Ramrao Adik Institute of Technology, Nerul

DEPARTMENT OF INSTRUMENTATION ENGINEERING

Program Outcomes (PO)

Program Outcome	Description
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO)

Program Specific Outcome	Description
PSO1	To apply the concept of instrumentation engineering for selection, design, calibrate and troubleshoot instrumentation and control system commonly used in industry.
PSO2	To use research methods to design and development of solutions for complex engineering problems in the areas of instrumentation system, process automation and control, electronics system design and signal processing with appropriate consideration for safety, society and environment.
PSO3	To function as an individual and as a project leader to serve the society with sound professional ethics and having strong competency in using modern engineering tools like MATLAB /Simulink, LabVIEW/MultiSim, for design and development of Instrumentation/Automation/Embedded solutions.

CO Detail

FIRST YEAR SEM-I

Course Name: APPLIED MATHEMATICS-I (FEC101)

Students will be able to:

CO1	Apply the knowledge of matrices to solve the problems.
CO2	Know and to understand various types of numerical methods.
CO3	Ability to interpret the mathematical results in physical or practical terms for complex numbers.
CO4	Inculcate the Habit of Mathematical Thinking through Indeterminate forms and Taylor series expansion.
CO5	Solve and analyze the Partial derivatives and its application in related field of engineering.

Course Name: APPLIED PHYSICS - I (FEC102)

Students will be able to:

CO1	Explain the concept of crystallography and apply it to different crystal structures.
CO2	Understand the principles of quantum mechanics and its key.
CO3	Apply semiconductor properties in electronic devices as well as to comprehend the concept of superconductors and their applications.
CO4	Learn the principles behind the Acoustic Design of a Hall and also methods of production of Ultrasonic and its Applications in various fields.

Course Name: APPLIED CHEMISTRY-I (FEC103)

Students will be able to:

CO1	i) Calculate the types & percentage of impurities in water ii) Calculate various reagents required to soften hard water

	iii) Understand methods of purification of water as per the standards.
CO2	Understand the chemistry of polymers along with their applications.
CO3	Understand mechanism of lubrication and its properties.
CO4	Understand thermodynamics of chemical processes.
CO5	Understand the process of manufacture of cement and Engineering materials.

Course Name: ENGINEERING MECHANICS (FEC104)

Students will be able to:

CO1	Construct free body diagram and calculate the reactions for static equilibrium.
CO2	Determine the centroid of plane lamina.
CO3	Calculate the internal forces, moments and distributed loads in members.
CO4	Evaluate the velocity, acceleration, time, force and energy of the particle as well as rigid bodies.
CO5	Locate instantaneous centre of rotation for rigid bodies having plane motion.

Course Name: BASIC ELECTRICAL ENGINEERING (FEC105)

CO1	To understand fundamentals of DC circuits and apply knowledge for analysing network theorems in DC circuits.
CO2	To learn the fundamentals and analyse single phase AC circuits.
CO3	To learn the fundamentals and analyse three phase AC circuits.
CO4	To learn the basic operation and analyse the performance of single phase transformer.
CO5	To understand the construction and basic operation of DC motors and generators.

Course Name: ENVIRONMENTAL STUDIES (FEC106)

CO1	Students would understand and attain the knowledge of ecosystem, food chain, food web and Ecological pyramid and types of environment
CO2	Students will have proper concept of sustainable development dealing with

	economical, social, and environmental aspect and 3 R.
CO3	The students will have full knowledge of various types of environmental pollution, which is the biggest problem that the world is facing today, due to increase in population and rapid growth of science and technology.
CO4	To study Environmental laws that provide the guidelines and legal measures for effective management and protection of environment.
CO5	To study the various types conventional and nonconventional energy source, to study working of wind power, hydel energy, geothermal energy and their applications in the various fields.
CO6	To study the concept of carbon credit, green building and role of information technology in human health

FIRST YEAR SEM-II

Course Name: APPLIED MATHEMATICS-II (FEC201)

Students will be able to:

CO1	Apply this knowledge to solve the problems.
CO2	Apply and analyse various types of numerical methods for solving differential equations.
CO3	Solve and analyse the Differential equations and its application in related field of engineering
CO4	Solve the model by selecting and applying a suitable mathematical method like Trapezoidal rule, Simpson's (1/3)rd rule etc.
CO5	Interpreting the mathematical results practically
CO6	Find and analyse area, mass of lamina and volume of solid by using double and triple integration,
CO7	Find length of arc of a given curve.
CO8	Inculcate the habit of Mathematical Thinking.

Course Name: APPLIED PHYSICS - II (FEC202)

Students will be able to:

CO1	Ability to demonstrate competency & understanding of basic concepts of Physics like - Optics, Lasers, Fibre optics, Electrodynamics, Nanotechnology, etc.
CO2	Comprehend the concepts of interference and diffraction and their applications
CO3	Apply the working principles of Optical fibre, LASER and their applications in emerging technology
CO4	Understand electrodynamics, Maxwell's equations and their applications
CO5	Assimilate knowledge of the Nanotechnology and tools used SEM, TEM, AFM

Course Name: APPLIED CHEMISTRY-II (FEC203)

Students will be able to:

CO1	Calculate the quantity of air and oxygen required for the complete combustion of fuels and carry out analysis of fuels.
CO2	Understand the mechanisms of corrosion, methods of preventing corrosion.
CO3	Understand the properties and uses of various alloys.
CO4	Calculate atom economy by various methods of synthesis. Incorporate the knowledge of green synthesis of various chemicals.
CO5	Understand the chemistry of composite materials.

Course Name: ENGINEERING DRAWING (FEC204)

Students will be able to:

CO1	Apply the basic principles of projections in 2D drawings.
CO2	Apply the basic principles of projections in converting 3D view to 2D drawings.
CO3	Read a given drawing.
CO4	Visualize an object from the given two views.
CO5	Use CAD tool to draw different views of an object.

Course Name: STRUCTURED PROGRAMMING APPROACH (FEC205)

Students will be able to:

CO1	Understand the basic terminology used in computer programming.
CO2	Write, compile and debug programs in C language.
CO3	Use different data types in a computer program.
CO4	Design programs involving decision structures, loops and functions.
CO5	Describe the dynamics of memory by the use of pointers.
CO6	Use different data structures and create/update basic data files.

Course Name:COMMUNICATION SKILLS (FEC206)

Students will be able to:

CO1	Identify, interpret and construct appropriate messages for a variety of contexts.
CO2	Display oral and written skills in the English language in different scenarios of business communication.
CO3	Enhance the proficiency to use appropriate language for technical writing.
CO4	Demonstrate good comprehension, inference making, vocabulary building, paraphrasing and summarizing.
CO5	Communicate through result oriented writing both within and outside the organization.

SECOND YEAR SEM-III

Course Name: APPLIED MATHEMATICS-III (ISC301)

Students will be able to:

CO1	Demonstrate basic knowledge of Laplace Transform.
CO2	Obtain the time response of systems using inverse Laplace transform.
CO3	Find the Fourier series, Complex form of Fourier series, Fourier Integral and Fourier transform of the functions.
CO4	Study the differential vector algebra and its properties.

CO5	Study vector line integral and theorems in plane and surface.
CO6	Check for analytical functions and find the analytical function and study the mapping.

Course Name: ANALOG ELECTRONICS(ISC302)

Students will be able to:

CO1	Explain working of Diode and Zener diode and its applications
CO2	Analyze, simulate, and design amplifiers using BJT biasing techniques, frequency response.
CO3	Analyze circuits using MOSFET.
CO4	Explain power amplifiers and power supply.
CO5	Explain op-amp parameters
CO6	Design various circuits using operational amplifiers.

Course Name: TRANSDUCERS-I (ISC303)

Students will be able to:

CO1	Explain the measurement systems, errors of measurement
CO2	Explain the working principles of sensors and transducers.
CO3	Discuss the working principle of displacement transducers and their applications.
CO4	Discuss the working principle of transducers used for Temperature measurement, comparative study of various transducers.
CO5	Explain the working principle of transducers used for level measurement, comparative study of various transducers and their applications.
CO6	Identify various transducers in the industry and understand working of miscellaneous sensors.

Course Name: DIGITAL ELECTRONICS (ISC304)

CO1	Students will be able toRepresent numerical values in various number systems andperform number conversions between different number systems.

CO2	Students will be able toExplain operation of logic gates using IEEE/ANSI standardsymbols. Analyze and design, digital combinational circuits.
CO3	Students will be able toAnalyze and design, sequential logic circuits.
CO4	Students will be able toAnalyze and design, asynchronous sequential logic circuits.
CO5	Students will be able toExplain nomenclature and technology in memory devices
CO6	Students will be able toAnalyze logic families and their application to design the digitalsystem.

Course Name: Electrical Networks and Measurement (ISC305)

CO1	Students will be able toAnalyze AC and DC circuits using different theorems.
CO2	Students will be able toAnalyze transient and steady-state response of passive electricalnetworks.
CO3	Students will be able toAnalyze network using poles and zeros and find their parameters likeZ, Y, and ABCD.
CO4	Students will be able toSynthesize the networks using canonical forms.
CO5	Students will be able toDiscuss construction and working principle and applications of analogand digital instruments
CO6	Students will be able toMeasure electrical parameter like R, L, C using electrical bridges

Course Name: OBJECT ORIENTED PROGRAMMING AND METHODOLOGY(ISL301)

The students will be able to:

CO1	Apply fundamental programming constructs.
CO2	Illustrate the concept of packages, classes and objects.
CO3	Elaborate the concept of strings arrays and vectors.
CO4	Implement the concept of inheritance and interfaces.
CO5	Implement the notion of exception handling and multithreading.
CO6	Develop GUI based application

Course Name: ANALOG ELECTRONICS LAB PRACTICE (ISL302)

The students will be able to:

CO1	Demonstrate operation of basic electronic devices such as Diode
CO2	Demonstrate operation of basic electronic devices BJT, Assemble circuits using BJT AND find frequency response
CO3	Demonstrate operation of MOSFET.
CO4	Demonstrate linear applications of operational amplifier.
CO5	Demonstrate non-linear applications of operational amplifier
CO6	Design various circuits like regulator.

Course Name: TRANSDUCER - I LAB PRACTICE (ISL303)

The students will be able to:

CO1	Explain measurement techniques and measuring instruments.
CO2	Classify sensors, Transducers, and their brief Performance specifications.
CO3	Examine characteristics of various temperature transducers.
CO4	Examine characteristics of various level transducers
CO5	To demonstrate the performance characteristics of displacement transducers.
CO6	To demonstrate the performance characteristics of miscellaneous transducers.

Course Name: DIGITAL ELECTRONICS LAB PRACTICE(ISL304)

The students will be able to:

CO1	Implement code converters.
CO2	Verifying truth tables of all logic gates using NAND and NOR gates.
CO3	Using gates for constructing half and full adder and subtractor and also realize with multiplexer.
CO4	Understand the basics of types of flip-flops and design them to implement other flip-flops.

CO5	Design and implement counters and shift registers.
CO6	Learn how to convert BCD to seven segment and design finite state machine

SECOND YEAR SEM-IV

Course Name: APPLIED MATHEMATICS-IV (ISC401)

The students will be able to:

CO1	Check the given set of vectors is the vector space.
CO2	Find eigenvalues and eigenvectors of matrix and can diagonalize the matrix.
CO3	Find the probability distribution, expectation, variance and moments for the given data.
CO4	Use binomial distribution and Poisson distribution and normal distribution for the data for required probability.
CO5	Apply Cauchy‘s integral formula and theorem and residue theorem to solve the integral problem.
CO6	Find the correlation coefficients and rank correlation coefficients and lines regression between the two data.

Course Name: TRANSDUCER-II (ISC402)

The course would enable the students to:

CO1	Explain working principle of strain gauges.
CO2	Explain working principle of pressure transducers
CO3	Learn transducers for vacuum measurement.
CO4	Identify types of flow and use different transducers for flow measurement.
CO5	Explain the terminologies of electrochemical sensors and their applications in industry.
CO6	Identify sensors for power, density, humidity, pH measurement.

Course Name: FEEDBACK CONTROL SYSTEM (ISC403)

The students will be able to:

CO1	Identify open and closed loop control system
CO2	Formulate mathematical model for physical systems.
CO3	Simplify representation of complex systems using reduction techniques.
CO4	Use standard test signals to identify performance characteristics of first and second-order systems.
CO5	Apply root locus technique for stability analysis.
CO6	Analyze performance characteristics of system using Frequency response methods.

Course Name: ANALYTICAL INSTRUMENTATION (ISC404)

The students will be able to:

CO1	Define and explain various fundamentals of spectroscopy, qualitative and quantitative analysis.
CO2	Discuss the terms, principle, instrumentation, operation and applications of Molecular spectroscopic techniques.
CO3	Differentiate between principle, instrumentation and operation of Atomic absorption and emission Spectroscopy.
CO4	Explain the various Separation techniques and its instrumentation.
CO5	Describe the principle and working of various Radiation detectors.
CO6	Discuss the principle and working of various Gas analyzers.

Course Name: SIGNAL CONDITIONING CIRCUIT DESIGN (ISC405)

The students will be able to:

CO1	Explain principle of analog signal conditioning circuits
CO2	Design analog signal conditioners
CO3	Design digital signal conditioners
CO4	Apply knowledge of signal conditioning circuits to design temperature and pressure transducers signal conditioning
CO5	Apply knowledge of signal conditioning circuits to design optical and miscellaneous

	transducers signal conditioning
CO6	Apply knowledge to design different power supplies.

Course Name: APPLICATION SOFTWARE PRACTICES (ISL401)

The students will be able to:

CO1	Design logical operations, using Graphical programming language
CO2	Develop customized virtual instruments and represent them in required format with user friendly graphical programming software for LOOPS like FOR LOOP, WHILE LOOP etc.
CO3	Discuss Global variable, sequence structure etc.
CO4	Explain Visa programming
CO5	Discuss concepts of hardware used
CO6	Use the data acquisition card or simulated software module and make user interface in the field of engineering.

Course Name: TRANSDUCER - II LAB PRACTICE (ISL402)

The students will be able to:

CO1	Explain working principle of transducers used for strain measurement.
CO2	Explain working principle of transducers used pressure measurement.
CO3	Identify constant head type flow sensors such as orifice, venturi, tube, nozzle and pitot tube and study the applications.
CO4	Identify variable area and electromagnetic flow meters
CO5	Demonstrate the performance characteristics of various electrochemical sensors
CO6	Use miscellaneous sensors for density and viscosity measurement.

Course Name: FEEDBACK CONTROL SYSTEMS LAB PRACTICE (ISL403)

The students will be able to:

CO1	Plot frequency response of first-order electrical system.

CO2	Plot time response of second-order electrical system and calculate the steady-state error.
CO3	Demonstrate their knowledge to obtain the transfer function and transient and steady-state response to test signals such as step, ramp, and parabolic.
CO4	Understand the effect of damping factor on system response.
CO5	Inspect the time response specifications of systems by using root-locus.
CO6	Inspect the frequency response specifications of systems by using bodeplot, Polar plot, Nyquist-plot techniques, and comment on the stability of system

Course Name: ANALYTICAL INSTRUMENTATION LAB PRACTICE (ISL404)

The students will be able to:

CO1	Illustrate the concept and working of various spectrometers using different samples.
CO2	Analyze the given sample in qualitative and quantitative manner, using spectral techniques.
CO3	Use specific techniques employed for monitoring different pollutants in air and water.
CO4	Demonstrate the working of various radiation detectors.
CO5	Experiment the working of instruments used for clinical analysis, and pharmaceutical laboratories.
CO6	Illustrate the concept of separation science.

Course Name: SIGNAL CONDITIONING CIRCUIT DESIGN LAB PRACTICE (ISC405)

The students will be able to:

CO1	Explain working principle of signal conditioning circuits
CO2	Discuss the design considerations of analog signal conditioners used in transducer signal conditioning.
CO3	Discuss the design considerations of various digital signal conditioners used in transducer signal conditioning.
CO4	Apply knowledge of signal conditioning circuits to design temperature and

	pressure transducers signal conditioning
CO5	Apply knowledge of signal conditioning circuits to design optical and miscellaneous transducers signal conditioning
CO6	Apply knowledge to design different power supply.

THIRD YEAR SEM-V

Course Name: SIGNALS AND SYSTEMS (ISC501)

The students will be able to:

CO1	Describe the basic concept of signals and systems and their classification and operations on signals and plot the result.
CO2	Examine analysis of LTI systems using convolution and correlation.
CO3	Execute Fourier series analysis of periodic signals.
CO4	Demonstrate Fourier Transform and its applications.
CO5	Explain application of Laplace transform for analysis of CT signals and systems.
CO6	Demonstrate an ability to apply Z Transform for the analysis of DT signals and systems.

Course Name: APPLICATIONS OF MICROCONTROLLER (ISC502)

The students will be able to:

CO1	Identify the technology in the area of embedded systems.
CO2	Explain the comparative study of various microcontrollers and microprocessors
CO3	Outline the knowledge of operation of integrated hardware components.
CO4	Explain programming tools and design software programs in assembly or „C" language.
CO5	Solve and construct interfacing of peripheral components with MCS 51.

CO6	Investigate, recommend and design the sophisticated application based on MCS-51 such as Traffic light control, Digital weighing machine etc.

Course Name: CONTROL SYSTEM DESIGN (ISC503)

The students will be able to:

CO1	Obtain state-space model of electrical circuits, translational/rotational mechanical systems and electromechanical systems etc with emphasis on linear time-invariant systems
CO2	Obtain solution of state equations by using Laplace transform methods, Cayley Hamilton method etc.
CO3	Examine system for its stability, controllability and observability and design controller and observer with given transient specifications.
CO4	Design Lead, Lag and Lead –lag compensator using time domain method.
CO5	Design Lead, Lag and Lead –lag compensator using frequency domain method.
CO6	Study the PID controller tuning by Ziegler Nicholas and Cohen-coon methods

Course Name: CONTROL SYSTEM COMPONENTS (ISC504)

The students will be able to:

CO1	Study, select & implement various pneumatic system components & circuits.
CO2	Select & Compare various control systems like Hydraulic, pneumatic & electric.
CO3	Apply knowledge to classify, select & use various Transmitters.
CO4	Select, classify & use various control valves & their accessories.
CO5	Describe the Need of Auxiliary process control components & study their industrial usage.
CO6	Apply knowledge of Industrial Control Components & their application

Course Name: ADVANCED SENSORS (ISDLO5011)

The students will be able to:

CO1	Explain the various principles employed in transducers.

