communication in distributed system
			CO4: Students will be able to Apply appropriate distributed system principles in ensuring transparency ,consistency and fault-tolerance in distributed file system
			CO5: Students will be able to Compare the concurrency control mechanisms in distributed transactional environment
			CO6: Students will be able to Outline the need for mutual exclusion and election algorithms in distributed systems
	414463	Ubiquitous Computing	CO1: Illustrate the knowledge of design of Ubicomp and its applications
			CO2: Understand smart devices and services used Ubicomp
			CO3: Understand the content of actuators and controllers in real time application design
			CO4: Use the concept of HCI to understand the design of automation applications
			CO5: Analyze Ubicomp privacy and explain the challenges associated with Ubicomp privacy
			CO6: Describe Ubicomp communication and management.
	Elect III 414464 (A)	Internet Of Things	CO1: Students will be able to Explain what is internet of things.
			CO2:Students will be able to Understand architecture and design of IoT.
			CO3: Students will be able Describe the objects connected in IoT.
			CO4: Students will be able Understand the underlying Technologies and platforms in IOT.
			CO5: Students will be able to Understand cloud interface to IoT.
			CO6: Students will be able to understand data transfer between IOT device and cloud Environment

	III	414	ation Ret	CO1: Understand the concept of Information retrieval.

			CO2: Deal with storage and retrieval process of text and multimedia data.
			CO3: Evaluate performance of any information retrieval system.
			CO4: Design user interfaces.
			CO5: Understand importance of recommender system.

Program Name	Course Code	Course Name	Course Outcome (COs)
Information Technology (B.E) 2015 Course			CO6: Understand concept of multimedia and distributed information retrieval.
	ElectII414464 (C)	MULTIMEDIA TECHNIQUES	CO1: Students will be able to create own file formats for specific application
			CO2: Students will be able to do some projects based on current trends in multimedia techniques
			CO3: Students will be able To use open sources for authoring tool for animation and presentations
			CO4: Students will be able to Understand some research areas of current multimedia techniques.
			CO5: Studentswillbeableto Understand Principlesbehindanimationandtechnologies
			CO6: Students will be able to Understand issues of quality of service in multimedia networking.
	Elect III 414464 (D)	Elective 4 D Internet and Web Programming	CO1: Students will be able to Demonstrate static website using basic tools.
			CO2:Students will be able to Develop client side and server side programming skills
			CO3: Studentswillbeableto Understandwebservicesandhandlecontentmanagement tools
			CO4:StudentswillbeabletoDevelopmobilewebsiteusingmobilewebdevelopmenttools.
			CO5:Students will be able to Understand aspects of web security and cyber ethics
			CO6: Studentswill be able to select tools thatassist in automating data transfer over the Internet.
	Elect IV 414465 A	Elective 4 A Rural Technologies and community Development	CO1: Understand rural development model.
			CO2: Learndifferentmeasures in rural development and its impactonoverall economy
			CO3: Understand and learn importance of technologies in rural and community development
			CO4: Understand challenges and opportunities in rural development.
			CO5: Analyse technologies applicable for the development of rural area
			CO6: Determine the measures and actions for community development in rural areas
	414465 B	Elective 4 B Parallel Computing	CO1: Understand fundamentals in parallel computing
			CO2: Understand and learn importance of technologies including different hardware structures used in parallel computing
			CO3: Understand challenges and opportunities in parallel computing.
			CO4: Learn and apply openMP programming
			CO5: Learn programming heterogeneous processors

			CO6: Learn MPI programming
	414465 C	Elective 4 C Computer Vision	CO1:Implementfundamentalimageprocessingtechniquesrequiredforcomputervision.
			CO2: Implement boundary tracking techniques.
			CO3: Apply Hough Transform for line, circle, and ellipse detections.
			CO4: Implement motion related techniques.
			CO6: To understand three-dimensional image analysis techniques.
			CO5: Develop skills to develop applications using computer vision techniques

Program Name	**Course Code**	**Course Name**	**Course Outcome (COs)**
Information Technology (B.E) 2015 Course	414465 D	Elective 4 D Social Media Analytics	CO1: Understand the fundamentals of social media analytics
			CO2: Apply the data mining algorithms in social media
			CO3: Use social media measures for social media data
			CO4: Understand behavior analytics techniques used for social media data
			CO5: Apply learned techniques on Facebook and other social media platforms data.
			CO6: Understand the parameters of social media world
	414466	Computer Laboratory IX	CO1: Students will be able to Demonstrate knowledge of the core concepts and techniques in distributed systems.
			CO2: Students will be able to Learn how to apply principles of state-of-the-Art Distributed systems in practical application.
			CO3: Students will be able to Design, build and test application programs on distributed systems..
			CO4: Students will be able to apply Shared Data access and Files concepts
			CO5: Students will be able to understand Distributed Computing techniques, Synchronous and Processes.
			CO6: Students will be able to understand the importance of security in distributed systems
	414467	Computer Laboratory X	CO1: Used the Android environment and explain the Evolution of cellular networks
			CO2: Develop the User Interfaces using pre-built Android UI components.
			CO3: Design an applications for performing CURD SQLite database operations using Android.
			CO4: Design the smart android applications using the data captured through sensors
			CO5: Understand and implement the authentication protocols between two mobile devices for providing security
			CO6: Analyze the data collected through android sensors using any machine learning Algorithm
	4 1	P r o	CO1: Learn co-operation, support, and formal communication among team members

