Department of Civil Engg.
COURSE OUTCOMES

1st Sem

18CIV14/24	CO1	Understanding various fields of Civil Engineering, importance of infrastructural development and its significance
	CO2	Determining the resultant of given force systems and analyzing bodies with rough surface of contact
	CO3	Compute the reactive forces in beams and trusses and the effects that develop as a result of the external loads
	CO4	Locate the centroid and compute moment of inertia of regular and built up sections
	CO5	Categorize the various types of motion of bodies and illustrating through numerical problems

3rd Sem

17MAT31	CO1	Know the use of periodic signals and Fourier series to analyze circuits and systems communication.
	CO2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier transform and z-transform.
	CO3	Employ appropriate numerical methods to solve algebraic and transcendental equations..
	CO4	Apply Green;s theorem, Divergence theorem and Stokes theorem in various application in the field of electro-magnetic and gravitational fields and fluid flow problems.
	CO5	Determine the extremals of functional and solve the simple problems of the calculus of variations
17CV32	CO1	Understand the strength and behavior of various structural elements for the applied forces. (Compression, tension, shear, bending and torsion)
	CO2	Evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts
	CO3	Maximize or minimize the sections of the material for the applied loads (bending, shear stress and torsion)
	CO4	Interpret the basic concept of vertical structural elements (columns and struts).
17CV33	CO1	Understand fundamental properties of fluids and fluid Continuum
	CO2	Evaluate the applied pressure on the material due to applied due to static

		conditions of fluids(including practical applications).
	CO3	Apply principles of mathematics to represent kinematic concepts related to fluid flow
	CO4	Formulate the flow equation based on the Bernoulli's principle
	CO5	Determine the discharge through pipes and over notches and weirs
17CV34	CO1	Understand fundamental principles Geodetics
	CO2	Evaluate linear and angular dimensions applied to basic surveying problems.
	CO3	Capture geodetic data to process and perform analysis for survey problems
	CO4	Analyse the obtained spatial data and compute areas and volumes.
17CV35	CO1	Apply the knowledge of geology and its role in Civil Engineering
	CO2	Utilization of earth's materials such as mineral, rocks and water in civil engineering practices.
	CO3	Analyze the natural disasters and their mitigation.
	CO4	Identify various structural features and geological tools in ground water exploration
	CO5	Select the appropriate building materials in construction
17CV36	CO1	Develop knowledge of material science and behaviour of various building materials used in construction.
	CO2	Identify the construction materials required for the assigned work.
	CO3	Provide procedural knowledge of the simple testing methods of cement, lime and concrete etc.
	CO4	Adopt suitable repair and maintenance work to enhance durability of buildings.
17CVL37	CO1	Evaluate the strength of materials in tension, compression, shear and torsion using professional practice.
	CO2	Develop a solution to engineering problem
17CVL38	CO1	Apply the basic principles of engineering surveying for linear and angular measurements.
	CO2	Comprehend effectively field procedures required for a professional surveyor.
	CO3	Choose the techniques, skills and conventional surveying instruments necessary for engineering practice.

4th Sem

17MAT41	CO1	Use appropriate single step and multi step numerical methods to solve first and second order differential equation arising in flow data design problems
	CO2	Explain the idea of analyticity, potential fields residues and poles of complex potentials in field theory and electromagnetic theory.
	CO3	Employ Bessel's functions and Legendre's polynomial for tackling problems arising in continuum mechanics, hydrodynamics and heat conduction.

	CO4	Describe Random variables and Probability distributions using rigorous statistical methods to analyze problems associated with optimization of digital circuits, coding theory and stability analysis of systems.
	CO5	Apply the knowledge of joint probability distribution and Markov chains in attempting engineering problems for feasible random events.
17CV42	CO1	Determine the forces in determinate trusses by method of joints and sections.
	CO2	Solve for the deflection of cantilever, simply supported and overhanging beams by different methods
	CO3	Apply the energy principles and energy theorems to determine the deflections of trusses and bent frames.
	CO4	Determine the stress resultants in arches and cables.
	CO5	Construct Influence Line Diagram for the moving loads.
17CV43	CO1	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters
	CO2	Design the open channels of various cross sections including economical channel sections
	CO3	Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation,
	CO4	Compute water surface profiles at different conditions
	CO5	Design turbines for the given data, and to know their operation characteristics under different operating conditions
17CV44	CO1	Understand material characteristics and their influence on microstructure of concrete.
	CO2	Distinguish concrete behavior based on its fresh and hardened properties.
	CO3	Design of different types of concrete mixes for required fresh and hardened properties using professional codes.
17CV45	CO1	Identify the type of soil based on physical properties
	CO2	Evaluate the engineering properties of soil in terms of shear and compressibility
	CO3	Compute the effective stresses of the soil strata
	CO4	Interpret the effect of hydraulic conductivity of the soils.
	CO5	Predict the failure behaviour of soils
17CV46	CO1	Apply the knowledge of geometric principles to arrive at surveying problems
	CO2	Analyze the geo-spatial data obtained using modern surveying instruments and apply the same to appropriate engineering problems.
	CO3	Interpretation of data to analyze the survey problems with the use of electronic instruments;
	CO4	Design and implement the different types of curves for deviating type of alignments.
17CVL47	CO1	Develop procedure for standardization of experiments.

	CO2	Calibrate flow discharge measuring devices used in pipes, channels and tanks.
	CO3	Determine fluid and flow properties.
	CO4	Characterize laminar and turbulent flows.
	CO5	Test the performance of pumps and turbines
15CSL48	CO1	Identify the minerals and rocks and utilize them effectively in civil engineering practices
	CO2	Understand and interpret the geological conditions of the area for the implementation of civil engineering projects.
	CO3	Interpret subsurface information such as thickness of soil, weathered zone, depth of hardrock and saturated zone by using geophysical methods.
	CO4	Understand the techniques of drawing the curves of electrical resistivity data and its interpretation for geotechnical and aquifer boundaries.

5th Sem

	CO1	Explain the basic concepts of limit state method of design
	CO2	Analyze singly, doubly reinforced and flanged beams for flexure and shear
15CV51	CO3	Design singly, doubly reinforced and flanged beams using limit state method
	CO4	Design different types of slabs, stairs, columns and footing
15CV52	CO1	Explain the basic concepts of Slope Deflection Method, Moment Distribution Method and Kani's Method for the analysis of beams and plane frames
	CO2	Analyze beams and plane frames using Slope Deflection Method, Moment Distribution Method and Kani's Method
	CO3	Analyze of continuous beams, plane trusses and using rigid frames Flexibility Method
	CO4	Analyze of continuous beams, plane trusses and using rigid frames Stiffness Method
15CV53	CO1	Estimate the geotechnical engineering properties through subsurface exploration program
	CO2	Analyse the stresses and settlements of soils due to super-imposed loads
	CO3	Discuss the important parameters in determination of ultimate and safe loads for shallow and pile foundations
	CO4	Predict the horizontal thrust and failure surface for earth retaining structures
	CO5	Design the geometry of the shallow(isolated and combined) footings.
15CV54	CO1	Explain the basic concepts CAD drawing tools
	CO2	Prepare drawings Building Related Elements

	CO3	Develop drawings for Functional planning of residential and public buildings
15CV551	CO1	Identify the sources, causes & effects of air pollution
	CO2	Analyze the environmental impacts of air pollution
	CO3	Identify & explain the meteorological components & models
	CO4	Apply the sampling & control techniques
15CV552	CO1	Develop layout plans for different transport modes
	CO2	Design of geometric aspects for railway system, runways, tunnelling and taxiway
	CO3	Characterize & Estimate the material quantity required for laying a railway track
15CV561	CO1	Understand and identify the fundamental components of traffic engineering
	CO2	Collection and analysing traffic survey data
	CO3	Design and detailing of various types of intersections
	CO4	Evaluate traffic impacts on environment and traffic safety measures
	CO5	Recommend suitable traffic management and demand management measures
15CV564	CO1	Identify hazards in the workplace that pose a danger or threat to their safety or health, or that of others
	CO2	Explain unsafe or unhealthy hazards and propose methods to eliminate the hazard
	CO3	Outline the occupational Health and Safety Regulations as well as supported legislation
	CO4	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors
	CO5	Choose the correct decisions required to maintain protection of the environment, workplace as well as personal health and safety
15CVL57	CO1	Physical and index properties of the soil
	CO2	Classify based on index properties and field identification
	CO3	To determine OMC and MDD, plan and assess field compaction program
	CO4	Shear strength and consolidation parameters to assess strength and deformation characteristics
	CO5	In-situ shear strength characteristics (SPT- Demonstration)
15CVL58	CO1	Conduct appropriate laboratory experiments and interpret the results
	CO2	Determine the quality and suitability of cement
	CO3	Design appropriate concrete mix
	CO4	Determine strength and quality of concrete
	CO5	Test the road aggregates and bitumen for their suitability as road material
	CO6	Test the soil for its suitability as sub grade soil for pavements

6th Sem

15CV61	CO1	Outline the various construction management process.
	CO2	Select various construction equipment and materials.
	CO3	Identify the Construction Quality and safety
	CO4	Solve variety of issues that are encountered by every professional in discharging professional duties
	CO5	Recognize the significance of engineering economy and entrepreneurship
15CV62	CO1	Explain the basic concepts of design of steel structures and plastic analysis
	CO2	Design of bolted and welded connections
	CO3	Design of steel members subjected to axial load
	CO4	Analyze and design of steel members under flexure
15CV63	CO1	Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data
	CO2	Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction
	CO3	Design road geometrics, structural components of pavement and drainage
	CO4	Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts
15CV64	CO1	Compare average and peak water demand for a community
	CO2	Explain available sources of water, quantitatively and qualitatively and make appropriate choice for a community
	CO3	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system
	CO4	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards
15CV651	CO1	Explain existing solid waste management system and to identify their drawbacks
	CO2	Show different elements of solid waste management system
	CO3	Outline suitable scientific methods for solid waste management elements
	CO4	Design suitable processing system and evaluate disposal sites
15CV661	CO1	Evaluation of groundwater potential
	CO2	Discuss the concept related to planning and management of water resources
	CO3	To recognize and implement IWRM in different sectors
	CO4	Explain the legal issues of water policies
	CO5	Identify the methods for water harvesting based on the area
15CVL67	CO1	Use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work
15CVL68	CO1	Apply Surveying knowledge and tools effectively for the projects
	CO2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance

		expectations, technical and behavioral competencies
	CO3	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills
	CO4	Professional etiquettes at workplace, meeting and general
	CO5	Establishing trust-based relationships in teams & organizational environment
	CO6	Orientation towards conflicts in team and organizational environment, Understanding sources of conflicts, Conflict resolution styles and techniques

7th Sem

15CV71	CO1	Design municipal and industrial sewage treatment plant.
	CO2	Estimate the degree and type of treatment for disposal, reuse and recycle
	CO3	Analyse waste water characteristics
	CO4	Recognize the common physical, chemical and biological unit operations encountered in treatment processes
	CO5	Communicate with the stake holders on sewage and industrial effluent issues
15CV72	CO1	Analyze and Design RCC footing, retaining wall, water tanks and portal frame using relevant Indian standard codal provisions.
	CO2	Analyze and Design Steel roof truss, plate girder and gantry girder using IS 800:2007.
15CV73	CO1	Apply the knowledge of hydrological cycle components and its importance
	CO2	Estimate the precipitation, its losses
	CO3	Assess runoff and develop unit hydrographs
	CO4	Apply the various methods of irrigation for different field conditions
	CO5	Estimate quantity of irrigation water and frequency of irrigation water for various crops
	CO6	Design the components canal systems
15CV741	CO1	Apply IRC standards for load calculations on bridges
	CO2	Analyse & Design the slab and T beam bridges
	CO3	Analyse & Design Box culvert, pipe culvert

	CO4	Design Piers and abutments and use bearings, hinges and expansion joints
15CV742	CO1	Identify the basic characteristics of aquifers
	CO2	Estimate the quantity of ground water by various methods
	CO3	Locate prospective zones of groundwater availability
	CO4	Analyze the suitable techniques for groundwater exploration
	CO5	Select particular type of well to augment the ground water recharge
	CO6	Recommend methods of water harvesting structures based on the terrain conditions
15CV751	CO1	Analyse the data required for transportation planning
	CO2	Formulate transportation project planning and development
	CO3	Predict future trip distribution rate for the study area
	CO4	Develop modal split and trip assignment techniques for various travel patterns
	CO5	Validate the developed model for long term transportation plan
15CVL76	CO1	Analyse & Estimate the various parameters present in water and waste water
	CO2	Compare the result with Codal provisions.
	CO3	Evaluate type of treatment, degree of treatment for water and waste water
	CO4	Conduct investigations on water, wastewater, air and noise using modern equipment.
	CO5	Formulate the problem statement and remedial solutions for their project work.
15CVL77	CO1	Analyse the data furnished for detailing
	CO2	Prepare the detailed structural drawings based on codal provisions
15CVL78	CO1	Identification of complex problems by comprehensive literature review and formulate the sustainable objectives.
	CO2	Design the methodology and selection of suitable materials for the experimental work or design the suitable methodology for the analysis
	CO3	Choose the appropriate approach for the condition of project
	CO4	Form a group to function effectively in a diverse teams and multidisciplinary settings
	CO5	Communicate effectively to address complex engineering problems with proper documentations, reports and presentations through ICT tools.