CO2	Examine the methods of fabricating a sensor.
CO3	Apply knowledge in designing smart sensors.
CO4	Discuss the techniques of fabrication and application of MEMS.
CO5	Describe the various applications of smart sensors.
CO6	Discuss advanced sensing technology.

Course Name: OPTIMIZATION TECHNIQUES (ISDLO5012)

The students will be able to:

CO1	Translate descriptive statements of the design engineering problems in to a mathematical statement of optimization.
CO2	Write optimality conditions for unconstrained and constrained problems and use Lagrange multiplier and KKT necessary conditions for solving problems.
CO3	Translating linear programming problem (LPP) in to standard form and then use simplex or two phase simplex method.
CO4	Use alternate form of two-phase simplex method called Big-M method also write dual problem for the given LP Problem for solving it.
CO5	Explain gradient-based search and direct search methods for design optimization problems.
CO6	Use the numerical methods for unconstrained optimization.

Course Name: DATABASE MANAGEMENT SYSTEM (ISDLO5013)

The students will be able to:

CO1	To describe data models and schemas in DBMS.
CO2	Explain the features of database management systems and Relational database.
CO3	Use SQL- the standard language of relational databases.
CO4	Identify the functional dependencies and Design a database.
CO5	TDescribe the concept of Transactions Management and Concurrency.
CO6	Explain the concept of Query Processing and Optimization.

Course Name: FIBER OPTIC INSTRUMENTATION (ISDLO5014)

The students will be able to:

CO1	Explain the principle of optical fibers and its properties.
CO2	Examine the various optical losses in the fiber, use OTDR for determining faults in the fiber.
CO3	Compare the different types of light sources and detectors and select one appropriately.
CO4	Explain the various principles of fiber optic sensors.
CO5	Use optical fiber sensors for different parameter measurement.
CO6	Investigate the various optical devices.

Course Name: BUSSINESS COMMUNICATION AND ETHICS (ISL501)

The students will be able to:

CO1	Design a technical document using precise language, suitable vocabulary and apt style.
CO2	Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships.
CO3	Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibilities.
CO4	Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP.
CO5	Deliver formal presentations effectively implementing the verbal and non-verbal skills.

Course Name: Applications of Microcontroller Lab Practice (ISL502)

The students will be able to:

CO1	Design and develop programs using instructions learned from instruction set in assembly or „c“ language.
CO2	Explain the comparative study of various microcontrollers and microprocessors

CO3	Outline the knowledge of operation of integrated hardware components.
CO4	Design software programs in assembly or „C“ language.
CO5	Solve and construct interfacing of peripheral components with MCS 51.
CO6	Investigate, recommend and design the sophisticated application based on MCS-51 such as Traffic light control, Digital weighing machine etc.

Course Name: CONTROL SYSTEMS DESIGN LAB PRACTICE (ISL503)

The students will be able to:

CO1	Obtain state model of a system from transfer function and study similarity transformation.
CO2	Verify the controllability and observability of the given system.
CO3	Design the controller and observer for the given system with transient specifications.
CO4	Obtain solution of state equations.
CO5	Design lead, lag, and lag-lead compensator using root-locus and bode-plot techniques with given transient specifications.
CO6	Tune PID controller by using Ziegler-Nichols and Cohen-coon methods for a given system represented by transfer function in time and frequency domain.

Course Name: CONTROL SYSTEM COMPONENTS LAB PRACTICE (ISL504)

The students will be able to:

CO1	Study, select & implement various pneumatic system components & circuits.
CO2	Select & Compare various control systems like Hydraulic, pneumatic & electric.
CO3	Apply knowledge to classify, select & use various Transmitters.
CO4	Select, classify & use various control valves & their accessories.
CO5	Describe the Need of Auxiliary process control components & study their industrial usage.
CO6	Apply knowledge of Industrial Control Components & their application.

Course Name: ADVANCED SENSORS LAB PRACTICE (ISL505)

The students will be able to:

CO1	Explain the various principles employed in transducers.
CO2	Examine the methods of fabricating a sensor.
CO3	Apply knowledge in designing smart sensors.
CO4	E Investigate the techniques of fabrication and application of MEMS.
CO5	Describe the various applications of smart sensors..
CO6	Discuss advanced sensing technology.

Course Name: OPTIMIZATION TECHNIQUES LAB PRACTICE (ISL505)

The students will be able to:

CO1	Formulate practical design problems having two design variables and solve graphically and identify the nature of the problem.
CO2	Apply the simplex method algorithm and solve LPP by two-phase simplex method numerically.
CO3	Apply algorithm of simplex method to solve quadratic programming problem numerically.
CO4	Use necessary and sufficient conditions and verify the descent conditions for a given search direction for unconstrained optimization problem.
CO5	Calculate step size along search direction using search methods numerically.
CO6	Apply numerical methods algorithms to solve unconstrained problems.

Course Name: DATABASE MANAGEMENT SYSTEM LAB PRACTICE (ISL505)

The students will be able to:

CO1	To model or design ER diagram based on the given schema or case study.
CO2	Use SQL- the standard language of relational databases.
CO3	Use a desktop database package to create, populate, maintain, and query a database.
CO4	Apply the concept of integrity and Security in Database:
CO5	Apply the concepts of Transaction Management and Concurrency.

Course Name: FIBER OPTIC INSTRUMENTATION-LAB PRACTICE (ISL505)

The students will be able to:

CO1	Explain the principle of optical fibers and its properties.
CO2	Examine the various optical losses in the fiber,use OTDR for determining faults in the fiber.
CO3	Compare the different types of light sources and detectors and select one appropriately.
CO4	Explain the various principles of fiber optic sensors.
CO5	Use optical fiber sensors for different parameter measurement.
CO6	Investigate the various optical devices.

THIRD YEAR SEM-VI

Course Name: PROCESS INSTRUMENTATION SYSTEM (ISC601)

The students will be able to:

CO1	Understand & Learn Process Control Terminologies, Process Dynamics & their mathematical model.
CO2	Understand different types of control actions & their selection.
CO3	Learn Features & Classify controllers like electronic, pneumatic and hydraulic & their Tuning Techniques.
CO4	Learn various process control schemes & their applications and selection.
CO5	Understand Multivariable Control systems & their Interaction
CO6	Develop relay logic for various processes & symbols.

Course Name: INDUSTRIAL DATA COMMUNICATION (ISC602)

The students will be able to:

CO1	Explain the importance of modulation in communication.
CO2	Examine the importance of OSI,TCP/IP model,various networking components.

CO3	Compare the different types of networks at various levels of field communication.
CO4	Use HART for communication
CO5	Establish Foundation fieldbus communication.
CO6	Investigate the various wireless devices.

Course Name: ELECTRICAL MACHINES AND DRIVES (ISC603)

The students will be able to:

CO1	Explain working of DC motors and study their characteristics.
CO2	Describe the working principle of 3-phase I.M.
CO3	Discuss the constructional features of single-phase I.M.
CO4	Compare basic characteristics and ratings of power electronic devices.
CO5	Use controlled rectifiers, Inverters & choppers with different loads.
CO6	Illustrate working of AC & DC drives.

Course Name: DIGITAL SIGNAL PROCESSING (ISC604)

The students will be able to:

CO1	Describe the basic concept of discrete time signal processing such as sampling, aliasing, concept of DSP.
CO2	Demonstrate an ability to apply Discrete Fourier Transform, Fast Fourier transform and convolution techniques to signals.
CO3	Apply the concepts of all-pass and minimum-phase systems to analyses the LTI system, Also realization of system by direct form I, II, Cascade, Parallel and Structure form.
CO4	Design FIR filter by different techniques.
CO5	Describe how IIR filters are designed and Implemented by different methods.
CO6	Explain DSP processors and adaptive filters such as LMS, RLS for various applications.

Course Name: ADVANCED CONTROL SYSTEM (ISC605)

The students will be able to:

CO1	Differentiate linear and nonlinear system, study characteristics of common physical nonlinearities.
CO2	Perform linearization of the nonlinear systems by using linearization techniques.
CO3	Construct phase-plane trajectories, study behavior of limit cycle and concept of sliding mode control.
CO4	Investigate the stability of nonlinear system by describing function method.
CO5	Investigate the stability of nonlinear system by Lyapunov‟s method
CO6	Design and develop the IMC structure for particular system with Uncertainty and Disturbances.

Course Name: MATERIAL SCIENCE (ISDLO6021)

The students will be able to:

CO1	Classify and brief the properties of materials.
CO2	Describe about the mechanical testing.
CO3	Explain structure of materials.
CO4	Acquire knowledge about heat treatment of steel
CO5	Examine micro-macro metals.
CO6	Analyze different non ferrous alloys

Course Name: COMPUTER ORGANIZATION AND ARCHITECTURE(ISDLO6022)

The students will be able to:

CO1	To describe basic structure and operation of a digital computer.
CO2	To design fixed-point and floating-point addition, subtraction, multiplication & division and other arithmetic unit algorithms.
CO3	To describe the different ways of communicating with I/O devices and standard I/O interfaces.

CO4	To analyze the hierarchical memory system including cache memories and virtual memory.
CO5	To describe pipelining and its Hazards
CO6	To Explain the Pentium processor Hardware design

Course Name: BIO-SENSORS AND SIGNAL PROCESSING (ISDLO6023)

The students will be able to:

CO1	To describe the basic concept behind bioelectric phenomena.
CO2	To classify the different types of bio-sensors and describe their characteristics.
CO3	To distinguish between the different biosensors used for physical and chemical measurands.
CO4	To explain the various types of transducers found in biosensors and their significance.
CO5	To explain about the various basic signal processing techniques used in bio-signal acquisition and analysis.
CO6	To apply the appropriate biosensor for different applications.

Course Name: NUCLEAR INSTRUMENTATION(ISDLO6024)

The students will be able to:

CO1	To explain basics of radioactivity, properties of alpha, beta and gamma rays.
CO2	To compare construction and working of various radiation detectors.
CO3	To describe electronics and counting systems used in nuclear instrumentation to process nuclear detector signal.
CO4	To list various factors influencing resolution of gamma energy spectrum and specifications of nuclear ADC.
CO5	To apply nuclear radiation detectors in medicine

CO6	To apply nuclear instrumentation in industry.

Course Name: PROCESS INSTRUMENTATION SYSTEM- LAB PRACTICE (ISL601)

The students will be able to:

CO1	Understand & Learn Process Control Terminologies, Process Dynamics & their mathematical model.
CO2	Understand different types of control actions & their selection.
CO3	Learn Features & Classify controllers like electronic, pneumatic and hydraulic & their Tuning Techniques.
CO4	Learn various process control schemes & their applications and selection.
CO5	Understand Multivariable Control systems & their Interaction
CO6	The students will be able to develop relay logic for various processes & symbols.

Course Name: INDUSTRIAL DATA COMMUNICATION-LAB PRACTICE (ISL602)

The students will be able to:

CO1	Explain the importance of modulation in communication.
CO2	Examine the importance of OSI,TCP/IP model,various networking components.
CO3	Compare the different types of networks at various levels of field communication.
CO4	Use HART for communication
CO5	Establish Foundation fieldbus communication.
CO6	Investigate the various wireless devices.

Course Name: ELECTRICAL MACHINES AND DRIVES – LAB PRACTICE (ISL603)

The students will be able to:

CO1	Perform speed control of DC motor by different methods
CO2	Describe working principle of three-phase and single -phase induction motors.

CO3	Study the characteristics of semiconductor devices
CO4	Use semiconductor devices to build different circuits..
CO5	Apply drives for speed control of DC motor.
CO6	Discuss the working of AC drive for I.M.

Course Name: DIGITAL SIGNAL PROCESSING- LAB PRACTICE (ISL604)

The students will be able to:

CO1	Verify sampling theorem using simulation software.
CO2	Demonstrate DT Fourier analysis, convolution and correlation concept using simulation software.
CO3	Perform Fast Fourier Transform of signals.
CO4	Design and implement FIR and IIR filters using computer simulation software platform.
CO5	Realize filters by direct form I, II, Cascade and Parallel form.
CO6	Study DSP processors, Adaptive filters and their applications.

Course Name: ADVANCED CONTROL SYSTEM- LAB PRACTICE (ISL605)

The students will be able to:

CO1	Construct the phase-plane trajectories using Delta Method.
CO2	Classify stability of limit cycle as per obtained response of the system
CO3	Derive DF for common nonlinearities and investigate stability of system with limit cycle.
CO4	Determine Lyapunov‟s function and also able to investigate the stability of nonlinear system
CO5	Design the IMC structure and apply same for stability analysis.
CO6	Design IMC based PID controller.

FORTH YEAR SEM-VII

Course Name: INDUSTRIAL PROCESS CONTROL (ISC701)

CO1	The student will be able to get a complete overview of strategies for process control.
CO2	The student will be able to Know all the industrial processes and demonstrate their knowledge in designing the control loops for these processes.
CO3	The students will be able to Understand the safety related terms such as classification of hazards in the industry and design Hazard free plant.
CO4	The students will be able to analysecontinuous process industries.
CO5	The students will be able to understand the batch process industries.
CO6	The student will be aware about miscellaneous process equipment's.

Course Name: BIOMEDICAL INSTRUMENTATION (ISC702)

CO1	Students will be able to identify various Bio-potentials and their specifications in terms of amplitude and frequency.
CO2	Students will be able to describe the principle and working of various Biomedical Instruments for diagnosis applications.
CO3	Students will be able to choose therapeutic instruments applications for treatment purpose.
CO4	Students will be able to illustrate applications of Life Support Equipment's.
CO5	Students will be able to summarize applications of imaging instruments and the modalities involved in each technique.
CO6	Students will be able to categorize electrical hazards and related safety measures.

Course Name: ADVANCED CONTROL SYSTEM (ISC703)

CO1	Students will be able to learn Linear and nonlinear physical system.
CO2	Students will be able to analyse nonlinear system behaviour using singular point and Physical nonlinearities.
CO3	Students will be able to learn Phase plane graphical method and stability.
CO4	Students will be able to analyse describing function and IMC with Uncertainty and Disturbances.

CO5	Students will able to learn Lyapunov method.
CO6	Students will be able to learn Optimal Control.

Course Name: PROCESS AUTOMATION (ISC704)

CO1	Students will be able to define automation, it's importance, expectations from Industrial automation and applications in industry.
CO2	Students will be able to understand working of PLC, I/O modules of PLC, Programming languages and instructions of PLC, design PLC based application by proper selection and sizing criteria, developing GUI and ladder program.
CO3	Students will be able to analyses the evolution and architecture of DCS, hierarchical control in DCS, programming DCS through function Block Diagram (FBD) method.
CO4	Students will be able to visualize SCADA architecture, communication in SCADA, develop any application based on SCADA along with GUI using SCADA software.
CO5	Students will be able to explore the Philosophies of Alarm Management , Historian, MES
CO6	Students will be able to determine the need of SIS, risk reduction methods, evolution of SIL (Safety Integrated Levels)

Course Name: IMAGE PROCESSING (ISE7052)

CO1	Student will be able to understand the basic concepts and methodologies for digital image processing.
CO2	Students are expected to develop a foundation that can be used as the basis function i.e. image transform for further development of image processing techniques.
CO3	Students will be able to study and program advanced techniques for image enhancement and restoration etc.
CO4	Students will be able to study and program advanced techniques for image segmentation etc.
CO5	Students will be able to study and program advanced techniques for image compression etc.
CO6	Students will be able to study and program advanced techniques for morphological operations etc.

Course Name: FUNCTIONAL SAFTY (ISE7053)

CO1	To make the students aware of basic concepts of safety instrumented system, standards and risk analysis techniques. To make the students aware about standards and regulations in process industry sector.
CO2	To make the students aware about standards and regulations in process industry sector. To make student understand about a safety review of the process, implementation of other safety layers, systematic analysis, as well as detailed documentation and procedures.
CO3	Students should aware about process and safety control and failures. Students should know the different technologies used for safety functioning of system.
CO4	The students should be able to understand the role of calculative safety analysis in Safety instrumented system in the industry.
CO5	The students should able to understand the quantitative, semi-quantitative, and qualitative methods of process hazard analysis.
CO6	Identify and analyse the hazards, Select the Safety integrity level. The student should able to select the SIL through proper hazard analysis.

Course Name: PROJECT-I (ISP706)

CO1	Formulation of problem & literature survey
CO2	Specifications & Requirements
CO3	Overview/Design of Components / Elements / System
CO4	Implementation
CO5	Testing and Evaluation
CO6	Cost Benefit Analysis

FORTH YEAR SEM-VIII

Course Name: DIGITAL CONTROL SYSTEM (ISC801)

CO1	To understand mathematical models of linear discrete-time control systems using transfer function and state space model.
CO2	Analyze transient and steady- state behaviours of linear discrete-time control system.

CO3	Determine whether performance of linear discrete-time control systems meet specified design criteria.
CO4	Design controllers and observers for linear discrete-time control systems so that their performance meet specified design criteria.
CO5	Design PID controllers.
CO6	To understand concepts of transfer function approach to controller design.

Course Name: INSTRUMENTATION PROJECT DOCUMENTATION AND EXECUTION (ISC802)

CO1	A. Design and develop of basic and detailed engineering project deliverables B. Project team understand types of project executed in I& C Projects.
CO2	Text Document preparation : Instrument Index Sheet , Instrument specification sheet etc.
CO3	Graphic document preparation- ISA symbols, P and ID, Instrument installation diagram
CO4	System integration : network diagram, CAT, FAT, SAT
CO5	A. Understand Procedures, Guidelines and Thumb Rules for performing Precommissioning activities. B.Software packages
CO6	Overall Development of the students by Hands on working Experience.

Course Name: INSTRUMENT AND SYSTEM DESIGN (ISC803)

CO1	The student will be able to design and analyses CV Sizing.
CO2	The students will be able to identify & select appropriate control panel.
CO3	The students will be able to design of electronic product.
CO4	The students will be able to select, calibrate & install suitable transducer.
CO5	The students will be able to design ergonomically fulfilled control room.
CO6	The students will be able to calculate reliability of any engineering product.