			CO2: Prepare well in implementation phase and tackle technical challenges effectively
			CO3: Demonstrate effective communication at various levels and write precise reports and technical documents in a nutshell
			CO4: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting teamwork, Inter-personal relationships, conflict management and leadership quality
			CO5: Provide solution to problems considering social, safety, environmental, ethical and legal issues
			CO6: Get exposure of various types of testing methods and tools.
	Audit Course 414469	Entrepreneurship	CO1: Expand your knowledge of Entrepreneurship & Startups.
			CO2: Discover how you can use Entrepreneur Qualities.
			CO3: Expand the practical knowledge of Finance, Legal-Patents, Intellectual Property, and Business Associations.
			CO4: Expand the understanding of Deliverables & Achieving Target.
			CO5: To understand the abilities to become an Entrepreneur.
			CO6: To understand how Business Finance concepts can be implemented.

Program Name	**Course Code**	**Course Name**	**Course Outcomes**
Mechanical Engineering (S.E) 2015 Course	207002	Engineering Mathematics – III	CO1: Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems. CO2: Apply Laplace transform and Fourier transform techniques to solve differential equations involved in Vibration theory, Heat transfer and related engineering applications. CO3: Apply statistical methods like correlation, regression analysis in analyzing, interpreting experimental data and probability theory in testing and quality control. CO4: Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems. CO5: Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations CO6: To get the conceptional clarity of vector differentiation and integration applied to problems in Fluid Mechanics
	202041	Manufacturing Process- I	CO1: Select and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects. CO2: Compare and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes. CO3: Classify and develop different plastic molding processes, Extrusion of Plastic and Thermoforming CO4: Select and Apply different Welding and joining processes and its defects CO5: Design and Analyze different sheet metal working processes CO6: Illustrate the constructional details and Working of Centre Lathe

	202042	Computer Aided Machine Drawing	CO1: Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM. CO2: Understand the significance of parametric technology and its application in 2D sketching. CO3: Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling. CO4: Ability to create 3D assemblies that represent static or dynamic Mechanical Systems CO5: Ability to ensure manufacturability and proper assembly of components and sub-assemblies. CO6: Ability to communicate between Design and Manufacturing using 2D drawings.
	202043	Thermodynamics	CO1: Apply various laws of thermodynamics to various processes and real systems. CO2: Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes. CO3: Analyze the performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case. CO4: Evaluate the condition of steam and performance of vapour power cycle and vapour compression cycle. CO5: Evaluate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants CO6: Apply Psychromertic charts and estimate various essential properties related to Psychrometry and processes
Mechanical Engineering (S.E) 2015 Course	202044	Material Science	CO1: Describe the basic concepts and properties of Material. CO2: Illustrate about material fundamental and processing. CO3: Select and analyze proper metal, alloys, nonmetal and powder metallurgical component for specific requirement CO4: Evaluate the defects in crystal and its effect on crystal properties. CO5: Evaluate the different properties of material by studying different test CO6: Recognize how metals can be strengthened by cold-working and hot working

Program Name	Course Code	Course Name	Course Outcomes
Mechanical Engineering (S.E) 2015 Course	202051	Strength of Materials	CO1: Apply knowledge of mathematics, science for engineering applications CO2: Design and conduct experiments, as well as to analyze and interpret data CO3: Design a component to meet desired needs within realistic constraints of health and safety CO4: Identify, formulate, and solve engineering problems CO5: Practice professional and ethical responsibility CO6: Use the techniques and practical skills necessary for engineering practice
	202055	Audit Course I: Value Education	CO1: Promote self-reflection and critical inquiry that foster critical thinking of one's value and the values of others. CO2: Understood the salient values of life like honesty, ethics, teamwork, unity CO3: Practice respect for human rights and democratic principles. CO4: Familiarized with various living and non-living organisms and their interaction with environment. CO5: Ability to increase awareness among students about environment and create attitude towards sustainable lifestyle. CO6: Ability to educate and make the young generation students aware of their social responsibilities
	202055 A	Audit Course I: Innovations in Engineering Field/ Agriculture	CO1: Understand what is thinking, its tools and process and its application to innovation CO2: Practice application of innovation in engineering CO3: Understand important terms like national productivity, sustainable development and inclusive growth CO4: Throw a light on developing technologies in agriculture CO5: Learn Interdisciplinary Engineering applications in Agriculture CO6: Update with innovations and technological advancements in respective fields of engineering.
	202055 B	Audit Course I : Road Safety	CO1: Generate awareness about number of people dyeing every year in road accidents, traffic rules and characteristics of accident. CO2: Gain information and knowledge about people responsible for accidents and their duties CO3: Understand the importance of multidisciplinary approach to planning for traffic safety and rehabilitation CO4: Participation in events based on the topic under study CO5: Understand roles and responsibilities in ensuring road safety CO6: Acquire knowledge and understanding of the road environment
	202045	Fluid Mechanics	CO1: Determine various properties of fluid in solving the problems in fluids and understand the laws of fluid statics and concepts of buoyancy. CO2: Identify the various types of fluid flow and their characteristics. CO3: Apply Bernoulli's equation and its application for solving fluid flow problems. CO4: Estimate the various characteristics of Laminar and Turbulent flow. CO5: Apply Dimensional Analysis method to solve the fluid problems and determination of Losses through Pipe flow. CO6: Determine boundary layer formation over an external surface.

