

## POs, PSOs and COs for M. Sc. Applied Electronics

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI  
P. G. DEPARTMENT OF APPLIED ELECTRONICS  
*Faculty of Science and Technology*

### Programme Outcomes

Programme: M. Sc. (Applied Electronics)

**PO1:** At the time of completion of the programme, the student will be able to develop extensive knowledge in various areas of Electronics.

**PO2:** Apply the knowledge of mathematics, science, engineering fundamentals and electronics to the solution of engineering problems.

**PO3:** Identify, formulate, research literature, and analyse science and engineering problems using the first principles of mathematics and engineering sciences.

**PO4:** Understand solutions for electronic and allied systems and design system modules or processes that meet the specified needs with appropriate societal consideration.

**PO5:** Choose and apply appropriate modern tools/frameworks/platforms, software simulators, techniques, resources, and modern engineering and IT tools for solving engineering problems with an understanding of the limitations.

**PO6:** Function effectively as an individual, and as a member or leader in diverse teams.

**PO7:** Communicate effectively on engineering activities with the science and engineering community and with the society at large, such as, being able to comprehend and write effective reports and make effective presentations.

### Programme Specific Outcomes (PSOs)

**PSO1:** At the end of the two-year M. Sc. Applied Electronics programme, the student will understand and be able to explain different branches of Electronics such as Electronic Devices and Circuits, Linear and Digital Integrated Circuits, Communication Engineering, Analog and Digital Electronics, Microprocessors, Microcontrollers, VLSI, Embedded Systems, Smart Sensors, Digital Signal Processing, Microwave Engineering, Embedded System Design, Computer Organization, Optical Fiber Communications, Mobile Communications, etc.

**PSO2:** Courses in foundational subjects like Electrical Engineering and Network Analysis, Electronic Devices and Circuits, Linear Integrated Circuits, Linear and Digital Integrated circuits, Microprocessors and Microcontrollers, Digital Signal Processing, Microwave Engineering, Optical Fiber Communication Engineering, Embedded System Design, etc. have a prominent lab component, offering hands-on training and exercises on numerous practical aspects of crucial importance.

A postgraduate of the M. Sc. Applied Electronics Program will demonstrate:

## POs, PSOs and COs for M. Sc. Applied Electronics

**PSO3:** An ability to understand the basic concepts in Electronics & Communication Engineering and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of systems.

**PSO4:** An ability to solve Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive at cost effective and appropriate solutions.

**PSO5:** Skill development by undertaking supervised projects by students with a flexibility to balance between research- and application-oriented work that require innovative approaches.

### Course Outcomes (COs) for the Programme M. Sc. Applied Electronics

Programme: M. Sc. Applied Electronics		
Course Code	Course Title	COs (Course Outcomes)
<b>M. Sc. Applied Electronics Semester - I</b>		
1AE1	Electrical Engineering & Network Analysis	After successfully completing the course, the students will be able to <ol style="list-style-type: none"> <li>1. Analyze electrical circuits using mesh and node analysis.</li> <li>2. Apply suitable network theorems to analyze electrical circuits.</li> <li>3. Apply Laplace Transform for circuit analysis.</li> <li>4. Draw oriented graph of network to determine their currents and voltages.</li> <li>5. Relate various two port network and apply two-port network theory for network analysis</li> </ol>
1AE2	Electronic Devices and Circuits	After successfully completing the course, the students will be able to <ol style="list-style-type: none"> <li>1. Comprehend the knowledge of diode and its applications in rectifier and regulator circuits.</li> <li>2. Understand basics of BJT, JFET, MOSFET, UJT and their operational parameters.</li> <li>3. Understand feedback concept, topologies and their applications.</li> <li>4. Implement and analyze various electronic circuits such as oscillators, multistage amplifiers and power amplifiers using BJT.</li> <li>5. Design and analyze electronic circuits,</li> </ol>
1AE3	Object Oriented Programming C++	After successfully completing the course, the students will be able to <ol style="list-style-type: none"> <li>1. Justify the basics of object-oriented programming concepts such as data types, functions, classes, objects, constructors, inheritance, overloading etc</li> <li>2. Design, implement, test, and debug simple programs in an object-oriented programming language.</li> <li>3. Describe how the class mechanism supports encapsulation and information hiding.</li> <li>4. Design and test the implementation of C++ programming concepts</li> </ol>
1AE4	Electric & Magnetic Fields	After successfully completing the course, the students will be able to <ol style="list-style-type: none"> <li>1. Apply vector calculus to understand the behavior of static electric/magnetic fields.</li> <li>2. Formulate and solve problems in electrostatics and magnetostatics in dielectric media.</li> <li>3. Describe and analyze electromagnetic wave propagation in free-space.</li> </ol>