Course Name: NUCLEAR INSTRUMENTATION (ISE8041)

CO1	The students get well versed with construction and working of various radiation detectors.
CO2	Students get deep knowledge of radioactivity, properties of alpha, beta and gamma rays .
CO3	Students also get thorough knowledge of electronics and counting systems used in nuclear instrumentation.
CO4	Students get information about nuclear spectroscopy systems, MCA, nuclear ADC.
CO5	Students get detailed information about applications of nuclear instrumentation in medicine, industry etc.

Course Name: POWER PLANT INSTRUMENTATION (ISE8042)

CO1	The students will get well versed with all power generation plants.
CO2	Students will be able to perceive thorough knowledge of Instrumentation involved in power plants.
CO3	Student will be able to summarize different components used in power plant.
CO4	Students will be able to to acquire knowledge about safety standards and safety hazards in handling different types of power plants.
CO5	Students will be able to illustrate the applications involved in power plants.
CO6	Students will be able to compare various power plants for the best performance and maximum utilization of the renewable resources.

Course Name: PROJECT-II (ISP805)

CO1	Formulation of problem & literature survey
CO2	Specifications & Requirements
CO3	Overview/Design of Components / Elements / System
CO4	Implementation
CO5	Testing and Evaluation
CO6	Cost Benefit Analysis

DEPARTMENT OF ELECTRONICS AND TELE-COMMUNICATION ENGINEERING

PROGRAM OUTCOME

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 The engineer and society : Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME

PSO1 Knowledge of Engineering Fundamentals: A graduate will be able to acquire in-depth knowledge of Basic sciences, mathematics and fundamentals of Electronics and Telecommunication Engineering.

PSO2 Technical skills and Ability: A graduate will be able to get the desired exposure to software & hardware tools and emerging technologies necessary for the acquisition of technical skills and problem solving ability.

PSO3 Application of Knowledge: A graduate will be able to apply the acquired knowledge to design, solve and analyze real-life engineering problems and applications. He/she will have the understanding of the impact of engineering solutions in a global, economic, environmental and societal context.

PSO4 Research and Innovation: A graduate will be able to provide innovative and original solutions by possessing requisite research and developmental aptitude and abilities.

ECC301 APPLIED MATHEMATICS III SEM III

CO1 Students will gain basic knowledge of Laplace Transform and demonstrate an ability to identify, formulate, and solve Electronics Engineering problems. Also participate and succeed in competitive exams like GATE, GRE, etc.

CO2 Student will demonstrate an understanding of foundation of Fourier series and succeed in competitive exams like GATE, GRE, etc.
CO3 Student will be capable of working collaboratively to frame and solve complex problems
CO4 Students will learn Bessel's function and demonstrate an ability to identify, formulate, and solve Electronics Engineering problems
CO5 Student will become familiar with Vector algebra and demonstrate an ability to identify and formulate

ECC302 EDC-I SEM III

CO1 Understand the current and voltage characteristics of Semiconductor devices.
CO2 Able to Design and analyze regulator circuits.
CO3 Able to design and Analyze DC circuits of semiconductor devices with their physical operation.
CO4 Design and analysis of BJT and FET amplifier circuits
CO5 Understand the concepts of frequency response of BJT and FET amplifiers.

ECC303 DSD SEM III

CO1 Develop a digital logic and apply it to solve real life problems
CO2 Analyze, design and implement combinational logic circuits
CO3 Classify different semiconductor memories
CO4 Analyze, design and implement sequential logic circuits.
CO5 Analyze digital system design using PLD.
CO6 Simulate and implement combinational and sequential circuits using VHDL systems.

ECC304 CTN SEM III

CO1 Apply their knowledge in analyzing Circuits by using network theorems.
CO2 Apply Network topology for analyzing the circuit.
CO3 Apply the time and frequency method of analysis.
CO4 Analyze the network function for the circuit.
CO5 Find the various parameters of two port network.
CO6 Synthesize the network using passive elements.

ECC305 EIC SEM III

CO1 Students will be able to find transfer function for given system
CO2 Students will be able to predict stability of given system using appropriate criteria.
CO3 Students will be able to calculate time domain & frequency domain parameters for given system
CO4 Students will be able to explain principles of operation for measuring instruments for passive components
CO5 Students will able to explain principle of operation for various sensors.
CO6 Students will be able to describe functional blocks of data acquisition system.

ECL301 EDC-I SEM III

CO1 Able to identify electronic instruments and understand characteristics and operation of electronic components.
CO2 Able to analyze regulator circuits
CO3 Able to understand characteristics & different biasing techniques of transistors.
CO4 Able to analyze and design BJT and FET amplifier circuits.
CO5 Able to understand frequency response of FET and BJT amplifier.

ECL302 DSD III

CO1 Develop a digital logic and apply it to solve real life problems.
CO2 Analyze, design and implement combinational logic circuits
CO3 Able to understand basic arithmetic circuits.
CO4 Analyze, design and implement sequential logic circuits.
CO5 Simulate and implement combinational and sequential circuits using VHDL systems.

ECL303 OOP III

CO1 Students will be able to code a program using JAVA constructs
CO2 Students will be able to understand fundamental features of an object oriented language: object classes and interfaces, exceptions and libraries of object collections.
CO3 Students will be able to develop a program that efficiently implements the algorithm for given tasks
CO4 Students will be able to utilize the knowledge acquired in this course to develop higher level algorithms.

ECC401 APPLIED MATHEMATICS IV IV

CO1 Students will demonstrate an ability to manipulate matrices & compute eigen values & eigen vectors which are necessary to formulate, solve & analyze engineering problems.

CO2 Student will Identify and classify zeros, singular points, residues and their applications and will demonstrate the understanding of impact of engineering mathematics on Electronics & Telecommunication Engineering.
CO3 Students will demonstrate an ability to identify formulate and solve Electronics & Telecommunication Engineering related problem using calculus of variations to specific systems.
CO4 Student will gain basic concept of Vector spaces over real field and can participate and succeed in competitive exams like GATE,GRE.
CO5 Student will demonstrate basic knowledge of correlation and lines of regression.
CO6 Students will demonstrate basic knowledge of Random variables and probability distributions functions.

ECC402 EDC-II IV

CO1 Able to design and analyze the basic operations of MOSFET.
CO2 Able to analyze and design multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain.
CO3 Able to understand the concept of different power amplifier circuits, their design and use in electronics and communication circuits.
CO4 Able to understand the characteristics and analysis of feedback amplifier circuits.
CO5 Able to analyze and design the different oscillator circuits for various frequencies.

ECC403 LIC IV

CO1 Understand the fundamentals for the integrated circuits (OP-Amp).
CO2 Understand the areas of applications for the integrated circuits (OP-Amp).
CO3 Analyze important types of integrated circuits.
CO4 Demonstrate the ability to design practical circuits that perform the desired operations.
CO5 Understand the differences between theoretical, practical & simulated results in integrated circuits.
CO6 Select the appropriate integrated circuit modules to build a given application.

ECL401 EDC-II IV

CO1 Able to design and analyse the basic operations of MOSFET.
CO2 Able to analyze and design multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain.
CO3 Able to understand the concept of different power amplifier circuits, their design and use in electronics and communication circuits.
CO4 Able to understand the characteristics and analysis of feedback amplifier circuits.
CO5 Able to analyze and design the different oscillator circuits for various frequencies.

ECL402 LIC IV

CO1 To understand Linear applications of OPAMP and it's simulated results.
CO2 To understand Non-linear applications of OPAMP and it's simulated results.
CO3 To understand design and application of Timer IC 555.
CO4 Design and understand specialized applications of IC.
CO5 Design regulator circuit for particular application.

ECC405 PCE IV

CO1 Identify and solve basic communication problems.
CO2 Use of different Amplitude modulation and demodulation techniques used in analog communication.
CO3 Use of different frequency modulation and demodulation techniques used in analog communication
CO4 Analyze transmitter and receiver circuits.
CO5 Generation, detection & Application of pulse communication system.
CO6 Compare and contrast design issues, advantages, disadvantages and limitations of analog communication systems.

ECL403 PCE Lab IV

CO1 Use of different modulation and demodulation techniques used in analog communication.
CO2 Identify and solve basic communication problems
CO3 Analyse transmitter and receivers circuits
CO4 Compare and contrast design issues, advantages, disadvantages/limitations of analog communication systems. Use of various techniques of analog pulse modulation & demodulation
CO5 Use of various multiplexing & demultiplexing in analog pulse communication.

ECC404 SS IV

CO1 Understand about various types of signals and systems, classify them, analyze them, and perform various operations on them.
CO2 Observe the effect of various properties and operations of signals and systems.
CO3 Understand use of transforms in analysis of signals and system in continuous time domain.
CO4 Understand use of transforms in analysis of signals and system in discrete time domain.
CO5 Evaluate the time and frequency response of Continuous and Discrete time systems which are useful to understand the behavior of electronic circuits and communication systems.
CO6 Understand applications concepts of signals and systems in Speech, Image and control system applications.

ECL503 BCE SEM V

CO1 Design a technical document using precise language, suitable vocabulary and apt style.

CO2 Develop life skills / interpersonal skills to progress professionally by building stronger relationship.

CO3 Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibility.

CO4 Apply the traits of a suitable candidate for a job/ higher education upon being trained in the techniques of holding group discussion, facing interviews and writing resumes/sop.

CO5 Deliver formal presentation effectively implementing verbal and non -verbal skills

ECL504 CL LAB SEM V

CO1 Learn open source programming tools for communication technology
CO2 Simulate and anlyze the performance of commmunication systems
CO3 Implement the communication system/subsystem
CO4 Extensive use of signal processing experiments in Scilab
CO5 To simulate digital communication system using python
CO6 To apply knowledge of open source technology for mini-project

ECC502 DC SEM V

CO1 Understand random variables and random processes of signal
CO2 Apply the concepts of Information Theory in source coding
CO3 Evaluate performance of different error control codes
CO4 Compare different band-pass modulation techniques
CO5 To understand different methods to eliminate Inter-symbol interference
CO6 Compare different receiver techniques in terms of error probability.

ECLDLO5014 Data compression and encryption SEM V

CO1 To study text compression techniques.
CO2 To study image compression techniques.
CO3 To study audio and compression techniques.
CO4 To understand data encryption techniques.
CO5 To study number theory and Asymmetric key cryptography
CO6 To study network theory

ECC504 DTSP SEM V

CO1 Understand the concept of discrete time fourier transform and fast fourier transform
CO2 Apply the knowledge of design of IIR digital filters to meet arbitrary specifications.
CO3 Apply the knowledge of design of FIR digital filters to meet arbitrary specifications.
CO4 Analyze the effect of hardware limitations on performance of digital filters.
CO5 Apply the knowledge of DSP processors for various applications.

ECC503 EME SEM V

CO1 Understand fundamentals of electrostatics and application of Gauss's Law and Divergence Theorems

CO2 Learn the Poisson and Laplace Equations and characteristics of Electric Fields in Material medium.

CO3 Understand the fundamental laws of Magnetism and magnetic materials.

CO4 Understand Maxwell's equations and electromagnetic wave propagation in free space as well as material medium.
CO5 Understand fundamentals of Transmission Lines in electromagnetic wave propagation and learn the use of Smith Chart in solving such problems.
CO6 Understand various devices based on electromagnetism and diverse applications.

ECC501 MPI SEM V

CO1 Understand the basic concepts for design and development of microcomputer systems

CO2 Understand the architecture and software aspects of microprocessor 8086
CO3 Understand assembly language programming to implement engineering problems using modern tools.
CO4 Design microprocessor based systems by interfacing peripherals
CO5 Design and create systems compatible with real world data using various analog and digital Interfacing with 8086
CO6 Design Co-processor and memory based microprocessor systems to solve complex problems

ECL501 MPI LAB SEM V

CO1 Understand the basic concepts for design and development of microcomputer systems.

CO2 Understand the architecture and software aspects of microprocessor 8086.
CO3 Understand assembly language programming to implement engineering problems using modern tools.
CO4 Design microprocessor based systems by interfacing peripherals.
CO5 Design and create systems compatible with real world data using various analog and digital Interfacing with 8086
CO6 Design Co-processor and memory based microprocessor systems to solve complex problems

ECCDLO5012 TVE SEM V

CO1 Understand overview of TV system.
CO2 Describe and differentiate working principles of color theory and also Understand, use and working principles of different CCIR systems.
CO3 Understand details of compression technique.
CO4 Know about different dvb standards
CO5 Understand advanced digital systems
CO6 Understand, use and working principles of latest display like LCD, LED & Chromcast.

ECLDLO5012 TV-LAB SEM V

CO1 To understand CVS and TV receiver.
CO2 To understand troubleshooting of TV.
CO3 Students will able to understand various DTH section.
CO4 Describe and diffrentiate working principle of latest digital TV system like HDTV.
CO5 Describe and diffrentiate working principle of analog TV transmitter and camera tubes and latest display like LED and LCD.

ECC603 ARWP Antenna & Radio Wave Propagation SEM VI

CO1 Understand Basic antenna parameters like radiation pattern, directivity, gain, etc.
CO2 Learn and derive the field equations for the basic radiating wire elements like linear, loop and helical antennas.
CO3 Design the linear and planar antenna arrays using isotropic and directional Sources.
CO4 Learn the implementation of various types of Aperture Antennas.
CO5 Learn the implementation of special types of Antennas like microstrip antennas.
CO6 Understand radio wave propagation on ground, in sky and in space in addition to learning methods of measurement of various antenna parameters.

ECL603 Antenna & Radio Wave Propagation LAB SEM VI

CO1 To Understand Basic antenna parameters like radiation pattern, directivity, gain, etc
CO2 To study various types of wire antennas.
CO3 To study and simulate antenna arrays.
CO4 To study frequency independent antennas like log periodic antenna.
CO5 To study special types of Antennas like microstrip antennas.

ECC602 COMPUTER COMMUNICATION NETWORKS SEM VI

CO1 Study of small or medium sized computer network with reference to layered models.
CO2 To study media types, end devices, and interconnecting devices that meets a customer‘s specific needs.
CO3 Explain the concept of Algorithm for achieving reliable flow control and error control of frames.
CO4 Acquire knowledge of programming for network communications.
CO5 Perform basic configurations on routers and Ethernet switches.
CO6 Develop knowledge and troubleshoot connectivity problems in a host occurring at multiple layers.

ECL602 COMPUTER COMMUNICATION NETWORKS LAB SEM VI

CO1 To Perform installation of simulation software like NS2,Netkit emulator etc
CO2 Design a small or medium sized computer network including media types, end devices, and interconnecting devices that meets a customer‘s specific needs.
CO3 Learn to simulate computer networks and analyze the simulation results
CO4 To study the troubleshooting connectivity problems in network.
CO5 Demonstrate knowledge of programming for network communications
CO6 Perform basic configurations on routers and Ethernet switches.

ECCDLO6023 DATABASE MANAGEMENT SYSTEM SEM VI

CO1 Understand the fundamentals of database systems and different data models and design issues in database.
CO2 Design ER diagram and relational schemas and will also be able to apply concepts of normalization to relational database design
CO3 Understand the basics of model of relational Algebra and calculus.
CO4 Design views and querying the database using SQL.
CO5 Understand the concept of transaction management and concurrency control

ECLDLO6023 DBMS LAB SEM VI

CO1 Understand the fundamentals of database systems and different data models and design issues in database.
CO2 Design ER diagram and relational schemas and will also be able to apply concepts of normalization to relational database design.
CO3 Understand the basics of model of relational Algebra and calculus.

CO4 Design views and querying the database using SQL.
CO5 Understand the concept of transaction management and concurrency control.
CO6 Understand the concept of transaction management and concurrency control.

ECC604 IPMV SEM VI

CO1 Understand theory and models in image processing.
CO2 Interpret and analyze 2D signals in frequency domain through image transforms.
CO3 To Develop spatial and frequency domain techniques for image enhancement.
CO4 Apply quantitative models of image processing for image restoration for various applications.

CO5 Apply segmentation for image analysis.
CO6 Find shape using various representation techniques and classify the object using different classification method.

ECL604 IPMV Lab SEM VI

CO1 Understand theory and color models in Image and Video Processing
CO2 Interprete and anlyze 2D signals in frequency domain through image transforms.
CO3 To develepe spatial anf frequency domain techniques for image enhancement.
CO4 Apply quantitative models of image prcessing for image restoration for various application.

CO5 Apply segmentation for image analysis.
CO6 Find shape using various representation techniques and classify the object using different clssification method.

ECC601 MCA SEM VI

CO1 Draw and describe detailed architecture and software aspects of 8051 microcontrollers.

CO2 Study the in depth working of the microcontroller and their instruction set.
CO3 Design microcontroller based systems by interfacing various peripheral devices to 8051.

CO4 Understand the detailed data flow model of ARM7 microcontroller.
CO5 Implement engineering problems using modern tools and write the assembly language program for ARM7.
CO6 Design ARM microcontroller based system using embedded C programs.

ECL601 MCA LAB SEM VI

CO1 Demonstrate detail feature, data flow and software aspects of microcontrollers.
CO2 Apply and demonstrate the knowledge acquired from microcontroller by performing the experiments in assembly language using IDE & KIT.
CO3 Simulate &Implement the design of interface based programs for 8051 applications to analyze, interpret result &write appropriate conclusion.
CO4 Develop the assembly language program to understand basic instruction for ARM7 using simulator.
CO5 Design &Implement ARM microcontrollers based system using peripherals with embedded C programs for KIT.
CO6 Design &Implement ARM microcontrollers based system using peripherals with embedded C programs for KIT.

ETC601 DC VI

CO1 Understand the basics of information theory & coding techniques.

CO2 Determine methods to mitigate inter symbol interference in baseband transmission system.

CO3 Determine the minimun number of bits per symbol required to represent the source & maximum rate at which reliable communication can take place over the channel.

CO4 Describe and determine the performance of different waveform techniques for the generation of digital representation of signals.

CO5 Describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel.

CO6 Understand various spreading techniques & determine bit error performance of various digital communication systems.

ETC602 DTSP VI

CO1 Formulate engineering problems in terms of DSP tasks.
CO2 Apply engineering problem solving strategies to DSP problems.
CO3 Design and test signal processing algorithms for various applications.
CO4 Design and simulate digital filters .
CO5 Recover information from signals.
CO6 Case study of practical applications in various fields.