Mechanical Engineering (S.E) 2015 Course	202047	Soft Skills	CO1: Ability to develop speaking, listening and presentation skills. CO2: Ability to develop writing skills CO3: Learning Corporate & Business Etiquettes. CO4: Ability to work effectively as an individual and as a member/leader in a team and also manage time & stress. CO5: Become more effective individual through goal/target setting, self-motivation and practicing creative thinking. CO6: Develop right-attitudinal and behavioral change
	202048	Theory of Machines – I	CO1: Identify mechanisms in real life applications. CO2: Perform kinematic analysis of simple mechanisms. CO3: Perform static and dynamic force analysis of slider crank mechanism CO4: Determine moment of inertia of rigid bodies experimentally CO5: Analyze velocity and acceleration of mechanisms by vector and graphical methods. CO6: Understand the concept of friction and its application
	202049	Engineering Metallurgy	CO1: Describe how metals and alloys formed and how the properties change due to microstructure CO2: Apply core concepts in Engineering Metallurgy to solve engineering problems. CO3: Conduct experiments, as well as to analyze and interpret data CO4: Select materials for design and construction CO5: Apply the skills and techniques necessary for modern materials engineering practice CO6: Recognize how metals can be strengthened by alloying, cold-working, and heat treatment
	202050	Applied Thermodynamics	CO1: Define basics of engine terminology, air standard, fuel air and actual cycles. CO2: IDENTIFY factors affecting the combustion performance of SI CO3: IDENTIFY factors affecting the combustion performance of CI engines CO4: DETERMINE performance parameters of IC Engines and emission control. CO5: EXPLAIN working of various IC Engine systems and use of alternative fuels. CO6: Measure performance of single and multistage reciprocating compressors and DISCUSS rotary positive displacement compressors
	203152	Electrical and Electronics Engineering	CO1: Ability to be conversant with basics of Electrical and Electronic controls CO2: Develop the capability to identify and select suitable DC motor / induction motor / special purpose motor and its speed control method for given industrial application. CO3: Program Arduino IDE using conditional statements CO4: Interfacing sensors with Arduino IDE CO5: Proficiently apply advanced technical knowledge of electrical and electronic engineering for mechanical engineering. CO6: Ability to provide development in electrical/electronic engineering.

	203153	Machine Shop - I	CO1: Ability to set the manufacturing set–up appropriately CO2: Ability to operate Milling machine CO3: Ability to select appropriate process parameter for obtaining desired characteristic on work piece. CO4: Ability to understand the operational and safety problems CO5: Ability to operate plastic molding machine, Press CO6: Ability to operate grinding machine
Program Name	**Course Code**	**Course Name**	**Course Outcomes**
Mechanical Engineering (T.E) 2015 Course	302041	Design of Machine .Elements – I	CO1: Identify and understand failure modes for mechanical elements and design of machine elements based on strength. CO2: Design Shafts, Keys and Coupling for industrial applications. CO3: Design and analyze machine elements subjected to fluctuating loads CO4: Design and develop Power Screws for various applications CO5: Design fasteners and welded joints subjected to different loading conditions. CO6: Design various Springs for strength and stiffness.
	302042	HEAT TRANSFER	CO1: Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system. CO2: Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction. CO3: Understand thermal insulation concepts and lumped system analysis CO4: Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation CO5: Interpret heat transfer by radiation between objects with simple geometries. CO6: Analyze the heat transfer equipment and investigate the performance.
	302043	Theory of Machine – II	CO1: Apply fundamentals of gear theory which will be the prerequisite for gear design. CO2: Performs force analysis of Spur, Helical, Bevel, Worm and Worm gear. CO3: Analyzes speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design. CO4: Design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves. CO5: Analyze & synthesize a four bar mechanism with analytical and graphical methods. CO6: Analyze the gyroscopic couple or effect for stabilization of Ship, Aero plane and Four wheeler vehicle. CO7: Select appropriate drive for given application (stepped / step-less).
	302044	Turbo Machines	CO1: Apply thermodynamics and kinematics principles to turbo machines. CO2: Analyze the performance of turbo machines. CO3: Classify & Select turbo machine for given application CO4: Evaluate & Predict performance of turbo machine using model analysis. CO5: Understand the working principles of turbo machines and apply it to various types of machines CO6: Analyze performance parameters of compressors

	302045	Metrology And Quality Control	CO1: Describe the methods of measurement, selection of measuring instruments. CO2: Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design CO3: Select & apply Quality Control Techniques/ Statistical Tools appropriately in industrial applications CO4: 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. CO5: Ability to analyze and interpret data for quantitative and qualitative measurement. CO6: Apply TQM tools for industrial applications
	302046	Skill Development	CO1: Understand details of various part of machines and machine drawings CO2: Application of different types of tools used to assemble & disassemble of machines CO3: Utilize their skill for getting concept of component used in machineries CO4: Understand the dimensional feature of various machine elements for assembly & disassembly CO5: Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships CO6: Ability to demonstrate engineering problems related to maintenance of Industrial equipment
	302047	Numerical Methods and Optimization	CO1: Select & Apply appropriate Numerical Methods to solve complex mechanical engineering problems. CO2: Formulate algorithms and programming. CO3: Apply Mathematical Solver CO4: Generate Solutions for real life problem using optimization techniques. CO5: Analyze the research problem CO6: Develop logical skills to solve Problems.