8th Sem

15CV81	CO1	Develop detailed and abstract estimates for Buildings and roads
	CO2	Evaluate valuation reports of buildings
	CO3	Interpret contract documents of Domestic Construction works
15CV82	CO1	Apply the knowledge in understanding concept of PSC.
	CO2	Analyse the forces in the PSC members.
	CO3	Estimate the losses and deflection of PSC members.
	CO4	Design PSC members subjected to flexure.
	CO5	Evaluate the anchorage zone stresses and design of shear and end block.
15CV833	CO1	Analyse stresses, strains and deflections using various theories
	CO2	Design of pavements as per codal provisions
	CO3	Evaluate the performance of pavements under extreme environmental conditions
	CO4	Predict the failure behaviour of flexible and rigid pavements
	CO5	Develop pavement maintenance solutions based on site specific requirements
	CO6	Analyse the field survey data for airfield pavements

Deparment of Computer Science & Engg

Course Outcomes During 2018-19 (For Naac)

3rd Sem

Course Code	Course Outcomes	Description
17MAT31	CO1	Make use of periodic signals and Fourier series to analyze circuits and systems communication.
	CO2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier transform and z-transform.
	CO3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
	CO4	Apply Green;s theorem, Divergence theorem and Stokes theorem in various application in the field of electro-magnetic and gravitational fields and fluid flow problems.
	CO5	Determine the extremals of functional and solve the simple problems of the calculus of variations. Utilize the concepts of functional and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits.
17CS32	CO1	Define and explain the current voltage characteristics of semiconductor and analog devices
	CO2	Demonstrate the combinational and sequential logic circuits by using various logical blocks..
	CO3	Design and Compare various digital data communication efficiency using Data Processing Circuits
	CO4	Apply various methods to get more efficient throughput in synchronous counters and sequential circuit applications using flip flop and registers
	CO5	Evaluate and develop an understanding the concept ADC, DAC blocks required for data conversion
17CS33	CO1	Apply the knowledge of fundamentals of C language and definition of data structure
	CO2	Analyze and demonstrate the stacks, queues operations and its applications
	CO3	Create data storage using linked lists concepts and demonstrate its applications
	CO4	Construct trees data structures and perform operations such as traversals,

		searching and expression evaluation.
	CO5	Use graph based data structure approach for storing, sorting, searching of data and understand file handling basics
17CS34	CO1	Explain the basic organization of a computer system.
	CO2	Examine the importance of I/O organization and interrupts in computer system
	CO3	Demonstrate functioning main memory and imporatnce of virtual memory and secondary storage
	CO4	Illustrate hardwired control and micro programmed control. pipelining, embedded and other computing systems
	CO5	Design and analyze simple arithmetic and logical units
17CS35	CO1	Understand multi user unix os and its basic features and variarion
	CO2	Interpret unix commands shell basics and shell environments using interpretive manner
	CO3	Design and develop shell programming using filters , communication, system calls and terminologies.
	CO4	Design and develop unix file IO , unix processes and awk programming
	CO5	Write pearl script
17CS36	CO1	Verify the correctness of an argument using propositional and predicate logic and truth tables.
	CO2	Demonstrate the ability to solve problems using counting techniques and combinatorics in the context of discrete probability
	CO3	Solve problems involving recurrence relations and generating functions.
	CO4	Construct proofs using direct proof, proof by contraposition, proof by contradiction, proof by cases, and mathematical induction.
	CO5	Explain and differentiate graphs and trees
17CSL37	CO1	Design different types of wiring and instruments connections and to evaluate performance characteristics of electronic circuits
	CO2	Choose testing and experimental procedures on different types of electronic circuit and analyze their operation different operating conditions..
	CO3	Identify the overheads in practical experiments simulations results

Course Code	Course Outcomes	Description
		and develop a new design to overcome those problem
17CSL38	CO1	Able to implement linear and non linear data structures and understand its applications
	CO2	Create and analyze searching and sorting algorithms in data structures.
	CO3	Demonstrate data structure for solving real world problems

4th Sem

Course Code	Course Outcomes	Description
17MAT41	CO1	Solve first and second order ordinary differential equations arising in flow problems using single step and multistep numerical methods
	CO2	Solve problems of quantum mechanics employing Bessel's function relating to cylindrical polar coordinate systems and Legendre's polynomials relating to spherical polar coordinate systems
	CO3	Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory Describe conformal and bilinear transformation arising in aerofoil theory, fluid flow visualization and image processing,
	CO4	Solve problems on probability distributions relating to digital signal processing ,Determine joint probability distributions and stochastic matrix connected with the multivariable correlation problems for feasible random events
	CO5	Draw the validity of the hypothesis proposed for the given sampling distribution in accepting or rejecting the hypothesis, Define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.
17CS42	CO1	Understand the object oriented concepts using C++
	CO2	Demonstrate the fundamentals of java and working of java development kit
	CO3	Understand object oriented concepts like class , inheritance, exception handling ,packages and interfaces in java
	CO4	Interpret exception handling and demonstrate multithreading in java
	CO5	Develop simple GUI and handling events using applets and swings
17CS43	CO1	Understand the basics of algorithm, methods for analyzing algorithm and also expressing the boundaries of efficiencies using asymptotic notations.
	CO2	Describe the method of divide and conquer and when to use such algorithms

	CO3	Describe dynamic programming paradigm and explain when an algorithm design situation calls for it
	CO4	Describe Backtracking and branch and bound approaches
	CO5	Analyze different classes of algorithms such as P,NP and NP hard.
17CS44	CO1	Describe the Architecture of 8086 & ARM
	CO2	llustrate the various addressing modes of 8086 & its operation
	CO3	Apply the concepts of 8086 in Hardware programming .
	CO4	Demonstatre the 8086 interrupts and its programming
	CO5	Explain the concepts of ARM interfacing and its applications
17CS45	CO1	Understand Software Engineering methods, software process models, ethical and professional issues.
	CO2	Analyze various system models in design and implementation
	CO3	Evaluate software to verify and validate using various testing methods.
	CO4	Create a quality project plan for software development .
	CO5	Apply advanced software development methods like agile programming for better software development practice.
17CS46	CO1	Illustrate basic computer network technology..
	CO2	Identify the different types of network topologies and protocols..
	CO3	Enumerate the layers of the OSI model and TCP/IP functions of each layer.
	CO4	Make out the different types of network devices and their functions within a network.
	CO5	Demonstrate the skills of IEEE Ethernet configurations..
17CSL47	**CO1**	Write programs in java to solve Various problems.
	CO2	implement Quicksort, Merge sort , and Dynamic algorithm
	CO3	implement Backtracking algorithms for the sum of subset and Hamiltonian cycle, greedy algorithm for Knapsack prims and kruskal's
17CSL48	CO1	Perceive the significance of the Assembly language programming (8086 and ARM)
	CO2	Develop application using 8086 instruction set
	CO3	Demonstrate the functioning of hardware devices and interfacing them to x86 and ARM family

5th Sem

15CS51	CO1	Define the management, organization , entrepreneur , planning ,staffing ,ERP.
	CO2	outline the importance of directing leadership styles, controlling and communication .
	CO3	Describe the quality and characteristics of entrepreneurs'.
	CO4	Utilize the resources available effectively through ERP.
	CO5	use of IPR's and institutional support in entrepreneurship.
15CS52	CO1	Demonstration of Application layer protocols.
	CO2	Recognize transport layer services and infer UDP/TCP protocols
	CO3	Classify routers, IP and Routing algorithms in Network layer.
	CO4	Disseminate the wireless and mobile networks covering IEEE 802.11 standard.
	CO5	Describe multimedia networking and network management.
15CS53	CO1	Learn the basic concepts, application and architecture of database systems
	CO2	Understand the design principles and representing the description of the database using E-R diagram, and Gain Knowledge on relational database theory
	CO3	Understand the basic of SQL and Construct queries using relational algebra expressions and SQL on commercial relational database system(oracle) and Illustrate to tune the database design using normalization Techniques
	CO4	Learn basics issues of transaction processing and concurrency control, recovery.
	CO5	Able to design and develop any database application system successfully
15CS54	CO1	Demonstrate an in-depth understanding of theories, concepts and techniques in automata and their link to computation.
	CO2	Compare the Different models of Computation like Deterministic, Non-deterministic and Software models.
	CO3	Describe Grammars and Automata for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.
	CO4	Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness.
	CO5	Formulate a problem with respect to different models of Computation.
15CS553	CO1	Able to Interpret the need of advanced java concepts such as enumerations, auto boxing and annotations
	CO2	Understand the working of collection framework and build programs in

		Java
	CO3	Able to demonstrate handling of string and implement the string operations
	CO4	Build web application using servlets, Java Server Pages and deployment in web server
	CO5	Illustrate the database access and manage data using JDBC concepts in Java
15CS562	CO1	Able to understand the problems, where AI is needed and solving using heuristic search approaches
	CO2	Analyze the issues in represent the knowledge and deriving rules to represent knowledge
	CO3	understand and analyze the different AI techniques to solve problems
	CO4	Define learning techniques and compare learning techniques
	CO5	Discuss on Natural Language Processing and Expert systems
15CS564	CO1	Build applications on Visual Studio .NET platform by understanding the syntax and semantics of C#.
	CO2	Demonstrate Object Oriented Programming concepts in C# programming language.
	CO3	Design custom interfaces for applications and leverage the available built-in interfaces in building complex applications
	CO4	Illustrate the use of generics and collections in C#.
	CO5	Compose queries to query in-memory data and define own operator behavior.
15CSL57	CO1	1Analyze and Compare various networking protocols, security and error checking mechanisms
	CO2	Demonstrate the working of different concepts of computer networking
	CO3	Analyze, Implement and evaluate networking protocols in NS2 / NS3
15CSL58	CO1	Create, Update and query on the database.
	CO2	Demonstrate the working of different concepts of DBMS
	CO3	Implement, analyze and evaluate the project developed for an application

6th Sem

	CO1	Discuss cryptography and its need to various applications.
	CO2	Design and develop simple cryptography algorithms.
15CS61	CO3	Analyze different digital signature algorithm and key management techniques
	CO4	Compare and examine different protocols used in Wireless LAN.
	CO5	Understand cyber security and cyber Law needs.

15CS62	CO1	Explain the concepts of computer graphics and usage of openGL.
	CO2	Illustrate geometric transformation and viewing functions on 2D objects.
	CO3	Demonstrate the concepts of clipping, 3D transformations, color and illumination model.
	CO4	Differentiate various projection and viewing techniques on 3D objects.
	CO5	Demonstrate the use of various APIs for input interaction to develop GUI.
15CS63	CO1	Discuss & understand the various functions features of assemblers, loaders, linkers & microprocessors
	CO2	Write object code for a given assembly level language program
	CO3	Describe basics of compilers and its phases
	CO4	Illustrate the problems related to SR parsing, compute FIRST and FOLLOW sets,LL1) and SLR parsing
	CO5	Write SDT's ,intermediate code and generate target code
15CS64	CO1	Demonstrate need for OS and different types of OS
	CO2	Apply suitable techniques for management of different resources
	CO3	Use processor , memory, storage and file system commands
	CO4	Define deadlock situation and solve deadlock scenarios in a OS
	CO5	Realize the different concepts of OS in platform of usage through case studies
15CS651	CO1	Understand the basics concepts of data mining and data warehousing
	CO2	Identify data mining problems and implement the data warehouse
	CO3	Write association rules for a given data pattern
	CO4	Describe the classification and clustering techniques
	CO5	Choose between classification and clustering solution for a given problem
15CS653	CO1	Define and Explain the basic necessity to operate the problem.
	CO2	Solve the Various problem using different optimization techniques.
	CO3	Understand and Examine the given problem as transportation and assignment problem and solve.
	CO4	Evaluate the game theory for decision support system.
	CO5	Design lower-level procedure or heuristic (partial search algorithm) that may provide a sufficiently good solution to an optimization problem, especially with incomplete or imperfect information or limited computation capacity
15CS664	CO1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.

	CO2	Demonstrate proficiency in handling Strings and File Systems.
	CO3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
	CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
	CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.
15CS661	CO1	Create, test and debug Android application by setting up Android development environment
	CO2	Implement adaptive, responsive user interfaces that work across a wide range of devices.
	CO3	Infer long running tasks and background work in Android applications.
	CO4	Demonstrate methods in storing, sharing and retrieving data in Android applications.
	CO5	Describe the steps involved in publishing Android application to share with the world.
15CSL67	CO1	Implement and demonstrate Lexer's and Parser's
	CO2	Implement and demonstrate top down. Bottom up parsing and generation of intermediate code.
	CO3	Implement different algorithms required for memory management, process scheduling, Resource allocation used in OS
15CSL68	CO1	Illustrate the concepts of computer graphics and Implement computer graphics applications using OpenGL
	CO2	Develop and execute polygon filling, clipping algorithms and animate curves using OpenGL
	CO3	Design and Implement basic transformations and viewing functions on objects using OpenGL for real world problems.

7th Sem

	CO1	Adapt HTML and CSS syntax and semantics to build web pages.
	CO2	Construct and visually format tables and forms using HTML and CSS
15CS71	CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
	CO4	Appraise the principles of object oriented development using PHP
	CO5	Inspect JavaScript frameworks like Jquery and backbone which facilitates developer to focus on core features.
15CS72	CO1	Students should be able to explain the concepts of parallel computing and network technologies
	CO2	Compare and contrast the parallel architecture
	CO3	illustrate parallel programming concepts
	CO4	.Understand the concept of memory hierarchy and its importance

	CO5	understand the concepts of advances in computer architecture area
15CS73	CO1	Differentiate supervised and unsupervised techniques
	CO2	Identify optimal techniques suitable for a given problem
	CO3	Evaluate learning algorithms
	CO4	Design an application using machine learning methods
	CO5	Apply reinforcement technique towards real world data analysis.
15CS753	CO1	Review the fundamental concepts of a digital image processing system.
	CO2	Analyze images in the frequency domain using various transforms.
	CO3	Evaluate the techniques for image enhancement and image restoration.
	CO4	Categorize various compression techniques
	CO5	Interpret Image compression standards and Interpret image segmentation and representation techniques.
15CS744	CO1	Analyze the UNIX kernel structure and system calls
	CO2	. Differentiate between ANSI C and C++ programming languages
	CO3	Master UNIX files I/O (i.e. open, close, read, write, seek)
	CO4	.Analyze the basic UNIX OS concepts such as: Process, program, process groups, signals, running programs, process control, address space, user and kernel modes, system calls, and context switching.
	CO5	Analyze the Interposes Communication using pipes, shared memory, semaphores and Messages
15CS743	CO1	To understand the Fundamentals and History of Cryptography
	CO2	To understand the Hash functions and Application of Hash Functions
	CO3	To acquire knowledge on password schemes and analyzing the simple Cryptographic Protocol
	CO4	To understand the various key distribution and management schemes
	CO5	To acquire basic knowledge of design a security applications in the field of Information technology
15CS754	CO1	Identify key challenges in managing information along with RAID implementations
	CO2	Describe different storage networking technologies and virtualization.
	CO3	Illustrate backup, archive and replication. Explain components and the implementation of NAS.
	CO4	Describe the cloud computing characteristics, deployments and infrastructure
	CO5	Illustrate the storage infrastructure and management activities.
15CSL77	CO1	Explore various python libraries useful for real time application and apply appropriate data sets to the Machine Learning algorithms

	CO2	Understand the implementation procedures for the machine learning algorithms.
	CO3	Identify and apply Machine Learning algorithms to solve real world problems.
15CSL78	CO1	Adapt HTML and CSS syntax and semantics to build web pages.
	CO2	Construct and visually format tables and forms using HTML and CSS
	CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.