ETC603 CCTN VI

CO1 Troubleshoot connectivity problem in a host occuring at multiple layer of OSI model
CO2 Demonstrate knowledge of programming for network communication
CO3 Learn to simulate computer network and analyze the simulation results
CO4 Perform basic configuration of routers and ethernet switches
CO5 Assemble the component of the PC and install one or more network operating system resulting in a functioning
CO6 Design a small or medium sized computer network including media types , end devices and interconnecting devices that meets a customers specific needs

ETC604 Television Engineering VI

CO1 Understand, use and working principles of Analog TV and camera tubes.
CO2 Describe and differentiate working principles of monochrome and color theory and also Understand, use and working principles of different CCIR systems.
CO3 Describe and differentiate various concept of digital video.
CO4 Describe and differentiate working principles of latest digital TV and advanced TV systems.

CO5 Describe and differentiate working principles of HDTV, WDTV and MUSE system.
CO6 Understand, use and working principles of latest display like LCD, LED, Plasma and large plat panel Monitor.

ETC605 OS VI

CO1 Students will be able to understand the basic structure and functioning as well as issue of operating system.
CO2 Students will be able to learn the role of operating system in management of process, deadlock and basics of memory management, I/O management and file management.
CO3 Students will be able to understand Concepts related to UNIX operating system & its functionality.
CO4 Students will be able to understand Concepts of o Linux operating system & its functionality.

CO5 Students will be able to learn & understand RTOS structure.

ETC606 VLSI Design VI

CO1 Students will be able to demonstrate a clear understanding of CMOS fabrication flow and technology scaling.
CO2 Students will be able to design MOSFET based logic circuits
CO3 Students will be able to draw layout of a given logic circuit and realize logic circuits with different design styles
CO4 Students will be able to demonstrate an understanding of working principle of different types of memories
CO5 Students will be able to design and analyze between adders,multipliers and shifters
CO6 Students will be able to demonstrate an understanding of working principle of power generation ,distribution of clocking and power reduction

ETL601 DTSP Lab VI

CO1 Formulate engineering problems in terms of DSP tasks.
CO2 Apply engineering problem solving strategies to DSP problems.
CO3 Design and test signal processing algorithms for various applications.
CO4 Design and simulate digital filters .
CO5 Recover information from signals.
CO6 Case study of practical applications in various fields**.**

ETL602 CELIII VI

CO1 To implement different types of Line code to represent digital signal in Baseband Transmission
CO2 To implement different digital modulation techniques and study their waveforms.
CO3 To measure Intersymbol Interference in Baseband transmission system.
CO4 Study of end devices,interconnecting devices that meets customer specific needs.
CO5 Learn to simulate computer networks and analyse the simulation results
CO6 Demonstrate the knowledge of programming for network communication

ETL603 CEL-IV VI

CO1 Students will be able to design MOSFET based logic circuits
CO2 Students will be able to draw layout of a different logic circuit
CO3 Students will be able to realize logic circuits with various design styles
CO4 Describe and differentiate working principle of analog TV transmitter and camera tubes and latest display like LED, LCD
CO5 Describe and differentiate working principle of latest digital TV and advance TV system like HDTV.

ETL604 Miniproject-II VI

CO1 Apply the knowledge and skills learned out of courses studied to solve/implement predefined practical problem.
CO2 Learning additional skills.
CO3 Development of ability to define and design the problem and lead to its accomplishment with proper planning.
CO4 Learn the behavioral science by working in a group.

ETC701 IVP VII

CO1 Understand theory and models in Image Processing
CO2 Interpret and analyze 2D signals in frequency domain through image transforms
CO3 Develop innovative design for practical applications in various fields
CO4 Apply segmentation and morphology for analysis of images

CO5 To study the restoration of image
CO6 Apply quantitative models of video processing for various engineering applications.

ETC702 Mobile Communication VII

CO1 To study the concept of cellular system design.
CO2 To understand mobile technologies like GSM,CDMA concepts n architecture,frame structure,system capacity,services provided.
CO3 To know the mobile communication evolution of 3G in detail.
CO4 To know the mobile communication evolution of 3GPP LTE in detail.
CO5 Understanding emerging technologies required for 4G mobile system such as SDR,MIMO etc. Standards.
CO6 Understand different indoor & outdoor propogation models related to losses & different types of fading.

ETC703 OPTICAL COMMUNICATION NETWORK VII

CO1 Apply the fundamental principles of optics and light wave to design optical fiber communication systems.
CO2 Identify structures, functions, materials, and working principle of optical fibers, light sources, couplers, detectors, and multiplexers. OTDR,WDM etc.
CO3 Design optical fiber communication links using appropriate optical fibers, light sources, couplers,detectors, and multiplexers.
CO4 Explore concepts of designing and operating principles of modern optical communication systems and networks.
CO5 Apply the knowledge developed in-class to contemporary optical fiber communication research and industrial areas.
CO6 Apply the knowledge for Network design, Transmission system model, management Network management functions and optical safety.

ETC704 MRE VII

CO1 The Student will be able to understand microwave band and characteristics. Mode analysis of rectangular and circular wave guide will be understood. The student is able to understand resonator, reentrant cavities and all microwaves passive device.
CO2 The student will be able to understand matching and tuning network using passive component and microwave stubs with the help of ZY and smith charts.
CO3 The student will be able to understand the principle of generation and amplification microwave frequencies using klystron, TWT, CFA, etc.
CO4 The student will be exposed to construction working and performance of various semiconductor devices at microwave frequencies.
CO5 The student shall be able to understand basic of radar, radar range equation (differential) types of radar, display and tracking method.
CO6 The student will be able apply the microwave devices and radar for industrial and scientific purposes.

ETE701 Data Compression Encryption VII

CO1 To study text compression techniques.
CO2 To study audio compression techniques
CO3 To study image and video compression techniques
CO4 Understand symmetric key cryptography schemes
CO5 Understand asymmetric key cryptography schemes
CO6 Introduction to network security and ethical hacking will provide a new vision to security enthusiasts

ETL701 IVP Lab VII

CO1 Understand theory and models in Image and Video Processing
CO2 Interpret and analyze 2D signals in frequency domain through image transforms
CO3 Develop innovative design for practical applications in various fields.
CO4 Apply segmentation and morphology for analysis of images.
CO5 To study the restoration of image
CO6 Apply quantitative models of video processing for various engineering applications.

ETL702 ACEL1 VII

CO1 To implement the concept of cellular System Design.
CO2 To design and implement CDMA concept
CO3 To design and implement different spread spectrum techniques
CO4 To study the mobile communication evolution of 3GPP LTE in detail
CO5 To study the emerging technologies required for 4G mobile systems such as SDR, MIMO etc. standards
CO6 To simulate the different types of fading channels

ETL703 ACL 2 LAB VII

CO1 The Student will be able to understand microwave band and characteristics. Mode analysis of rectangular and circular wave guide will be understood. The student is able to understand resonator, reentrant cavities and all microwaves passive device.
CO2 The student will be able to understand the principle of generation and amplification microwave frequencies using reflex klystron.
CO3 The student will be exposed to construction working and performance of GUNN diode at microwave frequencies.
CO4 The student will be exposed to principles of optics and light waves and will understand fibers links using appropriate optical fibers, light sources and detectors.
CO5 The student will understand the working principle and characteristics of optical fibers, light sources such as numerical apertures.
CO6 The students will be studying different losses incurred to light wave while propagating through different fiber optic cables.

ETEL701 DCEL VII

CO1 To study text compression techniques.
CO2 To study audio compression techniques
CO3 To study image and video compression techniques
CO4 Understand symmetric key cryptography schemes
CO5 Understand asymmetric key cryptography schemes
CO6 Introduction to network security and ethical hacking will provide a new vision to security enthusiasts

ETP701 Project Stage-I VII

CO1 Formulation of problem & literature survey
CO2 Specifications & Requirements
CO3 Overview/Design of Components / Elements / System
CO4 Implementation
CO5 Testing and Evaluation
CO6 Cost Benefit Analysis

ETE703 Neural Network and Fuzzy Logic VII

CO1 Understand the Basic Concepts of artificial neural networks with its representation and learning processes
CO2 To study supervised learning networks and their algorithms in neural network
CO3 To study unsupervised learning networks and their algorithms in neural network
CO4 To study Applications of Neural networks and its algorithms with real world problems
CO5 Understand Basic Concept of Fuzzy logic, Fuzzy Sets, fuzzy rules and fuzzy reasoning
CO6 To study Design and applicability of fuzzy logic and fuzzy system.

ETEL703 Neural Network and Fuzzy Logic VII

CO1 Understand the Basic Concepts of artificial neural networks with its representation and learning processes
CO2 To study supervised learning networks and their algorithms in neural network
CO3 To study unsupervised learning networks and their algorithms in neural network
CO4 To study Applications of Neural networks and its algorithms with real world problems
CO5 Understand Basic Concept of Fuzzy logic, Fuzzy Sets, fuzzy rules and fuzzy reasoning
CO6 To study Design and applicability of fuzzy logic and fuzzy system.

ETC801 WIRELESS NETWORK VIII

CO1 Overview of Cellular System
CO2 Describe the phases of planning and design of mobile wireless networks
CO3 List and compare personal area network (PAN) technologies such as Zigbee, Bluetooth etc
CO4 Students will details of sensor network architecture, traffic related protocols, transmission technology etc
CO5 Understand middleware protocol and network management issues of sensor networks

ETC802 SCN VIII

CO1 Understand different concepts of satellite communication and also launching mechanisms.
CO2 Understand basic Parameters of communication satellite and also the different sub-systems of satellite.
CO3 Design satellite link and study effect of noise and importance of EIRP.
CO4 Design earth Station technology and it's criteria for different types of Earth Stations.
CO5 Understand space segement access & their utilization for satellite communication.
CO6 Understand different satellite networks & different networking models & also LASER satellite.

ETC803 Internet and voice communication VIII

CO1 Explain the concept of encapsulation and its relationship to layering in the network models.
CO2 Describe how DNS works in the global Internet including caching and root servers. Install, configure, and troubleshoot server and client operating systems.
CO3 Explain how TCP’s byte-stream sliding window is related to a traditional packet- based sliding window algorithm.
CO4 Implement local area networks using both static and dynamic addressing techniques including sub netting, routing function.
CO5 Learning various audio and video compression techniques.
CO6 Learning VOIP as a real-time interactive audio/video service

ETE802 Telecom Network Management VIII

CO1 Demonstrate broad knowledge of fundamental principles and technical standards underlying and Understand basic of telecommunication, networking and information technologies.

CO2 Understand concepts and architecture behind standards based on OSI network management.

CO3 Gain in-depth knowledge of network management, in particular of SNMP (Simple Network Management Protocol).and compare a number of variations of the network management architecture.

CO4 Continuously improve their technology knowledge and communication skills.

CO5 Understand issues and challenges pertaining to the management of a network system

CO6 Understand the TMN management services architecture and TMN implementation.

ETL801 WN VIII

CO1 Understand the Mobile Wireless Network Simulator

CO2 Learn and Implements WPAN Networks.

CO3 Detail study about Wireless Security tools.

CO4 Describe Simulators for Wireless Sensor Networks.

CO5 Understand hardware and software developments toolkits and emerging technology .

ETL802 SCN LAB VIII

CO1 Significance of microwave frequencies in satellite communication.

CO2 Design criteria for earth station and general configuration of earth station.

CO3 To study different sub systems of satellite communication network.

CO4 To understand use of antenna for satellite communication network.

CO5 To study earth station system & multiple access techniques.

CO6 Design link budget ,calculation of EIRP,C/N ratio & to study the satellite network.

ETL803 Internet and voice communication VIII

CO1 Explain the concept of encapsulation and its relationship to layering in the network models.

CO2 Describe how DNS works in the global Internet including caching and root servers. Install, configure, and troubleshoot server and client operating systems.

CO3 Explain how TCP's byte-stream sliding window is related to a traditional packet- based sliding window algorithm.

CO4 Implement local area networks using both static and dynamic addressing techniques including sub netting, routing function.

CO5 Learning various audio and video compression techniques.

CO6 Learning VOIP as a real-time interactive audio/video service

ETEL802 Telecom Network Management VIII

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CO3 Gain in-depth knowledge of network management, in particular of SNMP (Simple Network Management Protocol).and compare a number of variations of the network management architecture.

CO4 Continuously improve their technology knowledge and communication skills.

CO5 Understand issues and challenges pertaining to the management of a network system.

CO6 Understand the TMN management services architecture and TMN implementation.

ETP801 Project Stage-II VIII

CO1 Formulation of problem & literature survey
CO2 Specifications & Requirements
CO3 Overview/Design of Components / Elements / System
CO4 Implementation
CO5 Testing and Evaluation
CO6 Cost Benefit Analysis

DEPARTMENT OF ELECTRONICS ENGINEERING

Program Outcomes	Description
PO1	**Engineering knowledge :** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis :** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions :** Design solutions for complex

	engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems :** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage :** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society :** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability :** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics :** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work :** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication :** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance :** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning :** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes	Description
PSO1	An ability to understand the concept of mathematics and basic electronics engineering and to apply them to various areas like Signal Processing, VLSI, Embedded systems, Power Electronics, etc.
PSO2	An ability to specify, design, prototype and test systems involving analog and digital electronics and

	communication systems to analyze, interpret data and provide valid conclusions.
PSO3	An ability to apply the advanced hardware &software tools and analytical skills in electronics engineering to carry out multi-disciplinary research to solve complex engineering problems.
PSO4	An ability to work efficiently as a member of professional team and contribute towards the goals of the organization.

EDC-1	
COURSE OUTCOME	**DESCRIPTION**
CO1	Students will be able to analyze characteristics of PN Junction diode.
CO2	Students will be able to understand the usefulness of BJT devices in circuit making.
CO3	Students will be able to perform dc and ac analysis of the FET useful to conclude an application based on these.
CO4	Students will be able to explain working of different semiconductor devices.
CO5	Students will understand the difference between Rectifiers and Regulators.
CO6	Students will be able to design electronics circuits for given specifications.

ENAS	
COURSE OUTCOME	**DESCRIPTION**
CO1	Students will be able to apply their understanding of network theorems in analyzing complex DC circuits.
CO2	Students will be able to apply their understanding of network theorems in analyzing complex AC circuits.
CO3	Students will be able to analyse the time and frequency response of electrical circuits and thereby understand the behavior of electrical networks.
CO4	Students will be able to evaluate the inter-relationship among various circuit parameters and solve complex networks using these parameters.
CO5	Students will be able to synthesize electrical networks for a given network function.
CO6	Students will be able to design simple filters.

AM-III

COURSE OUTCOME	DESCRIPTION
CO1	Students will gain basic knowledge of Laplace Transform and demonstrate an ability to identify, formulate, and solve Electronics Engineering problems. Also participate and succeed in competitive exams like GATE, GRE, etc.
CO2	Student will demonstrate an understanding of foundation of Fourier series and succeed in competitive exams like GATE, GRE, etc.
CO3	Student will be capable of working collaboratively to frame and solve complex problems.
CO4	Students will learn Bessel's function and demonstrate an ability to identify, formulate, and solve Electronics Engineering problems.
CO5	Student will become familiar with Vector algebra and demonstrate an ability to identify and formulate.

DCD	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to perform various logical and arithmetic operations various number systems as well as conversion of one representation to another..
CO2	Ability to apply Boolean algebra for the implementation and minimization of logic functions.
CO3	Ability to analyze, design and implement combinational circuit and its elements.
CO4	Ability will be able to differentiate between logic families TTL and CMOS.
CO5	Ability to analyze, and study sequential logic elements, and their conversion.
CO6	Ability to analyze, design and implement sequential logic circuits.

EIM	
COURSE OUTCOME	**DESCRIPTION**
CO1	An ability to apply knowledge of electronic instrumentation for measurement of electrical quantities.
CO2	Ability to apply the principles and practices for instrument design and development to

	real world problems.
CO3	Ability to select and use latest hardware for measurements and instrumentation.
CO4	Students will be able to understand the key role of transducers/sensors for the measurements of physical quantities like resistance and capacitance…
CO5	An ability to design and conduct experiments for measurement and ability to analyze and interprets data.
CO6	An ability to understand the operation of Monitoring instruments and to understand the working principle of transducers

EDC-1 LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Students will be able to analyze characteristics of PN Junction diode.
CO2	Students will be able to understand the usefulness of BJT devices in circuit making.
CO3	Students will be able to perform dc and ac analysis of the FET useful to conclude an application based on these.
CO4	Students will be able to explain working of different semiconductor devices.
CO5	Students will understand the difference between Rectifiers and Regulators.
CO6	Students will be able to design electronics circuits for given specifications.

DCD LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to understand the basics of logic gates and number systems
CO2	Ability to analyze, design and implement combinational circuits, reduction of SOP and POS equations using Karnaugh Map and concept of Boolean algebra.
CO3	Ability to analyse, design and implement combinational circuits using different SSI, MSI, LSI Ics
CO4	Ability to analyze, and study sequential logic elements, and their conversion. And study of various characteristic of Logic Families.
CO5	Ability to analyse, design and implement Sequential circuits and its element and to use

	SSI, LSI and MSI devices in various application.

ENAS LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Through test and laboratory exercises, students will be able to apply their knowledge in solving complex circuits.
CO2	Students will be able to evaluate the time and frequency response which is useful in understanding behavior of electronic circuits and control system.
CO3	Student will be able analyze the behavior of two-port networks.
CO4	Students will be able to design simple filters.
CO5	To study various types of transducers and measurements
CO6	Student will be able to simulate VDVS using Pspice

OOPM LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	To apply fundamental programming constructs and understand the object oriented programming concepts.
CO2	To illustrate the concept of packages, classes and objects.
CO3	To elaborate the concept of strings, arrays and vectors.
CO4	To implement the concept of inheritance and interfaces.
CO5	To implement the notion of exception handling and multithreading.
CO6	To develop GUI based application and build GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles.

AM-IV	
COURSE	**DESCRIPTION**

OUTCOME	
CO1	Student will demonstrate an ability to manipulate matrices and compute eigen values and eigenvectors which are necessary to formulate, solve and analyze engineering problems.
CO2	Student will Identify and classify zeros, singular points, residues and their applications and will demonstrate the understanding of impact of engineering mathematics on Electronics Engineering.
CO3	Students will demonstrate an ability to identify formulate and solve Electronics Engineering related problem using calculus of variations to specific systems.
CO4	Student will gain basic concept of Vector spaces over real field and can participate and succeed in competitive exams like GATE, GRE.
CO5	Student will demonstrate basic knowledge of correlation and lines of regression.
CO6	Students will demonstrate basic knowledge of Random variables and probability distributions functions.

