Department of Electronics

Program Outcomes and Program Specific Outcomes: M. Sc. Electronics

Department of Electronics	After successful completion of two year master degree program in Electronics a student should be able to
Program Outcomes	PO-1.Demonstrate, solve and understand major concepts in various disciplines of Electronics. PO-2.Apply the theories learnt and the skills acquired to solve real time problems. PO-3.Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Electronics experiments. PO-4. Inculcate the scientific temperament. PO-5. Develop problem-solving abilities, management skills and expertise in designing and operation of electronics systems. PO-6. Aims to equip students with excellence in education and skills, thus enabling the student to pursue a career of her choice.
Program Specific Outcomes	PSO-1. Apply the knowledge of electronics to solve complex engineering problems in Electronic Devices and Circuits, Analog & Digital communication, Embedded systems, MEMS and other associated topics. PSO-2. Understand the principles and working of both hardware and software aspects of Electronic systems PSO-3 Gain both theory and practical knowledge in developing areas of Electronics. PSO-4. To analyze, design and implement analog and digital electronic systems, information and communication systems. PSO-5. To assess the impact of new technologies and solve complex problems. PSO-6. Develop research oriented skills. PSO-7. To inculcate laboratory skills in students so that they can take up independent projects and develop entrepreneurial skills.

Course Objectives and Learning Outcomes: M. Sc Electronics

Semester I			
Course Code	**Course Title**	**Course Objectives**	**Course Learning Outcomes**
ELT-1.1	Solid State Semiconductor Devices	To enable the students to understand about the crystal structure and properties, formation of bands in semiconductors, charge carrier concentration and transport phenomenon and fabrication of p-n junctions and to study various semiconductor devices	CO1: Learn the basic knowledge and concepts of Semiconductor materials and devices. CO2: Understand the various crystal properties, crystal growth processes. CO3: Gain insight into the charge carrier concentrations and carrier transport phenomena. CO4: Understand the fabrication process of p-n junctions and the associated phenomenon. CO5: Study the construction, operation and characteristics of semiconductor devices.
ELT-1.2	Analog Devices and Circuits	To empower students to understand the design and working of diodes, BJT / FET and Operational Amplifier.	CO1: Understand the construction, operating principle, characteristics and applications of pn junction diodes and zener diode CO2: Study the construction and operation of BJT and compute different parameters for characterizing different circuits CO3: Analyze the performance of CE, CB and CC modes of transistor and design biasing circuits CO4: Learn the construction, working, characteristics and types of FET. Classify different types of FETs and demonstrate feedback amplifiers, OP-AMPs, and oscillator circuits. CO5: Understand the characteristics and parameters of op-amp. CO6: Study the op-amp configurations and applications.

ELT-1.3	Programming in C++	To understand the various concepts of object oriented programming and to enable students to apply programming skill to solve real world problems.	CO1: Learn the basics of programming language CO2: Understand the concepts of tokens, decision making statements and functions. CO3: To learn object oriented programming language CO4: Study about templates. CO5: To handle abnormal termination of a program using exception handling CO6: Gain insight into the STL
ELT-1.4	Digital Electronics and Verilog HDL	To understand the digital circuits and to develop the skills to model a digital system using Verilog HDL	CO1: Review of Boolean algebra and simplification techniques CO2: Study the combinational and sequential logic circuits. CO3: Learn a hardware description language that can be used to model a digital system CO4: Understand the level of abstraction ranging from the behavioral level to gate level
ELP-1.5	C++Programming lab	Understand the programming constructs to write C++ programs	CO1: Write programs to solve real world problems.
ELP-1.6	Digital Electronics and Verilog Experiments	Focus on hardware and software techniques of designing and implementing various digital systems.	CO1: Design and implement various digital circuits CO2: Gain insight into hardware and software techniques. CO3: To write programs to implement digital circuits.

Semester II			
Course Code	**Course Tilte**	**Course Objectives**	**Course Learning Outcomes**
ELT-2.1	8086 Architecture, Programming and Interfacing	To understand the architecture, programming of 8086 microprocessor, interfacing an external device with the	CO1: Understand the 8086 architecture and addressing modes CO2: Learn to program 8086 microprocessor

		processors.	CO3: To understand various interrupts and hardware features of 8086 CO4: Gain insight about interfacing and coprocessors.
ELT-2.2	Signals and Systems	The concepts and theories of signals and systems form the foundation for further studies in areas such as analog and digital communication, analog and digital signal processing, control systems and circuit analysis and synthesis	CO1: To understand mathematical description and representation of both continuous-time and discrete-time signals and systems and their properties. CO2: Study about Linear-Time Invariant systems. CO3: Learn about the concept of frequency domain representations and how to decompose periodic signals into their frequency components CO4: Analyze a signal using Fourier series and Fourier transform.
ELT-2.3	Electronic Instrumentation and Microcontrollers	To understand the concepts of measurement, transducer and data acquisition systems. Gain insight about microcontrollers and study PIC16F887 microcontroller	CO1: Study about basic concepts of measurement. CO2: Understand various transducers and data acquisition systems. CO3: Gain knowledge about biomedical instrumentation CO4: Learn PIC16F887 microcontroller
ELT-2.4	Electronic Communication Theory	To acquire knowledge about analog communication systems.	CO1: Describe basic components of communication system and concept of modulation. CO2: Understand different modulation

			techniques. CO3: Learn about optical fiber communication. CO4: Understand the concepts and applications of Satellite communication system.
ELP-2.5	8086 Programming and Interfacing with PIC Microcontroller Experiments	To understand the assembly language programming and interfacing experiments using PIC Microcontroller.	CO1: Student will be able to write assembly language programs. CO2: Learn to interface various devices using PIC Microcontroller.
ELP-2.6	Electronic Communication Experiments	To gain practical knowledge through laboratory experiments.	CO1: Construct and study various modulation techniques. CO2: Construct and study about active filters. CO3: Analyze various analog modulation and demodulation schemes in time and frequency domains using communication kits