8th Sem

	CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
	CO2	Compare and contrast the deployment of smart objects and the technologies to connect them to network
15CS81	CO3	Appraise the role of IoT protocols for efficient network communication
	CO4	Elaborate the need for Data Analytics and Security in IoT.
	CO5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.
	CO1	Understand the concept of HDFS and MapReduce framework
	CO2	Invistigate Hadoop related tools for Big Data analytics and perform basic Hadoop adminiostration
15CS82	CO3	Recognise the role of business intelligence, data warehousing and visualization in decision making
	CO4	Infer the importance of core data mining techniques for data analytics.
	CO5	Compare and contrast text mining, web mining, naïve-bayes analysis, support vector machines and social network analysis.
	CO1	Identify the role of important elements of discrete even simulation and modeling paradigm in real world.
	CO2	Describe the various distribution models and analyze various queuing models
15CS834	CO3	Examine and apply techniques for generating random numbers and random variates.
	CO4	Judge appropriate method for data collection and testing methods
	CO5	Sketch the model and apply the results to resolve critical issues in a real world environment

COURSE OUTCOMES ACADEMIC YEAR 2018-19

3rd Semester

17MAT31	CO1	Know the use of periodic signals and Fourier series to analyze circuits and systems communication.
	CO2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier transform and z-transform.
	CO3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
	CO4	Apply Green's theorem, Divergence theorem and Stokes theorem in various application in the field of electro-magnetic and gravitational fields and fluid flow problems.
	CO5	Determine the extremals of functional and solve the simple problems of the calculus of variations. Utilize the concepts of functional and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits
17EC32	CO1	Describe instrument measurement errors and calculate them.
	CO2	Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters.
	CO3	Describe functional concepts and operation of Digital voltmeters and instruments to measure voltage, frequency, time period, phase difference of signals, rotation speed, capacitance and pH of solutions.
	CO4	Describe functional concepts and operation of various Analog measuring instruments to measure field Strength, impedance, stroboscopic speed, in/out of phase, Q of coils, insulation resistance.
	CO5	Describe and discuss functioning and types of Oscilloscopes, Signal generators and Transducers.
	CO6	Utilize AC and DC bridges for passive component and frequency measurements.
17EC33	CO1	Develop the Ability to understand the design and working of BJT / FET amplifiers with small signal analysis.
	CO2	Analyse the low and high frequency responses of common amplifier circuits using BJT/FET.
	CO3	Evaluate the effect of negative feedback on different parameters of an Amplifier and different types of negative feedback topologies.
	CO4	Describe the effect of positive feedback and understand the working of different Oscillators using BJTS/FETs.
	CO5	Evaluate the efficiency of Class A and Class B power amplifiers and voltage regulators.
17EC34	CO1	Develop simplified switching equation using Karnaugh Maps and QuineMcClusky techniques.
	CO2	Explain the operation of decoders, encoders, multiplexers, demultiplexers, adders, subtractors and comparators
	CO3	Explain the working of Latches and Flip Flops (SR,D,T and JK).

	CO4	Design Synchronous/Asynchronous Counters and Shift registers using Flip Flops.
	CO5	Develop Mealy/Moore Models and state diagrams for the given clocked sequential circuits.
17EC35	CO1	Distinguish the networks and discuss various circuit analysis techniques.
	CO2	Analyze the circuit parameters during switching transients and apply Laplace transform to solve the given network
	CO3	Apply network theorems to solve a given network.
	CO4	Evaluate the frequency response for resonant circuits and the network parameters for two port networks.
17EC36	CO1	Evaluate problems on electric field due to point, linear, volume charges by applying conventional methods or by Gauss law.
	CO2	Determine potential and energy with respect to point charge and capacitance using Laplace equation.
	CO3	Calculate magnetic field, force, and potential energy with respect to magnetic materials.
	CO4	Apply Maxwell's equation for time varying fields, EM waves in free space and conductors.
	CO5	Evaluate power associated with EM waves using Poynting theorem.
17ECL37	CO1	Test circuits of rectifiers, clipping circuits, clamping circuits and voltage regulators.
	CO2	Determine the characteristics of BJT and FET amplifiers and plot its frequency response.
	CO3	Compute the performance parameters of amplifiers and voltage regulators
	CO4	Design and test the basic BJT/FET amplifiers, BJT Power amplifier and oscillators.
17ECL38	CO1	Demonstrate the truth table of various expressions and combinational circuits using logic gates.
	CO2	Explain the operation of decoders, encoders, multiplexers, demultiplexers, adders, subtractors and comparators
	CO3	Realize Boolean expression using decoders.
	CO4	Construct and test flips-flops, counters and shift registers
	CO5	Simulate full adder and up/down counters.

4th Semester

	CO1	Solve first and second order ordinary differential equations arising in flow problems using single step and multistep numerical methods
17MAT41	CO2	Solve problems of quantum mechanics employing Bessel's function relating to cylindrical polar coordinate systems and Legendre's polynomials relating to spherical polar coordinate systems

	CO3	Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory Describe conformal and bilinear transformation arising in aerofoil theory, fluid flow visualization and image processing,
	CO4	Solve problems on probability distributions relating to digital signal processing, determine joint probability distributions and stochastic matrix connected with the multivariable correlation problems for feasible random events
	CO5	Draw the validity of the hypothesis proposed for the given sampling distribution in accepting or rejecting the hypothesis, define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.
17EC42	CO1	Understand mathematical descriptions and representation of continuous and discrete time signals and systems.
	CO2	Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time systems.
	CO3	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
	CO4	Understand the limitations of Fourier transform and need for Laplace transform and develop the system in S domain.
	CO5	Understand the basic concepts of Z-transform and to develop the ability to analyze systems in Z-domain.
17EC43	CO1	Develop the mathematical model of mechanical and electrical systems.
	CO2	Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method.
	CO3	Determine the time domain specifications for first and second order systems.
	CO4	Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique.
	CO5	Determine the stability of a system in the frequency domain using Nyquist and bode plots
	CO6	Develop a control system model in continuous and discrete time using state variable techniques.
17EC44	CO1	Determine the performance of analog modulation schemes in time and frequency domains.
	CO2	Determine the performance of systems for generation and detection of modulated analog signals.
	CO3	Characterize analog signals in time domain as random processes and in frequency domain using Fourier transforms.

	CO4	Characterize the influence of channel on analog modulated signals
	CO5	Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.
17EC45	CO1	Acquire the knowledge to solve problems related to Operational amplifiers.
	CO2	Analyze the performance of Op-amp and its applications.
	CO3	Interpretation of Performance Characteristics of Practical Op-amps.
	CO4	Apply the knowledge gained to design practical circuits such as amplifiers, filters, oscillators, Multivibrators, voltage regulators and electronic systems.
17EC46	CO1	Explain the History of evaluation of Microprocessors, Architecture and instruction set of 8086, CISC & RISC, Von-Neumann & Harvard CPU Architecture, Configuration & Timing diagrams of 8086 and Instruction set of 8086.
	CO2	Develop 8086 Assembly level programs using the 8086 instruction set, modular programs using procedures
	CO3	Develop 8086 Stack and Interrupts programming, Use INT 21 DOS interrupt function calls to handle Keyboard and Display
	CO4	Interface 8086 to Static memory chips and 8255, 8254, 0808 ADC, 0800 DAC, Keyboard, Display and Stepper motors.
17ECL47	CO1	Program a microprocessor to perform arithmetic, logical and data transfer applications.
	CO2	Understand assembler directives, DOS Interrupts, branch and loop operations.
	CO3	Interface a microprocessor to various devices for simple applications.
	CO4	Effectively utilize microprocessor peripherals.
	CO5	Utilize procedures and macros for modular programming
17ECL48	CO1	Gain hands-on experience in building analog systems for a given specification using the basic building blocks.
	CO2	Gain hands-on experience in AM and FM techniques, frequency synthesis
	CO3	Gain hands-on experience in pulse and flat top sampling techniques
	CO4	Design and analyze the performance of instrumentation amplifier, LPF, HPF, DAC and oscillators using linear IC.
	CO5	Understand the applications of Linear IC for addition, integration and 555 timer operation to generate signals/pulses.

5th Semester

15ES51	CO1	Learn and explain basic is management and acquire basic managerial skills.

	CO2	Analyze the nature, purpose & objectives of Planning, Organizing & Staffing.
	CO3	Develop the factual leadership qualities for development of organizations
	CO4	Learn and build the qualities and characteristics of business ethics and entrepreneurs
	CO5	Describe the importance of small scale industries in economic development and institutional support to start a small scale industry and implement.
	CO6	Demonstrate the project management, product planning, project design and network analysis.
15EC52	CO1	Determine response of LTI systems using time domain and DFT techniques.
	CO2	Compute DFT of real and complex discrete time signals.
	CO3	Computation of DFT using FFT algorithms and linear filtering approach.
	CO4	Design of digital IIR and FIR filters
	CO5	Realization of filters in direct form, cascade, parallel and lattice structures
15EC53	CO1	Define and describe the usage of Verilog Hardware Description Language (HDL) in semiconductor technology and design flow of digital circuits
	CO2	Write Register Transfer Level (RTL) models of digital circuits in different modelling styles.
	CO3	Design dataflow and structural designing and verify the same models.
	CO4	Implement digital circuits in behavioural designing and verify the same models.
	CO5	Differentiate Verilog HDL and VHDL, design RTL code in VHDL.
15EC54	CO1	Ability to apply the mathematical knowledge of probability to measure information in discrete message source (Dependent and independent source)
	CO2	Apply source encoding algorithm such as Shannon coding, Huffman coding, Arithmetic coding to ensure transmission of information of a discrete message source using minimum number of bits.
	CO3	Ability to compute and analyze the capacity and efficiency of discrete and continuous time channels.
	CO4	Design encoding and decoding techniques for Linear block code, Cyclic code, Convolution code, BCH code and Golay code to ensure error free transmission of information of a discrete message source.
15EC553	CO1	Explain the goals, structure, operation and types of operating systems.
	CO2	Apply scheduling techniques to find performance factors
	CO3	Explain organization of file systems and IOCS.
	CO4	Apply suitable techniques for contiguous and non-contiguous memory allocation.
	CO5	Describe message passing, deadlock detection and prevention methods.

15EC562	CO1	Explain the object-oriented programming C++ program structure with all its components.
	CO2	Develop functions using classes and objects.
	CO3	Apply the concept of constructors, destructors and operator overloading for efficient programming.
	CO4	Apply the concept of inheritance, pointers, virtual functions and polymorphism features.
	CO5	Develop programs using suitable I/O and file operations for different application.
15EC561	CO1	Acquire an overview of automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.
	CO2	Use available automotive sensors and actuators while interfacing with microcontrollers / microprocessors during automotive system design
	CO3	Understand the networking of various modules in automotive systems, communication protocols and diagnostics of the sub systems.
	CO4	Design and implement the electronics that attribute the reliability, safety, and smartness to the automobiles, providing add-on comforts and get fair idea on future Automotive Electronic Systems
	CO5	Acquire an overview of automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.
15ECL57	CO1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.
	CO2	Modelling of discrete time signals and systems and verification of its properties and results.
	CO3	Implementation of discrete computations using DSP processor and verify the results.
	CO4	Realize the digital filters using a simulation tool and a DSP processor and verify the frequency and phase response.
15ECL58	CO1	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.
	CO2	Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms
	CO3	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.
	CO4	Interface the hardware to the programmable chips and obtain the required output
	CO5	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.

6th Semester

15EC61	CO1	Associate and apply the concepts of bandpass sampling to well specified signals and channels
	CO2	Analyse symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels
	CO3	Analyse symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels
	CO4	Demonstrate bandpass signals subjected to corrupt and distorted symbols in a bandlimited channel, can be demodulated and estimated at receiver to meet specific
	CO5	Analyse and compute spread spectrum techniques.
15EC62	CO1	Describe the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.
	CO2	Apply the knowledge gained for Programming ARM Cortex M3 for different applications.
	CO3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
	CO4	Develop the hardware software co-design and firmware design approaches.
	CO5	Explain the need of real time operating system for embedded system applications
15EC63	CO1	Understanding of MOS transistor theory, CMOS fabrication flow and scaling.
	CO2	Understanding concept of basic gates using the stick and layout diagram
	CO3	Interpret memory elements along with timing considerations
	CO4	Demonstrate knowledge of FPGA based system design
	CO5	Analyze CMOS subsystems and architectural issues
	CO6	Interpret testing and testability issues in VLSI Design
15EC64	CO1	Identify the protocols and services of Data link layer.
	CO2	Identify the protocols and functions associated with the transport layer services
	CO3	Describe the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.
	CO4	Distinguish the basic network configurations and standards associated with each network
	CO5	Construct a network model and determine the routing of packets using different routing algorithms.
15EC653	CO1	Understand the role of neural networks in engineering, artificial intelligence, and cognitive modelling.
	CO2	Understand the concepts and techniques of neural networks through the study of the most important neural network models.

	CO3	Evaluate whether neural networks are appropriate to a particular application.
	CO4	Apply neural networks to particular applications, and to know what steps to take to improve performance.
15EC654	CO1	Understand the electromechanical switching systems and its comparison with the digital switching.
	CO2	Determine the telecommunication traffic and its measurements.
	CO3	Understand the technologies associated with the data switching operations.
	CO4	Describe the software aspects of switching systems and its maintenance.
15EC663	CO1	Design embedded systems, using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores.
	CO2	Design & Construct the combinational circuits using discrete gates and programmable logic devices.
	CO3	Describe Verilog model for sequential circuits and test pattern generation
	CO4	Explore the different types of semiconductor memories and their usage for specific chip design
	CO5	Design and synthesis of processor and I/O controllers that are used in embedded system design
15EC664	CO1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
	CO2	Demonstrate proficiency in handling Strings and File Systems.
	CO3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
	CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
	CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.
15ECL67	CO1	Understand the instruction set of 32-bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.
	CO2	Develop assembly language programs using ARM Cortex M3 for different applications.
	CO3	Interface external devices and I/O with ARM Cortex M3.
	CO4	Develop C language programs and library functions for embedded system applications.
15ECL68	CO1	Choose suitable tools to model a network and understand the protocols at various OSI reference levels.
	CO2	Design a suitable network and simulate using a Network simulator tool.
	CO3	Simulate the networking concepts and protocols using C/C++ programming.
	CO4	Model the networks for different configurations and analyze the results.

