I	**Program:**	M.Sc **Electronics**		
	PO Code	**Programme Outcomes:**		
	PO1			Apply knowledge and skill in the design and development of Electronic circuits to cater to the needs of Electronic Industry.
	PO2			Acquire in-depth knowledge of Electronic devices, Linear and digital electronics, behavior of linear and non-linear circuits, Hardware description Language, Microprocessors and Microcontrollers in wider and global perspective, with an ability to discriminate, evaluate, analyze, synthesize and integrate for enhancement of knowledge.
	PO3			Acquire knowledge about the recent technologies like embedded systems, VLSI, DSP, Nanoelectronics and Biomedical Instrumentation and getting hands on experiences so that students can be industry ready.
				Apply the knowledge to evaluate the problems related to society, health and environment and to provide a sustainable solution.
Semester	**Course Code**	**Course Name**	**CO Code**	**Course Outcomes**
I	CC-01	**Electronic Devices + Lab**	CO1	Realize crystal lattice structure, crystal growth, energy bands in metals, semiconductors and insulators, and drift of carriers in E and H fields.
			CO2	Explain and realize the operation of different diodes and their applications
			CO3	Explain the working of BJTs with the help of different models.
			CO4	Describe the working of FETs, MOSFETs, MESFETs
I	CC-02	Network Analysis	CO1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta

					transformation/ source transformation/ source shifting.
				CO2	Perform Synthesis of waveforms, Solve network problems by applying Superposition/ Reciprocity/ Thevenin's/ Norton's/ Maximum Power Transfer/ Millman's Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.

			CO3	Apply Laplace transform to solve the given network. Evaluate for RLC elements/ frequency response related parameters like resonant frequency, quality factor, half power frequencies, voltage across inductor and capacitor, current through the RLC elements, in resonant circuits.
			CO4	Solve the given network using specified two port network parameter like Z or Y or T or h.
I	CC-03	Power Electronics + Lab	CO1	Describe the characteristics of different power devices and identify the applications.
			CO2	Illustrate the working of DC-DC converter and inverter circuit.
			CO3	Determine the output response of a thyristor circuit with various triggering options.
			CO4	Determine the response of controlled rectifier with resistive and inductive loads.
I	CC-04	Digital Electronics and VHDL Programming + Lab	CO1	Develop simplified switching equation using Karnaugh Maps and QuineMcClusky techniques. Design combinational and sequential circuits, Design of Synchronous/Asynchronous Counters and Shift registers using Flip Flops.
			CO2	Write VHDL programs in dataflow, behavioral and structural modeling levels of Abstraction. Write simple programs in VHDL in different styles.
			CO3	Design and verify the functionality of digital circuit/system using test benches. Identify the suitable Abstraction level for a particular digital design.

I	AC-01	Signals and Systems		Determine performance of a system in time-domain given impulse response
				Determine frequency components of a given arbitrary periodic or aperiodic analog signal using Fourier methods
				Determine frequency components of a given arbitrary periodic or aperiodic discrete signal using Fourier methods
				Understand the properties of Fourier transforms and their use in sampling of analog signals. Application of Laplace transform in analyzing LTI systems.
I	AC-02	Embedded C - Programming		To analyse the given problem
				Write the programs and solve the mathematical and logical problems using C language.
II	CC-05	Embedded systems and PIC Microcontroller + Lab		Write assembly level language programmes
				Write programs using embedded C language
				Import the programs onto the microcontroller board
				Debug a program on a target device and embed the code in flash memory for stand-alone system for embedded system designs.
II	CC-06	Advanced Communication + Lab		**Apply** the **knowledge** of various signal processing and coding techniques for effective communication in digital systems
				Analyze the performance of a given digital communication system
				Design a digital communication system for a given set of specifications.

