**PROGRAMME OUTCOMES**

**PROGRAMME SPECIFIC OUTCOMES**

**COURSE OUTCOMES**

**B.Sc Electronics**

## UNDER GRADUATE PROGRAM OUTCOMES:

At the end of Under Graduate Program at St. Thomas College (Autonomous), a student will have obtained:

|  |  |
| --- | --- |
| PO1 | **Critical Thinking:** Ability to take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives |
| PO2 | **Effective Communication:** Ability to speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology |
| PO3 | **Effective Citizenship:**Ability to demonstrate empathetic social concern and equity-centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering |
| PO4 | **Environment and Sustainability:**Ability to understand the issues of environmental contexts and sustainable development |
| PO5 | **Ethical Living:**Ability to recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them |
| PO6 | **Social Interaction:**Ability to elicit views of others, mediate disagreements and help reach conclusions in group settings |
| PO7 | **Problem Solving and Analytical Skills:**Ability to think rationally, analyze situations and solve problems adequately |

## Program Specific Outcomes:

At the end of B.Sc Electronics at St. Thomas College (Autonomous), Thrissur, a student will have developed:

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| --- | --- |
| PSO1 | Understand the principles of electronic devices, digital and analog circuits, microwave and communication systems. |
| PSO2 | Understand the processes in DSP and VLSI Technology. |
| PSO3 | Understand various methods in control systems, network theory and electromagnetic theory. |
| PSO4 | Develop the skills in computer programming, computer networking and design of embedded systems. |

**Course Outcomes**:

**B.Sc. Electronics**

**ELE1B01- BASIC ELECTRONICS AND NETWORK THEOREMS**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Understand the principles of passive electronic devices |
| CO2 | Understand the structure and principles of semiconductor devices |
| CO3 | Illustrate series and parallel resistive circuits |
| CO4 | Understand different network theorems |

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**ELE2B03- BASIC ELECTRONICS AND NETWORK THEOREMS LAB**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Familiarize various electronic components, measuring and testing instruments. |
| CO2 |  Interpret the voltage, current and resistance of various resistor networks. |
| CO3 | Analyse Kirchoffs laws |
| CO4 | Understand the characteristics of various active components. |

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**ELE2B02- ELECTRONIC CIRCUITS**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Understand rectifier, filter and voltage regulator circuits. |
| CO2 | Distinguish various wave shaping circuits |
| CO3 | Determine transistor biasing methods and various amplifier circuits. |
| CO4 | Understand the concepts of various oscillator circuits. |

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**ELE2B04- ELECTRONIC CIRCUITS LAB**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Understand various rectifier and filter circuits. |
| CO2 | Familiarize various wave shaping circuits. |
| CO3 | Understand the working of voltage regulator. |
| CO4 | Apply transistor biasing methods in amplifier circuits. |
| CO5 | Identify various oscillator circuits |

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**A11- Python Programming**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand basic constructs in python programming. |
| CO2 | Apply methods to design and program Python applications |
| CO3 | Understand the concepts of functions and represent Compound data using Lists, Tuples and Dictionaries |
| CO4 | Design real life situational problems and think creatively about solutions of them. |
| CO5 | Understand the concepts of indexing and slicing to access data in Python programs |
| CO6 | Identify various application areas of Python |

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**A12- SENSORS AND TRANSDUCERS (Basic principle, working and applications only expected)**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Understand transducers and its characteristics. |
| CO2 | Comprehend the principles of resistive, inductive and capacitive transducers and its types  |
| CO3 | Explain the concepts of Thermal sensors and its types |
| CO4 | Classify Pressure Transducers and Level Transducers |
| CO5 | Explain the concepts of Flow Transducers and Bernoulli’s principle  |
| CO6 | Comprehend the principles of Radiation Sensors and its different types  |
| CO7 | Understand Sound Transducers and Hall Effect Transducers |

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**ELE3B05- DIGITAL ELECTRONICS**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand different type of digital codes and number systems |
| CO2 | Identify digital IC’s in the 74XX Series in detail. |
| CO3 | Compare different types of logic families. |
| CO4 | Analyze different combinational circuits and working. |
| CO5 | Design various sequential circuits. |
| CO6 | Interpret different ADC, DAC circuits  |

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**ELE4B07- DIGITAL ELECTRONICS LAB**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Interpret different logic gates |
| CO2 | Understand universal property of NAND and NOR gates |
| CO3 | Design various combinational circuits |
| CO4 | Design and implement different sequential circuits |

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**ELE4B09- SKILL DEVELOPMENT LAB**

At the end of this course, a student will have developed ability to:

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| CO1 | Understand the basics of PCB designing |
| CO2 | Analyze different circuits |
| CO3 | Design circuits using PCB fabrication techniques |