EDC-II	
COURSE OUTCOME	**DESCRIPTION**
CO1	Students will be able to analyze frequency response of single stage amplifiers.
CO2	Students will be able to perform low, mid and high frequency response of multistage amplifiers.
CO3	Students will able to understand concept of feedback and application of feedback.
CO4	Students will able to analyze MOSFET differential amplifiers
CO5	Students will able to differentiate between small signal and large signal amplifiers.
CO6	Students will able to explain the working and construction details of special semiconductor devices.

DSD	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to design and implement synchronous sequential logic circuits.

CO2	Ability to analyze various types of digital logic circuits.
CO3	Ability to understand engineering concepts in the design of digital circuits using ASM charts and RTL.
CO4	Ability to understand the role of hardware description languages in combinational circuit design and implementation.
CO5	Ability to understand the role of hardware description languages in sequential circuit design and implementation.
CO6	Ability to understand the concept of CPLD and FPGA Architecture.

MPA	
COURSE OUTCOME	**DESCRIPTION**
CO1	To discuss basic concepts and working of 16-bit microprocessor architecture.
CO2	To describe writing structured assembly language programming for 8086 microprocessor.
CO3	To explain overview of 8086 microprocessor interrupts and their applications.
CO4	To complete 8086 CPU design and understand concept of memory interfacing.
CO5	To develop Single Board Computer (SBC) using various peripheral devices.
CO6	To understand and explain 32-bit microprocessor architecture.

PCE	
COURSE OUTCOME	**DESCRIPTION**
CO1	Students will be able to comprehend the need for various components in analog communication
CO2	Students will be able to design and analyze Amplitude modulators and demodulators
CO3	Students will be able to design and analyze Angle modulated systems
CO4	Students will be able to analyze the characteristics of Transmitter and Receiver of analog systems.
CO5	Students will be able to assess the characteristics of pulse modulation techniques.

CO6	Students will be able to understand the concept of PCM and its significance and recognize the need for multiplexing techniques in communication systems.

LCS	
COURSE OUTCOME	**DESCRIPTION**
CO1	Student will understand the basic concepts, real life applications and mathematical modeling of different types of control systems and represent them in various forms.
CO2	Students will understand time response analysis of the control systems.
CO3	Student will be able to apply concepts of time domain techniques in stability analysis of control systems.
CO4	Student will be able to apply concepts of frequency domain techniques in stability analysis of control systems.
CO5	Student will be able to create State variable models of systems and analyze their controllability and observability
CO6	Student will be able to identify controllers and compensators to justify the correct use of them in different systems.

PCE LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Students will be able to analyze and design Amplitude modulators and demodulators.
CO2	Students will be able to analyze and design Angle modulated systems
CO3	Students will be able to analyze the characteristics of Transmitter and Receiver of analog systems.
CO4	Students will be able to assess the characteristics of pulse modulation techniques
CO5	Students will be able to recognize different digital modulation techniques and various multiplexing techniques.

MPA LAB

COURSE OUTCOME	DESCRIPTION
CO1	To discuss basic concepts and working of 16-bit microprocessor architecture.
CO2	To describe writing structured assembly language programming for 8086 microprocessor.
CO3	To explain overview of 8086 microprocessor interrupts and their applications.
CO4	To complete 8086 CPU design and understand concept of memory interfacing.
CO5	To develop Single Board Computer (SBC) using various peripheral devices.
CO6	To understand and explain 32-bit microprocessor architecture.

DSD LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to design and implement synchronous sequential logic circuits.
CO2	Ability to analyze various types of digital logic circuits.
CO3	Ability to understand engineering concepts in the design of digital circuits using ASM charts and RTL.
CO4	Ability to understand the role of hardware description languages in combinational circuit design and implementation.
CO5	Ability to understand the role of hardware description languages in sequential circuit design and implementation.
CO6	Ability to understand the concept of CPLD and FPGA Architecture.

EDC-II LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Students will be able to perform low, mid and high frequency response of multistage amplifiers.
CO2	Students will demonstrate an ability to design RC and LC Oscillator.
CO3	Students will observe characteristics of special semiconductor devices

CO4	students will develop an ability to simulate electronic circuits using software simulation tool.
CO5	Students will demonstrate an ability to design electronics circuits

MCA	
COURSE OUTCOME	**DESCRIPTION**
CO1	Explain 8051 microcontroller architecture.
CO2	Develop assembly language/C program for 8051 microcontroller.
CO3	Learn and program internal hardware of 8051 microcontroller
CO4	Design and implement 8051 based system.
CO5	Explain advance features of Cortex-M3 Architecture

MCA LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Devlop assembly language program using 8051 microcontroller.
CO2	Write C language program for 8051 microcontroller using IDE(Keil)
CO3	Interfacing various peripherals with 8051 microcontroller
CO4	Interfacing various peripherals with 8051 microcontroller

DC	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to demonstrate the understandingof thenetworking concepts,required Protocols and to analyze the functions of various layers and protocols of the layered architecture
CO2	Ability to analyze the various data transmission Standards and Protocols in Physical Layer.
CO3	Ability to identify and explain the functions of Data Link Layer i.e. Flow control and error control and analyze theassociated Protocols

CO4	Ability to analyze the IP Packet formats and to evaluate the Routing Protocols needed to forward the packets through switching networks as well as Routing in the internet.
CO5	Ability to discuss the important Transport Layer Protocols as well as Application Layer Protocolsand to analyze the efficiency of the networks based on the different parameters.
CO6	Ability to appreciateHigh speed LAN Protocol Architecture.

DC LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to understand the fundamentals of networking, network hardware and software requirements & Protocols
CO2	Ability to understand the significance of functions of Data Link Layer i.e. Framing, Error control and associated Protocols
CO3	Ability to implement the Routing Protocols needed to forward the packets through switching networks
CO4	Ability to understand and analyze the functions of Transport Layer
CO5	Ability to study the Medium Access Method of Wired LAN

EME	
COURSE OUTCOME	**DESCRIPTION**
CO1	Student will be able to understand the concept of electric and magnetic fields produced due to different charge distributions
CO2	Student will analyze behaviour of Electromagnetic waves in different media
CO3	Students will understand different Antenna parameters and apply computational techniques to analyze electromagnetic field distribution.
CO4	Student will understand different mechanisms of radio wave propagation.
CO5	Student will evaluate various parameters of transmission line.

DLIC

COURSE OUTCOME	DESCRIPTION
CO1	measure different parameters of OP-AMP
CO2	Study and verify different application of OP-Amp
CO3	Design of different applications using IC 555
CO4	Design of voltage regulator using IC 723
CO5	Simulate different integrated circuits using software simulation tool (PSpice)

DLIC LAB	
COURSE OUTCOME	DESCRIPTION
CO1	Demonstrate an understanding of fundamentals of linear integrated circuits
CO2	Analyze the various linear applications and circuits based on integrated circuit.
CO3	Analyze the various non linear applications and circuits based on integrated circuit.
CO4	Use of integrated circuits to build ADC and DAC applications
CO5	Design an application with the use of integrated circuit.

BCE	
COURSE OUTCOME	DESCRIPTION
CO1	Able to communicate effectively in both verbal and written form and demonstrate knowledge of professional and ethical responsibilities
CO2	Able to participate and succeed in Campus placements and competitive examinations like GATE, CET.
CO3	Able to possess entrepreneurial approach and ability for life-long learning.
CO4	Able to have education necessary for understanding the impact of engineering solutions on Society and demonstrate awareness of contemporary issues.
CO5	Ability to apply norms of etiquettes and ethical principles in day today life

ERTOS	
COURSE OUTCOME	**DESCRIPTION**
CO1	Identify and describe various characteristic features and applications of embedded systems.
CO2	Understand hardware for embedded systems requirements and implementation.
CO3	Comprehend program modelling and Embedded C concepts.
CO4	Recognize the concepts of Real Time Operating Systems and μCOS-II.
CO5	Explain the design life-cycle with testing and debugging of embedded systems.
CO6	Select/choose proper components to develop and design optimal embedded system.

ERTOS LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Identify and describe various characteristic features and applications of embedded systems.
CO2	Understand and analyze hardware for embedded systems requirements and its implementation.
CO3	Comprehend and analyze various software issues involved in Embedded systems.
CO4	Understand the concepts of Real Time Operating Systems and requirements.
CO5	To develop their skills to select/choose proper components approach and method to develop and design optimal embedded system.

CCN	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to demonstrate the understandingof thenetworking concepts,required Protocols and to analyze the functions of various layers and protocols of the layered architecture

CO2	Ability to analyze the various data transmission Standards and Protocols in Physical Layer.
CO3	Ability to identify and explain the functions of Data Link Layer i.e. Flow control and error control and analyze theassociated Protocols
CO4	Ability to analyze the IP Packet formats and to evaluate the Routing Protocols needed to forward the packets through switching networks as well as Routing in the internet.
CO5	Ability to discuss the important Transport Layer Protocols as well as Application Layer Protocolsand to analyze the efficiency of the networks based on the different parameters.
CO6	Ability to appreciateHigh speed LAN Protocol Architecture.

CCN LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to understand the fundamentals of networking, network hardware and software requirements & Protocols
CO2	Ability to understand the significance of functions of Data Link Layer i.e. Framing, Error control and associated Protocols
CO3	Ability to implement the Routing Protocols needed to forward the packets through switching networks
CO4	Ability to understand and analyze the functions of Transport Layer
CO5	Ability to study the Medium Access Method of Wired LAN

VLSI	
COURSE OUTCOME	**DESCRIPTION**
CO1	A clear understanding of choice of technology and technology scaling.
CO2	To understand the static and dynamic analysis of various MOS inverters.
CO3	Ability to realize Logic circuits with different MOS based Design Styles.
CO4	To understand the operation and design strategy of Semiconductor Memories.

CO5	Design of Data Path Circuit using MOS.
CO6	A clear understanding of system level design issues such as protection, timing and power dissipation.

VLSI LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	To understand the static and dynamic analysis of various MOS inverters.
CO2	Ability to realize Logic circuits with different MOS based Design Styles.
CO3	To understand the operation and design strategy of Semiconductor Memories.
CO4	Design of Data Path Circuit using MOS.
CO5	A clear understanding of system level design issues such as protection, timing and power dissipation.

SS	
COURSE OUTCOME	**DESCRIPTION**
CO1	Students will be able to recognize and differentiate between continuous and discrete time signals.
CO2	Students will be able to identify and distinguish between continuous and discrete time systems.
CO3	Students will be able to apply the concept of Laplace transform and understand conversion from time domain to frequency domain for continuous time signals.
CO4	Students will be able to apply the concept of z- transform and comprehend conversion from time domain to frequency domain for discrete time signals.
CO5	Students will be able to apply frequency domain techniques for analysis of discrete time signals.

CO	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to understand and impelemnt the basics of Neural Network
CO2	Ability to implement different types of Neural Network.
CO3	Ability to design a Neural Network for particular application
CO4	Ability to understand the applications of Neural network and implement them using software.
CO5	Ability to appreciate the need for fuzzy logic control and implement using software.

CCN	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to understand the fundamentals of networking ,explain the network topologies and Layers of OSI Refernce Model .Compare with TCP/IP model
CO2	Ability to understand the various transmission madia ,the data transmission Standards and discuss the various Protocols in Physical Layer including CSMA ,ALOHA, Slotted ALOHA.
CO3	ability to understand the functions of Data Link Layer and classify the error control and Flow control techniques. And discuss the HDLC Protocol, PPP Protocol.
CO4	Ability to explain the switching technologies,significance of IPv4 and IPv6 Packets and to analyze LS & DV Routing algorithms , and discuss Routing in the internet.
CO5	Ability to summarize the Transport Layer Protocols, TCP, UDP, understand the Congestion control methods and methods and parameters to improve QOS.
CO6	Ability to describe the various Application Layer Protocols and services In different networking scenarios.

DIP	
COURSE	**DESCRIPTION**

OUTCOME	
CO1	Student will be able to understand the fundamental concepts of Digital Image Processing and colour models
CO2	Student will be able to understand and explain image enhancement
CO3	Understand how image are analyzed to extract features of interest in segmentation and representation of image.
CO4	Student will learn how to apply binary image processing operations. i.e Image Morphology
CO5	Student will understand and analyse mathematically different transforms used in image processing.
CO6	Student will be able to differentiate and choose digital image compression and decompression techniques for the given application

ESD	
COURSE OUTCOME	DESCRIPTION
CO1	To teach scope, usage, requirements, challenges and general design methodology of embedded systems
CO2	To learn various methods for communication of embedded systems
CO3	To apply hardware knowledge to develop embedded system application according to requirement and constraints
CO4	To develop programming skills for effective applications and to learn Real time operating systems (RTOS)
CO5	To analyze system using simulation, testing and debugging methodology and tools
CO6	To develop their skills to select/choose proper components approach and method to develop and design optimal embedded system

ICT	
COURSE OUTCOME	DESCRIPTION

CO1	To demonstrate a clear understanding of CMOS fabrication flow and technology scaling
CO2	To demonstrate a clear understanding of various MOS fabrication processes
CO3	To study semiconductor measurements, packaging, testing
CO4	To study advanced semiconductor technologies
CO5	To discuss physical mechanism in novel devices

OFC	
COURSE OUTCOME	**DESCRIPTION**
CO1	Interpret the working and specifications of the optical fiber, connectors, splicer and the fabrication methods.
CO2	Interpret the working of LEDs, Laser Diodes, Optical Detectors and receivers and their specifications.
CO3	Check the performance of transreceivers, optical amplifiers, filters, isolators and optical switches.
CO4	Interpret the optical fiber losses to check the performance.
CO5	Interpret Optical fiber Architectures and Network Topologies to optimise the network performance.
CO6	Manage Optical Transmission Systems to optimise the performance and budget.

CO LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to understand and impelemnt the basics of Neural Network
CO2	Ability to implement different types of Neural Network.
CO3	Ability to design a Neural Network for particular application
CO4	Ability to understand the applications of Neural network and implement them using software.

CO5	Ability to appreciate the need for fuzzy logic control and implement using software.

CCN LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to understand the significance of hardware network components , network topologies and software requirements of Networking.
CO2	Ability to design and analyze the data transmission Standards and Protocols in Physical Layer.
CO3	ability to implement functions of Data Link Layer i.e. Flow control and error control in HDLC Protocol
CO4	Ability to design and understand the Routing Protocols needed to forward the packets through switching networks
CO5	Ability to understand and analyze the Protocols of Transport Layer and Application Layer

DIP LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Understand the basic concepts &methodologies of DIP, how the images are formed,sampled,quantised and represented digitally.
CO2	students will learn the techniques for Image Enhancement They will also learn how the image information can be modelled analytically
CO3	understand image segmentation and representation schemes applications.
CO4	understand Binary Image Processing i.e Morphological applications.
CO5	understand transform domain representation of the image
CO6	Understand Image compression Techniques and Apply that knowledge in applications

ESD LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	To teach scope, usage, requirements, challenges and general design methodology of embedded systems
CO2	To provide communication/networking interface between hardware peripheral sensors and systems.
CO3	To become aware of the architecture of the ARM CORTEX processor and its programming aspects
CO4	Design real time embedded systems using the concepts of RTOS.
CO5	An ability to conduct and standard simulation tests and measurements; to conduct, analyze, and interpret systems and debugging methodologies to the experimental results for improving processes.
CO6	To design various case studies of embedded systems based on various processors and controllers.

ICT LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	To understand the concept of CMOS fabrication flow using Layout structures.
CO2	To verify fabrication processes and device characteristics via simulations.
CO3	To study the fabrication of advanced semiconductor devices.
CO4	To study fabrication processes of novel devices.

OFC LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Interpret the working and specifications of the optical fiber, connectors, splicer and the fabrication methods.
CO2	Interpret the working of LEDs, Laser Diodes, Optical Detectors and receivers and their

	specifications.
CO3	Check the performance of transreceivers, optical amplifiers, filters, isolators and optical switches.
CO4	Interpret the optical fiber losses to check the performance.
CO5	Interpret Optical fiber Architectures and Network Topologies to optimise the network performance.
CO6	Manage Optical Transmission Systems to optimise the performance and budget.

CMOS	
COURSE OUTCOME	**DESCRIPTION**
CO1	Demostrate and use VLSI design tools for analog circuit designing
CO2	Analyse a MOSFET characteristics with variation in other parameter like Vth, LAMBADA etc
CO3	Design and Simulate various MOSFET based circuit
CO4	Evaluate various MOSFET based mixed signal circuits
CO5	Anayse a layout for various CMOS analog circuits

MC	
COURSE OUTCOME	**DESCRIPTION**
CO1	To understand the Fundamentals of Cellular Communication System: frequency reuse, channel assignment and Handoff Strategies, Trunking theory
CO2	To acquire the Knowledge about overall GSM cellular concept and analyse its services and features
CO3	To comprehend and analyze the features of CDMA IS-95 Technology and compare with GSM.D12
CO4	To understand & analyze the evolution of cellular technology from 2G to 4G and examine various 3G Services such as GPRS,EDGE,UMTS,WCDMA, CDMA 2000.

CO5	To recognize the Need for 4G Network and analyze various 4G Standards
CO6	To comprehend the concept of emerging wireless technologies and discuss various applications such as Mobile IP, MANETS,WSN and RFID

MEMS	
COURSE OUTCOME	**DESCRIPTION**
CO1	Introduction to various sensors and actuators
CO2	Understand the underlying fundamental principles of MEMS devices including physical operation, mathematical modelling and material properties
CO3	To educate on the rudiments of Micro fabrication techniques
CO4	Elaborate on different fabrications techniques like etching ,packaging, dicing
CO5	Develop different concepts of micro system sensors and actuators for real-world applications
CO6	To study characteristics of MEMS Devices

ANT	
COURSE OUTCOME	**DESCRIPTION**
CO1	Ability to understrand the concept of various emerging wireless networking technologies, and their IEEE standards.
CO2	Ability to understrand the principles of optical networking used in Broadband networks i.e. SONET.
CO3	Ability to understand the significance of faster Packet switching technologies of WANS: Frame Relay and ATM.
CO4	Ability to understand the fundamentals of access network design.
CO5	Ability to understand the importance of network security, security threats and safeguards.
CO6	Ability to understand the network management protocol, SNMP and analyze the performance of networks

CMOS LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Demostrate and use VLSI design tools for analog circuit designing
CO2	Analyse a MOSFET characteristics with variation in other parameter like Vth, LAMBADA etc
CO3	Design and Simulate various MOSFET based circuit
CO4	Evaluate various MOSFET based mixed signal circuits
CO5	Anayse a layout for various CMOS analog circuits

MC LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Comprehend the characteristics of Wireless communication channel and concept of cellular communication system.
CO2	Analyze the features of cellular 2G technology standards: GSM
CO3	Understand and analyze the concepts of DS-SS and its application in CDMA(IS 95)
CO4	Recognize the advantages of 3G technology standard and understand the concept of OFDM ,the multi-carrier modulation used in 4G Systems.
CO5	Analyze the various emerging wireless technologies, i.e MANET, WSN, RFID, ZIGBEE

MEMS LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	To design and simulate pressure sensors.
CO2	To design and simulate actuators .

