MAR ATHANASIUS COLLEGE OF ENGINEERING

KOTHAMANGALAM

ELECTRONICS & COMMUNICATION ENGINEERING DEPARTMENT

LIST OF COURSE OUTCOMES

B. TECH 2015 SCHEME

SEMESTER	SUBJECT CODE	SUBJECT NAME	CO NO:	CO DESCRIPTION
S1	MA 101	CALCULUS	1	Acquired knowledge in visualizing graphs of hyperbolic functions using software.
			2	The student will be able to visualize the surfaces and will also be able to study the analytic geometry of space.
			3	Solve problems in real life situations using results in partial derivatives.
			4	Understand the applications of fundamental concepts in vector differential calculus.
			5	Analyze problems in engineering using multiple integrals.
S1	CY-100	Engineering Chemistry	1	Understand the basic concepts of spectroscopy which will be useful in the analysis of new materials for engineering applications.
			2	Understand the basic concepts of Electrochemistry to explore the possibilities of electrochemical machining and applications of batteries.
			3	Learn about the various thermal analysis methods which will be useful in understanding the behaviour of engineering materials at various temperatures. Also learn the principles of chromatographic methods.
			4	Learn about polymers and nanomaterials and understand the principles, applications and limitations of these cutting-edge materials in various designs.
			5	Gain knowledge about the properties of fuels and lubricants to develop new fuels and lubricants to

				increase the efficiency of automobiles
			6	Study various types of water-treatment methods including sewage to develop skill for treating industrial wastewater.
S1	BE 101-04	INTRODUCTION TO ELECTRONICS ENGINEERING	1	Identify different active and passive electronic components.
			2	Design and setup simple circuits using different types of diodes.
			3	Understand the working principles of transistors and Junction Field Effect Transistors and use them in electronic circuits.
			4	Use the knowledge on diodes and other basic components to implement wave shaping circuits.
			5	Design and set up regulators and power supplies.
			6	Operate electronic instruments to measure voltage and current values in electronic circuits.

S1	BE 103	INTRODUCTION TO SUSTAINABLE ENGINEERING	1	Understand the concept of sustainability, sustainable development, standard of living and quality of life
			2	Get awareness about different types of pollution, its agents, threats to sustainability and its controlling measures
			3	Analyze different international standards to meet sustainability criteria & assessment methods for environment management
			4	Describe green energy concepts in design, construction, and certification practice for environment management, sustainable cities/buildings & scope of its implementation
			5	Get clear concept about various renewable & nonrenewable sources of energy & its related project concept
			6	Discuss about urbanization, industrialization & how poverty can be reduced in India

S1	EC 110	ELECTRONICS ENGINEERING WORKSHOP	1	Distinguish between different active and passive components and test those components.
			2	Operate an Electronic Design Automation tool and interpret data sheets of basic components
			3	Use different electronic instruments to perform experiments
			4	Implement electronic circuits by interconnecting components on breadboard as well as by PCB soldering
			5	Create single sided PCB for simple circuits using manual etching.
			6	Recognize the subsystems of a desktop computer and also set up and identify the subsystems of a Public Address system and TV.

S1	CY 110	ENGINEERING CHEMISTRY LAB	1	Learn the estimation hardness by complexometric titration and understand the working of PH meter
			2	Understand the basic principles of spectroscopy and the use of Colorimeter in the estimation of unknown concentration and in the determination of molar absorptivity
			3	Study the effect of concentration on the emf of Daniel cell and hence to verify the Nernst equation
			4	Learn titration using potentiometer for the estimation of Fe2+ in Mohr's salt solution
			5	Understand the working of conductivity meter and the determination of conductivity of unknown solutions
			6	Study the basic principles of emission spectroscopy and the working of Flame photometer

S2	MA102	DIFFERENTIAL EQUATIONS	1	Understand the application of differential equations in engineering problems.