## POs, PSOs and COs for M. Sc. Applied Electronics

		<ol style="list-style-type: none"> <li>Analyze plane electromagnetic waves at boundaries between homogeneous media.</li> <li>Analyze the electromagnetic radiation from localized charges considering retardation effects</li> </ol>
1AE5	Communication Skills	<p>Upon successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> <li>Acquire knowledge about the various principles of communication.</li> <li>Learn the importance of verbal and non-verbal communication in the professional world.</li> <li>Imbibe the knowledge of effective classroom speaking and presentation.</li> <li>Learning the nuances of effective writing by using short and crisp sentences.</li> <li>Synthesize and apply appropriate and effective conflict management strategies.</li> </ol>
1AE6	Electrical Engineering & Network Analysis Laboratory	<p>By the end of the course the student will be able to:</p> <ol style="list-style-type: none"> <li>Analyze and solve the Electric circuits</li> <li>Understand different transformer connections</li> <li>Incorporate knowledge on different testing methods for Transformers</li> <li>Apply the fundamental concepts in solving and analyzing different Electrical networks</li> <li>Estimate the performance of a particular network from its analysis</li> </ol>
1AE7	Electronic Devices and Circuits Laboratory	<ol style="list-style-type: none"> <li>Acquiring basics of parameters and operation of various semiconductor devices.</li> <li>Implementation of basic circuits using electronic devices.</li> <li>Verification and analysis of performance of electronic circuits.</li> </ol>
1AE8	Object Oriented Programming C++ Laboratory	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>Justify the basics of object-oriented design and the concepts of encapsulation, abstraction, inheritance, and polymorphism</li> <li>Write code, implement, test, and debug simple programs in an object-oriented programming language.</li> <li>Describe how the class mechanism supports encapsulation and information hiding.</li> <li>Design and test the implementation of C++ programming concepts</li> </ol>
1AE9	Communication Skills Laboratory	<p>On completion of this course the student should be able to:</p> <ol style="list-style-type: none"> <li>Accomplish sound vocabulary and its proper use contextually.</li> <li>Speak clearly, confidently, comprehensibly.</li> <li>Listen/view and comprehend different spoken discourses/excerpts in different accents</li> <li>Write cohesively and coherently and flawlessly avoiding grammatical errors</li> </ol>
1AE10x	Free Elective (Audit)	
1AE101	Electronic Devices & Components	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>Understand component symbol, working principle, classification and specification.</li> <li>Handle basic electrical and electronics equipment.</li> <li>Understand all the fundamental concepts involving electronics engineering</li> <li>Understand Function of PCB and PCB lay-out</li> <li>Understand the IC fabrication technology, classification, packaging and SMD.</li> </ol>
1AE102	Introduction to Lab Electronic Instruments	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>Understand the testing of electronic devices and components using ohmmeter, multimeter.</li> </ol>