Mechanical Engineering (T.E) 2015 Course	302048	Design of Machine Elements – II	CO1: Understand and Apply principles of gear design to spur gears and industrial spur gear boxes. CO2: Ability to become proficient in Design of Helical and Bevel Gear boxes CO3: Ability to develop capability to analyze Rolling contact bearing and its selection from manufacturer's Catalogue CO4: Ability to analyze & design worm gear box for various industrial applications. CO5: Ability to design belt drives and selection of belt, rope and chain drives. CO6: Ability to analyze & design of Sliding contact bearing in industrial applications.
	302049	Refrigeration and Air Conditioning	CO1: Illustrate the fundamental principles and applications of refrigeration and air conditioning system CO2: Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems CO3: Calculate cooling load for air conditioning systems for domestic and industrial applications CO4: Operate and analyze the refrigeration and air conditioning systems. CO5: Define the properties, applications and environmental issues of different refrigerants CO6: Understand various equipment-operating principles, operating and safety controls employed in refrigeration air conditioning systems

	302050	Mechatronics	CO1: Understand mechatronics and its applications, sensors and actuators and to Study their classification. CO2: Identify key elements of mechatronics system and its representation in terms of block diagram CO3: Understand Interfacing of Sensors using appropriate DAQ micro-controller. Apply the concept of signal processing and use of interfacing systems such as ADC, DAC, and digital I/O. CO4: Development of PLC ladder programming and implementation of real-life system CO5: Understand Time and Frequency domain analysis of system model (for control application). CO6: Apply PID control implementation on real time systems.
	302051	Manufacturing Process – Ii	CO1: Ability to analyze and understand the metal cutting phenomena. CO2: Ability to select process parameter and tools for obtaining desired machining characteristic CO3: Ability to understand principles of manufacturing processes. CO4: Able to figure out application of modernization in machining CO5: Apply knowledge of Jigs and Fixtures so as to utilize machine capability for variety of operations. CO6: Understand the CNC technology and prepare CNC program
	302052	Machine Shop – II	CO1: Apply the knowledge of various machines tools. CO2: Apply knowledge of Jigs and Fixtures for industrial components CO3: Ability to apply operational safety measures on shop floor CO4: Ability to operate lathe machine CO5: Ability to operate Milling and Drilling machine CO6: Ability to perform finishing operations on grinding machine
	302053	Seminar	CO1: Establish motivation for any topic of interest and develop a thought process for technical presentation. CO2: Organize a detailed literature survey and build a document with respect to technical publications. CO3: Comprehension of proof-of-concept and related data. CO4: Effective presentation and improve soft skills CO5: Make use of new and recent technology (e.g. Latex) for creating technical reports CO6: Ability demonstrate problem-solving skills and apply theoretical knowledge

Mechanical Engineering (T.E) 2015 Course	302054	Audit Course II :- Fire & Safety Technology	CO1: Create and sustain a community of learning in which students acquire knowledge in fire, safety and hazard management CO2: Learn to apply fire and safety rules for ethical, human life & property safety issues. CO3: Ability to pursue research and development in fire safety engineering, hazard management and disseminate its findings. CO4: Ability to meet the challenges of fire accidents in society CO5: Ability 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. CO6: Ability to demonstrate fire and safety rules to society.

	302054	Audit Course II Entrepreneurs	CO1: Identify entrepreneurship opportunity CO2: Develop winning business plans and projects CO3: Know the parameters to assess opportunities and constraints for new business ideas CO4: Understand the systematic process to select and screen a business idea CO5: Design strategies for successful implementation of ideas CO6: Ability to write a business plan
	302054	Audit Course II - Lean Management	CO1: Ability to practice Lean Management at the workplace CO2: Ability to do contribute in Continuous Improvement program of the Organization CO3: Understand the need for Lean Management System CO4: Apply appropriate approaches to project using Lean tools and techniques CO5: Understand the working concept of lean principles and implementation. CO6: Ability to identify waste in the production process.
	302054	Audit Course II - Smart Manufacturing	CO1: Comfortable with terminology and practices in Smart Manufacturing CO2: Able to face the challenges in Industry & also contribute towards advancement. CO3: Active part of Industry 4.0 (Fourth Industrial Revolution) CO4: Understand and apply the role of IT in manufacturing. CO5: Ability to interface manufacturing processes, manufacturing systems, systems engineering, IT, Networks and basic shop floor communications. CO6: Apply flexibility in physical processes to address a dynamic and global market
Mechanical Engineering (B.E) 2015 Course	402041	Hydraulics and Pneumatics	CO1: Demonstrate principles & applications of various components used for hydraulic & pneumatic systems. CO2: Analyze industrial hydraulic & Pneumatic circuits. CO3: Evaluate the performance of fluid power components. CO4: Justify system requirements & Design hydraulic and pneumatic system for industrial applications CO5: Understand working principle of components used in hydraulic & pneumatic systems CO6: Develop and apply knowledge to various applications
	402042	CAD CAM and Automation	CO1: Apply homogeneous transformation matrix for geometrical transformations of 2D/3D CAD entities. CO2: Model mathematically analytical and synthetic curves, surfaces and differentiate between Solid Representation Methods in part modelling. CO3: Analyze and Evaluate the solution of structural problems using FEA CO4: Develop the CNC part program for Turning / Milling and generate tool path using CAM software. CO5: Demonstrate understanding of various advanced manufacturing methods- Rapid Prototyping (RP) processes. CO6: Understand the robotics and automation systems and their applications in manufacturing industries.