			2	Learn the concepts of solving non-homogeneous linear ODE and apply in various engineering problems.
			3	Under the concepts of Fourier series respresentation of functions appearing in various engineering problems.
			4	Analyse solution of partial differential equations and utilize it for solving problems in machine design theory and mechanical vibration problems.
			5	Ability to analyse one dimensional wave equation and its solution.
S2	PH 100	ENGINEERING PHYSICS	1	Familiarity with the theory of oscillations and the ability to apply it to various systems.
			2	Ability to analyze interference in optical systems, ability to apply interferometric techniques in material science
			3	Ability to apply optical polarization in material anaysis; familiarity with superconductors and their tech. Applications
			4	Ability to apply the principles of statistical mechanics and quantum mechanics in order to calculate various physical parameters.
			5	To enable the student to utilize ultrasonic waves in material analysis; to gain an ability to determine relevant architectural parameters during the design of rooms having optimal acoustic profile
			6	Familiarity with the theory and applications of laser and optical fibres; an ability to utilize optical fibres and optical detectors in various design of devices for sensing.
S2	CE 100	BASICS OF CIVIL ENGINEERING	1	Make the students aware of the relevance of civil engineering and various disciplines.

			2	Ability to develop building plans based on their requirements.
			3	Make the students aware of the importance of measurements and various instruments used in horizontal measurements.
			4	Make the students aware of vertical measurements and their significance.
			5	Ability to know the components and characteristics of common building materials.
			6	Make the students aware of various building services. To get the concept of intelligent buildings.
S2	BE102	Design and Engineering	1	Identify various problems, define them with clarity and generate creative ideas.
			2	Describe different processes involved in design.
			3	Develop a model from prototype while considering various organizational standards.
			4	Design quality products by considering safety standards and minimizing the waste generated.
			5	Use a product centered approach to make its attributes more user friendly.
			6	Explain the post production aspects of a product.
S2	PH110	ENGINEERING PHYSICS LAB	1	Ability to measure signal parameters using CRO.
			2	Insight into the various features of the Newton's Rings system.
			3	Familiarity with the diffraction pattern of a transmission grating and Familiarity with the diffraction pattern of a reflection grating
			4	Insight into thermo electric effect.
			5	Familiarity with polarizers and analyzers and Familiarity with the working of polarimeters.
			6	Ability to analyze the I-V characteristics of a solar cell.

S3	MA201	LINEAR ALGEBRA AND COMPLEX ANALYSIS	1	Identify analytic functions and Harmonic functions
			2	Identify conformal mappings and some important transformations
			3	Evaluation of integrals using Cauchy's integral formula
			4	Evaluate real definite Integrals as application of Residue Theorem
			5	Solve any given system of linear equations
			6	Find the Eigen values of a matrix and how to diagonalize a matrix
S3	EC201	NETWORK THEORY	1	Apply the knowledge of basic circuit laws and identify the best approach to use reduce the electrical network.
			2	Evaluate the s-domain representation of different functions.
			3	Analyze the circuits using s-domain transformations.
			4	Recognize the importance of network functions.
			5	Identify, analyze and reduce the two port networks.
			6	Understand the concept of resonance and coupled circuits
S3	EC203	SOLID STATE DEVICES	1	Understand the basics of semiconductor physics and analyse the carrier transport mechanism in intrinsic and extrinsic semiconductors.
			2	Explain the generation and recombination mechanisms of excess carriers in semiconductors.
			3	Understand the basics of semiconductor diodes, current components and energy band diagrams.
			4	Analyze diode capacitances and breakdown mechanisms in diode.
			5	Memorize the basics of bjts and evaluate the current components.
			6	Discuss the operation of MOS capacitor and MOSFET.