## POs, PSOs and COs for M. Sc. Applied Electronics

		<ol style="list-style-type: none"> <li>Understand Function specification and usage of CRO, function generator, multimeter</li> <li>Understand the analog signal analysis using spectrum analyser and network analyser</li> <li>Understand logic analyser</li> </ol>
<b>M. Sc. Applied Electronics Semester -II</b>		
2AE1	Linear Integrated Circuits	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>Comprehend the knowledge of basic concepts and performance parameters of Op-Amp.</li> <li>Analyze and design electronic circuits for various linear and non-linear applications</li> <li>Comprehend the knowledge of PLL, its applications and data converters.</li> <li>Acquire and apply knowledge for design of voltage regulator circuits using ICS and discrete components.</li> <li>Design Electronic circuits using different ICs and sensors.</li> </ol>
2AE2	Communication Engineering	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>Understand the necessity of modulation and identify the various components of analog communication systems.</li> <li>Comprehend the knowledge of different modulation and demodulation schemes in analog and pulse communication systems.</li> <li>Analyze the performance of analog communication systems in presence of noise.</li> <li>Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.</li> </ol>
2AE3	Digital Integrated Circuits	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>Use Boolean algebra to solve logic functions, number systems and its conversion.</li> <li>Understand digital logic families and their characteristics.</li> <li>Identify, analyze and design combinational and sequential circuits.</li> <li>Use the knowledge of semiconductor memories, programmable logic devices in digital design</li> <li>Analyze, design and implement sequential logic circuits.</li> </ol>
2AE4	Microprocessor and Microcontroller	<p>Upon completion of this course, students will demonstrate the ability to :</p> <ol style="list-style-type: none"> <li>Understand architectural difference between Microprocessor and Microcontroller.</li> <li>Understand Assembly Language Programming concepts of Microprocessor &amp; Microcontroller.</li> <li>Comprehend interfacing of different peripheral devices with Microprocessor and Microcontroller</li> </ol>
2AE5x	Professional Elective	
2AE51	Electronic Instrumentation	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>Identify various sensors, transducers and their brief performance specifications.</li> <li>Understand working principle of various transducers used to measure Temperature, Displacement, Level, Pressure, Strain etc.</li> <li>Make comparative study of various transducers and understand their applications in industry.</li> </ol> <p>Understand Data Acquisition System</p>
2AE52	Control Systems	<p>At the end of the course the student will be able to:</p> <ol style="list-style-type: none"> <li>Determine transfer function models of electrical, mechanical and electromechanical systems.</li> </ol>

## POs, PSOs and COs for M. Sc. Applied Electronics

		<ol style="list-style-type: none"> <li>2. Determine transient response and steady state response parameters.</li> <li>3. Analyze stability/relative stability of the LTI system.</li> <li>4. Determine the state model and the response of the system using state variable method.</li> <li>5. Analyze the response of the discrete time system.</li> </ol>
2AE6	Integrated Circuits Laboratory	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Design various linear and non linear applications by using IC 741.</li> <li>2. Design voltage regulators using discrete components and ICs.</li> <li>3. Implement various waveform generators using IC555, IC565, IC566, IC8038</li> <li>4. Apply practically the concepts of digital electronics.</li> <li>5. Understand the operation of various logic gates and their implementation using digital IC's.</li> <li>6. To design and implement various combinational logic circuits and sequential logic circuits.</li> </ol>
2AE7	Professional Elective Laboratory	
2AE71	Electronic Instrumentation Laboratory	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. link theoretical principles with practical issues of electronic instrumentation</li> <li>2. get exposed to a set of multidisciplinary aspects, both theoretical and practical, providing them with the ability of integrating blocks in which they have practically worked into a full instrumentation system.</li> </ol>
2AE72	Control Systems Laboratory	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. familiarize with the modeling of dynamical systems and the characteristics of control components like ac servo motor, synchro and magnetic amplifier.</li> <li>2. simulate and analyze the stability using MATLAB software and design the compensators.</li> <li>3. analyze the physical systems represented in transfer function.</li> <li>4. apply the control components like ac servo motor, synchro and magnetic amplifier.</li> <li>5. Design controllers, compensators using MATLAB software</li> </ol>
2AE8	Microprocessor and Microcontroller Laboratory	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop skill of writing programs in ALP for various applications of 8085 &amp; 8051.</li> <li>2. Interface various peripherals with 8085 &amp; 8051.</li> </ol>
2AE9	Basic Electronic Workshop	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Identify and handle the basic electronics components</li> <li>2. Understand the electronics components and their data sheets and characteristics.</li> <li>3. Have knowledge of fabrication technology for semiconductor devices and integrated circuits</li> <li>4. Understand Function of PCB and PCB lay-out.</li> <li>5. Analyze the circuit and troubleshoot errors if any.</li> </ol>
2AE10x	Free Elective (Audit)	
2AE101	Environmental Studies	<p>After successfully completing the course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.</li> <li>2. Change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.</li> <li>3. Identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted.</li> </ol>