				Conduct experiments / simulate to demonstrate a given application / problem statement in digital communication
				Engage in **self-learning** of advanced concepts and application of Digital Communication.
II	CC-07	Modern Control Systems +Lab		**Understand** basic control systems and **applying** different techniques to reduce system and determine stability.
				Analyzing system performance and stability using different approaches.
				Evaluation of system performance by varying system parameters of the control systems.
				Create, **Apply** and **analyze** control system problems using MATLAB or Simulink tool
II	CC-08	MEMS and Microsystems + Lab/Tutorial		Understand the concept of MEMS and materials.
				Perform micro-machining, scaling and fabrication of various MEMS devices.
				Understand the concepts of MEMS designing and packaging.
				Learn the applications and challenges of existing MEMS devices.
II	AC-03	Research Methodology		Identify the overall process of designing a research study from its inception to its report.
				Select and define appropriate research problem, organize and conduct research in a structured manner.
				Prepare a project proposal, to write a

				research report, articles and thesis in a decipherable manner.
II	AC-04	Optical Fiber Communication		Analyze the propagation of information through optical fibers.
				Analyze different types of losses in the transmission.
				Understand the applications of Digital and Analog links.
III	EC-01	VLSI Design and Systems		Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
				Apply the knowledge of CMOS technology to construct basic and advanced CMOS logic circuit like memory & array subsystems
				Design CMOS based combinational and sequential circuits for given specification.
				Analyze Memory elements along with timing considerations.
				Demonstrate knowledge of FPGA based system design Interpret testing and testability issues in VLSI Design.
				Analyze CMOS subsystems and architectural issues with the design constraints.
III	EC-02	Digital Signal Processing + lab		**Analyze** the response of LTI systems using time domain and DFT techniques.
				Compute DFT of real and complex discrete time signals.
				Computation of DFT using FFT algorithms and linear filtering approach.
				Solve problems on digital filter

				design and realize using digital computations with MATLAB and DSP Kits.
III	EC-03	Nanoelectronics I + Lab		The student realizes the importance of nano scaling and how it's useful for Nanoelectronics era.
				Students understand the under laying physical process in Short channel effects.
				The student will be able to connect the similarities and differences from classical devices to non classical devices through that they understand evolution.
				The student learns the impact of nanotechnology on electronics and the advanced devices operations such as CNT FET, SOI FET, SET etc
				The student understand the importance and necessity of future devices and it's working.
III	EC-04	Electronic Instrumentation and Biomedical Instrumentation/ Wireless communication		Analyze the problem in a systematic procedure.
				Select appropriate transducer for the given application. Define basic medical terms and physical values that can be handled by medical instrumentation.
				Familiarized with various medical equipments and their technical aspects.
				Introduced to the measurements involved in some medical equipments.
				Understand, design and evaluate systems and devices that can measure, test and/or acquire biological information from the

				human body.
				Demonstrate measuring of basic medical parameters.
III	AC-05	ARM-9 Processor		Understand the working of ARM processor and its features.
				Apply all the concepts and develop a minor project using an ARM 9 board like Raspberry pi.
III	OE	Consumer Electronics		Realize the importance of Electronics in the everyday activities.
				Identify and understand the working principle of Electronic components
				understand the working of different home appliances and consumer electronic systems
IV	EC-05	Microwaves and Antenna Theory		Apply the concepts of static Electric & Magnetic fields to study Time-varying electro-magnetic field.
				Analyze propagation of uniform plane waves in different media
				Analyze various parameters related to microwave transmission lines and waveguides
				Identify microwave devices for several applications
				Analyze various antenna parameters necessary for building an RF system
				Apply concepts of Fields and Networks to study working principles of specific microwave active/passive devices, transmission lines/waveguides.
				Recommend various antenna configurations according to the applications

IV	EC-06	Nanoelectronics II + Lab		The student will be able to appreciate emerging research devices and architectures
				The student gains competence to understand the different types of RAMs and its architectures
				The student understand the operation of organic devices Student able to analyze the functioning of advanced MOSFETs, Memories,organic devices
IV	EC-07	Embedded Systems Design / Digital Image Processing		Understand the basics of real time concepts and survey of software architecture.
				Analyze the embedded OS functionality and study the basic design using RTOS
				Design embedded applications using given specifications and concepts of development process.
				Demonstrate practical experiments on developing embedded systems.
				Engage in self learning in analyzing and carrying out embedded projects.
IV	PR-01	Project / Viva Voce		Apply the knowledge gained in the course to develop a working project.
				Understand the importance of research
				Write a review article or publish their research findings in a journal/ conference