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**A13- Data Communication and Optical Fibers**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Introduce basic concepts of data communication. |
| CO2 | Familiarize multiplexing and its applications. |
| CO3 | Recognize data link control and protocols. |
| CO4 | Identify LANs, viz., Ethernet, token ring,token bus, FDDI. |
| CO5 | Compare switching techniques. |
| CO6 | Introduce optical fiber communication and its applications. |
| CO7 | Familiarize optical sources and detectors.  |

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**A14- Microprocessors- Architecture and Programming**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand the General Architecture of 8085 Microprocessor. |
| CO2 | Identify various 8085 instructions and Timing Diagrams. |
| CO3 | Develop the skill in Assembly Language Programming. |
| CO4 | Practice Advanced Programming techniques. |
| CO5 | Interpret different Programmable peripheral Devices . |
| CO6 | Understand 8086 Microprocessor Architecture. |

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**ELE4B06- ANALOG INTEGRATED CIRCUITS**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand the characteristics and internal blocks of IC 741 Op-Amp. |
| CO2 | Understand the basic working of Op-Amp Amplifiers.  |
| CO3 | Differentiate the working of Butter worth filters and wave form generators using Op-Amp. |
| CO4 | Interpret the working of comparators using IC 741 Op-Amp. |
| CO5 | Illustrate the working of Multivibrators using IC 555 timer. |
| CO6 | Compare the basic circuit configuration and characteristics of voltage regulators. |

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**ELE4B08- ANALOG INTEGRATED CIRCUITS LAB**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Design different Amplifier configurations using Op-Amp IC 741 |
| CO2 | Design different filters, wave form generators and comparators using Op-Amp |
| CO3 | Compare the working of Multivibrators using IC 555 timer |
| CO4 | Understand the working and performance of different voltage regulators |

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**ELE4B09- Skill Development Lab**

At the end of this course, a student will have developed ability to:

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| CO4 | **Design and Development of a mini project based on Skill Development Lab 1 and Core Courses 1- 4** |

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**ELE5B10- ELECTROMAGNETIC THEORY**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand fundamentals of vector operation. |
| CO2 | Illustrate the concept of gradient, divergent and curl in rectangular coordinates  |
| CO3 | Sketch transformation between various coordinates. |
| CO4 | Understand the fundamentals of electrostatics |
| CO5 | Understand the fundamentals of magnetostatics. |
| CO6 | Describe electromagnetic fields and waves |
| CO7 | Interpret electromagnetic waves in free space and conducting medium. |
| CO8 | Understand the fundamentals of antennas and its parameter |

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**ELE5B11- MICROCONTROLLER & INTERFACING**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Understand the architecture of 8051 microcontroller |
| CO2 | Understand bus organization, memory organization, addressing modes and instruction set of 8051 microcontroller |
| CO3 | Identify different timers and serial modes of 8051 microcontroller |
| CO4 | Understand the interrupts of 8051 microcontroller |
| CO5 | Describe the architecture of arduino |
| CO6 | Interpret different data types and variables in embedded c and arduino IDE. |

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**ELE5B12- NETWORK THEORY**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand the assumptions and concepts of circuit analysis |
| CO2 | Analyze series and parallel passive networks |
| CO3 | Illustrate different methods for solving networks and circuits |
| CO4 | Understand the DC Transient analysis of RC,RL and RLC circuits |
| CO5 | Understand the Sinusoidal Circuit Analysis for RL, RC and RLC Circuits |
| CO6 | Understand the concept of series resonance |
| CO7 | Understand the concept of parallel resonance |
| CO8 | Design passive filters for different pass band characteristics |

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**ELE6B17- MICROPROCESSOR & MICROCONTROLLER PROGRAMMING**

 **AND INTERFACING LAB**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Remember the fundamentals of assembly level programming of microprocessor 8085 |
| CO2 | Familiarize Python using Raspberry Pi. |
| CO3 | Understand the programming strategies and select proper mnemonics and run their program on training boards and interfacing modules of 8051 microcontroller |
| CO4 | Familiarize with Arduino IDE, programming to provide knowledge of Arduino boards and basic components. |

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**ELE6B20- Industrial Visit & Project Work**

At the end of this course, a student will have developed ability to:

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| CO1 | Understand the practical applications of instruments handled during course curriculum. |
| CO2 | Relate about Industry Practices and career opportunities. |
| CO3 | Acquaint Students with Interesting Facts and Newer Technologies to generate new entrepreneurs. |
| CO4 | Develop the ability in creative thinking and finding viable solutions to real life problems |