S3	EC205	ELECTRONIC CIRCUITS	1	Knowledge in the application of mathematics to analyse various circuits using discrete components
			2	Theoretical background in the biasing and stability analysis of BJT
			3	Able to design various amplifiers
			4	Knowledge in the analysis and design of oscillators, mulivibrators and voltage regulators
			5	Able to design and analyse MOSFET amplifier
			6	Acquired basic skill of Electronic circuits and hence to become a technically competent and ethically strong Electronic student
S3	EC207	LOGIC CIRCUIT DESIGN	1	Compare various positional number systems and binary codes
			2	2. Apply Boolean algebra in logic circuit design
			3	3. Design combinational circuits
			4	4. Design sequential circuits
			5	5. Design and implement digital systems using basic programmable blocks
S3	HS210	LIFE SKILLS	1	Communicate effectively,Make effective presentations.
			2	Write different types of reports,Face interview & group discussion.
			3	Face interview & group discussion.
			4	Solve problems.
			5	Become an effective leader.
			6	Work in Group & Teams
			7	Handle Engineering Ethics and Human Values.
S3	HS200	Business Economics	1	Make investment decisions based on capital budgeting methods in alignment microeconomic and macroeconomic theories.
			2	Able to analyse the profitability of the firm, economy of operation, determination of price under

				various market situations with good grasp on the effect of trade cycles in business.
			3	Gain knowledge on monetary theory, measures by RBI in controlling interest rate and emerging concepts like bitcoin.
			4	Gain knowledge of elementary accounting concepts used for preparing balance sheet and its interpretation.
			5	Identify the need for various credit control methods and the significance of national income concepts.
			6	Understand the functioning of the Indian capital and money markets and the tax system.
S3	EC231	Electronic Devices & Circuits Lab	1	Knowledge in the working of analog circuits
			2	Able to design amplifiers, oscillators, voltage regulators and Schmitt trigger according to the given specifications
			3	Competent to inplement the designed circuit
			4	Able to analyse observed results
			5	Repot preparation
			6	Efficient to communicate the knowledge in various circuits
S3	EC233	ELECTRONICS DESIGN AUTOMATION LAB	1	Apply the knowledge of computer, science and engineering to the analysis of electrical and electronics engineering problems.
			2	Design systems which include hardware and software components.
			3	Identify, formulate and solve engineering problems.
			4	Apply modern engineering techniques in day to day life.
			5	Implement analog and digital circuits using HDL.
			6	Generate, plot and analyze various time varying signals.
S4	EC202	SIGNALS & SYSTEMS	1	Define, represent and classify Continuous and Discrete time signals and systems

			2	Interpret the response of Continuous and Discrete time systems.
			3	Transform Continuous time signals into frequency domain using Laplace Transform, Continuous Time Fourier series and Continuous Time Fourier Transform
			4	Examine Continuous LTI systems using Laplace Transform and Continuous Time Fourier Transform
			5	Transform discrete time signals using Z Transform , Discrete Time Fourier series and Discrete Time Fourier Transform
			6	Analyze Discrete LTI systems using Z Transform and Discrete Time Fourier Transform
S4	EC204	ANALOG INTEGRATED CIRCUITS	1	Students will be familiar with differential amplifiers and current mirror circuits.
			2	Students will acquire knowledge in the basics of Op_amps
			3	Students should be able to design circuits using op-amps for various applications
			4	Students should be familiarised in active filters and its design.
			5	Students should acquire knowledge and design concepts with special IC's like 555, PLL_NE 566 etc.
			6	Students will have knowledge in various analog to digital and digital to analog conversion techniques.

S4	EC206	COMPUTER ORGANISATION	1	Explain the functional units of a computer and the circuits in a ALU
			2	Interpret machine language codes to identify the different types of instructions.
			3	Interpret various addressing modes.
			4	Explain the architectural state of MIPS.
			5	Explain the different I/O accessing techniques.

			6	Classify the different types of memory with emphasis on cache and virtual memory.

S4	EC208	ANALOG COMMUNICATION ENGINEERING	1	Understand the basic idea of communication systems and concepts of modulation.
			2	Understand the fundamentals of noise and its effect in communication system.
			3	Explain the principle and working of AM systems, transmitters and receivers.
			4	Explain the principle and working of FM systems, transmitters and receivers.
			5	Describe the effect of noise in analog communication systems.
			6	Acquire basic information about telephone systems.