## POs, PSOs and COs for M. Sc. Applied Electronics

		4. Think in terms of sustainable envelopment based on the knowledge they have in different subjects of science and engineering
2AE102	Introduction to MATLAB	After successfully completing the course, the students will be able to : <ol style="list-style-type: none"> <li>1. Understand the main features of the MATLAB development environment</li> <li>2. Use the MATLAB GUI effectively</li> <li>3. Write simple algorithms to solve problems</li> <li>4. Write simple programs in MATLAB to solve scientific and mathematical problems</li> </ol>
<b>M. Sc. Applied Electronics Semester -III</b>		
3AE1	Digital Communications	Upon successful completion of this course, the student will be able to: <ol style="list-style-type: none"> <li>1. Understand basic building blocks of digital communication system and formatting of digital signal.</li> <li>2. Analyze performance of different digital modulation techniques.</li> <li>3. Understand methods to mitigate inter symbol interference in baseband transmission system.</li> <li>4. Implement different error control coding schemes for the reliable transmission.</li> <li>5. Understand various multiple access schemes and spreading techniques.</li> </ol>
3AE2	Digital Signal Processing	By the end of the course the student will be able to: <ol style="list-style-type: none"> <li>1. Identify the discrete time signals and identify the type system.</li> <li>2. Compute the z-transform of a sequence, identify its region of convergence, and compute the inverse z-transform.</li> <li>3. Evaluate the Fourier transform of a signal.</li> <li>4. Design FIR and IIR filters.</li> <li>5. Understand the concepts of Multirate Digital Signal Processing and need of Filter banks.</li> </ol>
3AE3	VLSI Design	On completion of this course the student should be able to: <ol style="list-style-type: none"> <li>1. Demonstrate a clear understanding of CMOS fabrication flow and technology scaling.</li> <li>2. Analyze CMOS based logic circuit</li> <li>3. Realize logic circuits with different design styles</li> <li>4. Understand Front &amp; Back end design aspects of simple VLSI Digital circuits</li> <li>5. Model digital circuits with VHDL, simulate, synthesize and prototype in PLDs.</li> </ol>
3AE4x	Professional Elective#1	
3AE41	Embedded System Design	After completion of the course the students will be able to: <ol style="list-style-type: none"> <li>1. Distinguish real-time embedded systems from other systems.</li> <li>2. Describe fundamentals of embedded based firmware design.</li> <li>3. Evaluate the need for real-time operating system.</li> <li>4. Interpret real-time algorithm for task scheduling.</li> <li>5. Summarize technique used for product enclosure design and development.</li> </ol>
3AE42	Electronic Circuit Design	By the end of the course the student will be able to: <ol style="list-style-type: none"> <li>1. Design electronic circuits using different ICs and sensors.</li> <li>2. Understand Front &amp; Back end design aspects of simple VLSI Digital circuits</li> <li>3. Model digital circuits with VHDL, simulate, synthesize and prototype in PLDs.</li> <li>4. Design of combinational blocks/digital circuits.</li> </ol>