Mechanical Engineering (B.E) 2015 Course	402043	Dynamics of Machinery	CO1: Determine natural frequencies for single DOF undamped & damped free vibratory systems CO2: Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces. CO3: Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems. CO4: Apply static and dynamic balancing technique for single cylinder, multi cylinder inline and radial engines. CO5: Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control. CO6: Explain noise, its measurement & noise reduction techniques for industry and day to day life problems.
	402044 A	Elective – I Finite Element Analysis	CO1: Understand the different terminologies, approaches and analysis used in Finite Element Analysis (FEA) to solve mechanical engineering problems. CO2: Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses of structural problems i.e. spring, bar, truss, beam and Plane Stress/Strain problems. CO3: Demonstrate the concept of isoperimetric Elements and Numerical Integration in Finite Element Analysis (FEA). CO4: Explain the Finite Element formulation for One dimensional steady-state heat transfer problem and Dynamic Analysis problem. CO5: Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer. CO6: Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
	402044 B	Elective – I Computational Fluid Dynamics	CO1: Analyze and model fluid flow and heat transfer problems. CO2: Generate high quality grids and interpret the correctness of numerical results with physics. CO3: Conceptualize the programming skills. CO4: Use a CFD tool effectively for practical problems and research. CO5: Ability to formulate and solve computational problems arising in the flow of fluids. CO6: Ability to assess the accuracy of a numerical solutions by comparison to known solutions of simple test problems and by mesh refinement studies
	402044 C	Elective – I Heating, Ventilation, Air Conditioning and	CO1: Determine the performance parameters of trans-critical & ejector refrigeration systems CO2: Estimate thermal performance of compressor, evaporator, condenser and cooling tower. CO3: Describe refrigerant piping design, capacity & safety controls and balancing of vapour compressor system. CO4: Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system. CO5: Estimate heat transmission through building walls using CLTD and decrement factor &time lag methods with energy-efficient and cost-effective measures for building envelope. CO6: Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.

	402045 A	Elective – II Automobile Engineering	CO1: Compare and select the proper automotive system for the vehicle. CO2: Analyze the performance of the vehicle. CO3: Diagnose the faults of automobile vehicles. CO4: Apply the knowledge of EVs, HEVs and solar vehicles CO5: Develop a strong base for understanding future developments in the automobile industry. CO6: Understand the environmental implications of automobile emissions

Mechanical Engineering (B.E) 2015 Course	402045 B	Elective – II Operation Research	CO1: Apply LPP and Decision Theory to solve the problems CO2: Apply the concept of transportation models to optimize available resources. CO3: Decide optimal strategies in conflicting situations. CO4: Implement the project management techniques. CO5: Minimize the process time CO6: Optimize multi stage decision making problems
	402045 C	Elective – II Energy Audit and Management	CO1: Understand need of renewable energy, energy consumption scenario of India and world and relate between energy and environment. CO2: Carry out energy audit using different instruments and prepare energy audit report. CO3: Apply financial analysis techniques like simple payback period, time value of money, net present value and internal rate of return to compare energy projects. CO4: Evaluate energy conservation opportunities in Thermal Utilities. CO5: Generalize electrical load management and accurately predict the electricity bill required for the installation. CO6: Categorize cogeneration processes and various heat recovery devices to develop clean development mechanism.
	402046	Project – I	CO1: Knowledge Application & Independent Learning: Ability to apply multidisciplinary knowledge CO2: Problem Solving Skills: Ability to design, analyze and solve engineering problem by doing project CO3: Optimization: Ability to optimize method and process with help of project CO4: Collaboration: Promotes independent logical thinking and capability to work in team. CO5: Communication: Ability to demonstrate effective verbal and written communication skills CO6: Ethics: Provide solution to industrial/agricultural problems considering social, safety, environmental, ethical and legal issues
	402047	Energy Engineering	CO1: Describe the power generation scenario and Identify the components of thermal power plant and illustrate the Rankine cycle, Cogeneration cycle CO2: Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same CO3: Recognize the layout, component details of hydroelectric power plant and nuclear power plant. CO4: Describe the details of diesel power plant, gas power plant and analyze gas turbine power cycle. CO5: Explain the fundaments of non-conventional power plants CO6: Describe the different power plant instruments and analyze economics of power generation.