S4	EC230	LOGIC CIRCUIT DESIGN LAB	1	Design and implement functions in SOP and POS forms
			2	Design and implement combinational circuits
			3	Realise various types of flip flops using gates.
			4	Design and implement counters.
			5	Implement various types of shift registers.
			6	Realise the working of BCD to seven segment decoder..

S4	EC232	ANALOG INTEGRATED CIRCUITS LAB	1	Design and demonstrate functioning of various analog circuits using op-amp.
			2	Design and demonstrate functioning of various analog circuits using timer IC NE 555.
			3	Analyze and design various applications using OP AMP
			4	Design and implement various signal conditioning circuit using op-amp.

			5	Design and develop ADC and DAC
			6	Design and implement regulated dc power supply
S5	EC301	Digital Signal Processing	1	Understand the difference between transforms & various filtering methods based on DFT.
			2	Evaluate the FFT algorithm for fastest computation of DFT.
			3	Create FIR filters using different filter methods.
			4	Create IIR filters using different transformation techniques.
			5	Analyze IIR and FIR filters using signal flow graphs.
			6	Understand about the DSP processor and the digital data manipulation & errors occurring in it.
S5	EC303	Applied Electromagnetic Theory	1	Enable the students to understand the different spacial coordinate systems. Thereby they can understand the behaviour of static electric and magnetic field by applying different fundamental laws.
			2	Enable the students to understand the behaviour of Electric & Magnetic fields at boundaries. They will also become aware about the concepts of propagation of EM waves in different mediums.
			3	Enable the students to understand the concept of polarization & the behaviour of EM waves at boundaries. They will also learn about pointing vector and power density of EM wave.
			4	Students will become aware of the behaviour of transmission lines and reflections that occurs in transmission lines.
			5	Students will become aware of Smith chart & its applications. They will also become aware of half wave and quarter wave transmission lines.

			6	Enable the students to understand the behaviour of EM waves while passing through waveguides.
S5	HS300	Principles of Management	1	A student who has undergone this course would be able to manage people and organisations
			2	A student who has undergone this course would be able to critically analyse and evaluate management theories and practices
			3	A student who has undergone this course would be able to plan and make decisions for organisations
			4	A student who has undergone this course would be able to do staffing and related HRD functions
S5	EC305	Microprocessor & Microcontroller	1	Explain the architecture and concepts of 8085 microprocessor
			2	Interface 8085 with peripherals and write simple assembly language programs
			3	Explain the architecture of 8086 microprocessor and compare 8086, 80286, 80386, 80486 & Pentium processors.
			4	Familiarize the architecture, memory organization and instructions of 8051 microcontroller
			5	Design an 8051 microcontroller based system with interfacing devices such as DIP switch, stepper motor, ADC, DAC, seven segment display and LCD.
			6	Acquire concepts on timers, interrupts and serial communication of 8051 microcontroller.
S5	EC307	Power Electronics & Instrumentation	1	Develop a solid foundation in power semiconductor switches and analyse its switching characteristics
			2	Understand the working and analyse the waveforms of various

				non isolated and isolated converters
			3	Analyse different topologies of single phase and three phase inverters
			4	Get an insight on electronic instruments , their configuration and measurement using them
			5	Understand the selection and principle of operation of transducer
			6	Familiarise digital instruments and digital measurements
S5	EC333	Digital Signal Processing Lab	1	Learn how to use a DSP board and implement various systems on it.
			2	Familiarized with Matlab and will be able to implement various algorithms in Matlab.
			3	Able to implement a digital filter in DSP board.
			4	Understand the concepts of convolution and aliasing.
			5	Able to analyse behavior of AM & FM in time domain and frequency domain.
			6	Able to design a digital filter of given specifications in matlab
S5	EC335	Power Electronics & Instrumentation Lab	1	Design and demonstrate basic power electronics circuits
			2	Use transducers for sensing and measuring applications
			3	Function effectively as an individual and in a team to accomplish the given task
			4	Design and demonstrate practical dc dc converters and inverters
			5	Design and demonstrate practical sensor based measurements
			6	Solve real life problems using power electronics and instrumentation systems
S5	EC341	DESIGN PROJECT	1	Able to contribute as an individual or in a team in the development of technical projects.
			2	Enhance their communication skills by the presentation of projects.