## POs, PSOs and COs for M. Sc. Applied Electronics

3AE5x	Professional Elective#2	
3AE51	Introduction to Neural Networks and Fuzzy Logic	By the end of the course the student will be able to: <ol style="list-style-type: none"> <li>1. Understand algorithms for supervised and unsupervised ANN.</li> <li>2. Implement the ANN concepts to solve real life problems.</li> <li>3. Analyze the ANN network.</li> <li>4. Understand algorithms in fuzzy logic for applications such as pattern recognition.</li> <li>5. Implement the fuzzy logic concepts to solve real life problems.</li> </ol>
3AE52	Computer Organization	On completion of this module the student should be able to: <ol style="list-style-type: none"> <li>1. Understand basics of computer organization</li> <li>2. Know functions of memory management unit</li> <li>3. Comprehend Instruction pipeline, ALU and CPU structure</li> <li>4. Appreciate differences between the CISC and RISC</li> <li>5. Familiarize with the multi-processor organizations: SMP, NUMA, Clusters</li> </ol>
3AE6	Digital Signal Processing Laboratory	On completion of this course the student should be able to: <ol style="list-style-type: none"> <li>1. Generate different plots and explore results to draw valid conclusions and inferences in DSP problems.</li> <li>2. Approach for requirement of digital signal processing and digital system design using simulation tools.</li> <li>3. Familiarize with the concepts of Multirate Digital Signal Processing.</li> <li>4. Understand the architecture of digital filter.</li> </ol>
3AE7	Professional Elective#1 Laboratory	
3AE71	Embedded System Design Laboratory	On completion of this course the student should be able to: <ol style="list-style-type: none"> <li>1. get familiarized with Embedded system Design Tools and Hardware</li> <li>2. understand about the basic functions and structure of embedded systems</li> <li>3. understand about the basic concepts of embedded systems</li> <li>4. know about the applications of embedded systems</li> <li>5. understand about the development of embedded software</li> </ol>
3AE72	Electronic System Design Laboratory	On completion of this course the student should be able to: <ol style="list-style-type: none"> <li>1. verify the theoretical concepts through laboratory experiments</li> <li>2. To understand the design procedure of different power supplies.</li> <li>3. To know to design transreceiver and voltage regulator.</li> <li>4. To understand the working of Microprocessor and DSP based system design</li> </ol>
3AE8	Project and Seminar	Seminar <b>Course Outcomes</b>  After completion of the course the students will be able to: <ol style="list-style-type: none"> <li>1. study research papers for understanding of a new field, in the absence of a textbook, to summarise and review them.</li> <li>2. identify promising new directions of various cutting edge technologies</li> <li>3. impart skills in preparing detailed report describing the project and results</li> <li>4. effectively communicate by making an oral presentation before an evaluation committee</li> </ol> Project <b>Course Outcome:</b>  After completion of the course the students will be able to: <ol style="list-style-type: none"> <li>1. Demonstrate a sound technical knowledge of their selected project topic.</li> </ol>