7th Semester

15EC71	CO1	Apply the knowledge of electromagnetic theory to understand and analyze waveguides, coaxial line, planar transmission lines, different antennas and its parameters.
	CO2	Design solutions for transmission lines involving primary and secondary constants and to use the 'Smith Chart' tool for impedance matching
	CO3	Understand and analyze the behavior of microwave devices using scattering parameters and Identify microwave devices for several applications
	CO4	Understand and analyze various antenna configurations according to the application
	CO5	Apply the knowledge of electromagnetic theory to understand and analyze waveguides, coaxial line, planar transmission lines, different antennas and its parameters.
15EC72	CO1	Understand image formation and the role human visual system plays in perception of gray and color image data.
	CO2	Apply image processing techniques in both the spatial and frequency (Fourier) domains.
	CO3	Analysis of image segmentation techniques and to evaluate the Methodologies for segmentation.
	CO4	Conduct independent study and analysis of Image Enhancement techniques.
15EC73	CO1	Understand the construction and working of various power devices.
	CO2	Design and analysis of thyristor circuits with different triggering conditions
	CO3	Learn the applications of power devices in controlled rectifiers, converters and inverters to the society
	CO4	Demonstrate and understanding the power electronics circuits and models using modern tools under various load conditions
15EC751	CO1	Comprehend the knowledge and concepts of digital signal processing techniques.
	CO2	Apply the knowledge of DSP computation building blocks to achieve speed in DSP architecture or processor
	CO3	Apply knowledge of various types of addressing modes, interrupts, peripherals and pipelining structure of TMS320C54xx processor
	CO4	Develop basic DSP algorithms using DSP processors
	CO5	Discuss about synchronous serial interface and multichannel buffered serial port (McBSP) of DSP device
	CO6	Demonstrate the programming of CODEC interface
15ECL77	CO1	Develop the test bench to stimulate the various digital circuit

	CO2	Examine and stimulate basic CMOS circuits like inverter, common source amplifier Differential amplifier and high level circuits like OPAMP, ADC circuits to meet desired parameter.
	CO3	Interpret concepts of AC analysis, DC analysis and transient analysis in analog circuit
	CO4	Design the gates, using gates realize the shift register and adder to meet desired parameter.
	CO5	Demonstrate knowledge and understanding the engineering principles to manage projects
15ECL78	CO1	Determine the characteristics and response of microwave devices.
	CO2	Determine the characteristics of micro strip antennas and compute the parameters associated with it.
	CO3	Simulate the digital modulation schemes with the display of waveforms and computation of performance parameters using MATLAB.
	CO4	Design and test the digital modulation circuits/systems and display the waveforms.
	CO5	Determine the losses in optical fiber and measure numerical aperture using optical fiber link.

8th Semester

15EC81	CO1	Explain the concepts of propagation mechanisms in wireless channels and understand the system architecture, functional standard specified in LTE 4G
	CO2	Analyze the role of LTE radio interface protocols and also understand the concept of multiple antenna transmission and reception
	CO3	Demonstrate the concepts of protocols used, spectrum allocation and distinguish different transmission modes
	CO4	Test and Evaluate the performance of resource management and packet data processing and transport algorithms
15EC82	CO1	Understand and describe the basic concepts of optical fiber, classify different types and modes of propagation, transmission characteristics and losses in optical fiber communication.
	CO2	Understand and analyze the construction, working principle of optical sources, detectors and receiver.
	CO3	Explain and demonstrate the concepts of WDM, active and passive elements and optical amplifiers.
	CO4	Illustrate the networking aspects of optical fiber and describe various standards associated with it .

15EC835	CO1	Ability to learn various networking protocols to provide security of the data over the network
	CO2	Understand and analyze the vulnerabilities in any computing system for different applications and design a security solution.
	CO3	Apply scientific method to design antipatterns and perform investigations.
	CO4	Implement the concept of cyber security framework in computer system administration

Department of Electrical and Electronics Engg.
2015-19 Scheme Course Outcomes

SEM: I/II	18ELE13/23	Basic Electrical Engineering
C103.1	To understand and apply the basic concepts of DC circuits	
C103.2	To study and Analyze AC Circuits	
C103.3	Apply the basic knowledge of electrical concepts to obtain the desired parameters/performance characteristics of Transformer and Electric Machines	
C103.4	Conduct a study on safety aspects, wiring and consumption of electrical power in domestic installations	

SEM:I/II	18ELEL17/27	Basic Electrical Engineering Laboratory
C107.1	To verify the fundamental laws of electrical engineering and to measure an impedance of a given coil	
C107.2	To compare Power, Power factor of different lamps and to analyze an open and short circuit condition for an electrical circuit	
C107.3	Determine earth resistance and understand two way and three-way control of lamps.	
C107.4	Measure the three-phase power by two wattmeter's and determine thepower consumed in a 3-phase load.	

SEM: III	15MAT31	Engineering Mathematics III
C301.1	Know the use of perodic signals and Fourier series to analyze circuits and systems communication.	
C301.2	Explain the general linear system theory for continous - time signals and digital signal processing using the Fourier transform and z-transform.	
C301.3	Employ appropriate numerical methods to solve algebraic and transcedental equations.	
C301.4	Apply Green's theorem, Divergence theorem and Stokes theorem in various application in the field of electro-magnetic and gravitational fields and fluid flow problems.	
C301.5	Determine the extermals of functional and solve the simple problems for calculus of variations. Utilize the concepts of functional and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits.	

SEM: III	15EE32	Electric circuit Analysis
C302.1	To familiarize the basic laws, theorems and the methods of analyzing electrical circuits	
C302.2	To explain and analyzethe resonance and concept of coupling in electric circuits	
C302.3	Analyze networks based on two port network and state variables	
C302.4	Toanalyze the transient response of circuits with dc and sinusoidal ac input	
C302.5	To impart basic knowledge on network analysis using Laplace transforms	

SEM: III	15EE33	Transformers and Generators
C303.1	Explain the construction and operation and performance of transformers. Explain different connections for the three phase operations, their advantages and applications.	
C303.2	Understand the working of dc generator. Explain the construction and operation of Synchronous machines and evaluate the regulation of Synchronous machines by different methods.	
C303.3	Analyze the operation of the synchronous machine connected to infinite machine. Explain the construction and operation and performance of transformers.	
C303.4	Explain different connections for the three phase operations, their advantages and applications. Understand the working of dc generator.	
C303.5	Explain the construction and operation of Synchronous machines and evaluate the regulation of Synchronous machines by different methods.	

SEM: III	15EE34	Analog Electronic Circuits
C304.1	To understand and utilize the characteristics of transistor for different applications	
C304.2	To design and analyze biasing circuits for transistor and FETs.	
C304.3	To design, analyze and test transistor circuitry as amplifiers and oscillators	

SEM: III	15EE35	Digital system design
C305.1	Design and analyze combinational & sequential circuits.	
C305.2	Design circuits like adder, sub tractor, code converter, Encoder-decoder, Mux-Demux.	
C305.3	Design of counters and sequence generators.	

SEM: III	15EE36	Electrical and Electronic Measurements
C306.1	Explain the importance of Units and dimensions.	
C306.2	Measure resistance,Inductance and capacitance by different methods	
C306.3	Explain the working of various meters used for measurement of Power and energy.	
C306.4	Explain the working of different electronic instruments and display devices	

SEM: III	15EEL37	Electrical machines laboratory-1
C307.1	Conduct different tests on transformers to evaluate the performance characteristics of the 1-phase and 3-phase transformers.	
C307.2	Connect single phase transformers for three phase operation and phase conversion.	
C307.3	Compute the voltage regulation of synchronous generator using the test data obtained in the laboratory. Evaluate the performance of synchronous generators from the test data.	

SEM: III	15EEL38	Electronics Laboratory
C308.1	Design and test different diode circuits	
C308.2	Design and test amplifier and oscillator circuits and analyze their performance	
C308.3	Use universal gates and ICs for code conversion and arithmetic operations	
C308.4	Design and verify on of different counters	

SEM: IV	15MAT41	Engineering Mathematics-IV
C401.1	Solve first and second ordinary differential equations arising in flow problems using single step and multistep numerical methods.	
C401.2	Solveproblems of quantum mechanics employing Bessel's function relating to cylindrical polar coordinate systems and Legrendre's polynomials relating to spherical polar coordinate systems	
C401.3	Understand the analyticity,potentialfields,residues and poles of complex potentials in field theory and electromagnetic theory Describe conformal and bilinear transformation arising in aerofoil theory fluid flow visualization and image processing	
C401.4	Solve problems on probability distributions relating to digital signal processing, determine joint probability distributions and stochastic matrix connected with multivariate correlation problems for feasible random events	
C401.5	Draw the validity of the hypothesis proposed for the given sampling distribution in accepting or rejecting the hypothesis,Definetransition probability matrix of a Markov chain and solve problems related to discrete parameter random process.	

SEM: IV	15EE42	Power Generation and Economics
C402.1	Understand and Describe the working of hydroelectric, Thermal, nuclear and gas power plants and state functions of major equipment of the power plants.	
C402.2	Understand and discuss types of substations and also explain the importance of grounding.	
C402.3	Understand the importance of economic aspects of power system operation and its effects.	
C402.4	Discuss the importance of power factor and methods used for PF improvement.	

SEM: IV	15EE43	Transmission and Distribution
C403.1	Explain the concepts of various methods of generation power	
C403.2	Explain the importance of HVAC,EHVAC,UHVACand HVDC transmission.	
C403.3	Design and analyze overhead transmission system for a given voltage level	
C404.4	Calculate the parameters of the transmission line for different configurations and assess the performance of line	
C404.5	Explain the use of underground cables and evaluate different types of distribution systems	

SEM: IV	15EE44	Electric Motors
C404.1	Explain the constructional features of Motors and select a suitable drive for specific application.	
C404.2	Analyze and assess the performance characteristics of DC motors by conducting suitable tests and control the speed by suitable method.	
C404.3	Explain the constructional features of Three Phase and Single phase induction Motors and assess their performance	
C404.4	Control the speed of induction motor by a suitable method.	
C404.5	Explain the operation of Synchronous motor and special motors.	

SEM: IV	15EE45	Electromagnetic Field Theory
C405.1	To use different coordinate systems to explain the concept of gradient, divergence and curl of a vector	
C405.2	To understand and use Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations and Calculate the energy and potential due to a system of charges.	
C405.3	To explain the behavior of electric field across a boundary between a conductor and dielectric and between two different dielectrics	
C405.4	To explain the behavior of magnetic fields and magnetic materials	
C405.5	To understand and assess time varying fields and propagation of waves in different media	

SEM: IV	15EE46	Operational Amplifiers and Linear ICs.
C406.1	To understand the basics of Linear ICs such as Op-amp, Regulator, Timer & PLL.	
C406.2	To learn the designing of various circuits using linear ICs..	
C406.3	To use these linear ICs for specific applications	
C406.4	To understand the concept and various types of converters.	
C406.5	To use these ICs, in Hardware projects.	

SEM: IV	15EEL47	Electrical Machines Laboratory –2
C407.1	Demonstrate and understandingthe performance of DC motors by conducting suitable experiments and report the results.	
C407.2	Estimate the performance of induction and synchronous motor byconducting suitable experiments and report the results.	
C407.3	Experiment and analyze the speed control techniques for single phase and three-phase induction motors.	

SEM: IV	15EEL48	Op- amp and Linear ICs Laboratory
C408.1	To conduct experiment to determine the characteristic parameters of OP-Amp	
C408.2	To design test the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator	
C408.3	To design test the OP-Amp as oscillators and filters	
C408.4	Design and study of Linear IC's as multivibrator power supplies.	
C408.5	To design test the different applications of OP-Amp in comparator and converter circuits	

SEM: V	15EE51	Management & Entrepreneurship
C501.1	Explain the field of management, task of the manager, planning and the need of proper staff, recruitment and selection process.	
C501.2	Discuss work allocation, the structure of organization, the modes of communication and importance of managerial control in business.	
C501.3	To explain need of coordination between the manager and staff in exercising the authority and delegating duties and to explain the social responsibility of business and leadership	
C501.4	Explain the concepts of entrepreneurship and the role and importance of the entrepreneur, Small Scale Industries, business plan in economic development	
C501.5	Discuss the concepts of project management, capitol building process, project feasibility study, project appraisal and project financing and state /central level institutions / agencies supporting business enterprises	

SEM: V	15EE52	Micro Controller
C502.1	To discuss the history of the 8051 and features of other 8051 family members and the internal architecture of the 8051	
C502.2	To discuss and explain the use of an 8051 assembler, the stack and the flag register, loop, jump, and call instructions.	
C502.3	Discuss 8051 addressing modes, accessing data and I/O port programming, arithmetic, logic instructions, and programs.	
C502.4	Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, Logic and arithmetic operations, data conversion and data serialization	
C502.5	Discuss the hardware connection of the 8051 chip, its timers, serail data communication and its interfacing of 8051 to the RS232, interrupts and writing interrupt handler programs.	
C502.6	Interface 8051 with real-world devices such as LCDs and keyboards, ADC, DAC chips & sensors.	

SEM: V	15EE53	Power Electronics
C503.1	To explain power diode characteristics, types, their operation and the effects of power diodes on RL circuits .To give an overview of applications power electronics, different types of power semiconductor devices, their switching characteristics.	
C503.2	explain steady state ,switching characteristics and gate control requirements of different power transistors and their limitations	
C503.3	Discuss different types of thyristors, their operation, chars and applications.	
C503.4	Explain working of different controllers like controlled rectifiers,Ac voltage controllers,Inverters and Choppers	

SEM: V	15EE54	Signals & Systems
C504.1	Classify the signals and systems and explain basic operations on signals and properties of systems	
C504.2	Use convolution in both continuous and discrete domain for the analysis of systems given the impulse response of a system for a LTI system and to represent it in block diagram	
C504.3	Apply continuous time Fourier transform representation to study signals and linear time invariant systems	
C504.4	Apply discrete time Fourier transform representation to study signals and linear time invariant systems. Use Z-transform and properties of Z transform for the analysis of discrete time systems	

SEM: V	15EE553	Estimating and Costing
C505.1	Explain the purpose of estimation and costing. Discuss market survey, estimates, purchase enquiries, tenders, comparative statement and payment of bills and Indian electricity act and some of the rules.	
C505.2	Discuss distribution of energy in a building, wiring and methods of wiring, cables used in internal wiring, wiring accessories, fittings and fuses&its types.	
C505.3	Discuss design of lighting points and its number, total load, sub-circuits, size of conductor.	
C505.4	Discuss different types of service mains and estimation of power circuits.	
C505.5	Discuss estimation of overhead transmission and distribution system and its components	
C505.6	Discuss main components of a substation, their graphical representation and preparation of single line diagram of a substation	

SEM: V	15EC562	Object Oriented Programming With C++

C506.1	Explain the basics of object oriented programming concepts. Apply the object initialization and destroy concept using constructors and destructors
C506.2	Apply the concept of polymorphism to implement compile time polymorphism in programs by using overloading methods and operators
C506.3	Use the concept of Inheritance to reduce the length of code and valuate the usefulness
C506.4	Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs. Use I/O operations and file streams in programs

SEM: V	15EE563	Renewable Energy Systems
C507.1	Summarize the energy sources of India and world, classification of non - conventional energy sources. Explain the energy consumption as a measure of prosperity. Define solar constant, basic sun-Earth Angles and their representation related to solar geometry.	
C507.2	Explain the different types of solar thermal energy collectors used for various thermal applications, describe the working solar cell system, characteristics and their applications.	
C507.3	Understand and explain the different types of energy production from hydrogen, Wind and geothermal system. Calculate the power available in the wind turbines. Explain the importance of solid waste and agriculture refuse.	
C507.4	Describe the biomass and biogas energy conversion system and also Explain the different types of biomass and biogas plants.	
C507.5	Discuss the importance of tidal power generation, tidal energy availability and explain the methods tidal power generation.	
C507.6	Discuss the importance and explain the power generation process from sea wave energy and ocean thermal energy.	