			3	Think innovatively on the development of products, processes or technologies in the engineering fields.
			4	Able to analyze the problem requirements and formulate workable design solutions.
			5	Develop practical knowledge within a chosen area of technology for project development.
			6	Able to report their technical ideas, strategies and methodologies.
S5	EC360	Soft Computing	1	Identify and describe soft computing techniques and their roles in building intelligent Machines.
			2	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems
			3	Recognize the feasibility of applying a soft computing methodology for a particular Problem.
			4	Apply neural networks to pattern classification and regression problems.
			5	Apply genetic algorithms to combinatorial optimization problems
S5	EC361	Digital System Design	1	To analyze and design clocked synchronous sequential circuits
			2	To analyze and design asynchronous sequential circuits
			3	To apply their knowledge in diagnosing faults in digital circuits, PLA
			4	To interpret architecture of cplds and FPGA

S5	EC365	Biomedical Engineering	1	Get a basic idea about the physiology of the body
			2	Understand diagnosis and therapy related equipments
			3	Understand the problem and identify the necessity of equipment for diagnosis and therapy
			4	Understand the importance of electronics engineering in the medical feild
			5	:Understand the importance of telemetry in patient care
			6	Understand the handling of equipment and patient safety
S6	EC302	Digital Communication	1	Illustrate the Digital representation of analog source
			2	Compare the performance of various Digital Pulse Modulation Schemes
			3	Apply the knowledge of ISI problems in Digital communication to derive Nyquist criteria for zero ISI
			4	Analyse the need for introducing ISI in Digital Communication in a controlled manner
			5	Construct signal space representation of signal using Gram Schmidt orthonormalisation procedure
			6	Describe the principle of spread spectrum communication and to illustrate the concept of FHSS and DSSS
			7	Understand various Diversity Techniques
			8	Compare the error probability for different digital modulation schemes like BPSK, BFSK, QPSK etc.
S6	EC304	VLSI	1	Identify the basic concepts for fabricating various ics.

			2	Interpret the different layout levels, process sequence and thereby for fabricating monolithic components.
			3	Analyze the characteristics of CMOS inverter & to sketch the stick diagram and layout of CMOS logic functions.
			4	Analyse MOSFET logic for an application.
			5	Understand the structure of memories and design of PLA's
			6	Design functional units such as adders & multipliers.
S6	EC306	Antenna & Wave Propagation	1	The basic working of antennas
			2	Various types of antennas
			3	Different types of antenna arrays and their design.
			4	Various techniques involved in antenna parameter measurements
			5	Principle and design of mobile antennas
			6	Propagation of radio waves in the atmosphere
S6	EC308	Embedded Systems	1	Describe embedded system design process & identify the software and hardware components required for an embedded system
			2	Use different communication interfaces & buses for embedded networking
			3	Explain how memory & I/O devices are handled in embedded systems
			4	Develop programs for various embedded systems
			5	Describe different inter process communication techniques used in an operating system
			6	Explain the internal functionalities of a Real Time Operating System

S6	EC312	Object Oriented Programming	1	Understand the features of Object Oriented Programming like Class,

				Polymorphism, inheritance in C++ & Java
			2	CO2: Understand advanced features of C++ such as template, abstract classes and virtual functions.
			3	CO3: Analyze the advanced features of java such as multi-threading, packages and error management.
			4	CO4: Understand the android application development
			5	CO5: Apply the skills in debugging, deploying and testing of mobile application.
			6	CO6: Create applications using object oriented languages like C++, java, & android