	402048	Mechanical System Design	CO1: Understand the difference between component level design and system level design. CO2: Design mechanical systems like machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated CO3: Ability to apply the statistical considerations in design and analyze the defects and failure modes in components. CO4: Recognize thick & thin cylinders, categorize different pressure vessels and design them using codes and Standards CO5: Identify materials for IC engine components and apply design procedure to design IC engine components. CO6: Learn optimum design principles and apply it to mechanical components.
	402049 A	402049 A Elective –III	CO1: Understand the importance of Tribology in Industry. CO2: Understand the basic concepts of Friction, Wear, Lubrications and their measurements. CO3: Understand the performance of different types of bearings. CO4: Apply the principles of surface engineering for different applications of tribology. CO5: Understand Rheodynamics (Static) Lubrication characteristics, materials in extreme environments CO6: Understand and apply the basic design calculations of hydrodynamic lubrication problems, including thrust bearings and journal bearings

Mechanical Engineering (B.E) 2015 Course	402049 B	Elective –III Industrial Engineering	CO1: Analyze and implement different concepts involved in method study to improve productivity CO2: Design and Develop different aspects of work system and facilities CO3: Undertake project work based on modeling & simulation area. CO4: Apply the Industrial Engineering concept CO5: Understand and Apply Industrial safety standards, financial management practices. CO6: An ability to analyze, interpret data and use engineering judgment to draw conclusions
	402049 C	Elective –III Robotics	CO1: Identify different type of robot configuration with relevant terminology. CO2: Select suitable sensors, actuators and drives for robotic systems. CO3: Understand kinematics in robotic systems. CO4: Design robot with desired motion with suitable trajectory planning. CO5: Select appropriate robot programming for given application. CO6: Understand need of IoT, machine learning, simulation in robotics
	402050 A	Elective –IV Advanced Manufacturing	CO1: Classify and analyze special forming processes and advanced joining processes CO2: Select appropriate micro and nano fabrication techniques for engineering applications CO3: Analyze effects of chemical composition, composition variation, crystal structure. CO4: Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques CO5: Understand and apply various additive manufacturing technology for product development CO6: Illustrate various non-traditional machining techniques
	402050 B	Elective–IV Solar and Wind Energy	CO1: Design of solar food drier for domestic purpose referring existing system CO2: Design of parabolic dish solar cooker for domestic purpose referring existing system CO3: Design of solar photovoltaic system for domestic purpose referring existing system CO4: Design miniature wind mill for domestic purpose referring existing system CO5: Understand of renewable and non-renewable sources of energy CO6: Gain knowledge about working principle of various solar energy systems

	402050 B	Elective – IV Product Design and Development	CO1: Ability to employ engineering, scientific, and mathematical principles CO2: Execute a design from concept to finished product CO3: Ability to work in a team to successfully complete a product design. CO4: Ability to identify the customer needs, selection of processes and materials. CO5: Provide solution to problems considering social, safety, environmental, ethical and legal issues CO6: Illustrate various approaches and techniques for designing and developing products
	402051	Project-II	CO1: Knowledge Application & Independent Learning: Ability to apply multidisciplinary knowledge CO2: Problem Solving Skills: Ability to design, analyze and solve engineering problem by doing project CO3: Optimization: Ability to optimize method and process with help of project CO4: Collaboration: Promotes independent logical thinking and capability to work in team. CO5: Communication: Ability to demonstrate effective verbal and written communication skills CO6: Ethics: Provide solution to industrial/agricultural problems considering social, safety, environmental, ethical and legal issues. CO6: Understand the causes of corrosion and methods for minimizing corrosion.

Program Name	**Course Code**	**Course Name**	**Course Outcomes**
Mechanical Engineering (S.E) 2019 Course	202041	Solid Mechanics	CO1. DEFINE various types of stresses and strain developed on determinate and indeterminate members. CO2. DRAW Shear force and bending moment diagram for various types of transverse loading and support. CO3. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam. CO4. CALCULATE torsional shear stress in shaft and buckling on the column. CO5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element. CO6. UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.
	202042	Solid Modeling and Drafting	CO1. UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management CO2. UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry CO3. CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system CO4. APPLY geometric transformations to simple 2D geometries CO5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc. CO6. USE PMI & MBD approach for communicatio

	202043	Engineering Thermodynamics	CO1. DESCRIBE the basics of thermodynamics with heat and work interactions. CO2. APPLY laws of thermodynamics to steady flow and non-flow processes. CO3. APPLY entropy, available and non available energy for an Open and Closed System, CO4. DETERMINE the properties of steam and their effect on performance of vapour power cycle. CO5. ANALYSE the fuel combustion process and products of combustion. CO6. SELECT various instrumentations required for safe and efficient operation of steam generator.
	202044	Engineering Materials and Metallurgy	CO1. COMPARE crystal structures and ASSESS different lattice parameters. CO2. CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials. CO3. DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials. CO4. IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc. CO5. ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy. CO6. SELECT appropriate materials for various applications
Mechanical Engineering (S.E) 2019Course	202045	Dimensioning and Tolerancing Lab	CO1. SELECT appropriate IS and ASME standards for drawing CO2. READ & ANALYSE variety of industrial drawings CO3. APPLY geometric and dimensional tolerance, surface finish symbols in drawing CO4. EVALUATE dimensional tolerance based on type of fit, etc. CO5. SELECT an appropriate manufacturing process using DFM, DFA, etc.
	203156	Electrical and Electronics Engineering	CO1. APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems CO2. DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board CO3. UNDERSTAND the operation of DC motor, its speed control methods and braking CO4. DISTINGUISH between types of three phase induction motor and its characteristic features CO5. EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems CO6. CHOOSE energy storage devices and electrical drives for EVs
Mechanical Engineering (S.E) 2019Course	202007	Engineering Mathematics - III	CO1. SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems. CO2. APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications. CO3. APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control. CO4. PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems. CO5. SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.