SEM: V	15EEL57	Micro Controller Lab
C508.1	To write assembly language programs for data transfer, arithmetic, Boolean and logical instructions, code conversions	
C508.2	To write ALP using subroutines for generation of delays, counters, configuration of SFRs for serial communication and timers.	
C508.3	To perform interfacing of stepper motor and dc motor for controlling the speed, DAC interfacing, ADC interface.	

SEM: V	15EEL58	Power Electronics Lab
C509.1	Obtain static characteristics of semiconductor devices to discuss their performance.	
C509.2	Trigger the SCR by different methods.	

C509.3	Verify the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads.
C509.4	Control the speed of a dc motor, universal motor and stepper motors.
C509.5	Perform commutation of SCR by different methods

SEM: VI	15EE61	Control Systems
C601.1	Demonstrate the knowledge of mathematical modeling of control systems and components and discuss the effects of feedback and types of feedback control systems.	
C602.2	Evaluate the transfer function and stability of a linear time invariant system.	
C603.3	Apply block diagram manipulation and signal flow graph methods to obtain transfer function of systems.	
C604.4	Determine transient and steady state time response of a simple control system and Investigate the performance of a given system in time and frequency domains.	
C605.5	Discuss stability analysis using Root locus, Bode plots and Nyquist plots and determine the controller or compensator configuration and design.	

SEM: VI	15EE62	Power System Analysis – 1
C602.1	Show understanding of per unit system, computation and its implementation in problems of one-line diagram power system	
C602.2	Model and analyze power systems using complex mathematical transformations under short circuit and unbalanced conditions	
C603.3	Analyze different unsymmetrical faults on unloaded alternator and on complex power systems using symmetrical component transformations	
C604.4	Apply mathematical techniques to evaluate system stability	

SEM: VI	15EE63	Digital Signal Processing
C603.1	Analyze signals and perform various signalprocessing operations using DFT.	
C603.2	Explain and Apply FFT algorithms for efficientcomputation of DFT and IDFT of a given sequence.	
C603.3	Design of IIR analog and digital filters byusing Butterworth and Chebyshev technique.	
C603.4	Design of IIR digital filters by using impulseinvariant technique and bilinear transformation technique.	
C603.5	Design a digital IIR and FIR filter by using direct, cascade, parallel and linear phase methods of realization.	
C603.6	Design FIR filters by use of window functions and frequency sampling method	

SEM: VI	15EE64	Electrical Machine Design
C604.1	Ability to analyze magnetic material that used to design electrical machines and magnetic circuit of electrical machine.	
C604.2	Ability to analyze the performance, design winding and core of transformer	
C604.3	Ability to analyze the performance, design winding and core of DC machine	
C604.4	Appreciate the importance of magnetic, thermal and electrical loadings	
C604.5	Ability to analyze the performance, design Induction motor	
C604.6	Ability to analyze the performance, design winding and core of synchronous machine.	

SEM: VI	15EE653	Energy Audit and Demand side management
C605.1	To understand the behavior of energy audit and it types.	
C605.2	Understand the parameters required for energy audit of different systems	
C605.3	Realize the electrical load management techniques, harmonics and power factor improvement	
C605.4	Practice the scope of demand side management and its implementation.	
C605.5	To function on energy conservation	

SEM: VI	15EE662	Sensors and Transducers
C606.1	Discuss need of transducers, their classification, advantages and disadvantages. Show an understanding of working of various transducers and sensors	
C606.2	Discuss recent trends in sensor technology and their selection and discuss basics of signal conditioning and signal conditioning equipment	
C606.3	Discuss configuration of Dtat Acquisition System and data conversion and show knowledge of data transmission and telemetry	
C606.4	Explain measurement of non-electrical quantitiestemperature, flow,speed,force,torque,power and viscosity	

SEM: VI	15EEL67	Control System Laboratory
C608.1	Use software package or discrete components in assessing the time and frequency domain reposes of a given second order system.	
C608.2	Design and analyze Lead, Lag and Lag – Lead compensators for given specifications.	
C608.3	Determine the performance characteristics of ac and dc servomotors and synchro-transmitter receiver pair used in control systems.	
C608.4	Simulate the DC position and feedback control system to study the effect of P, PI, PD and PID controller and Lead compensator on the step response of the system	
C608.5	Write a script files to plot root locus, bode plot, Nyquist plots to study the stability	

		of the system using a software package.

SEM: VI	15EEL68	Digital Signal Processing Laboratory
C609.1	Utilize MATLAB platform to perform interpretation of sampling theorem in time and frequency domains.	
C609.2	Perform the impulse response, Linear and circular convolution of given sequences.	
C609.3	Compute DFT and IDFT of a given sequence using the basic definition and also using FFT algorithms.	
C609.4	Design and implementation of IIR and FIR filters for the given specifications.	

SEM: VII	15EE71	Power System Analysis -2
C701.1	Formulate network matrices and models for solving load flow problems. Perform steady state power flow analysis of power systems using numerical iterative techniques.	
C701.2	Suggest a method to control voltage profile.Show knowledge of optimal operation of generators on a bus bar, optimal operation of generators on a busbar, optimal unit commitment	
C701.3	Discuss optimal scheduling for hydro-thermal system, power system security and reliability. Analyze short circuit faults in power system networks using bus impedance matrix	
C701.4	Perform numerical solution of swing equation for multimachine stability	

SEM: VII	15EE72	Power System Protection
C702.1	Discuss the performance of protective relays, components of protection scheme and relay terminology, over current protection.	
C702.2	Explain the working of distance relays & effect of arc resistance,power swings, line length & source impedance on performance of distance relay	
C702.3	Discuss construction, operating principles & performance of differential relays for differentialprotection.	
C702.4	Discuss protection of generators, motors,Transformers& Bus-zone protection	
C702.5	Explain the principle of circuit interruption in different types of circuit breakers & fuse	
C702.6	Discuss protection against over-voltages & Gas insulated Substation-GIS	

SEM: VII	15EE73	High Voltage Engineering
C703.1	Explain conduction and breakdown phenomenon in gases, liquid dielectrics.	
C703.2	Explain breakdown phenomenon in solid dielectrics.	
C703.3	Explain generation of high voltages and currents	
C703.4	Discuss measurement techniques for high voltages and currents	
C703.5	Discuss overvoltage phenomenon and insulation coordination in electric power systems.	

C703.6	Discuss non-destructive testing of materials and electric apparatus and high-voltage testing of electric apparatus

SEM: VII	15EE742	Utilization of Electrical Power
C704.1	Understand the importance and types of electric heating, electric welding used for industrial applications and solve related problems.	
C704.2	Explain the laws of electrolysis, extraction and refining of metals, electro deposition and solve problems related electro deposition of various metals.	
C704.3	Explain the concept of illumination, laws, construction and working of different lamps, design lighting scheme for domestic and commercial applications and solve related problems.	
C704.4	Discuss the concept of electric traction, speed time curves for train movement, various motors used for traction purpose, characteristics and speed control mechanism and solve problems.	
C704.5	Discuss the importance of braking, types of braking employed for traction systems and also the importance of power supply used for traction purpose.	
C704.6	Explain the importance of Electric Vehicles and working of electric and hybrid electric vehicles used	

SEM: VII	15EE744	Power System Planning
C705.1	Discuss primary components of power system planning, planning methodology for optimum power system expansion, various types of generation, transmission and distribution.	
C705.2	Show knowledge of forecasting of future load requirements of both demand and energy by deterministic and statistical techniques using forecasting tools.	
C705.3	Discuss methods to mobilize resources to meet the investment requirement for the power sector	
C705.4	Understand economic appraisal to allocate the resources efficiently and appreciate the investmentdecisions.	
C705.5	Discuss expansion of power generation and planning for system energy in the country, evaluation of operating states of transmission system, their associated contingencies, reliability criteria, evaluation, power market and the stability of the system.	
C705.6	Discuss principles of distribution planning, supply rules, network development and the system studies.	

SEM: VII	15EE752	Testing & Commissioning of Power System Apparatus
C706.1	Describe the process to plan, control and implement commissioning of electrical equipment's	
C706.2	Demonstrate the process to plan, control and implement commissioning of electrical equipment's	

C706.3	Demonstrate the routine tests for synchronous machine, induction motor, transformer & switchgears
C706.4	Differentiate the performance specifications of transformer ,induction motor and synchronous machines.
C706.5	Explain the operation of an electrical equipment's such as isolators, circuit breakers, insulators and switchgears.

SEM: VII	15EEL76	Power systems simulation Lab
C707.1	Ability to form the Y-bus and Z-bus for the given power system	
C707.2	Ability to determination of efficiency and regulation of transmission lines	
C707.3	Ability to determine the Jacobian matrix, bus currents, bus power and line flow and line losses for the given power system	
C707.4	Ability to determine the power angle diagram, swing curve for the given synchronous machines power system	
C707.5	Ability to perform load flow studies, short circuit studies and ELD for the given power system	

SEM: VII	15EEL77	Relay & High voltage Lab
C708.1	Student will be able to apply knowledge on conduct experiment for obtaining breakdown characteristic of air insulation subjected for HVAC, HVDCapplications to distinguish between Uniform/Non-uniform field conditions.	
C708.2	Student will be able to apply knowledge on the quality of transformer oil sample by conducting experiment as per standards and assessing dielectric strengthof it.	
C708.3	Student can analyse the experiment on an Electromechanical type overcurrentrelay,Static over-voltage relay, Static undervoltage relay, Microprocessor based overcurrent relay and Microprocessor based overvoltage/under-voltage relay.	
C708.4	Student can acquire the knowledge experimentally by map field lines for co-axial cable model using electrolytic tank.	
C708.5	Student can analyse the experiment on Motor protection, Merz prize protection.	

SEM: VII	15EEP78	Project Phase – I
C709.1	Ability to research literature, and formulate a complex engineering problem of their selected project topic.	
C709.2	Apply the fundamental knowledge of mathematics, science and engineering principles in design of Solutions or system components.	
C709.3	Identify, Select, Apply a suitable engineering/IT tool in modeling/data interpretation/analytical Studies, conduct experiments leading to a logical solution.	
C709.4	Design engineering solutions to complex problems utilising a systems approach.	

C709.5	Communicate effectively to a diverse audience and develop technical reports and publications.
C709.6	Work as a team member/leader to manage projects in a multidisciplinary environment.

SEM:VIII	15EE81	Power System operation and control
C801.1	Students will be able to various levels of controls in power systems, the vulnerability of the system, components, architecture and configuration of SCADA and solve unit commitment problems	
C801.2	Students will be able analyze issues of hydrothermal scheduling and solutions to hydro thermal problems	
C801.3	Students will be able to understand basic generator control loops, functions of Automatic generation control, speed governors	
C801.4	Students will be to understand analyze mathematical models of Automatic Load Frequency Control	
C801.5	Students will be able to understand Aautomatic generation control, voltage and reactive power control in an interconnected power system.	
C801.6	Students will be able to understand reliability, security, contingency analysis, state estimation and related issues of power systems	

SEM:VIII	15EE82	Industrial Drives and Applications
C802.1	Explain the advantages and choice of electric drive	
C802.2	Explain dynamics and modes of operation of electric drives.	
C802.3	Suggest a motor for adriveand control of dc motor controlled rectifiers.	
C802.4	Analyze the performance of induction motor drives under different conditions.	
C802.5	Control of induction motor, synchronous motor and stepper motor drives	
C802.6	Suggest a suitable electrical drive for specific application in the industry	

SEM: VIII	15EE831	Smart Grid
C803.1	Explain methods to promote smart grid awareness and making the existing transmission system smarter by investing in new technology and discuss the progress made by different stakeholders in the design and development of smart grid.	
C803.2	Explain measurement techniques using Phasor Measurement Units and smart meters	
C803.3	Discuss tools for the analysis of smart grid and design, operation and performance	
C803.4	Discuss classical optimization techniques and computational methods for smart	

	grid design, planning and operation.	
C803.5	Explain predictive grid management and control technology for enhancing the smart grid performance and discuss the computational techniques, communication, measurement, and monitoring technology tools essential to the design of the smart grid.	
C803.6	Develop cleaner, more environmentally responsible technologies for the electric system.	

SEM: VIII	15EE84	Internship/ Professional Practice
C804.1	Demonstrate the ability to assess and report	
C804.2	Assess interests and abilities in their field of study	
C804.3	Demonstrate the ability to plan, implement,professional, ethical practice and evaluate engineering studies	
C804.4	Develop communication, interpersonal and other critical skills in the job interview process	

SEM: VIII	15EEP85	Project Phase – II
C805.1	Ability to research literature, and formulate a complex engineering problem of their selected project topic.	
C805.2	Apply the fundamental knowledge of mathematics, science and engineering principles in design of Solutions or system components.	
C805.3	Identify, Select, Apply a suitable engineering/IT tool in modeling/data interpretation/analytical Studies, conduct experiments leading to a logical solution.	
C805.4	Design engineering solutions to complex problems utilising a systems approach.	
C805.5	Communicate effectively to a diverse audience and develop technical reports and publications.	
C805.6	Work as a team member/leader to manage projects in a multidisciplinary environment.	