CO3	To design and simulate MEMS sensor for device characterization
CO4	To design and simulate MEMS sensor for biomedical applications
CO5	To design and simulate MEMS sensor for industrial applications

ANT LAB	
COURSE OUTCOME	**DESCRIPTION**
CO1	Students will be able to understand the concept of Wireless network technologies and simulate or implement WLANs
CO2	Students will be able to understand the various emerging wireless technologies such as Bluetooth , ZigBee , RFID
CO3	Students will be able to analyze and determine the security of Networks using “nmap” & " ufw or iptables
CO4	Students will able to determine the performance using Network Monitoring tools such as "etherape"
CO5	Students will be able to understand network management protocol ,SNMP

DEPARTMENT OF COMPUTER ENGINEERING

Program Outcomes (POs)

Sr. No.	Program Outcome	Description
1	**PO1**	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	**PO2**	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3	**PO3**	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	**PO4**	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	**PO5**	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	**PO6**	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	**PO7**	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	**PO8**	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**PO9**	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**PO10**	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**PO11**	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	**PO12**	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

Sr. No.	Program Specific Outcome	Description
1	PSO1	To build competencies towards problem solving with an ability to understand, identify, analyze and design the problem, implement and validate the solution including both hardware and software.
2	PSO2	To build appreciation and knowledge acquiring of current computer techniques with an ability to use skills and tools necessary for computing practice.
3	PSO3	To be able to match the industry requirements in the area of computer science and engineering. To equip skills to adopt and imbibe new technologies.

Course Outcomes (COs)

Sr. No.	Subject Code	Sem	Subject Name	Course Outcome	
1	FEC101	1	Applied Mathematics - I	CO1	Student will demonstrate an understanding of foundation of differential calculus for Higher studies and applications in Engineering.
				CO2	Solve and analyze partial derivatives and its applications in engineering.
				CO3	Inculcate the habit of mathematical thinking through Indeterminate forms and Expansion of functions.
				CO4	Inculcate lifelong learning with problem solving and modeling

					techniques of matrix theory.
				CO5	Student will understand various types of Numerical methods.
				CO6	Student will be capable to working collaboratively to frame and solve complex problems.
2	FEC102	1	Applied Physics - I	CO1	Apply the concepts of crystallography and to use XRD techniques for analysis of crystal structure .
				CO2	Apply the knowledge of Quantum mechanics to uncertainty principle and motion of free particle.
				CO3	To comprehend the basic concepts of semiconductor physics and apply the same to electronic devices.
				CO4	Apply the knowledge of superconductivity to SQUID and Magnetic levitation.
				CO5	Apply the reasons for Acoustic defects and use this in the proper design of a Hall/Auditorium.
				CO6	Use the knowledge of Piezoelectric and Magnetostriction effect for production of ultrasonic waves and its application in various fields.
3	FEC103	1	Applied Chemistry - I	CO1	Water containing various impurities are determined and removed by various methods and purified water is used for domestic and industrial purposes. After sewage treatment residue is used as manure and waste water is used for agricultural purposes.
				CO2	To determine usability of water for human, animal, agricultural consumption and industrial use by

					performing various softening tests
				CO3	Due to various important characteristic properties of polymer they have important position as engineering material.
				CO4	Students learn different types of lubricant and mechanism and proper utilization in the machines.
				CO5	Students learn effect of different variable factors on one and two component system.
				CO6	To learn the composition, properties & applications of various engineering materials like refractory, Portland cement, nano-materials etc.
4	FEC104	1	Engineering Mechanics	CO1	Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three dimensional systems with the help of FBD
				CO2	Demonstrate the understanding of Centroid and its significance and locate the same
				CO3	Correlate real life application to specific type of friction and estimate required force to overcome friction
				CO4	Establish relation between velocity and acceleration of a particle and analyse the motion by plotting the relation
				CO5	Illustrate different types of motions and establish Kinematic relations for a rigid body
				CO6	Analyse body in motion using force and acceleration, work-energy, impulse-momentum

					principles
5	FEC105	1	Basic Electrical Engineering	CO1	To understand the fundamental laws of electrical engineering with independent sources in DC circuits.
				CO2	To analyze DC circuits with independent sources using various network theorems.
				CO3	To learn the fundamentals of single phase AC circuits and analyze them under various load conditions.
				CO4	To study and analyze 3 phase AC circuits under various load conditions.
				CO5	To learn the basic operation and analyze the performance of single phase transformer.
				CO6	To understand the construction and working of DC generators and motors.
6	FEC106	1	Environmental Studies	CO1	Students would understand and attain the knowledge of ecosystem, food chain, food web and Ecological pyramid and types of environment
				CO2	Students will have proper concept of sustainable development dealing with economical, social, and environmental aspect and 3 R.
				CO3	The students will have full knowledge of various types of environmental pollution, which is the biggest problem that the world is facing today, due to increase in population
				CO4	To study environmental laws that provide the guidelines and legal measures for effective management and protection of environment.

				CO5	To study the various types conventional and nonconventional energy source, to study working of wind power, hydel energy, geothermal energy and their applications in the various fields.
				CO6	To study the concept of carbon credit, green building and role of information technology in human health
7	FEC201	2	Applied Mathematics - II	CO1	Student will acquire problem solving techniques of Linear Differential Equations and applications of DE.
				CO2	Students will be able to apply numerical techniques by using ODE.
				CO3	Student will be able to find improper integrals by using Beta and Gamma functions also they able to use DUIS.
				CO4	Student will able to utilize curve tracing in rectification also they can use numerical integration to find out approximate values of integrals
				CO5	Student will be introduced to the tools of integration of multivariate functions over areas and will learn the use of iterated multiple integration
				CO6	Student will learn how to transform between a triple integral over volume in Cartesian coordinates to polar or spherical coordinate respectively.
8	FEC202	2	Applied Physics - II	CO1	Learner will be able to comprehend the principles of interference and diffraction and their appliocations.
				CO2	Learner will be able to illustrate the principle, construction and working of various LASERs and their

					applications.
				CO3	Learner will be able to identify various applications of optical fibers.
				CO4	Learner will be able to comprehend the concepts of electrodynamicsand Maxwell's equations and their use in telecommunication system
				CO5	Learner will be able to apply the concepts of electromagnetism in focussing systems and CRO.
				CO6	Learner will be able to comprehend the significance of nanoscience and nanotechnology and its applications.
9	FEC203	2	Applied Chemistry - II	CO1	To learn the mechanism of dry and wet corrosion, to learn the various factors affecting the rate of corrosion, to learn different methods developed to control the corrosion and to study the different types of corrosion.
				CO2	To study the various types of alloys, their composition, properties and uses in the industry and other various fields.
				CO3	To study different types of fuels obtained from nature, to learn the methods developed to recover the valuable fuels from natural fuels,
				CO4	To learn the various methods to improve the efficiency of the fuels, to learn the production of secondary fuels from primary fuels.
				CO5	To study the various types of composite materials,and their applications in the various fields.
				CO6	To introduce Green Chemistry students have to learn the application of chemistry for pollution prevention

					by environmentally conscious designs of chemical products and processes that reduce or eliminate the use or generation of hazardous substances.
10	FEC204	2	Engineering Drawing	CO1	Apply the basic principles of projections in 2D drawings.
				CO2	Apply the basic principles of projections in converting 3D views to 2D drawings.
				CO3	Read a given drawing
				CO4	Visualize an object from the given two views.
				CO5	Use CAD tool to draw different views of a 3D object.
				CO6	Use CAD tool to draw an object in 3D.
11	FEC205	2	Structured Programming Approach	CO1	Students will understand classical problem solving strategies and use them in solving problems that can be implemented using a programming language and will identify a problem that requires a programmed solution using structured approach.
				CO2	Student will understand basic constructs of C like data-type, variable and operators to solve a problem.
				CO3	Students will implement different control structures using C.
				CO4	Students will be able to able to implement functions in C.
				CO5	Students will be able to use additional data-types like arrays, strings and structures to solve given

					problem.
				CO6	The students will be able to implement simple problems using files and pointers.
12	FEC206	2	Communication Skills	CO1	Understand and evaluate information they listen to and express their ideas with greater Clarity
				CO2	Speak and respond effectively along the various channels of communication in a business organization.
				CO3	Speak convincingly before an audience with the help of an expanded vocabulary and enhanced digital content.
				CO4	Read and summarize effectively.
				CO5	Communicate through result oriented writing both within and outside the organization.
				CO6	Write a set of effective and easy to understand technical description, instructions and convey the same using global information technology.
13	CSC301	3	Applied Mathematics III	CO1	Students will able to Understand the concept of Laplace transform of various functions and its applications to evaluate real integrals
				CO2	Students will able to Understand the concept of Inverse Laplace transform of various functions and its applications to solve ODEs
				CO3	Students will able to Expand the periodic function by using Fourier series and complex form of Fourier series.
				CO4	Students will able to understand complex variable theory, application

					of harmonic conjugate to get orthogonal trajectories and analytic functions. Plot the image of the curve by a complex transformation from Z-plane to w-plane
				CO5	Students will able to Apply the concept of correlation and Regression to the engineering problems and curve fitting for data analysis.
				CO6	Students will able to apply concept of Z-transform and will able to solve problems on Z-transform.
14	CSC302	3	Digital Logic Design and Analysis	CO1	Ability to understand different number system and their conversions.
				CO2	Analyze and minimize Boolean Expressions
				CO3	Design and analyze combinational circuits.
				CO4	Design and analyze sequential circuits.
				CO5	Understand the basic concepts of VHDL.
				CO6	Ability to study basics of TTL and CMOC Logic
15	CSC303	3	Discrete Mathematics	CO1	Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.
				CO2	Ability to reason logically.
				CO3	Ability to understand relations, Diagraph and lattice.
				CO4	Ability to understand use of functions, graphs and their use in programming applications.

				CO5	Understand use of groups and codes in Encoding-Decoding.
				CO6	Apply discrete structures into other computing problems such as formal specification, verification, artificial intelligence, cryptography, Data Analysis and Data Mining etc
16	CSC304	3	ECCF	CO1	To examine and understand the use of semiconductor devices in circuits and analyze them.
				CO2	Ability to gain the importance of oscillators and power amplifiers in communication system.
				CO3	To understand basic concepts of operational amplifier and their applications.
				CO4	Illustrate the fundamental concepts of electronic communication.
				CO5	Ability to gain knowledge of electronic devices and circuits in communication application.
				CO6	To study basic concepts of information theory.
17	CSC305	3	Data Structures	CO1	Students will be able to implement various linear and nonlinear data structures.
				CO2	Students will be able to handle operations like insertion, deletion, searching and traversing on various data structures.
				CO3	Students will be able to select appropriate sorting technique for given problem
				CO4	Students will be able to select appropriate searching technique for given problem.

				CO5	Students will be able to apply the learned concepts in various domains like DBMS and Compiler Construction.
				CO6	Students will be able to choose appropriate data structure for specified problem domain.
18	CSL301	3	Digital System Lab	CO1	Understand and implement different number system and their conversions.
				CO2	Understand the basics of various digital components and recognize its importance in computer architecture
				CO3	Understand the principles of design of combinational logic circuits using basic components.
				CO4	Understand the principles of design of sequential logic circuits using basic components.
				CO5	Design and simulate the basic digital circuit.
				CO6	Study and analyze basics of TTL and CMOS Logic families.
19	CSL302	3	Basic Electronics Lab	CO1	To examine the basics of various semiconductor devices, electronic components and Instruments and analyze the circuits using BJT.
				CO2	To understand the working of electronis circuits such as amplifier, power amplifier, oscillator and analyze them.
				CO3	To illustrate the basic concepts of operational amplifier and their applications.
				CO4	Recognize the importance of electronic circuits in electronic communication to understand the

					fundamental concepts of electronics communication.
				CO5	To understand the concepts of various modulation techniques and information theory.
20	CSL303	3	Data Structures Lab	CO1	Students will be able to implement various linear and nonlinear data structures.
				CO2	Students will be able to handle operations like insertion, deletion, searching and traversing on various data structures.
				CO3	Students will be able to select appropriate sorting technique for given problem
				CO4	Students will be able to select appropriate searching technique for given problem.
				CO5	Students will be able to apply the learned concepts in various domains like DBMS and Compiler Construction.
				CO6	Students will be able to choose appropriate data structure for specified problem domain.
21	CSL304	3	OOPM (JAVA) Lab	CO1	To apply fundamental programming constructs to understand object oriented programming concepts.
				CO2	To illustrate the concept of packages, classes and objects.
				CO3	To elaborate the concept of strings, arrays and vectors.
				CO4	To understand and demonstrate the concept of inheritance and interfaces.
				CO5	To interpret and apply the notion of

					exception handling and multithreading.
				CO6	To develop GUI based application to understand event-based GUI handling principles.
22	CSC401	4	Applied Mathematics IV	CO1	Students will be able to apply the method of solving complex integration, computing residues & evaluate various contour integrals.
				CO2	Students will be able to demonstrate ability to manipulate matrices and compute Eigen values and Eigen vectors.
				CO3	Students will be able to apply the concept of probability distribution to the engineering problems.
				CO4	Students will be able to apply the concept of Linear & Non-Linear Programming Problem to the engineering problems.
				CO5	Students will be able to apply the concept of sampling theory for large samples to the engineering problems.
				CO6	Students will be able to apply the concept of sampling theory for small samples to the engineering problems.
23	CSC402	4	Analysis of Algorithms	CO1	Analyze the running time and space complexity of algorithms.
				CO2	Describe, apply and analyze the complexity of divide and conquer strategy.
				CO3	Describe, apply and analyze the complexity of greedy strategy.
				CO4	Describe, apply and analyze the complexity of dynamic programming strategy.

				CO5	Explain and apply backtracking, branch and bound and string matching techniques to deal with some hard problems.
				CO6	Describe the classes P, NP and NP-Complete and be able to prove that a certain problem is NP-Complete.
24	CSC403	4	Computer Organization and Architecture	CO1	To describe basic structure of the computer system and demonstrate the arithmetic algorithms for solving ALU operations.
				CO2	To describe instruction level parallelism and infer hazards in typical processor pipelines.
				CO3	To determine control unit design methods / operations.
				CO4	To demonstrate the memory mapping techniques.
				CO5	To identify various types of buses, interrupts and I/O operations in a computer system.
				CO6	To summarize superscalar architectures, multi-core architecture and their advantages.
25	CSC404	4	Computer Graphics	CO1	Understand the basic concepts of computer graphics using graphical tools to build an application.
				CO2	Demonstrate various algorithms for scan conversion and filling of basic objects and their comparative analysis.
				CO3	Acquire knowledge about geometric transformations and apply it on graphical objects.
				CO4	Gain basic knowledge of viewing and clipping and apply it on

					graphical objects.
				CO5	Explore solid model representation techniques and projections.
				CO6	Understand and analyze visible surface detection techniques and illumination model.
26	CSC405	4	Operating Systems	CO1	Students should be able to recognize the basic concept of Operating System, its type and architecture.
				CO2	Student should be able to apply the concept of a process, thread and evaluate performance of process scheduling algorithms
				CO3	Student should be able to recognize and apply the concept of concurrency, IPC, mutual exclusion and analyze the deadlock problem.
				CO4	Student should be able to apply and analyze the concepts of memory management techniques and evaluate the performance of memory allocation and replacement techniques.
				CO5	Student should be able to apply and analyze different techniques of file and I/O management.
27	CSL401	4	Analysis of Algorithms Lab	CO1	Analyze the complexities of various problems in different domains.
				CO2	Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains using divide and conquer strategy.
				CO3	Create and apply the efficient algorithms for the effective problem solving with the help of different strategies like greedy method.

				CO4	Apply dynamic programming strategy to solve different problems effectively.
				CO5	Create and apply backtracking, branch and bound and string matching techniques to deal with some hard problems.
				CO6	Understand to prove that a certain problem is NP-Complete.
28	CSL402	4	Computer Graphics Lab	CO1	Understand the basic concepts of computer graphics using graphical tools to build an application
				CO2	Implement various output and filled area primitive algorithm using C/OpenGL
				CO3	Acquire knowledge about geometric transformations and apply it on graphical objects.
				CO4	Gain basic knowledge of viewing and clipping and apply it on graphical objects.
				CO5	Implement curve, fractal generation and projection.
				CO6	To perceive the fundamentals of Surface Detection techniques and discuss the Illumination models.
29	CSL403	4	Processor Architecture Lab	CO1	To explore and assemble personal computer
				CO2	Design the basic building blocks of a computer: arithmetic-logic unit, registers central processing unit&Implement various algorithms like Booths algorithm for arithmetic operations
				CO3	To compare control unit design methods / operations.