	202047	Kinematics of Machinery	CO1. APPLY kinematic analysis to simple mechanisms CO2. ANALYZE velocity and acceleration in mechanisms by vector and graphical method CO3. SYNTHESIZE a four bar mechanism with analytical and graphical methods CO4. APPLY fundamentals of gear theory as a prerequisite for gear design CO5. CONSTRUCT cam profile for given follower motion
Mechanical Engineering (S.E) 2019Course	202048	Applied Thermodynamics	CO1. DETERMINE COP of refrigeration system and ANALYZE psychrometric processes. CO2. DISCUSS basics of engine terminology,air standard, fuel air and actual cycles. CO3. IDENTIFY factors affecting the combustion performance of SI and CI engines. CO4. DETERMINE performance parameters of IC Engines and emission control. CO5. EXPLAIN working of various IC Engine systems and use of alternative fuels. CO6. CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors
	202049	Fluid Mechanics	CO1. DETERMINE various properties of fluid CO2. APPLY the laws of fluid statics and concepts of buoyancy CO3. IDENTIFY types of fluid flow and terms associated in fluid kinematics CO4. APPLY principles of fluid dynamics to laminar flow CO5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface CO6. CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws
M e	202050	Manufacturing Processes	CO1. SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process CO2. UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling CO3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations CO4. CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics CO5. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques CO6. UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites

	202051	Machine Shop	CO1. PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique CO2. MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques CO3. PERFORM cylindrical/surface grinding operation and CALCULATE its machining time CO4. DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine CO5. PREPARE industry visit report

			CO6. UNDERSTAND procedure of plastic processing
	202052	Project Based Learning - II	CO1. IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives. CO2. ANALYZE the results and arrive at valid conclusions. CO3. PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge. CO4. CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures. CO5. USE of technology in proposed work and demonstrate learning in oral and written form. CO6. DEVELOP ability to work as an individual and as a team member.

Mechanical Engineering (TE) 2019Course	302041	Numerical and Statistical Methods	CO1: SOLVE system of equations using direct and iterative numerical methods. CO2: ESTIMATE solutions for differential equations using numerical techniques. CO3: DEVELOP solution for engineering applications with numerical integration. CO4: DESIGN and CREATE a model using a curve fitting and regression analysis. CO5: APPLY statistical Technique for quantitative data analysis. CO6: DEMONSTRATE the data, using the concepts of probability and linear algebra.
	302042	Heat and Mass Transfer	CO1. ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system. CO2. DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction. CO3. EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results. CO4. INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces. CO5. ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems. CO6. DESIGN & ANALYSIS of heat transfer equipment's and investigation of its performance.
	302042	Design of Machine Elements	CO1. DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading. CO2. DESIGN shafts, keys and couplings under static loading conditions. CO3. ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack. CO4. EVALUATE dimensions of machine components under fluctuating loads. CO5. EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints. CO6. APPLY the design and development procedure for different types of springs.

	302044	Mechatronics	CO1. DEFINE key elements of mechatronics, principle of sensor and its characteristics. CO2. UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O. CO3. DETERMINE the transfer function by using block diagram reduction technique. CO4. EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system. CO5. APPLY the concept of different controller modes to an industrial application. CO6. DEVELOP the ladder programming for industrial application.
Mechanical Engineering (TE) 2019Course	302045A	Advanced Forming & Joining Processes	CO1. ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations CO2. ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications CO3. ANALYSE the effect of HAZ on microstructure and mechanical properties of materials CO4. CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications CO5. CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications. CO6. INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry.
	302045 B	Machining Science &Technology	CO1. DEFINE metal cutting principles and mechanics of metal cutting and tool life. CO2. DESCRIBE features of gear and thread manufacturing processes. CO3. SELECT appropriate grinding wheel and demonstrate the various surface finishing processes. CO4. SELECT appropriate jigs/fixtures and to draw the process plan for a given component. CO5. SELECT & EVALUATE various parameters of process planning. CO6. GENERATE CNC program for Turning / Milling processes and generate tool path using CAM software
	302046	Digital Manufacturing Laboratory	CO1. DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques. CO2. ANALYZE cutting tool parameters for machining given job. CO3. DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools. CO4. SELECT and DESIGN jigs and Fixtures for a given component. CO5. DEMONESTRATE different parameters for CNC retrofitting and reconditioning.
	302047	Skill Development	CO1. APPLY& DEMONSTRATE procedure of assembly & disassembly of various machines. CO2. DESIGN & DEVELOP a working/model of machine parts or any new product. CO3. EVALUATE fault with diagnosis on the machines, machine tools and home appliances.