SEM: VIII	15EES86	Technical Seminar
C806.1	Work in actual working environment and utilize technical resources	
C806.2	Find appropriate sources that can be summarized, give oral presentations related to the work and integrated into multimedia presentation	
C806.3	Engage in independent learning	
C806.4	Be aware of importance of access to data, knowledge and results of engineering studies	
C806.5	Demonstrate the ability to assess and report	

First year Courses common to all Branches

Subject / Subject Code	CO Mapped	Description
18MAT11 **Calculus & Linear Algebra**	**CO1**	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
	CO2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
	CO3	Apply the concept of change of order of integration and variable to evaluate multiple integrals and their usage in computing the area and volumes
	CO4	Solve first order linear / nonlinear differential equation analytically using standard methods
	CO5	Make use of matrix theory for solving of linear equations and compute Eigen values and Eigen vectors required for matrix diagonalization process
18MAT21 **Advanced Calculus & Numerical Techniques**	**CO1**	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
	CO2	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations and solve such linear ordinary differential equations .
	CO3	Construct a variety of partial differential equations and solution by exact methods / method of separation of variables.
	CO4	Explain the applications of infinite series and obtain series solution of ordinary differential equations.
	CO5	Apply the knowledge of numerical in the modeling of various physical and engineering phenomena.
18CHE12/22 **Engg. Chemistry**	**CO-1**	Understand the use of free energy in equilibria using thermodynamic consideration, electrochemical energy systems
	CO-2	Understand and explain the Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electro less plating.
	CO-3	Apply the knowledge for Production & consumption of energy for industrialization of country and living standards of people. Utilization of solar energy for different useful forms of energy
	CO-4	Analyse the engineering chemistry problems related to Environmental pollution waste management and water chemistry
	CO-5	Understand and explain different techniques of instrumental method of analysis, Fundamental principles of nanomaterial.
18CHEL16/26 **Engg. Chemistry lab**	**CO-1**	Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.
	CO-2	Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results

Course	CO	Description
18PHY12/22 **Engg. Physics**	**CO-1**	Understand various types of oscillations and their implications, the role of Shock waves in various fields and recognize the elastic properties of materials for engineering applications
	CO-2	Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
	CO-3	Compute Eigen values, Eigen functions of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation
	CO-4	Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields
	CO-5	Understand various electrical properties of materials like conductors, semiconductors and dielectrics using different theoretical models.
18PHYL16/26 **Engg. Physics lab**	**CO-1**	Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current
	CO-2	Understand the principles of operations of optical fiber and semiconductor devices such as Photodiode, and NPN transistor using simple circuits
	CO-3	Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
	CO-4	Recognize the resonance concept and its practical applications
	CO-5	Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results
(ISE) **18CPS13/23** **Programming for Problem solving**	**CO1**	Explore the principles of C Programming and develop algorithms and flowcharts.
	CO2	Analyze decision making and looping concepts.
	CO3	Design and develop modular programming.
	CO4	Explore usage of Arrays, strings functions and structures.
	CO5	Effective utilization of pointers and preprocessor directives.
18CPL17/27 **Computer Programming Lab**	**CO1**	Examine algorithms, flowchart and build programs for simple problems.
	CO2	Compile syntax and logical errors to execute a program.
	CO3	Analyze usage of functions, arrays and strings in problem solving.
	CO4	Illustrate use of pointers.
(CSE) **18CPS13/23** **C Programming for Problem solving**	**CO 1**	Illustrate simple algorithms from the different domain such as mathematics, physics etc.
	CO 2	Construct a programming solution to the given problem using C.
	CO 3	Identify and correct syntax and logical errors in C programs.
	CO 4	Modularize the given problem using functions.
	CO 5	Construct a programming solution using structures and pointers.
18CPL16/26 **Computer Programming Lab**	**CO 1**	Understanding the knowledge of simple application in C using condition statements and looping concepts
	CO 2	Ability to demonstrate and implement applications using arrays & strings
	CO 3	Apply the knowledge efficiently by adopting the various features of C functions, structures, pointers and files.
18ELE13/23 **Basic Electrical Engineering**	**CO1**	To understand the basic concepts of DC, AC circuits and Electrical Machines and able to solve the problems related to DC and AC circuits.
	CO2	Analysis of Single Phase and three phase AC Circuits and the representation of alternating quantities and also determining the power and other parameters in these circuits
	CO3	Apply the basic knowledge of mathematics, science and electrical engineering to obtain the desired parameters/performance characteristics of Transformer and Electric Machines
	CO4	Conduct a study on safety aspects, wiring and consumption of electrical power in domestic installations

18ELEL17 / 27 **Basic Electrical Engineering Lab**	**CO1**	Identify the common electrical components and measuring instruments used for conducting experiments in the electrical laboratory.
	CO2	Compare power factor of various lamps
	CO3	Determine impedance of an electrical circuit and power consumed in a 3-phase load.
	CO4	Determine earth resistance and understand two way and three-way control of lamps
18ELN14/24 **Basic Electronics**	**CO1**	Understand the operation of diodes, BJT and FET . Analyze general operating principles of SCR's and its application.
	CO2	Design and analyze the rectifiers, regulators, amplifiers and Oscillators.
	CO3	Design and analyze different types of operational amplifiers.
	CO4	Design fixed voltage IC regulator using 7805 and Astable Oscillator using timer IC 555. Understand the basic principle of operation of communication system and mobile phones.
	CO5	Ability to apply the knowledge of different number system in their conversions. Construct simple combinational and sequential circuits using flipflops.
18CIV14/24 **Elements of Civil Engg. & Mechanics**	**CO1**	Understanding various fields of Civil Engineering, Importance of Infrastructural Development & its significances
	CO2	Determining the resultant of given force systems and analyzing bodies with rough surface of contact
	CO3	Compute the reactive forces in beams and trusses and the effects that develop as a result of the external loads
	CO4	Locate the Centroid & compute Moment of Inertia of Regular & Built up Sections
	CO5	Categorize the various types of motion of bodies and illustrating through numerical problems
18ME15 **Elements of Mechanical Engineering**	**CO1**	Identify different sources of energy and their conversion process
	CO2	Explain the working principle of boilers, hydraulic turbines and pumps
	CO3	Discuss the working of IC engines, conventional machining processes, refrigeration & AC.
	CO4	Distinguish the types of power transmission elements like gear and belt drives.
	CO5	Compare the types of metal joining processes & also the types of engineering materials, their properties & applications
18EGDL15/25 **Basic Engineering Graphics**	**CO1**	Analyze orthogonal projection theory, dimensions and annotations in engineering drawing
	CO2	Develop engineering drawings as per BIS codes and conventions
	CO3	Compose manual and computerized drawings using 2D and 3D using modeling software packages
	CO4	Build geometric objects using development and isometricconcepts

	CO Mapped	Description
18MAT31 **Transform Calculus, Fourier Series And Numerical Techniques**	CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
	CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
	CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
	CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
	CO5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis

Department of Information Science and Engineering

COURSE OUTCOMES

3rd Sem

17MAT31	CO1	Know the use of periodic signals and Fourier series to analyze circuits and systems communication.
	CO2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier transform and z-transform.
	CO3	Employ appropriate numerical methods to solve algebraic and transcendental equations..
	CO4	Apply Green;s theorem, Divergence theorem and Stokes theorem in various application in the field of electro-magnetic and gravitational fields and fluid flow problems.
	CO5	Determine the externals of functional and solve the simple problems of the calculus of variations
17CS32	CO1	Explain the operation of JFETs and MOSFETs , Operational Amplifier circuits and their application
	CO2	Explain Combinational Logic, Simplification Techniques using Karnaugh Maps, Quine McClusky technique
	CO3	Demonstrate Operation of Decoders, Encoders, Multiplexers, Adders and Subtractors, working of Latches, Flip-Flops, Designing Registers, Counters, A/D and D/A Converters
	CO4	Design of Counters, Registers and A/D & D/A converters
17CS33	CO1	Explain different types of data structures, operations and algorithms
	CO2	Apply searching and sorting operations on files
	CO3	Make use of stack, Queue, Lists, Trees and Graphs in problem solving.
	CO4	Develop all data structures in a high-level language for problem solving.
17CS34	CO1	Explain the basic organization of a computer system.
	CO2	Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.
	CO3	Illustrate hardwired control and micro programmed control. pipelining, embedded and other computing systems.
	CO4	Build simple arithmetic and logical units.
17CS35	CO1	Understand multi user UNIX OS and its basic features and variations.
	CO2	Explain UNIX system and use different commands.
	CO3	Compile Shell scripts for certain functions on different subsystems.

	CO4	Demonstrate use of editors and Perl script writing
17CS36	CO1	Make use of propositional and predicate logic in knowledge representation and truth verification.
	CO2	Demonstrate the application of discrete structures in different fields of computer science.
	CO3	Solve problems involving recurrence relations and generating functions.
	CO4	Apply different mathematical proofs, techniques in proving theorems.
	CO5	Compare graphs, trees and their applications.
17CSL37	CO1	Demonstrate various Electronic Devices like Cathode ray Oscilloscope, Signal generators, Digital Trainer Kit, Millimeters and components like Resistors, Capacitors, Op amp and Integrated Circuit
	CO2	Design and demonstrate various combinational logic circuits.
	CO3	Design and demonstrate various types of counters and Registers using Flip-flops
	CO4	Make use of simulation package to design circuits.
17CSL38	CO1	Analyze and Compare various linear and non-linear data structures
	CO2	Demonstrate the working nature of different types of data structures and their applications
	CO3	Develop, analyze and evaluate the searching and sorting algorithms.
	CO4	Choose the appropriate data structure for solving real world problems

4th Sem

	CO1	Solve first and second order ordinary differential equation arising in flow problems using single step and multistep numerical methods.
17MAT41	CO2	Illustrate problems of potential theory, quantum mechanics and heat conduction by employing notions and properties of Bessel's functions and Legendre's polynomials.
	CO3	Explain the concepts of analytic functions, residues, poles of complex potentials and describe conformal and Bilinear transformation arising in field theory and signal processing.
	CO4	Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and design engineering.
	CO5	Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process.
17CS42	CO1	Explain the object-oriented concepts and JAVA.
	CO2	Develop computer programs to solve real world problems in Java.
	CO3	Develop simple GUI interfaces for a computer program to interact with users, and to comprehend the event-based GUI handling principles using

		Applets and swings.
17CS43	CO1	Describe computational solution to well-known problems like searching, sorting etc.
	CO2	Estimate the computational complexity of different algorithms.
	CO3	Develop an algorithm using appropriate design strategies for problem solving.
17CS44	CO1	Differentiate between microprocessors and microcontrollers
	CO2	Develop assembly language code to solve problems
	CO3	Explain interfacing of various devices to x86 family and ARM processor
	CO4	Demonstrate interrupt routines for interfacing devices
	CO5	Explain the concepts of ARM interfacing and its applications
17CS45	CO1	Design a software system, component, or process to meet desired needs within realistic constraints.
	CO2	Assess professional and ethical responsibility
	CO3	Function on multi-disciplinary teams
	CO4	Make use of techniques, skills, and modern engineering tools necessary for engineering practice
	CO5	Comprehend software systems or parts of software systems.
17CS46	CO1	Illustrate basic computer network technology.
	CO2	Identify the different types of network topologies and protocols.
	CO3	Enumerate the layers of the OSI model and TCP/IP functions of each layer.
	CO4	Make out the different types of network devices and their functions within a network.
	CO5	Demonstrate the skills of sub netting and routing mechanisms.
17CSL47	CO1	Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.)
	CO2	Develop variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language
	CO3	Analyze and compare the performance of algorithms using language features.
	CO4	Apply and implement learned algorithm design techniques and data structures to solve real-world problems
17CSL48	CO1	Summarize 80x86 instruction sets and comprehend the knowledge of how assembly language works.
	CO2	Design and develop assembly programs using 80x86 assembly language instructions
	CO3	Infer functioning of hardware devices and interfacing them to x86 family
	CO4	Choose processors for various kinds of applications.

15CS51	CO1	Able to find problems worth solving, advance their skills in customer development, customer validation, competitive analysis and iteration while utilizing design thinking and process tools to evaluate in real world problems and project
	CO2	Identify secure customers, stakeholders and team members through networks, primary customer research and competitive and industry analysis in order to prioritize and purse an initial target in real world projects.
	CO3	Effectively combine their understanding of technology and entrepreneurship in a cross disciplinary fashion to identify and develop attractive opportunities within their field of experience
	CO4	Utilize the resources available effectively through ERP
	CO5	Make use of IPRs and institutional support in entreneurship
15CS52	CO1	Explain principles of application layer protocols.
	CO2	Recognize transport layer services and infer UDP and TCP protocols
	CO3	Illustrate the working of Routing Algorithms in network layer
	CO4	Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard
	CO5	Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard
15CS53	CO1	Analyzing the concepts and design database for given information system
	CO2	Develop database programming skills in SQL.
	CO3	Apply the concepts of Normalization and design database which possess no anomalies.
	CO4	Able to write application programs considering the issues like concurrency control, recovery and security.
	CO5	Demonstrate the working of different concepts of DBMS
15CS54	CO1	Understanding the fundamentals of computation theories, concepts and techniques in automata and their formal languages
	CO2	Compare the different models of Computation like Deterministic, Non-deterministic and Software models (Finite Automata, PDA and Turing Machine).
	CO3	Describe and design the Grammars and Automata for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers..
	CO4	Develop skills in formal reasoning and reduction of a problem to a formal

		model, with an emphasis on semantic precision and conciseness.
	CO5	Formulate a problem with respect to different models of Computation.
15CS553	CO1	Understand Java Concepts like enumerations and strings in developing modular programs
	CO2	Illustrate use of collection framework in developing modular programs.
	CO3	Understand string handling mechanism
	CO4	Develop web applications
	CO5	Illustrate use of database connectivity
15CS564	CO1	Build applications on Visual Studio .NET platform by understanding the syntax and semantics of C#.
	CO2	Demonstrate Object Oriented Programming concepts in C# programming language.
	CO3	Design custom interfaces and leverage the available built-in interfaces in building complex applications.
	CO4	Illustrate the use of generics and collections in C#.
	CO5	Compose queries to query in-memory data.
15CS565	CO1	The students will be able to Explain the concepts and terminologies of cloud computing
	CO2	Demonstrate cloud frameworks and technologies.
	CO3	Define data intensive computing.
	CO4	Demonstrate cloud applications.
15CSL57	CO1	Understand functionality of different topologies and analyse the network performance varying different parameters
	CO2	Demonstrate and interpret the working of routing algorithms
	CO3	Compare and Analyze Transport Layer protocols to evaluate congestion in the network
	CO4	Demonstrate the working of Wireless networks and Implement security measures to apply for different networks
15CSL58	CO1	Demonstrate the working of different concepts of DBMS
	CO2	Implement and test the project developed for an application.
	CO3	Able to write application programs considering the issues like concurrency control, recovery and security.

15CS61	CO1	Discuss cryptography and its various applications.
	CO2	Design and develop simple cryptography algorithms.
	CO3	Analyze various authentication and key agreement protocols.
	CO4	Compare and examine different protocols used in wireless LAN.
	CO5	Analyze the need for cyber Law.
15IS62	CO1	Retrieve and explain different techniques for organization and manipulation of data in secondary storage which include basic file structure concepts, file operations, secondary storage devices and system software
	CO2	Illustrate management of records and organization of files for performance by applying object oriented concepts.
	CO3	Compare primary and secondary indexing and construct model for implementing consequential processing and sorting large files.
	CO4	Construct B trees and illustrate indexed sequential access and prefix B+ trees with appropriate data structures.
	CO5	Discuss hashing and its methods and demonstrate collision resolution using different techniques.
15IS63	CO1	Understanding basic terminologies of software testing methods
	CO2	Derive test cases for any given problem using black box and white box testing
	CO3	Understanding and apply different levels of testing
	CO4	Identify the needs of testing process framework
	CO5	Understanding the need of documenting and analysis and test
15CS64	CO1	Demonstrate need for OS and different types of OS
	CO2	Apply suitable techniques for management of different resources
	CO3	Use processor , memory, storage and file system commands
	CO4	Define deadlock situation and solve deadlock scenarios in a OS
	CO5	Realize the different concepts of OS in platform of usage through case studies
15CS651	CO1	Understand the basics concepts of data mining and data warehousing
	CO2	Identify data mining problems and implement the data warehouse
	CO3	Write association rules for a given data pattern
	CO4	Describe the classification and clustering techniques

	CO5	Choose between classification and clustering solution for a given problem
15CS653	CO1	Formulate the Linear Programming and solve.
	CO2	Select and apply optimization techniques for various problems.
	CO3	Model the given problem as transportation and assignment problem and solve.
	CO4	Apply game theory for decision support system.
	CO5	Illustrate the application of metaheurstics
15CS664	CO1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
	CO2	Demonstrate proficiency in handling Strings and File Systems.
	CO3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
	CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
	CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python
15CS661	CO1	Create, test and debug Android application by setting up Android development environment
	CO2	Implement adaptive, responsive user interfaces that work across a wide range of devices.
	CO3	Infer long running tasks and background work in Android applications.
	CO4	Demonstrate methods in storing, sharing and retrieving data in Android applications.
	CO5	Describe the steps involved in publishing Android application to share with the world.
15ISL67	CO1	List out the requirements for the given problem
	CO2	Design and implement the solution for given problem in any programming language
	CO3	Apply the appropriate technique for the design test cases
	CO4	Derive test cases for any given problem
	CO5	Create appropriate document for test cases
15ISL68	CO1	Implement various operations such insert, search, delete and modify on files.
	CO2	Apply record organization techniques on files.
	CO3	Apply indexing techniques on files
	CO4	Apply co-sequential processing and merging concept for files.