## POs, PSOs and COs for M. Sc. Applied Electronics

		<ol style="list-style-type: none"> <li>2. Undertake problem identification, formulation, objectives and solution.</li> <li>3. design the system incorporating hardware or software or a hybrid approach</li> <li>4. inculcate the ability to synthesize the results of the detailed analytical studies conducted, lay down validity and design criteria, interpret the result for application to the problem, develop the concept and detailed design solution and to effectively communicate the Project Report rationale</li> <li>5. Demonstrate the knowledge, skills and attitudes of a professional engineer.</li> </ol>
3AE9x	Free Elective (Audit)	
3AE91	Industrial Management	<ol style="list-style-type: none"> <li>1. Student is able to apply principles of management in his / her extra and co-curricular activity in college and in industrial in-plant training.</li> <li>2. Student is able to understand management of manufacturing.</li> <li>3. Student is able to apply work improvement techniques in an organization where he undergoes for in-plant training.</li> <li>4. Student is able to find out and reduce work content of the job.</li> <li>5. Student is able to express leadership and entrepreneurial attributes.</li> </ol>
3AE92	IPR and Patents	<p>After completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic concepts of Intellectual Property Rights;</li> <li>2. Learn IPR related issues.</li> <li>3. deal with the emerging issues in IPR and the rationale for the protection of IPR.</li> </ol>
3AE10	Industrial visit/tour	<p>After completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. get an insight regarding internal working of companies</li> <li>2. get an opportunity to learn practically through interaction, working methods and employment practices.</li> <li>3. Get an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college.</li> <li>4. combine theoretical knowledge with industrial knowledge.</li> </ol>
<b>M. Sc. Applied Electronics Semester -IV</b>		
4AE1	Microwave Engineering	<p>At the end of the course students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand operations of microwave active and passive devices.</li> <li>2. Describe characteristics of microwave propagation through waveguides.</li> <li>3. Use S-parameters for characterization of microwave devices.</li> <li>4. Measure various parameters of microwave system.</li> <li>5. Understand various applications of microwave engineering in specific area</li> </ol>
4AE2	Optical Fiber Communications	<p>Upon successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. understand optical fiber communication system</li> <li>2. Understand functioning of optical sources and detectors.</li> <li>3. Differentiate losses in optical fiber link and state transmission characteristics of optical fiber.</li> <li>4. Describe optical fiber communication system and its performance measures.</li> <li>5. Apply the fundamental principles of optics and light wave to design optical fiber communication systems</li> </ol>
4AE3	Mobile Communications	<p>After completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. understand various generations of mobile communications and the concept of cellular communications</li> <li>2. understand the basics of wireless communications</li> <li>3. Know GSM mobile communication standards, its architecture, logical channels, advantages and limitations.</li> </ol>

## POs, PSOs and COs for M. Sc. Applied Electronics

		<ol style="list-style-type: none"> <li>4. Know IS-95 CDMA mobile communication standard, its architecture, logical channels, advantages and limitations.</li> <li>5. understand multicarrier communication systems.</li> </ol>
4AE4x	Professional Elective#1	
4AE41	DSP with TMS 320C54xx	<p>After completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. distinguish between the architectural features of General-purpose processors and DSP processors.</li> <li>2. Understand the architectures of TMS320C54xx devices.</li> <li>3. use the DSP processors TMS 320C 54XX for implementation of DSP algorithms &amp; its interfacing techniques with various I/O peripherals.</li> </ol>
4AE42	Digital Image Processing	<p>On completion of this module the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Analyze general terminology of digital image processing.</li> <li>2. Examine various types of images, intensity transformations and spatial filtering.</li> <li>3. Understand the methodologies for image segmentation, Compression and restoration etc.</li> <li>4. Implement image processing and analysis algorithms.</li> <li>5. Apply image processing algorithms in practical applications.</li> </ol>
4AE5x	Professional Elective#2	
4AE51	Smart Sensors	<p>By the end of this course, the students shall be able to:</p> <ol style="list-style-type: none"> <li>1. Comprehend the basics of smart sensors</li> <li>2. Incorporate sensor information into the Microcontroller</li> <li>3. Use MCUs/DSPs to improve the sensor IQ.</li> <li>4. Discriminate various control techniques for smart sensors</li> <li>5. Use smart sensors in real-world projects</li> </ol>
4AE52	Biomedical Engineering	<p>By the end of this course, the students shall be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the importance and association of engineering with medical field.</li> <li>2. Understand the significance of various human signals and recording techniques.</li> <li>3. Get familiarized with various medical imaging systems, various life saving equipment.</li> <li>4. Understand the conceptualization of patient care &amp; safety requirements and its importance</li> </ol>
4AE6	Microwave Engineering and Optical Fiber Communications Laboratory	<p>By the end of the course the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify various microwave components.</li> <li>2. Demonstrate characteristics of microwave generated by various microwave sources and propagated through rectangular/circular waveguide.</li> <li>3. Measure transmission parameters of microwave propagation through rectangular/circular waveguide.</li> <li>4. Measure various parameters of microwave antenna.</li> <li>5. Be conversant on optical waveguide components, including single and multimode fiber, fiber couplers, connectors, and fiber amplifiers.</li> <li>6. Demonstrate basic fiber handling skills, including cleaving and splicing.</li> <li>7. Operate instrumentation for measuring fiber and optical system properties</li> <li>8. Measure noise and its effects on system performance.</li> </ol>
4AE7	Professional Elective#1 Laboratory	
4AE71	DSP with TMS 320C54xx Lab	<p>By the end of the course the student will be able to:</p> <ol style="list-style-type: none"> <li>1. distinguish between the architectural features of General purpose processors and DSP processors.</li> <li>2. Understand the architectures of TMS320C54xx devices.</li> <li>3. use the DSP processors TMS 320C 54XX for implementation of DSP algorithms &amp; its interfacing techniques with various I/O peripherals.</li> </ol>