			CO4. IDENTIFY & DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection.
Mechanical Engineering (TE) 2019Course	302049	Artificial Intelligence & Machine Learning	CO1. DEMONSTRATE fundamentals of artificial intelligence and machine learning. CO2. APPLY feature extraction and selection techniques. CO3. APPLY machine learning algorithms for classification and regression problems. CO4. DEVISE AND DEVELOP a machine learning model using various steps. CO5. EXPLAIN concepts of reinforced and deep learning. CO6. SIMULATE machine learning model in mechanical engineering problems
	302050	Computer Aided Engineering	CO1: DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations. CO2: APPLY the various meshing techniques for better evaluation of approximate results. CO3: APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution. CO4: ANALYZE and APPLY various numerical methods for different types of analysis. CO5: EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method. CO6: GENERATE the results in the form of contour plot by the USE of CAE tools.
	302051	Design of Transmission Systems	CO1. APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T. CO2. EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards. CO3. SELECT&DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters. CO4. DEFINE and DESIGN various types of Clutches, Brakes, used in automobile. CO5. APPLY various concept to DESIGN Machine Tool Gear box, for different applications CO6. ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.
	302052 A	Composite Materials	CO1. DEFINE & COMPARE composites with traditional materials. CO2. IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite CO3. CATEGORISE and APPLY Metal Matrix Process from possessions landscape. CO4. DETERMINE volume/weight fraction and strength of Composites. CO5. SELECT appropriate testing and inspection method for composite materials. CO6. SELECT composites materials for various applications.

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			CO1. DEMONSTRATE professional competence through industry internship. CO2. APPLY knowledge gained through internships to complete academic activities in a professional manner. CO3. CHOOSE appropriate technology and tools to solve given problem. CO4. DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life. CO5. DEVELOP network and social circle, and DEVELOPING relationships with industry people. CO6. ANALYZE various career opportunities and DECIDE career goals

Program Name	Course Code	Course Name	Course Outcome
First Year Engineering 2019 Course	107001	Engineering Mathematics-I	CO1: Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems.
			CO2: The Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
			CO3: To deal with derivative of functions of several variables that are essential in various branches of Engineering.
			CO4: To apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.
			CO5: the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equations, finding linear and orthogonal transformations, Eigen values and Eigen vectors applicable to engineering problems
	107002	Engineering Physics	CO1: Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.
			CO2: Learn basics of lasers and optical fibers and their use in some applications.
			CO3: Understand concepts and principles in quantum mechanics. Relate them to some applications.
			CO4: Understand theory of semiconductors and their applications in some semiconductor devices.
			CO5: Summarize basics of magnetism and superconductivity. Explore few of their technological applications.
			CO6: Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterial's and their application.
	102003	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	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 phase or arithmetic
			CO3: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phase or diagram.
			CO4: Relate phase and line electrical quantities in poly phase 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.

Program Name	Course Code	Course Name	Course Outcome
First Year Engineering 2019 Course	111006	WORKSHOP PRACTICE	CO1:Hands-on experience on various manufacturing processes.
			CO2: Ability to analyze Mechanical systems and its manufacturing.
			CO3: Proficiency in selection of materials for machining.
			CO4: Understand carpentry, fitting basics and application.
			CO5: Understand different Welding and joining processes.
			CO6: Ability to analyze and understand the metal cutting process.
		Engineering Mathe	CO1: Understand the effective mathematical tools for solutions of first order differential equations.
			CO2: Apply knowledge of differential equation for Newton's law of cooling, electrical circuit, rectilinear motion, SHM, heat conduction, chemical problems etc.

			CO3: Identify Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
			CO4: Develops the ability to trace the curve for given equation of curve and its nature, evaluation of some special function beta and gamma.
			CO5: Understand the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
			CO6: Evaluate multiple integral and apply the concept of multiple integrals to engineering applications (area, volume, CG etc.)
	102013	Basic Mechanical Engineering	CO1: Understanding the working principle of basic Mechanical components/ devices like transmission drives, shaft, axles, keys, etc.
			CO2: Understand the concept of various materials used in industry.
			CO3: Knowledge about Mechanical systems as well as industrial applications.
			CO4: Discuss several manufacturing processes and identify the suitable process.
			CO5: Explain various types of mechanism and its application.
			CO6: Explain basic laws of thermodynamics, heat transfer and their applications.
	101011	Engineering Mechanics	CO1: Determine resultant of various force systems
			CO2: Calculate position, velocity and acceleration of particle using principles of kinetics & Kinematics
			CO3: Calculate position, velocity and acceleration of particle using Newton's second law
			CO4: Calculate power, work, energy and impulse by using principle of motion for particle
			CO5: Determine reactions of beams, calculate forces in cables using principles of equilibrium
			CO6: Analysis of plane trusses and solve problems related to friction.
	110005	Programming and Problem Solving	CO1: Inculcate and apply various skills in problem solving.
			CO2: Choose most appropriate programming constructs and features to solve the problems in diversified domains.
			CO3: Exhibit the programming skills for the problems those require the writing of well documented
			CO4: Demonstrate significant experience with the Python program development environment.
First Year Engineering 2019 Course	101007	Environmental Studies-I	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.
	101008	Engineering	CO1: the effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.

			CO2: advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.
			CO3: to trace the curve for a given equation and measure arc length of various curves.
			CO4: the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
	107009	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.
	104010	Basic Electronics Engineering	CO1: Explain the working of P-N junction diode and its circuits.
			CO2: Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET.
			CO3: Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops
			CO4: Use different electronics measuring instruments to measure various electrical parameters.
			CO5: Select sensors for specific applications.
	102012	Engineering Graphics	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	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.
First Y	10101	Environme	CO1: Have an understanding of environmental pollution and the science behind those problems and potential solutions.

			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.