				CO4	Design the basic building blocks of a computer: memory.
				CO5	Summarize various I/O buses with merits and demerits
				CO6	Illustrate organization of various multicore processor.
30	CSL404	4	Operating Systems Lab	CO1	Student should be able to recognize basic concept of Operating System, its type, architecture. Explore various Operating system commands, system calls and able to write shell scripts, shell commands using kernel APIs.
				CO2	Student should be able to apply the concept of a process, thread and analyze performance of process scheduling algorithms. They should be able to evaluate process management techniques using simulator
				CO3	Student should be able to recognize and apply the concept of concurrency, IPC, mutual exclusion and able to evaluate deadlock handling using simulator.
				CO4	Student should be able to apply and analyze the concepts of memory management techniques and analyze the performance of memory allocation and replacement techniques.
				CO5	Student should be able to apply and analyze different techniques of file and I/O management
31	CSL405	4	Open Source Technology Lab	CO1	To apply basic concepts in python.
				CO2	To explore contents of files, directories and text processing with python

				CO3	To develop program for data structure using built in functions in python.
				CO4	To explore django web framework for developing python based web application.
				CO5	To apply basic concepts in perl.
				CO6	To explore file handling, database handling and basics of two way communication between client and server using perl.
32	CSC501	5	Microprocessor	CO1	Describe architecture of X86 processors
				CO2	Interpret the instructions of 8086 and write assembly and mixed language programs
				CO3	Discuss the concept of interrupt
				CO4	Identify the specifications of peripheral chip
				CO5	Design 8086 based system using memory and peripheral chips
				CO6	Appraise the architecture of advanced processors.
33	CSC502	5	Database Management Systems	CO1	Understand the fundamentals of database systems.
				CO2	Design and draw ER and EER diagram for the real life problem.
				CO3	Create relational model from conceptual model and formulate relational algebra queries.
				CO4	Design and querying database using SQL.
				CO5	Analyze and apply concepts of normalization to relational database

					design.
				CO6	Understand the concept of transaction, concurrency and recovery.
34	CSC503	5	Computer Networks	CO1	Demonstrate the concepts of data communication and compare ISO-OSI model with TCP/IP.
				CO2	Conceptualize data communication at physical layer.
				CO3	3. Demonstrate Knowledge of networking protocol at data link layer.
				CO4	Illustrate IP addressing and subnetting/supernetting scheme using various routing algorithm and protocol at network layer
				CO5	Analyze transport layer protocols and congestion control algorithms.
				CO6	Explore protocols at application layer.
35	CSC504	5	Theory of Computer Science	CO1	Identify the central concepts in theory of computation and differentiate between deterministic and nondeterministic automata, also obtain equivalence of NFA and DFA.
				CO2	Infer the equivalence of languages described by finite automata and regular expressions.
				CO3	Devise regular, context free grammars while recognizing the strings and tokens.
				CO4	Design pushdown automata to recognize the language.
				CO5	Develop an understanding of computation through Turing

					Machine.
				CO6	Acquire fundamental understanding of decidability and undecidability.
36	CSL501	5	Microprocessor Lab	CO1	Describe architecture of X86 processors
				CO2	Interpret the instructions of 8086 and write assembly and mixed language programs
				CO3	Discuss the concept of interrupt
				CO4	Identify the specifications of peripheral chip
				CO5	Design 8086 based system using memory and peripheral chips
				CO6	Appraise the architecture of advanced processors.
37	CSL502	5	Computer Network Lab	CO1	1. Demonstrate the concepts of data communication and compare ISO-OSI model with TCP/IP.
				CO2	2. Conceptualize data communication at physical layer.
				CO3	3. Demonstrate Knowledge of networking protocol at data link layer.
				CO4	Illustrate IP addressing and subnetting/supernetting scheme using various routing algorithm and protocol at network layer
				CO5	5. Analyze transport layer protocols and congestion control algorithms.
				CO6	6. Explore protocols at application layer.
38	CSL503	5	Database and Information System	CO1	Formulate problem Statement for real world example by using the fundamental concept of database

			Lab		system
				CO2	Design with and draw ER and EER diagram for the real life problem.
				CO3	Convert conceptual model into relational model with different DDL and DML Statements and Apply /Add integrity constraints and able to provide security to data.
				CO4	Implement and execute Simple, Complex queries and join operations.
				CO5	Apply triggers and procedures for relational database design.
				CO6	Understand the concept of concurrent transactions and able to access data through front end (using JDBC/ODBC connectivity).
39	CSL504	5	Web Design Lab	CO1	Explore the core concepts and features of Web Technology
				CO2	Design static web pages using HTML5 and CSS3
				CO3	Design dynamic web pages using JavaScript and JQuer by applying client side technologies.
				CO4	Create Interactive web pages using PHP ,AJAX with database connectivity using MySQL by evaluating client and server side technologies.
				CO5	Develop web pages using XML / XSLT by understanding the basics of XML, DTD and XSL
				CO6	Create web application using appropriate web technologies and web development framework by analyzing end user requirements

40	CSL505	5	Business Communication and Ethics	CO1	Design a technical document using precise language, suitable vocabulary and apt style.
				CO2	Develop life skills / interpersonal skills to progress professionally by building stronger relationship.
				CO3	Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibility.
				CO4	Apply the traits of a suitable candidate for a job/ higher education upon being trained in the techniques of holding group discussion, facing interviews and writing resumes/sop.
				CO5	Deliver formal presentation effectively implementing verbal and non -verbal skills
41	CSDLO5011	5	Multimedia Systems	CO1	Identify basics of multimedia system.
				CO2	Understand and analyse file formats and compression techniques of text and image.
				CO3	Understand and analyse file formats and compression techniques of an audio.
				CO4	Understand and analyse file formats and compression techniques of video.
				CO5	Interpret the protocols, the authoring systems and user interface issues used for efficient multimedia communication.
				CO6	To apply different security techniques in multimedia environment.

42	CSDLO5012	5	Advance Operating System	CO1	Demonstrate understanding of design issues of advanced operating systems and compare different types of operating systems
				CO2	Analyse design aspects and data structures used for file subsystem of Unix OS
				CO3	Analyse design aspects of memory subsystem and process subsystem of Unix OS
				CO4	Classify distributed computing models and explore design issues of distributed operating systems
				CO5	Identify different architectures used in Multiprocessor OS, the design and data structures and compare different processor scheduling algorithms used in Multiprocessor OS
				CO6	Analyse various real time scheduling algorithms and explore architectures and design issues of Mobile OS, Virtual OS, Cloud OS
43	CSDLO5013	5	Advance Algorithm	CO1	Describe analysis techniques for algorithms.
				CO2	Identify appropriate data structure and design techniques for different problems.
				CO3	Identify appropriate algorithm and apply it for the various application like geometric modeling, robotics, networking, etc.
				CO4	Understand and illustrate the role of probability and randomization in the analysis of algorithm.
				CO5	Analyze various network flow algorithms.

				CO6	Differentiate polynomial and non deterministic polynomial algorithms.
44	CSC601	6	Software Engineering	CO1	Understand and demonstrate basic knowledge in software engineering.
				CO2	Identify requirements, analyze and prepare models.
				CO3	Plan, schedule and track the progress of the models.
				CO4	Design & develop the software projects.
				CO5	Identify risks, manage & apply the change to assure quality in software projects.
				CO6	Apply testing principles on software project and understand the maintenance concepts.
45	CSC602	6	System Programming and Compiler Construction	CO1	Identify the relevance of different system programs.
				CO2	Illustrate role of lexical analyzer and designing of parser for any language.
				CO3	Justify the need synthesis phase to produce object code optimized in terms of high execution speed and less memory usage
				CO4	Describe the various data structures and passes of assembler design
				CO5	Identify the need for different features and designing of macros
				CO6	Distinguish different loaders and linkers and their contribution in developing efficient user applications.
46	CSC603	6	Datawarehousing and Mining	CO1	Understand data warehouse and design model of data warehouse.

				CO2	Apply steps of data exploration and preprocessing.
				CO3	Identify appropriate data mining algorithms to solve real world problems.
				CO4	Design and analyze OLAP operations.
				CO5	Compare and evaluate different data mining technique.
				CO6	Describe complex data type with respect to spatial and web mining.
47	CSC604	6	Cryptography and System Security	CO1	Perceive system security goals and concepts, classical encryption techniques and acquire fundamental knowledge on the concepts of modular arithmetic and number theory.
				CO2	Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
				CO3	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
				CO4	Apply different digital signature algorithms to achieve authentication and design secure applications
				CO5	Perceive network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP.
				CO6	Analyze and apply system security

					concept to recognize malicious code.
48	CSL601	6	Software Engineering Laboratory	CO1	Select case study & apply process model to selected case study.
				CO2	Identify requirements and apply basic knowledge in Software Engineering.
				CO3	Use software engineering tools to plan, schedule & track the progress of the project
				CO4	Analyze & design models for the selected case study using UML modeling.
				CO5	To analyze risk & manage the change in design.
				CO6	To validate the software project
49	CSL602	6	System Software Lab	CO1	Explore various tools like LEX and YACC.
				CO2	Identify and validate different tokens for given high level language code.
				CO3	Parse the given input string by constructing Top down /Bottom up parser.
				CO4	Implement synthesis phase of compiler
				CO5	Generate machine code by using various databases generated in two pass assembler.
				CO6	Construct different databases and implement single pass macro processor
50	CSL603	6	Datawarehousing and Mining Lab	CO1	Understand and Design models of data warehouse.
				CO2	Apply steps of data exploration and implement data preprocessing using

					appropriate tools.
				CO3	Identify and implement predication and Association mining algorithms to solve real world problems.
				CO4	Design and analyze OLAP operations.
				CO5	Identify and implement classification and clustering algorithms to solve real world problems.
				CO6	Describe complex data type with respect to spatial and web mining and implement spatial mining algorithm.
51	CSL604	6	System Security Lab	CO1	To be able to apply the knowledge of symmetric cryptography to implement simple ciphers.
				CO2	To be able to analyze and implement public key cryptosystem and Digital signature scheme like RSA and El Gamal.
				CO3	To analyze and evaluate performance of hashing algorithms.
				CO4	To explore the different network reconnaissance tools like sniffers, port scanners and other related tools to gather network related information.
				CO5	To be able to set up firewalls and transport layer security using open source technologies.
				CO6	To be able to explore various attacks like buffer-overflow, and web-application attacks.
52	CSP605	6	Mini-Project	CO1	Discuss formulation of Mini Project topic
				CO2	Conduct survey of existing systems

					in the preferred field of study
				CO3	Formulate methodology/technology to be used for solving proposed solution
				CO4	Systematically plan and implement the solution
				CO5	Testing and Evaluation of implementaed solution
				CO6	Analyse the effectiveness of the implemented solution
53	CSDLO6021	6	Machine Learning	CO1	Gain knowledge about basic concepts of Machine Learning and identify the applications of it.
				CO2	Use Neural Networks to perform various types of learning.
				CO3	Apply regression methods for learning the relationships between features of the data and classify the data using decision trees.
				CO4	Identify machine learning techniques suitable for a given problem and solve the problems using classification and clustering techniques.
				CO5	Apply Dimensionality reduction techniques.
				CO6	Recognize various optimization techniques in machine learning.
54	CSDLO6022	6	Advance Database System	CO1	Build indexing mechanisms for efficient retrieval of information from databases.
				CO2	Measure query cost and optimize query execution
				CO3	Design distributed database for better resource management

				CO4	Demonstrate the understanding of the concepts of document oriented databases
				CO5	Implement advanced data models for real life applications.
				CO6	Apply appropriate security techniques database systems.
55	CSDLO6024	6	Advance Computer Network	CO1	Demonstrate the understanding of advance data communication technologies.
				CO2	Demonstrate the understanding of WAN Technology typically ATM .
				CO3	Demonstrate the understanding of packet switching protocols such as X.25, X.75.
				CO4	Explore the issues of advance internet routing protocols and also QoS based protocols..
				CO5	Analyze issues of traffic requirements and perform capacity planning.
				CO6	Demonstrate the understanding of protocol used for management of network.
56	CPC701	7	Digital Signal Processing	CO1	To understand the concept of DT signal and perform signal manipulation
				CO2	To perform analysis of DT system in time domain
				CO3	To understand the concept of Discrete Fourier Transform and perform analysis of DT system in Frequency domain
				CO4	To develop FFT flow-graph and Fast DSP Algorithm

				CO5	To Design DSP system for Real Time Signal Processing
				CO6	To understand the different Applications of DSP
57	CPC702	7	Cryptography and System Security	CO1	Understand the principles and practices of cryptographic techniques.
				CO2	Apply the cryptosystem to ensure privacy and integrity of information.
				CO3	Apply security techniques and technologies to solve real-life security problems in practical systems.
				CO4	Design security protocols and methods to solve the specific security problems
				CO5	Analyze variety of generic security threats and vulnerabilities, and identify particular security problems with current research issues.
58	CPC703	7	Artificial Intelligence	CO1	Develop a basic understanding of AI building blocks presented in intelligent agents.
				CO2	Choose and solve an appropriate problem solving method and knowledge representation technique.
				CO3	Analyze the strength and weaknesses of AI approaches to knowledge–intensive problem solving.
				CO4	Design models for reasoning with uncertainty as well as the use of unreliable information.
				CO5	Analyze the basic ideas of planning and learning process of a system.
				CO6	Design and develop the AI

					applications in real world scenario
59	CPL701	7	Network Threats and Attacks Laboratory	CO1	Choose network-based tools for network analysis
				CO2	Select and test techniques for Network scanning
				CO3	Examine network vulnerability
				CO4	Determine tools to simulate intrusion detection system
				CO5	To enhance and install a firewall according to environment need
				CO6	Ensure the basic steps of ethical hacking and protecting real-life applications through the development of countermeasures
60	CPE7024	7	Software Architecture	CO1	To understand foundational concepts , principles and techniques of software architecture. Also introduces modeling concepts and analysis goals of an existing software system.
				CO2	To understand existing architectural descriptions and recognize common architectural styles and patterns and evaluate architectural documentation for quality and completeness.
				CO3	Apply dependency analysis and modeling techniques and tools to understand the architectural design of an existing software system
				CO4	To implement various architectural style based on the requirement of the system.
				CO5	To address and include non functional properties in the architectural design
				CO6	To design domain models for

					domain specific software engineering and architecture
61	CPE7025	7	Soft Computing	CO1	Understand concept of Soft computing and Foundation for Neural Networks and Fuzzy Set.
				CO2	Understand the basic supervised learning networks and apply them in classification and recognition problem.
				CO3	Ability to analyse and appreciate the applications which can use Fuzzy Logic.
				CO4	Understand the basic unsupervised learning networks and recognise their use in Clustering problem.
				CO5	Design the Fuzzy system and understand how Neural Network and Fuzzy logic can be hybridized to form a Neuro-Fuzzy Network and its various Applications.
				CO6	Understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.
62	CPC801	8	Data Warehouse and Mining	CO1	To understand data warehouse and design model of data warehouse
				CO2	To apply the preprocessing steps on data.
				CO3	To illustrate various analytical operations on data.
				CO4	To discover patterns and knowledge from data warehouse.
				CO5	To understand and implement classical algorithms in data mining and data warehousing; to assess the strengths and weaknesses of the

					algorithms, identify the application area of algorithms, and apply them.
63	CPC802	8	Human Machine Interaction	CO1	To apply HMI in their day-to-day activities.
				CO2	To analyze user models and develop user centric interfaces.
				CO3	To understand and apply principles of a good interface design
				CO4	To analyze human responses and develop guidelines for the best user experience.
				CO5	To design interface and apply the core concepts of Human Computer Interaction to improve them.
64	CPC803	8	Parallel and distributed Systems	CO1	CO1: Apply the principles and concepts in analyzing and designing the parallel systems
				CO2	CO2: Design different parallel processing architectures and measure their performance.
				CO3	CO3: Understand different models of distributed systems and discuss the challenges and opportunities faced by them.
				CO4	CO4: Implement the middleware technologies that support distributed applications using RPC, RMI and object based middleware.
				CO5	CO5: Analyze different synchronization and process management mechanisms for distributed system.
				CO6	CO6: Discuss the issues and approaches used for designing a distributed file system.
65	CPL801	8	Cloud Computing	CO1	To define Cloud Computing and

			Laboratory		memorize the different cloud services and deployment models.
				CO2	To describe importance of virtualization along with their technologies.
				CO3	To implement and analyze IaaS services on cloud.
				CO4	To evaluate identity management and access control in cloud computing.
				CO5	To develop single sign on (SSO) services over cloud to enhance its security features.
				CO6	To study and evaluate various service providers of the cloud computing.
66	CPE8034	8	Digital Forensic	CO1	To determine the various cybercrime, its prevention methods and understand the phases of Digital forensic investigation using different forensic tools.
				CO2	To select the procedures for identification, data collection and duplication of hard drive.
				CO3	To classify the types of digital evidence and identify the techniques for preservation and Extraction of electronic evidence.
				CO4	To understand the auditing, investigation of network and network forensic intrusion detection.
				CO5	To implement the data analysis technique for system investigation.
				CO6	To prepare the documentation of evidence collected and knowledge of different bodies of law.

67	CPE8035	8	Big Data Analytics	CO1	Identify the key issues in big data management and use Hadoop framework for resolving these issues.
				CO2	Apply various tools and techniques for big data analytics like Hadoop, Map Reduce and NO SQL
				CO3	Analyze the similarities between objects and use this analysis for grouping these objects in large dataset
				CO4	Apply fundamental enabling techniques and scalable algorithms for stream mining and frequent-itemset mining
				CO5	Analyze the web links for relevant information retrieval.
				CO6	Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.
68	CPP802	8	Project	CO1	Formulation of problem & literature survey
				CO2	Specifications & Requirements
				CO3	Overview/Design of Components / Elements / System
				CO4	Implementation
				CO5	Testing and Evaluation
				CO6	Cost Benefit Analysis

DEPARTMENT OF INFORMATION TECHNOLOGY

Program Outcomes:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:

PSO1: Problem Solving: To build an ability to identify, formulate, and solve engineering problems in the field of Information Technology: The graduate will be able to identify the problem, survey research literature and also formulate and analyze the complex engineering problems and solve using software techniques of Information processing on IT systems.

PSO2: Employability: To build skills and hands on expertise in programming and tools to make industry ready professional.

PSO3: Cutting Edge Technology: To build an ability to deploy innovative technology and advanced research findings for solving real time problems in the society.

ITC301	APPLIED MATHEMATICS - III	III	CO1	Students are able to know the concept of set theory and relation to use in different areas of Engineering
			CO2	Students are able to know the different types of functions and recursive functions and how to use it in engineering field.
			CO3	Students are able to find Laplace transform and enable to apply it to solve many engineering problems.
			CO4	Students are able to find inverse Laplace transform and enable to apply it to solve many engineering problems.
			CO5	Students are able to identify permutation and combination
			CO6	Students are able to know the concept of complex variable and mapping and to use in different areas of Engineering.
ITC302	Logic Design	III	CO1	Achieve Knowledge and Awareness of various components to design stable analog circuits.
			CO2	Represent numbers and perform arithmetic operations
			CO3	Minimize the Boolean expression using Boolean algebra and design it using logic gates
			CO4	Analyse and design combinational circuit.