S6	EC332	Communication Engineering Lab (Analog & Digital)	1	Demonstrate concepts of AM modulation, FM modulation& detection
			2	Design and demonstrate the working of PLL and its applications.
			3	Implement an analog signal sampling & reconstruction circuit.
			4	Design a random sequence generator and multiplexing & demultiplexing techniques employed in communication
			5	Develop and design various digital modulation & demodulation techniques
			6	Develop and design various digital modulation & demodulation techniques.

S6	EC334	Microcontroller Lab	1	Program and familiarise the 8051 trainer kit
			2	Develop 8051 assembly language programs
			3	Develop C programs for 8051 embedded applications
			4	Design 8051 microcontroller based applications using input devices like switches and push buttons

			5	Design 8051 microcontroller based applications using output display devices like leds and lcds.
			6	Design 8051 microcontroller based applications using Analog/Digital and Digital/Analog Converters to manipulate physical world signals

S6	EC352	Comprehensive Examination	1	Test comprehensive knowledge in subject
			2	Create self confidence
			3	Analyze problems/situations in respective area of Engineering
			4	Develop professional competency
			5	Organize time and stress pressures
			6	Develop communication skills

S7	EC401	INFORMATION THEORY & CODING	1	Will be able to understand concept of information, calculation of information content of a random variable from its probability distribution and applying Shannons source coding theorem.
			2	Will be able analyze the various coding schemes and channel capacities using Shannons theorems..
			3	Will be able to understand the importance of linear block codes on communication systems.
			4	Will be able to understand different codes, it encoding and decoding.
			5	Will be able to relate the joint, conditional and marginal entropies of variables in terms of theirs.
			6	Will be able to construct efficient codes for data on imperfect communication channels.

S7	EC403	MICROWAVE & RADAR ENGINEERING	1	Acquire a solid foundation in microwave engineering and radar systems.

			2	Analyze various methods and principles for the generation of microwaves and their limitations.
			3	Describes the measurements of different microwave parameters.
			4	Analyze Microwave network characterization and passive devices.
			5	Acquire knowledge on solid state microwave devices.
			6	Classify and describe different types of radar systems available.

S7	EC405	OPTICAL COMMUNICATION	1	Know the working of optical source and detector.
			2	Compare the performance of various optical modulation schemes.
			3	Apply the knowledge of optical amplifiers in the design of optical link.
			4	Analyse the performance of optical amplifiers.
			5	Know the concept of WDM.
			6	Describe the principle of FSO and lifi.

S7	EC407	COMPUTER COMMUNICATION	1	Compare and contrast different types of network topologies and protocols.
			2	List and describe the layers of OSI model and TCP/IP with their functions.
			3	Describe about different transmission media and its interconnections.
			4	Understand the concept of subnetting and routing mechanism.
			5	Understand the basic protocols of computer networks and how they can be used to assist in new design and implementation.
			6	Describe the security aspects in designing a trusted computer communication network.

S7	EC409	CONTROL SYSTEMS	1	Compute transfer function of the system, understand and model different control systems.
			2	Evaluate time domain response of control systems and compute different error coefficients.
			3	Analyse control systems in frequency domain and use different graphical tools like root locus techniques for analysis.
			4	Understand stability analysis techniques like Nyquist stability criterion, bode plot etc. & design of various controllers.
			5	Solve system equations in state-variable form (state variable analysis) & learn the concepts of Controllability and Observability.
			6	Analyse and design discrete-data control systems

S7	EC431	COMMUNICATION SYSTEMS LAB (OPTICAL & MICROWAVE)	1	Understand different microwave equipment and bench set up.
			2	Gain knowledge about different microwave sources, its working and characteristics.
			3	Recognize the measurement of different microwave parameters using microwave bench set up.
			4	Interpret different optical components in optical bench set up.
			5	Demonstrate on different optical sources and measure its characteristics.
			6	Analyze different optical parameters and losses in optical communication.