15CS71	CO1	Illustrate the Semantic Structure of HTML and CSS
	CO2	Compose forms and tables using HTML and CSS
	CO3	Design Client-Side programs using JavaScript and Server-Side programs using PHP
	CO4	Infer Object Oriented Programming capabilities of PHP
	CO5	Examine JavaScript frameworks such as query and Backbone
15IS72	CO1	Identify Design Patterns and State OO Concepts
	CO2	Recognize requirements, Design, Implement conceptual classes and Relationships
	CO3	Apply Structural Patterns to Develop Software Components
	CO4	Illustrate the usage of MVC Architecture
	CO5	Implement OO System by applying suitable pattern
15CS73	CO1	Identify the problems for machine learning. And select the either supervised, unsupervised, reinforcement
	CO2	Differentiate between supervised, unsupervised and reinforcement learning.
	CO3	Investigate concept learning, ANN, Bayes classifier, k nearest neighbor, K-means
	CO4	Explain theory of probability and statistics related to machine learning
15CS744	CO1	Understand the various Standards like ANSI C, POSIX and X/OPEN Standards. UNIX Kernel Support for Files.
	CO2	Design and Develop Commands using various API
	CO3	Explains about Process Creation and Controlling and Process Relationship
	CO4	Describes Unix Kernel support for Signals, Daemon Process & Characteristics
	CO5	Elaborate the need of Interprocess Communication, Message Queues, Semaphores, Shared Memory, Client Server Connections Functions.
15CS754	CO1	Identify key challenges in managing information and analyze different storage networking technologies and virtualization
	CO2	Explain components and the implementation of NAS
	CO3	Describe CAS architecture and types of archives and forms of virtualization
	CO4	Illustrate the storage infrastructure and management activities

	CO1	Understand the implementation procedures for the machine learning algorithms
15CSL76	CO2	Differentiate between supervised, unsupervised and reinforcement learning.
	CO3	Investigate concept learning, ANN, Bayes classifier, k nearest neighbor, K-means
	CO4	Explain theory of probability and statistics related to machine learning
	CO1	Design and develop static and dynamic web pages.
15CSL77	CO2	Familiarize with Client-Side Programming, Server-Side Programming, Active server Pages.
	CO3	Learn Database Connectivity to web applications.

8th Sem

	CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
	CO2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.
15CS81	CO3	Appraise the role of IoT protocols for efficient network communication.
	CO4	Elaborate the need for Data Analytics and Security in IoT.
	CO5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry
	CO1	Understand the concepts of HDFS and MapReduce framework
	CO2	Investigate Hadoop related tools for Big Data Analytics and perform basic Hadoop Administration.
15CS82	CO3	Recognize the role of Business Intelligence, Data warehousing and Visualization in decision making.
	CO4	Infer the importance of core data mining techniques for data analytics.
	CO5	Compare and contrast different Text Mining,web mining,naïve-bayes analysis, support vector machines and social network analysis.
15CS834	CO1	Explain the system concepts and apply functional modeling method to model the activities of a static system.

	CO2	Describe the behavior of a dynamic system and create an analogous model for a dynamic system
	CO3	Simulate the operation of a dynamic system and make improvement according to the simulation results.
15IS84	CO1	Apply domain knowledge in proposing solution for IT problem.
	CO2	Develop/implement the design with appropriate techniques, resources and contemporary tools and deliver solution with stipulated planning.
	CO3	Make the graduates work in collaboration/multidisciplinary environment.
	CO4	Construct an integrity and ethical behavior during preparation of Technical document/Report/development of solution.
	CO5	Discuss and make formal and informal communications with guide, make presentations and prepare technical document.
15CSP85	CO1	Discover Potential research areas in the field of IT.
	CO2	Conduct a Survey of Several available literature in the preferred field of study.
	CO3	Compare and contrast the several existing solutions for research challenge.
	CO4	Demonstrate an ability to work in teams and manage the conduct of the research study.
	CO5	Formulate and purpose a plan for creating a solution for the research plan identified and to report and present the findings of the study conducted in the preferred domain.

2017 SCHEME

Engineering Mathematics - III (17MAT31)

CO	Description
C201.1	Know the use of periodic signals and Fourier series to analyze circuits and systems communication.
C201.2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier transform and z-transform.
C201.3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
C201.4	Apply Green;s theorem, Divergence theorem and Stokes theorem in various application in the field of electro-magnetic and gravitational fields and fluid flow problems.
C201.5	Determine the externals of functional and solve the simple problems of the calculus of variations

Materials Science (17ME32)

Semester: 3	
C202.1	**Analyze** the Structure of materials at different levels, basic concepts of crystalline materials like unit cell, FCC, BCC, HCP, APF ,Co-ordination Number etc.
C202.2	**Understand** concept of mechanical behavior of materials and calculations of same using appropriate equations
C202.3	**Explain** the concept of phase & phase diagram & understand the basic terminologies associated with metallurgy.
C202.4	**Understand a**nd suggest the heat treatment process & types. Introduce the concept of hardenability & demonstrate the test used to find hardenability of steels
C202.5	**Explain** features, classification, applications of newer class materials like smart materials, piezoelectric materials, biomaterials, composite materials etc.

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Basic Thermodynamics (17ME33)

Semester: 3	
C203.1	Understand the thermodynamic systems, properties, Zeroth law of thermodynamics, temperature scales and energy interactions.
C203.2	Analyze heat, work, internal energy, enthalpy for flow & non flow process using First and Second Law of Thermodynamics.
C203.3	Identify the behavior of pure substances and its applications to practical problems.
C203.4	Analyze and apply the basic thermodynamic concept to calculate the change in internal energy, change in enthalpy and change in entropy using TD relations for ideal gases.
C203.5	Analyze and apply the knowledge of Thermodynamics properties of real gases at all ranges of pressure, temperatures using modified equation of state including Vander Waals equation, Redlich Wong equation and Beattie-Bridgeman equation Recall thermodynamic.

Mechanics of Materials (17ME34)

Semester: 3	
C204.1	Understanding the basics about the mechanics of materials and behavior of materials
C204.2	Understanding the concept of plane stress and strain and also to analyse stress distribution in thin and thick cylinders
C204.3	Exploring the ideas to understand and analyze the shear force and bending moment diagrams. Also to understand the stresses in beams.
C204.4	Interpret the phenomena of buckling of columns and concepts of torsion of shaft
C204.5	Apply the theories of failures as part the design criteria's and the strain energy for different loading conditions

Metal Casting and Welding (17ME35A)

Semester: 3	
C205.1	Apply the knowledge of various metal casting processes that are useful in designing system.
C205.2	Understand the concept of various metal casting methods.
C205.3	Identify the Solidification process in Casting of Non-Ferrous Metals.
C205.4	Discuss the various principle of operations in welding techniques
C205.5	Describe the Metallurgical aspects in Welding and inspection methods for the quality assurance of components made of casting and joining process.

Computer Aided Machine Drawing (17ME36 A)

Semester: 3	
C206.1	To read and understand the orthographic and sectional views of various machine components
C206.2	To develop 3D models using modeling software's
C206.3	To produce 2D drawings by manual drafting and by using drafting packages
C206.4	To construct assembly drawings, part drawings and Bill of materials as per BIS Conventions
C206.5	To apply limits fits and tolerance to all assemblies and part drawings

Materials Testing Lab (17MEL37A)

Semester: 3	
C207.1	Acquire experimentation skills in the field of material testing
C207.2	Develop theoretical understanding of the mechanical properties of materials by performing experiments
C207.3	Apply the knowledge to analyze a material failure and determine the failure inducing agents
C207.4	Apply the knowledge of testing methods in related areas
C207.5	Know how to improve structure/behavior of material for various industrial applications.

Foundry and Forging Lab (17MEL38A)

Semester: 3	
C208.1	Identify the properties of moulding sand (Tension, compression, shear & permeability)
C208.2	Prepare sand moulds using patterns and cores
C208.3	Identify the fundamentals of forging process
C208.4	Calculation of length of the raw material required for the forging model

Engineering Mathematics – IV (17MAT41)

Semester: 4	
C209.1	Use appropriate single step and multi step numerical methods to solve first and second order differential equation arising in flow data design problems
C209.2	Explain the idea of analyticity, potential field's residues and poles of complex potentials in field theory and electromagnetic theory.
C209.3	Employ Bessel's functions and Legendre's polynomial for tackling problems arising in continuum mechanics, hydrodynamics and heat conduction.
C209.4	Describe Random variables and Probability distributions using rigorous statistical methods to analyze problems associated with optimization of digital circuits, coding theory and stability analysis of systems.

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C209.5	Apply the knowledge of joint probability distribution and Markov chains in attempting engineering problems for feasible random events.

Kinematics of Machinery (17ME42)

Semester: 4	
C210.1	Analyze & describe the kinematic link, kinematic pairs, chains, mechanisms, mobility, and inversions.
C210.2	Able to determine analytically and graphically the velocities and accelerations of linkages and joints of mechanisms.
C210.3	Understand & calculate the interferences in gears and velocity ratios in gear trains.
C210.4	Able to construct the cam profiles for various motions of the follower.
C210.5	Able to analyze the cam for its motion characteristics.

Applied Thermodynamics (17ME43)

Semester: 4	
C211.1	**Recall** thermodynamic concepts and classify various types of gas power cycles and vapour power cycles.
C211.2	**Understand** the working principle of Rocket and Jet Propulsion.
C211.3	**Analyze** combustion of fuels and combustion processes in I C engines including alternate fuels and pollution effect on environment
C211.4	**Understand** the principles and applications of refrigeration systems and performance parameters of refrigeration and air-conditioning systems
C211.5	**Discuss** the operation of reciprocating compressor and functioning of steam nozzles.

Fluid mechanics (17ME44)

Semester: 4	
C212.1	Know about various basic fluid properties and about the behavior of fluid when it is at rest.
C212.2	Understand the concepts related to how a fluid behaves when it is in motion with and without considering the forces acting on them.
C212.3	Define the various types of flow, and can describe the energy losses that occurs in pipes during fluid flow.
C212.4	Explain the development of boundary layer and about the basic concepts of lift and drag of an aero-foil.
C212.5	Identify the need of dimensional analysis and will also know about the basic concepts of compressible flow and Computational Fluid Dynamics.

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Machine Tools and Operations (17ME45B)

Semester: 4	
C213.1	Explain constructional features and specifications of lathe, drilling, milling, boring, broaching, shaping, planning and grinding machines.
C213.2	Describe types of motions in machining and process relating to motions between tool and work piece
C213.3	Understand different properties of cutting tool materials, tool nomenclature and effect of machining parameters on surface finish.
C213.4	Understand mechanics of machining, chip formation, types of cutting process, Merchant's model for turning process and mechanics of drilling & milling process.
C213.5	Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.

Mechanical Measurements and Metrology (17ME46B)

Semester: 4	
C214.1	**Apply** the concepts, methods of measurement, System of measurements of metrology.
C214.2	**Differentiate** limits, fits and tolerances, design of gauges using Taylor's principle and comparators in measurement.
C214.3	**Compare** different methods of measurement of screw thread and gear.
C214.4	**Acquire** the knowledge of measurement systems and basic concepts of measurement methods, Intermediate modifying and terminating devices
C214.5	**Measure** the force, torque, pressure, strain and temperature using different measuring instruments.

Mechanical Measurements and Metrology Lab (17MEL47B)

Semester: 4	
C215.1	Determine the linear & angular measurements
C215.2	Perform the calibration of LVDTs, pressure gauges, load cells, and thermo-couples.
C215.3	Determine the pressure, force, and torque measurements using sensors and dynamometers.

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Machine Shop (17MEL48B)

Semester: 4	
C216.1	Understanding integral parts of lathe, shaping and milling machines and various accessories and attachments used thereof
C216.2	Select cutting parameters like cutting speed, feed, depth of cut and tooling for various machining operations like lathe,shaping,milling
C216.3	Perform cylindrical turning operations such as plain turning, taper turning, step turning, thread cutting, facing, knurling, internal thread cutting, eccentric turning and estimate cutting time
C216.4	To work on shaping machine to do the different shaping operations like plain shaping, keyway cutting, indexing and gear cutting and to demonstrating in power hacksaw machine for specimen preparations in machine shop

2015 SCHEME

Management and Engineering Economics (15ME51)

Semester: 5	
C301.1	**Explain** the development of management and the role it plays at different levels in an organization
C301.2	**Comprehend** the process and role of effective planning, organizing and staffing for the development of an organization
C301.3	**Understand** the necessity of good leadership, communication and coordination for establishing effective control in an organization
C301.4	**Understand** engineering economics demand supply and its importance in economic decision making and problem solving
C301.5	**Calculate** present worth, annual worth and IRR for different alternatives in economic decision making

Dynamics of Machinery(15ME52)

Semester: 5	
C302.1	**Apply** the concepts of static and dynamic balancing of reciprocating and rotating masses on automobiles
C302.2	**Determine** static and dynamic forces for four bar and slider crank mechanism,stability of governs ,the natural frequency and different parameters of vibratory system
C302.3	**Illustrate** stability of governors , ships , plane disc, aeroplanes , automobiles
C302.4	**Distinguish** different types of vibratory systems
C302.5	**Formulation** equations of damped and undamped vibratory system

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Turbo Machines(15ME53)

Semester: 5	
C303.1	Recognize the appropriate turbo machine and dimensionless variables for a given dynamical situation and predict prototype based on similitude.
C303.2	Comprehend the significance of static and stagnation properties for turbines and compressors.
C303.3	Summarize the Euler's equation to analyze energy transfer in turbo machines.
C303.4	Apply the velocity triangles for steam turbines and hydraulic turbines to estimate various performance parameters.
C303.5	Perform the preliminary design of centrifugal pumps and centrifugal compressors.