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**ELE5D01- COMPUTER HARDWARE**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand the evolution and knowledge of computer hardware |
| CO2 | Classify the concepts of number systems and logic gates. |
| CO3 | Identify different hardware components such as processor, memory, hard disk, mother board, input and output devices used in computers. |
| CO4 | Distinguish the features of the hardware components of a computer. |

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**ELE5D02- DIGITAL FUNDAMENTALS**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand the advantages of digital electronics.  |
| CO2 | Describe the concepts of number systems and logic gates. |
| CO3 | Compute and evaluate Boolean expression and its reduction using k-map |
| CO4 | Understand the basic concepts of latches and flip flops |
| CO5 | Analyse different registers and counters  |

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**ELE5D03- ELECTRONIC FUNDAMENTALS**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Distinguish the basic components in electronics. |
| CO2 |  Understand the basics of testing and measuring instruments in the circuit assembling |
| CO3 | Apply and evaluate troubleshooting of circuits |
| CO4 | Understand AC and DC fundamentals of circuits |

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**ELE6B13- COMMUNICATION SYSTEM**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Interpret the fundamentals of basic communication system, types of noise affecting communication. |
| CO2 | Illustrate the need of modulation, modulation process and different amplitude modulation schemes |
| CO3 | Interpret FM modulation techniques, its generation and detection |
| CO4 | Identify the various radio receivers with their parameters. |
| CO5 | Understand various modes of wave propagation |
| CO6 | Infer the generation and detection of pulse modulation techniques and multiplexing. |
| CO7 | Exploring the need of sampling and different sampling techniques. |
| CO8 | Identify the Digital modulation techniques |

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**ELE6B14- PRINCIPLES OF DSP**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand various types of signals and their representations. |
| CO2 | Identify the properties of signals. |
| CO3 | Differentiate various classification of systems  |
| CO4 | Compute convolutions |
| CO5 | Compute FFT |
| CO6 | Compute discrete Fourier transform. |
| CO7 | Compare different IIR systems |
| CO8 | Compare different of FIR systems |

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**ELE6B15- MICROWAVE THEORY AND TECHNIQUES**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Understand about microwave bands, spectrum and their applications. |
| CO2 | Identify different wave guides and principles of wave propagations. |
| CO3 | Understand the basics of transmission lines  |
| CO4 | Compare Waveguide Tees |
| CO5 | Understand different microwave tubes |
| CO6 | Understand about velocity modulation and beam bunching |
| CO7 | Understand the principle of operation and performance of diodes |
| CO8 | Understand about Gunn effect and Gunn diode |

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**ELE6B18- COMMUNICATION SYSTEM LAB**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Construct the basic circuits of communication system. |
| CO2 | Design various pulse modulation schemes |
| CO3 | Analyze different analog modulation schemes. |
| CO4 | Design basic circuits using IC 555 and IC 741 |

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**ELE6B19- PRINCIPLES OF DSP LAB**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Familiarize DSP simulation software ( MATLAB). |
| CO2 | Understand discrete time systems and their properties. |
| CO3 | Understand AM and FM signals |
| CO4 | Design FIR and IIR filters. |

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**ELE6B20- INDUSTRIAL VISIT & PROJECT WORK**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO5 | Compare the innovations in design of products, processes or systems. |
| CO6 |  Manage the conduct of the research study and the ability to work in teams |

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**ELE6B16a** - **OPTICAL COMMUNICATION**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Understand the basic optical fiber communication technology |
| CO2 | Understand attenuation, dispersion and weakening of optical signal |
| CO3 | Differentiate passive fiber optic devices |
| CO4 | Classify different active fiber optic devices  |

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**ELE6B16b** - **INDUSTRIAL ELECTRONICS**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Identify power semiconductor devices |
| CO2 | Understand different types of rectifiers  |
| CO3 | Distinguish various types of rectifiers, choppers and inverters |
| CO4 | Illustrate the use of SMPS  |
| CO5 | Understand the working of UPS |

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**ELE6B16c - CONTROL SYSTEMS**

At the end of this course, a student will have developed ability to:

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| --- | --- |
| CO1 | Understand the classifications of control system . |
| CO2 | Understand the fundamentals of Laplace transform. |
| CO3 | Illustrate overall gain using laplace transform, block diagram reduction and signal flow graph methods. |
| CO4 | Understand the performance characteristics of control system  |
| CO5 | Compute stability of the system using various methods. |
| CO6 | Illustrate various controllers and compensators |

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**ELE6B16d - VERILOG & FPGA BASED SYSTEM DESIGN**

At the end of this course, a student will have developed ability to:

|  |  |
| --- | --- |
| CO1 | Understand combinational and sequential circuit elements. |
| CO2 | Understand Finite state machines  |
| CO3 | Understand the principle of programmable logic device |
| CO4 | Illustrate programmable logic devices architectures. |
| CO5 | Practice Verilog HDL |