## POs, PSOs and COs for M. Sc. Applied Electronics

4AE72	Digital Image Processing Lab	To study the image fundamentals and mathematical transforms necessary for image processing. <ol style="list-style-type: none"> <li>To study the image enhancement techniques, image restoration and the image compression procedures.</li> <li>To Review the fundamental concepts of a digital image processing system.</li> <li>To Analyze images in the frequency domain using various transforms.</li> <li>To Categorize various compression techniques.</li> <li>To Interpret Image compression standards and image segmentation and representation techniques</li> </ol>
4AE8	Project and Seminar	<p><b>Seminar Course Outcomes</b></p> <p>After completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>To study research papers for understanding of a new field, in the absence of a textbook , to summarise and review them.</li> <li>To identify promising new directions of various cutting edge technologies</li> <li>To impart skills in preparing detailed report describing the project and results</li> <li>To effectively communicate by making an oral presentation before an evaluation committee</li> </ol> <p><b>Project Course Outcome:</b></p> <p>After completion of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>Demonstrate a sound technical knowledge of their selected project topic.</li> <li>Undertake problem identification, formulation, objectives and solution.</li> <li>design the system incorporating hardware or software or a hybrid approach</li> <li>inculcate the ability to synthesize the results of the detailed analytical studies conducted, lay down validity and design criteria, interpret the result for application to the problem, develop the concept and detailed design solution and to effectively communicate the Project Report rationale</li> <li>Demonstrate the knowledge, skills and attitudes of a professional engineer.</li> </ol>
4AE9x	Free Elective (Audit)	
4AE91	Engineering Ethics	By the end of the course the student will be able to: <ol style="list-style-type: none"> <li>Understand Code of Ethics and Standards of Professional Conduct</li> <li>identify and describe ethical dilemmas in the context of historical and developing technology and engineering practice</li> <li>Understand the professional rules of conduct for engineers and how to apply them.</li> <li>Recognize conflicts of interest and develop strategies for handling these.</li> <li>Understand the importance of communication with all stakeholders.</li> </ol>
4AE92	Technical Writing	On completion of this course the student should be able to: <ol style="list-style-type: none"> <li>gain an overview of the technical skills required by professional communicators</li> </ol>

## POs, PSOs and COs for M. Sc. Applied Electronics

		<ol style="list-style-type: none"><li>2. learn the methodology for planning technical communication projects</li><li>3. understand and know when and how to use appropriate writing and formatting conventions</li><li>4. learn how to use industry-standard software to produce a project such as a manual</li><li>5. be familiar with key trends and issues in the field of technical communication</li></ol>
--	--	---