S7	**451	Seminar and Project Preliminary	1	To analyse a current topic of professional interest
			2	To present a topic before an audience
			3	To identify an engineering problem
			4	To analyse and solve an engineering problem

			5	To propose a work plan and implement the solution for an engineering problem
			6	Students will have a knowledge on how to prepare a project report

S7	EC465	MEMS	1	Discuss the basics of MEMS and to review the basic mechanical concepts
			2	Analyse the working principles of micro sensors and actuators.
			3	Identify the importance of scaling laws in the design of Microsystems.
			4	Understand the typical materials used for fabrication of microsystems
			5	Describe the principles of standard microfabrication techniques
			6	Examine the challenges in the design of fabrication of microsystem

S8	EC402	NANOELECTRONICS	1	Understand the basics of nanotechnology and quantum mechanics
			2	Analyze different methods of fabrication of nanoparticles
			3	Understand different tools for characterization of nanomaterials
			4	Evaluate the behaviour of 2D electronic systems
			5	Understand the transport of charge in electric and magnetic field in nanoelectronics
			6	Create awareness of different nanolectronic devices.

S8	EC404	ADVANCED COMMUNICATION SYSTEMS	1	Understand the microwave radio communication in general, the modulations, its advantages & disadvantages.
			2	Gain knowledge and awareness of the technologies used in digital TV and its various file formats, modulation schemes, display technologies used inn digital tvs.

			3	Explain the various satellite communication system theories, terms related to satellite systems, subsystems and satellite applications.
			4	Describe the evolution of mobile radio communication, various generations of wireless networks, technologies and their architecture along the spectrum allocation.
			5	Understand the basic principle behind cellular concept & management techniques such as channel allocation, hand off, cell splits, sectoring, and physical mechanisms that affecting the signal & characteristics of different wireless channels.
			6	Analyzing and studying GSM network architecture, data services and various multiple access techniques employed in GSM &CDMA networks to share the spectrum efficiency.

S8	EC492	PROJECT	1	Analyze a current topic of professional interest
			2	Present a topic before the audience
			3	Identify an engineering problem
			4	Think innovatively on the development of components, products, process or technologies in engineering field.
			5	Apply knowledge gained in solving real life engineering problems
			6	Prepare a project report

S8	EC462	MIXED SIGNAL CIRCUIT DESIGN	1	Understand the working of different bias circuits.
			2	Analyze the working of CMOS amplifiers.
			3	Understand the working of CMOS op-amp.
			4	Understand the working of PLL.
			5	Analyze the working of switched capacitor circuits.

			6	Analyze the working of data converters.

S8	EC464	LOW POWER VLSI	1	Identify the sources of power dissipation in digital IC systems.
			2	Understand the impact of power on system performance and reliability
			3	Understand leakage sources and reduction techniques
			4	Recognise advanced issues in VLSI systems, specific to the deep-submicron silicon
			5	Technologies
			6	Identify the mechanisms of power dissipation in CMOS integrated circuits

S8	EC468	SECURE COMMUNICATION	1	Student can understand the mathematical models for cryptography.
			2	Students can identify network security treats and can develop security models.
			3	They get idea about various encryption and decryption techniques.
			4	Students can understand the security issues in public and private key cryptography.
			5	They can identify various intrusion techniques and suggest methods to prevent them.
			6	Students get idea about password management for network security.

S8	EC472	INTEGRATED OPTICS & PHOTONIC SYSTEMS	1	Devices that are basic components of integrated optics and photonic systems including Optical wave guides, optical couplers, Lasers, Detectors and modulators
			2	Light propagation in waveguides
			3	The fabrication process of Optical Integrated devices
			4	Applications of Optical Integrated devices

			5	Nano photonic devices