			CO5	Design and develop sequential circuits
			CO6	Translate real world problems into digital logic formulations using VHDL.
ITC303	Data Structure & Analysis	III	CO1	Select appropriate data structures as applied to specified problem definition.
			CO2	Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
			CO3	Students will be able to implement Linear and Non-Linear data structures.
			CO4	Implement appropriate sorting/searching technique for given problem.
			CO5	Design advance data structure using Non-Linear data structure.
			CO6	Determine and analyze the complexity of given Algorithms.
ITC304	Database Management Systems	III	CO1	Explain the features of database management systems and Relational database
			CO2	Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra
			CO3	Create and populate a RDBMS for a real life application, with constraints and keys, using SQL
			CO4	Retrieve any type of information from a database by formulating

				complex queries in SQL
			CO5	Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
			CO6	Build indexing mechanisms for efficient retrieval of information from a database
ITC305	Principle of Communication	III	CO1	Differentiate analog and digital communication systems.
			CO2	Identify different types of noise occurred, its minimization and able to apply Fourier analysis in frequency & time domain to quantify bandwidth requirement of variety of analog and digital communication systems.
			CO3	Design generation & detection AM, DSB, SSB, FM transmitter and receiver.
			CO4	Apply sampling theorem to quantify the fundamental relationship between channel bandwidth, digital symbol rate and bit rate.
			CO5	Explain different types of line coding techniques for generation and detection of signals.
			CO6	Describe Electromagnetic Radiation and propagation of waves.
ITL301	Digital Design Lab	III	CO1	Achieve Knowledge and Awareness of various components to design stable analog circuits.
			CO2	Represent numbers and perform arithmetic operations

			CO3	Minimize the Boolean expression using Boolean algebra and design it using logic gates
			CO4	Analyse and design combinational circuit.
			CO5	Design and develop sequential circuits
			CO6	Translate real world problems into digital logic formulations using VHDL.
ITL302	Data Structure & Analysis	III	CO1	Select appropriate data structures as applied to specified problem definition.
			CO2	Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
			CO3	Students will be able to implement Linear and Non-Linear data structures.
			CO4	Implement appropriate sorting/searching technique for given problem.
			CO5	Design advance data structure using Non-Linear data structure.
			CO6	Determine and analyze the complexity of given Algorithms.
ITL303	SQL LAB	III	CO1	Explain the features of database management systems and Relational database
			CO2	Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra

			CO3	Create and populate a RDBMS for a real life application, with constraints and keys, using SQL
			CO4	Retrieve any type of information from a data base by formulating complex queries in SQL
			CO5	Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
			CO6	Build indexing mechanisms for efficient retrieval of information from a database
ITL304	Java Programming Lab	III	CO1	Implement Object Oriented programming concept using basic syntaxes of controls Structures, strings and function for developing skills of logic building activity.
			CO2	Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.
			CO3	Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.
			CO4	Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
			CO5	Identify and describe common abstract user interface components to design GUI in Java using Applet &

				AWT along with response to events.
			CO6	Identify, Design & develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture.
ITC401	APPLIED MATHEMATICS - IV	IV	CO1	Students are able to understand the concept of the Number Theory and theorems based on it to use in different areas of Engineering.
			CO2	Students will recognize the role of probability theory and probability distribution functions in the applications of different areas of Engineering.
			CO3	Students are able to understand sampling theory and correlation apply it to solve in engineering fields
			CO4	Students are able to study the concepts of graphs and trees and apply it to solve engineering problems.
			CO5	Students are able to study group theory.
			CO6	Students are able to study the concept of Lattice theory and to use in different areas of Engineering.
ITC402	Computer Networks	IV	CO1	Describe the functions of each layer in OSI and TCP/IP model.
			CO2	Explain the functions of Application layer and Presentation layer paradigms and Protocols.
			CO3	Describe the Session layer design issues and Transport layer services

			CO4	Classify the routing protocols and analyze how to assign the IP addresses for the given network.
			CO5	Describe the functions of data link layer and explain the protocols.
			CO6	Explain the types of transmission media with real time applications.
ITC403	Operating Systems	IV	CO1	Describe the important computer system resources and the role of operating system in their management policies and algorithms.
			CO2	Understand the process management policies and scheduling of processes by CPU.
			CO3	Evaluate the requirement for process synchronization and coordination handled by operating system
			CO4	Describe and analyze the memory management and its allocation policies.
			CO5	Identify use and evaluate the storage management policies with respect to different storage management technologies
			CO6	Identify the need to create the special purpose operating system.
ITC404	Computer Organization and Architecture	IV	CO1	Desscribe basic organiztion of computer and architecture of 8086 microprocesoor
			CO2	Implement assembly language program for given task for 8086 microprocesoor

			CO3	Demonstrate control unit operation and conceptualise instruction level parallelism
			CO4	Demonstrate and perform computer arithmetic operations on integer and real numbers
			CO5	Categorize memory organiztion and expalain the function of each element of memory hierarchy
			CO6	Identify and compare different methods for computer I/O mechanisms
ITC405	AT	IV	CO1	Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.
			CO2	Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
			CO3	Understand, design, analyze and interpret Context Free languages, Expression and Grammars.
			CO4	Design different types of Push down Automata as Simple Parser.
			CO5	Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.
			CO6	Compare, understand and analyze different languages, grammars, Automata and Machines and appreciate their power and convert Automata to Programs and Functions.

ITL401	Networking LAB	IV	CO1	Describe the functions of each layer in OSI and TCP/IP model.
			CO2	Explain the functions of Application layer and Presentation layer paradigms and Protocols.
			CO3	Describe the Session layer design issues and Transport layer services
			CO4	Classify the routing protocols and analyze how to assign the IP addresses for the given network.
			CO5	Describe the functions of data link layer and explain the protocols.
			CO6	Explain the types of transmission media with real time applications.
ITL402	UnixLab	IV	CO1	Students will able to identify the basic Unix general purpose commands
			CO2	Students will able to apply and change the file permission using advanced unix commands
			CO3	Students will able to use awk,grep and perl scripts
			CO4	Students will able to implement shell script and sed
			CO5	Students will be able to apply basics of administrative task
			CO6	Studets will be able to apply unix networking commands
ITL403	Microprocessor Programming Lab	IV	CO1	Desscribe basic organiztion of computer and architecture of 8086 microprocesoor

			CO2	Implement assembly language program for given task for 8086 microprocesoor
			CO3	Demonstrate control unit operation and conceptualise instruction level parallelism
			CO4	Demonstrate and perform computer arithmetic operations on integer and real numbers
			CO5	Categorize memory organiztion and expalain the function of each element of memory hierarchy
			CO6	Identify and compare different methods for computer I/O mechanisms
ITL404	PL	IV	CO1	Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.
			CO2	Express different Decision Making statements and Functions.
			CO3	Interpret Object oriented programming in Python.
			CO4	Understand and summarize different File handling operations.
			CO5	Explain how to design GUI Applications in Python and evaluate different database operations.
			CO6	Design and develop Client Server network applications using Python.
ITC501	Microcontroller and Embedded Programming		CO1	Explain the embedded system concepts and architecture of embedded systems

			CO2	Describe the architecture of 8051 microcontroller and write embedded program for 8051 microcontroller.
			CO3	Design the interfacing for 8051 microcontroller.
			CO4	Understand the concepts of ARM architecture.
			CO5	Demonstrate the open source RTOS and solve the design issues for the same.
			CO6	Select elements for an embedded systems tool.
ITC502	Internet Programming		CO1	Implement interactive web page(s) using HTML,CSS and JavaScript.
			CO2	Design a responsive web site using HTML5 and CSS3.
			CO3	Demonstrate Rich Internet Application .
			CO4	Build Dynamic web site using server side PHP Programming and Database connectivity.
			CO5	Describe and differentiate different Web Extensions and Web Services.
			CO6	Demonstrate web application using Python web Framework-Django
ITC503	Advanced Data Management Technology		CO1	Explain and understand the concept of a transaction and how ACID properties are maintained when concurrent transaction occur in a database
			CO2	Measure query costs and design alternate efficient paths for query execution**.**
			CO3	Apply sophisticated access protocols to control access to the database.
			CO4	Implement alternate models like Distributed databases and Design applications using advanced models like mobile, spatial databases**.**

			CO5	Organize strategic data in an enterprise and build a data Warehouse.
			CO6	Analyze data using OLAP operations so as to take strategic decisions.
ITC504	Cryptography and Network Security		CO1	Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.
			CO2	Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
			CO3	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes
			CO4	Apply different digital signature algorithms to achieve authentication and create secure Applications
			CO5	Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP.
			CO6	Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications
ITDLO5011	Advance Data Structures and Analysis of Algorithms		CO1	Students will be able to choose appropriate advanced data structure for given problem.
			CO2	Students will be able to calculate complexity.
			CO3	Students will be able to select appropriate design techniques to solve real world problems.

			CO4	Students will able to apply the dynamic programming technique to solve the problems.
			CO5	Students will be able to apply the greedy programming technique to solve the problems.
			CO6	Students will be able to select a proper pattern matching algorithm for given problem.
ITL501	Internet Programming Lab		CO1	Design a basic web site using HTML5 and CSS3 to demonstrate responsive web design.
			CO2	Implement dynamic web pages with validation using JavaScript objects by applying different event handling mechanism.
			CO3	Use AJAX Programming Technique to develop RIA
			CO4	Develop simple web application using server side PHP programing and Database Connectivity using MySQL.
			CO5	Build well-formed XML Document and implement Web Service using Java.
			CO6	Demonstrate simple web application using Python Django Framework.
ITL502	Security Lab		CO1	Apply the knowledge of symmetric cryptography to implement simple ciphers
			CO2	Analyze and implement public key algorithms like RSA and El Gamal
			CO3	Analyze and evaluate performance of hashing algorithms
			CO4	Explore the different network reconnaissance tools to gather information about networks
			CO5	Use tools like sniffers, port scanners and other related tools for analyzing packets in a network.
			CO6	Apply and set up firewalls and intrusion detection systems using open source technologies and to

				explore email security.
ITL503	OLAP Lab		CO1	Implement simple query optimizers and design alternate efficient paths for query execution**.**
			CO2	Simulate the working of concurrency protocols, recovery mechanisms in a database
			CO3	Design applications using advanced models like mobile, spatial databases**.**
			CO4	Implement a distributed database and understand its query processing and transaction processing mechanisms
			CO5	Build a data warehouse
			CO6	Analyze data using OLAP operations so as to take strategic decisions.
ITL504	IOT Lab		CO1	Identify the requirements for the real world problems.
			CO2	Conduct a survey of several available literatures in the preferred field of study.
			CO3	Study and enhance software/ hardware skills.
			CO4	Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.
			CO5	To report and present the findings of the study conducted in the preferred domain
			CO6	Demonstrate an ability to work in teams and manage the conduct of the research study.
ITL505	Business Communication and Ethics		CO1	Design a technical document using precise language, suitable vocabulary and apt style.
			CO2	Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships.
			CO3	Demonstrate awareness of contemporary issues knowledge of professional and ethical

				responsibilities.
			CO4	Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP.
			CO5	Deliver formal presentations effectively implementing the verbal and non-verbal skills.
ITC601	Software engineering and Project Management		CO1	Define various software application domains and remember different process model used in software development.
			CO2	Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.
			CO3	Convert the requirements model into the design model and demonstrate use of software and user-interface design principles.
			CO4	Distinguish among SCM and SQA and can classify different testing strategies and tactics and compare them.
			CO5	Justify role of SDLC in Software Project Development and they can evaluate importance of Software Engineering in PLC.
			CO6	Generate project schedule and can construct, design and develop network diagram for different type of Projects. They can also organize different activities of project as per Risk impact factor.
ITC602	Data Mining and Business Intelligence		CO1	Demonstrate an understanding of the importance of data mining and the principles of business intelligence
			CO2	Organize and Prepare the data needed for data mining using pre preprocessing techniques

			CO3	Perform exploratory analysis of the data to be used for mining
			CO4	Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.
			CO5	Define and apply metrics to measure the performance of various data mining algorithms
			CO6	Apply BI to solve practical problems : Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support.
ITC603	Cloud Computing services		CO1	Define Cloud Computing and memorize the different Cloud service and deployment models
			CO2	Describe importance of virtualization along with their technologies.
			CO3	Use and Examine different cloud computing services
			CO4	Analyze the components of open stack & Google Cloud platform and understand Mobile Cloud Computing
			CO5	Describe the key components of Amazon web Service
			CO6	Design & develop backup strategies for cloud data based on features.
ITC604	Wireless Networks		CO1	Explain the basic concepts of wireless network and wireless generations.
			CO2	Demonstrate the different wireless technologies such as CDMA, GSM, GPRS etc
			CO3	Appraise the importance of Ad-hoc networks such as MANET and VANET and Wireless Sensor networks
			CO4	Describe and judge the emerging wireless technologies standards

				such as WLL, WLAN, WPAN, WMAN.
			CO5	Explain the design considerations for deploying the wireless network infrastructure.
			CO6	Differentiate and support the security measures, standards. Services and layer wise security considerations.
			CO1	Define the concept of ethical hacking and its associated applications in Information Communication Technology (ICT) world.
			CO2	Underline the need of digital forensic and role of digital evidences .
			CO3	Explain the methodology of incident response and various security issues in ICT world, and identify digital forensic tools for data collection
			CO4	Recognize the importance of digital forensic duplication and various tools for analysis to achieve adequate perspectives of digital forensic investigation in various applications /devices like Windows/Unix system.
			CO5	Apply the knowledge of IDS to secure network and performing router and network analysis
			CO6	List the method to generate legal evidence and supporting investigation reports and will also be able to use various digital forensic tools .
ITC6023	Digital Forensics			
BEITC701	Software Project Management	VII	CO1	Student shall be able to articulate similarities and differences between IT projects and other

				types of projects.
			CO2	Student shall be able to justify an IT project by establishing a business case and developing a project plan.
			CO3	Student shall be able to estimate resources (time, cost, human being, etc.) and scheduling project as well as ensure the quality of the project using various standards
			CO4	Student shall be able to esablish task inter-dependencies and construct network diagrams using communication plan demonstrating the team work and spirit to overcome the conflict.
			CO5	Student shall be able to identify IT project risks and develop risk mitigation strategies.
			CO6	Student shall be able to identify the need and significance of project procurement, outsourcing and the processes associated with project closure.
BEITC702	CLOUD COMPUTING	VII	CO1	Differentiate different computing techniques.
			CO2	Understand implementation and benefits of virtualization
			CO3	Compare various cloud computing providers software's.
			CO4	Handle Open Source Cloud Implementation and Administration and handling cloud programming
			CO5	Understand the risks involved in Cloud Computing.
			CO6	Understand the Mobile Cloud Computing Architecture, benefits and challenges.

BEITC703	Intelligent Systems	VII	CO1	Students will develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
			CO2	Students will be able to choose an appropriate problem-solving method and knowledge-representation scheme and develop an ability to analyze and formalize the problem (as a state space, graph, etc.) and select the appropriate search method.
			CO3	Learn the knowledge representation and reasoning techniques in rule-based systems, case-based systems, and model-based systems.
			CO4	Students familiarize with propositional and predicate logic and their roles in logic programming and write programs in declarative programming style.
			CO5	Students will learn how an agent can take advantage of the structure of a problem to construct complex plans of action.
			CO6	Students will be able to develop/demonstrate/ build simple intelligent systems or classical toy problems using different AI techniques.
BEITC704	Wireless Technology	VII	CO1	Understand the new trends in mobile/wireless communications networks.
			CO2	Understand the characteristics of mobile/wireless communication channels.
			CO3	Understand the multiple radio access techniques.
			CO4	Understand the multiuser detection techniques.
			CO5	Understand various wireless networks and their technologies.

			CO6	Understand need of securities and economies in wireless systems.
BEITC7053	E-Commerce and E-Business	VII	CO1	Students will be able to design and conduct experiments
			CO2	Students can analyze/interpret the technical requirements for developing E-commerce /E-Business website
			CO3	Students can analyze/interpret the user requirements for developing E-commerce/E-Business website
			CO4	Students can analyze/ interpret the Network requirements for developing E-commerce/E-Business website
			CO5	Students will be able to apply the knowledge gained and modern engineering tools in their application domain.
			CO6	Understands the role of ecommerce and e business in real world
BEITP805	Project	VII	CO1	Formulation of problem & literature survey
			CO2	Specifications & Requirements
			CO3	Overview/Design of Components / Elements / System
			CO4	Implementation
			CO5	Testing and Evaluation
			CO6	Cost Benefit Analysis
BEITC801	STORAGE NETWORK MANAGEMENT	VIII	CO1	Student will be able to understand the need for storage centric architecture and basics of storage

	AND RETRIEVAL			network.
			CO2	Students will be able to evaluate storage architectures, including storage subsystems, SAN, NAS and IP-SAN.
			CO3	Students will be able to understand storage virtualization and examine the requirement of business continuity and backup and recovery.
			CO4	Define information retrieval and study the different approaches for information retrieval
			CO5	
			CO6	
BEITC802	Big Data Analytics	VIII	CO1	Students shall be able to understand the key issues in big data management and its associated applications in intelligent business and scientific computing
			CO2	Students shall be able to acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics
			CO3	Students shall be able to interpret business models and scientific computing paradigms, and apply software tools for big data analytics
			CO4	Students shall be able to achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc
			CO5	

			CO6	
BEITC803	Computer Simulation and Modeling	VIII	CO1	Understand the meaning of simulation and its importance in business, science, engineering, industry and services and identify the common applications of discrete-event system simulation.
			CO2	Practice formulation and modeling skills and Understand simulation languages.
			CO3	Ability to analyze events and inter-arrival time, arrival process, queuing strategies, resources and disposal of entities and An ability to perform a simulation using spreadsheets as well as simulation language/package.
			CO4	Ability to generate pseudorandom numbers using the Linear Congruential Method
			CO5	Ability to perform statistical tests to measure the quality of a pseudorandom number generator and Ability to define random variate generators for finite random variables.
			CO6	Ability to analyze and fit the collected data to different distributions
BEITC8046	STQA	VIII	CO1	Students shall be able to identify the reasons for bugs and analyze the principles in software testing to prevent and remove bugs.
			CO2	Students shall be able to implement various test processes for quality improvement
			CO3	Students shall be able to apply the software testing techniques in commercial environments
			CO4	Students shall be able to gain practical knowledge about the various methods to test software and an understanding of some of the trade-offs between testing

				techniques.
			CO5	Students shall be able to get familiarized with the open source testing tools
			CO6	Students shall be able to know about software quality attributes