Semester III			
Course Code	**Course Tilte**	**Course Objectives**	**Course Learning Outcomes**
ELT-3.1	Digital Signal Processing	To acquire knowledge design, implementation and analysis of DSP systems.	CO1: Learn about the basic concepts of signals and systems. CO2: Understand frequency domain analysis of discrete time signals. CO3: Design, implementation, analysis and comparison of digital filters for processing of discrete time signals CO4: Consider practical implementation issues in designing DSP systems.

ELT-3.2	Microwave Electronics	To enable students to gain knowledge of microwave technology essential for developing the systems for mobile communication, satellite and spacecraft communication, RADAR etc.	CO1: Understand the laws of electrostatics and magnetostatics. CO2: Understand the basic concepts of microwaves and propagation through the transmission lines, microwave components CO3: Understand the working of microwave active circuits and study of various microwave semiconductor devices. CO4: Learn about the generation of microwaves through the vacuum-based tubes
ELT-3.3	Advanced Digital Communication	To acquire knowledge about digital communication systems, data coding, multiplexing and multiple access techniques.	CO1: Understand the building blocks of digital communication system CO2: Implement optimization techniques, data coding, channel requirements, signal to noise ratio, bandwidth, error finding within the received information and information theory CO3:Study the concept of multiplexing to fulfil the demand of high speed digital transmission CO4: Gain insight into wireless communication systems.
ELT-3.4	Control Engineering	To develop an understanding of the fundamentals of control theory, time and frequency response analysis and the concept of stability.	CO1: State open and closed loop control systems and their mathematical models. CO2: Understand the time response and frequency domain analysis of control systems. CO3: Gain insight about the stability analysis in terms of root-locus technique and bode plots.

ELP-3.5	Digital Signal Processing Lab	To gain practical knowledge through laboratory experiments.	CO1: Classify discrete time signals/systems. CO2: Determine the convolution of discrete time signals using graphical and analytical methods. CO3: Apply Z-transform and Fourier transform for different type of signals and systems. CO4: Compute DFT/IDFT for discrete time signals and find circular convolution CO5: Develop FFT algorithms and design of analog/digital filters CO6: Compute the frequency response of digital filters CO7: Construct and study various digital modulation techniques.
ELP-3.6	Digital Communication and Microwave Experiments	To understand the digital communication systems at the practical level focusing on the digital modulation techniques. The course also focuses on obtaining practical knowledge through laboratory experiments about microwave devices.	CO1: Understand Digital Modulation techniques. CO2: To design and implement different modulation and demodulation techniques. CO3: Determine the modes, tuning range and sensitivity of Reflex Klystron. CO4: Understand the characteristics of Gunn diode. CO5: Measurement of the radiation pattern of a horn antenna.
Semester IV			
Course Code	**Course Tilte**	**Course Objectives**	**Course Learning Outcomes**
ELT-4.1	Introduction to VLSI	To understand the theories and techniques of	CO1: Implement the logic circuits using MOS

	Circuits	digital VLSI design in MOS and CMOS technology	and CMOS technology. CO2: Acquire the knowledge about various CMOS fabrication process and its modeling. CO3: Analyse various circuit configurations and their applications.
ELT-4.2	Embedded Systems	To study about current technologies, integration methods and hardware and software design concepts associated with Embedded Systems.	CO1: Understand the hardware considerations in the design of embedded systems. CO2: Know about the fundamentals of operating systems and their importance in real time applications CO3: Describe how a real-time operating system designed and their importance in embedded system design.
ELT-4.3	Power Electronics and Circuits	To understand the theory of power semiconductor devices, their principle of operation, design and synthesis in different power electronic circuits.	CO1: Learn about basic power semiconductor devices CO2: Design and analyze Phase controlled rectifiers and power converter circuits CO3: Design and understand AC voltage controller, Cycloconverter and chopper circuits
ELT-4.4	MEMS and Microsystems Technology	To gain basic knowledge on overview of MEMS (Micro Electro Mechanical System) and Microsystems Technology.	CO1: Understand the overview of MEMS and Microsystems CO2: Understand the fundamental properties of materials used for MEMS devices CO3: Gain a comprehensive perspective of various physical mechanisms for MEMS design CO4: Understand the fundamental principle of

			piezoresistive sensing, piezoelectric sensing, magnetostatic actuation and methods for fabricating
ELP-4.5	Project Dissertation and Viva-voce	To provide the best possible training in learning to apply classroom knowledge to real experiments and allow further development of the creative process that is necessary to being a researcher.	CO1: Understand the importance of experimental and theoretical analysis. CO2: Design and develop embedded systems for real-time applications. CO3: Learn to write scientific papers.