Design of Machine Elements –I (15ME54)

Semester: 5	
C304.1	Understand the concepts of stresses for 1-d, 2-D and 3-D elements and the concepts of codes and standards
C304.2	Formulate; analyze stresses and strains in machine elements, permanent and temporary joints subjected to various loads.
C304.3	Analyze and design for static, fatigue and impact strength, permanent and temporary joints
C304.4	Evaluate the stresses in the elements such as Gears, cotter and knuckle joint,keys and couplings.
C304.5	Design and development of the systems related to the facilitation of the existing system designs.

Non Traditional Machining (15ME554)

Semester: 5	
C305A.1	Understand the difference between traditional and non-traditional machining process , its need and their applications.
C305A.2	Identify the variables involved in water jet machining and abrasive jet machining, and also its working principle.
C305A.3	Recognize the different elements that affect the working of chemical and electro-chemical machining.
C305A.4	Identify the parameters that influence the working of electrical discharge machining.
C305A.5	Analyse the mechanism and working principle of plasma arc and laser beam machining.

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Energy and Environment(15ME562)

Semester: 5	
C306A.1	Summarize the basic concepts of energy, its distribution and general Scenario
C306A.2	Explain different energy storage systems, energy management, audit and economic analysis
C306A.3	Summarize the environment ecosystem and its need for awareness.
C306A.4	Identify the various types of environmental pollution and their effects
C306A.5	Discuss the social issues of the environment with associated acts

Automation and Robotics(15ME563)

Semester: 5	
C306B.1	Identify various types of automation & manufacturing systems
C306B.2	Apply the knowledge to analyse different robot configurations, motions, drive systems and its performance parameters
C306B.3	Evaluate the basic concepts of control systems, feedback components, actuators and power transmission systems used in robots
C306B.4	Apply the knowledge to analyse the principle of working of transducers, sensors and machine vision systems
C306B.5	Perceive future capabilities of sensors, mobility systems and Artificial Intelligence in the field of robotics

Fluid Mechanics and Machines Lab(15MEL57)

Semester: 5	
C307.1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
C307.2	Conduct experiments on hydraulic turbines and pumps to draw characteristics.
C307.3	Determine the frictional losses for flow through pipe.
C307.4	Apply the momentum equation for determination of coefficient of impact of jet on vanes.
C307.5	Test the performance of reciprocating air compressor and air blower.

Energy Lab (15MEL58)

Semester: 5	
C308.1	Perform experiments to determine the properties of fuels and oils, Identify components of IC engine.
C308.2	Test basic performance parameters of I.C. Engine and compare working principal of Spark ignition and Compression ignition engine.
C308.3	Analyze the exhaust emission and factors affecting the emission.
C308.4	Exhibit competency towards preventive maintenance of IC engines

Finite Element Analysis (15ME61)

Semester: 6	
C309.1	Illustrate FEM as a numerical procedure for design based on direct method, energy method, variation method, and weighted residual method.
C309.2	Describe the interpolation models and elements for analysis.
C309.3	Determine the stress and strains in structural elements like bars, beams, trusses, shafts, and axi-symmetric members in static condition.
C309.4	Solve for field variables in heat transfer and fluid flow problems.
C309.5	Analyze the bars and beams in dynamic conditions.

Computer integrated manufacturing (15ME62)

Semester: 6	
C310.1	Explain the CAD, CAM, CNC, CIM and Flexible Manufacturing System.
C310.2	Understand the Robotic application in processing, assembly and inspection.
C310.3	Describe the Additive manufacturing and IOT.
C310.4	Apply the CNC programming, CAPP and Line balancing for manufacturing.
C310.5	Analyze the production rate, capacity utilization and material flow in automated Manufacturing.

Heat Transfer (15ME63)

Semester: 6	
C311.1	Comprehend the modes of heat transfer and apply basic laws of heat transfer to formulate and solve steady state heat transfer problems.
C311.2	Study and evaluate critical thickness of insulation, steady and variable thermal conductivity of fins, and transient heat transfer in finite, semi-infinite and infinite solids.
C311.3	Explain the principles of radiation heat transfer and predict the temperature distribution using numerical approach for heat conduction problems.
C311.4	Interpret and compute forced and free convection heat transfer.
C311.5	Design heat exchangers using LMTD and NTU methods and explain the concept of condensation and boiling of liquids.

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Design of Machine Elements –II (15ME64)

Semester: 6	
C312.1	Determine the stresses in curved beams, cylinders, and cylinder heads.
C312.2	Differentiate flexible drives (belts, ropes, and chains) and springs.
C312.3	Design of different types of gears, clutches, and brakes for static and dynamic loads
C312.4	Carry out the design of journal bearing by choosing the lubricant and choice of ball and roller bearings.
C312.5	Development of different theoretical design models

Metal Forming (15ME653)

Semester: 6	
C313A.1	Apply the knowledge of mathematics, science and principles of metal forming in the field of manufacturing processes
C313A.2	Understand forming processes based on load requirements and evaluate the possible reasons for defect formation.
C313A.3	Able to approach metal forming processes both analytically and numerically
C313A.4	Choose the different high energy rate forming process suitable for fabrication of bulk sheet metal products
C313A.5	Apply the concept of powder metallurgy technique in forming industries.

Automobile Engineering (15ME655)

Semester: 6	
C313B.1	Figure out the types of automotive engines, engine components along with construction and working
C313B.2	Deduce functioning of different systems employed in automobile engines
C313B.3	Infer functioning of transmission system, controlling systems & support systems employed in automobile
C313B.4	To comprehend the requirement of fuel, types in fuels and fuel supply systems used in automobiles
C313B.5	Conjecture automotive emissions, controlling measures along with standard norms

Industrial Safety(15ME662)

Semester: 6	
C314A.1	**Identify** the safety equipments around work environment and industries.
C314A.2	**Distinguish** different portable extinguishers used for different class of fires.
C314A.3	**Recognise** the safety measures while working in the laboratories.
C314A.4	**Understand** safety precautions to avoid electrical hazards
C314A.5	**Identify** various chemicals and **describe** prevention of chemical hazards

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Heat Transfer Lab (15MEL67)

Semester: 6	
C315.1	Perform experiments to determine the thermal conductivity of a metal rod and emissivity of a test plate.
C315.2	Estimate the effective thermal resistance in composite slabs and efficiency in pin-fin
C315.3	Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values
C315.4	Determine Boiling of Liquid and Condensation of Vapour and Estimate the performance of a refrigerator
C315.5	Calculate temperature distribution of study and transient heat conduction through a plane wall, cylinder and fin.

Modeling and Analysis Lab (FEA) (15MEL68)

Semester: 6	
C316.1	Analyze the structural members like bars, trusses, and beams for different loads.
C316.2	Determine the stresses in plates under plane stress conditions.
C316.3	Solve for temperature distribution in 1D and 2D members under conduction and convection heat transfer.
C316.4	Analyze bars and beams for dynamic response.

Energy Engineering (15ME71)

Semester: 7	
C401.1	Apply the knowledge of various energy conversion systems for real time applications.
C401.2	Apply the knowledge of principle of energy conversion of renewable sources like hydro, tidal and wind energy.
C401.3	Analyze the solar radiation parameters and working of solar PV and thermal systems.
C401.4	Understand the working principles of energy conversion from alternate sources like geothermal, ocean, biomass, and biogas.
C401.5	Review the applications of fuel cells, thermoelectric convertor and MHD generator.

Fluid Power Systems(15ME72)

Semester: 7	
C402.1	Understand the basic concepts (principles) of working and maintenance of fluid power system with its potential applications.
C402.2	Interpret the construction and working of input and output elements of fluid power systems viz. hydraulic and pneumatic pumps, motors and cylinders.
C402.3	Demonstrate the functioning of control valves for obtaining desired output from fluid power systems.
C402.4	Formulate (construct) the hydraulic and pneumatic circuits for various outputs
C402.5	Integrate fluid power system with electrical and logic elements, controls to maintain the sequence of operations

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Control Engineering (15ME73)

Semester: 7	
C403.1	**Recognize** control system and its types , control actions
C403.2	**Determine** the system governing equations for physical models(Electrical, Thermal, Mechanical, Electro Mechanical
C403.3	**Analyze** the gain of the system using block diagram and signal flow graph
C403.4	**Evaluate** the stability of transfer functions in complex domain and frequency domain
C403.5	**Employ** state equations to study the controllability and observability

Tribology (15ME742)

Semester: 7	
C404a.1	Understand the fundamentals of tribology and associated parameters
C404a.2	Apply concepts of tribology for the performance analysis and design of components experiencing relative motion
C404a.3	Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application.
C404a.4	Select proper bearing materials and lubricants for a given tribological application.
C404a.5	Apply the principles of surface engineering for different applications of tribology.

Smart Materials & MEMS (15ME745)

Semester: 7	
C404b.1	Describe the methods of controlling vibration using smart systems and fabrication methods of MEMS.
C404b.2	Explain the principle concepts of Smart materials, structures, ER & MR Fluids.
C404b.3	Study of Smart structures and modeling helps in Vibration control using smart materials in various applications.
C404b.4	Analyze the properties of smart structures, MEMS, with the applications and select suitable procedure for fabrication.
C404b.5	Summarize the methods and uses of Micro fabrications, Biomimetics, types of polymers used in MEMS, Fibre optics, piezoelectric sensing and actuation

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Automotive Electronics (15ME751)

Semester:7	
C405a.1	Understand the automobile physical configuration, engine control, ignition system and transmission systems.
C405a.2	Explain the electronic Engine Control systems used for performance and control of automobiles.
C405a.3	Distinguish the different Control Modes for fuel Control in automobiles.
C405a.4	Discuss automotive networking and vehicle motion control systems used in Automobiles.
C405a.5	Recognize the faults in the systems and subsystems used in automobiles.

Mechatronics (15ME753)

Semester: 7	
C405b.1	Develop electronic, hydraulic, pneumatic anelectrical actuation circuits using sensors, transducers, Microprocessors and PLC programming
C405b.2	Analyze the various hydraulics and pneumatics actuation circuits and rectify the errors
C405b.3	Construct hydraulic and pneumatic circuits using Automation studio software
C405b.4	Propose a solution for the situation related to automation system

Design Lab (15MEL76)

Semester: 7	
C406.1	Identify and Analyze principal stresses, strains in members subjected to various loading using Strain Rosettes
C406.2	Evaluate the parameters for single DOF of vibrational systems
C406.3	Estimate the parameters of journal bearing, governor and examine the balancing of rotating masses
C406.4	Apply the concept of photo elasticity for stress analysis

CIM Lab (15MEL77)

Semester: 7	
C407.1	Generate CNC Lathe part programs for different machining operations.
C407.2	Generate CNC Mill Part programs for point to point motions & line motions.
C407.3	Simulate Tool Path for different machining operations using CNC TRAIN software.
C407.4	Operate hydraulic, pneumatic systems and FMS along with robot.

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Project Phase – I (15MEL78)

Semester: 7	
C408.1	Review the research literature, identify and analyze the complex engineering problems, formulate the sustainable conclusions or solutions using the basic principles of applied mathematics, science and engineering
C408.2	Design proper methodology to derive the solutions for the existing or anticipated complex engineering problems in concern with the issues of public health, safety, societal, cultural and environmental areas
C408.3	Practice and establish the professional engineering methodology for sustainable development in the society to address the complex engineering problems associated with societal and environmental factors
C408.4	Form internal and external group to work together as a team in the project under consideration under multi-disciplinary settings
C408.5	Communicate effectively addressing the complex engineering activities with documentation, reports and proper presentation tools

Operations Research (15ME81)

Semester: 8	
C409.1	Understand the meaning, definitions, scope, need, phases, techniques and applications of operations research.
C409.2	Formulate as Linear Programming Problems and derive optimal solutions by graphical and tabulation techniques.
C409.3	Formulate Transportation and Assignment problems and derive optimum solutions .
C409.4	Solve problems on game theory for pure and mixed strategy under competitive environment and waiting line problems for M/M/1 and M/M/K queuing models.
C409.5	Construct network diagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks.

Additive Manufacturing (15ME82)

Semester: 8	
C410.1	Apply the knowledge of Additive Manufacturing and Rapid Prototyping technologies
C410.2	Choose various nanomaterials' production techniques.
C410.3	Develop NC machine program
C410.4	Automate the process by analyzing the required type of Pneumatic and hydraulics Systems in various application areas
C410.5	Decide the types of Industrial controls required

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Product life cycle Management (15ME835)

Semester: 8	
C411.1	Point out the Components, Phases, Characteristics, and Opportunities, benefits, Views, feasibility, vision and Drivers of PLM.
C411.2	Choose Conceptualization, Design, Development, Validation, Production, implementation of PLM and PDM.
C411.3	Calculate the Engineering prototype development, design for environment, virtual testing, validation and Creation of animation using CAD software
C411.4	Analyze the parameterization of design, optimization of products, Digital manufacturing, virtual learning curve, production planning.
C411.5	Evaluate the PLM strategy, PLM initiatives to support corporate objectives Infrastructure assessment, assessment of current systems and applications.

Internship / Professional Practice (15ME84)

Semester: 8	
C412.1	To understand, the process of design & development of solution for Engg. Problems being practiced in industries.
C412.2	**To get exposed to safety, social, health, cultural and legal, ethical, sustainable technology, environment & professional practices followed in industries.**
C412.3	To get enhanced domain knowledge and modern tool usage needed for the industry. Able technology, environment & professional practices followed in industries.
C412.4	To understand the roles, responsibility, managing the different projects, financial planning & handling, and acquire all such knowledge of Entrepreneurship.
C412.5	Ability to exhibit the talent of report writing, oral & written communication and to inculcate the lifelong learning habit owing to change in technology.

Project Phase – II (15ME85)

Semester: 8	
C413.1	Conduct investigation of the complex problems using research based knowledge and analyzing the experimental data's, information's & observations
C413.2	Apply appropriate techniques and modern modeling, analysis & design tools to find solution to complex engineering activities understanding the effectiveness and limitations
C413.3	Inculcate the professional ethics and responsibilities by incorporating the norms, codes and procedures while addressing the engineering problems.
C413.4	Recognize the scope to engage in lifelong independent learning adapting to technological changes.

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| C413.5 | Communicate effectively addressing the complex engineering activities with documentation, reports and proper presentation tools |
| C413.6 | Demonstrate the knowledge of project management, finance handling, team management while handling the projects of complex engineering problems |

Seminar (15MES86)

Semester: 8	
C414.1	
C414.2	
C414.3	
C414.4	
C414.5	

Program Specific Outcomes (PSO's)

After successful completion of Mechanical Engineering program, the graduates will be able to:

PSO1: Apply the Knowledge & Skill of Mechanical Engineering on Design, Manufacturing and Thermal platforms to address the real life problem of the society.

PSO2: Design and implement new ideas with the help of CAD/CAM and Industrial Automation tools.