



Department of Electronics Engineering

SEM III

ELX 301 Applied Mathematics III

Learners will be able to:	
ELX301.1	Understand how to apply Laplace and Inverse Laplace transform
ELX 301.2	Learn how to evaluate Fourier Series
ELX 301.3	Learn theory of Bessel's functions
ELX 301.4	Understand theory and applications of vector differentiation and vector integration
ELX 301.5	Learn concepts of analytic functions and conformal mapping

ELX 302 Electronic Devices and Circuits I

Learners will be able to:	
ELX 302.1	Understand characteristics of semiconductor devices.
ELX 302.2	Understand, analyze and design BJT circuits.
ELX 302.3	Understand, analyze and design FET circuits.
ELX 302.4	Understand, analyze and design rectifier and filter circuits.

ELX 303 Digital Circuit Design

Learners will be able to:	
ELX 303.1	Describe various number systems, gates, codes and conversion of one representation to another.
ELX 303.2	Apply different reduction techniques for the minimization and implementation of logic functions.
ELX 303.3	Analyse, design and implement combinational logic circuits.
ELX 303.4	Differentiate between logic families TTL and CMOS.
ELX 303.5	Analyze, design and implement sequential logic circuits.



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ELX 304 Electrical Network Analysis and Synthesis

Learners will be able to:	
ELX 304.1	Students will be able to apply their understanding of network theorems in analyzing complex circuits.
ELX 304.2	Students will be able to evaluate the time and frequency response of electrical circuits and thereby understand the behaviour of electrical networks.
ELX 304.3	Students will be able to evaluate the inter-relationship among various circuit parameters and solve complex networks using these parameters.
ELX 304.4	Students will be able to synthesize electrical networks for a given network function and design simple filters.

ELX 305 Electronics Instruments & Measurement

Learners will be able to:	
ELX 305.1	Interpret the performance characteristic, principles of measurement and instrumentation and errors in measurement.
ELX 305.2	Analyze various measuring instruments to determine the unknown quantity under measurement.
ELX 305.3	Compare and contrast various types of oscilloscopes, analog and digital instruments and use it to perform wide range of simple to complex measurement functions for voltage , current, phase etc.
ELX 305.4	Select the choice of transducers for practical applications based on their principle of operation, characteristics, construction and working.

ELXL301 Electronic Devices and Circuits I Laboratory

Learners will be able to:	
ELXL301.1	Perform experimental analysis of stage BJT based amplifiers and implement in hardware and EDA software tools.
ELXL301.2	Perform experimental analysis of stage MOSFET based amplifiers and implement in hardware and EDA software tools.
ELXL301.3	Perform experimental analysis of rectifiers and line filters
ELXL301.4	Design and implement single stage BJT based amplifier



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ELXL 302 Digital Circuit Design Laboratory

Learners will be able to:	
ELXL302.1	Analyse different digital circuits & applications using VHDL simulation software.
ELXL302.2	Design & implement different digital applications / state machines using MSI devices like 7490, 74163, 7494, 7474
ELXL302.3	Practice life-long learning combined with strong ethics, soft-skills, team-building & leadership strategies to create working solutions/project. Publish them in the form of Report.

ELXL 303 Electrical Network & Measurement Laboratory

Learners will be able to:	
ELXL 303.1	apply circuit theory theorems for electrical network analysis
ELXL 303.2	solve problems based on transient analysis
ELXL 303.3	Apply knowledge of electronic instrumentation for measurement of electrical quantities.

ELXL 304 Object Oriented Programming Methodology Laboratory

Learners will be able to:	
ELXL 304.1	Apply fundamental programming constructs by understanding the concept of OOP as well as the purpose and usage of principles of inheritance, polymorphism, encapsulation and method overloading.
ELXL 304.2	Illustrate the concept of classes, objects, members of a class and their relationships.
ELXL 304.3	Elaborate the concept of strings, arrays and vectors.
ELXL 304.4	Implement the concept of inheritance and interfaces.
ELXL 304.5	Implement the notion of exception handling and multithreading.
ELXL 304.6	To develop GUI based application.



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SEM IV

ELX 401 Applied Mathematics IV

Learners will be able to:	
ELX 401.1	understand method of calculus of variations
ELX 401.2	analyse theory of normed vector spaces and inner product spaces
ELX 401.3	Find eigen values and eigen vectors and also can find powers of matrices using Caley Hamilton theorem
ELX 401.4	learn theory of Probability distribution in detail
ELX 401.5	evaluate line integral using Cauchy integral theorem and formula Also study in detail Cauchy residue theorem with its applications
ELX 401.6	Able to evaluate correlation coefficient by different methods and further analyse the regression coefficient

ELX 402 Electronic Devices and Circuits II

Learners will be able to:	
ELX 402.1	Derive and calculate various amplifier parameters based on high frequency model of BJT/MOSFET (single and multistage amplifier) configuration for frequency response.
ELX 402.2	Analyze and apply negative and positive feedback in amplifier design and oscillators.
ELX 402.3	Analyze the differential amplifier circuits using BJT/JFET/MOSFET and design the same for the given specifications like in op-amp.
ELX 402.4	Compare and contrast different power amplifier circuits on the basis of their design and applications in electronic circuits.
ELX 402.5	Analysis of circuits based on physical operation of power devices and enhance comprehension capabilities through working and construction details of special, semiconductor devices to select appropriate circuit for given specifications/applications.

ELX 403 Microprocessors and Applications

Learners will be able to:	
ELX403.1	explain 16-bit& 32-bit microprocessor architecture
ELX403.2	write assembly level language programmes for 8086 Microprocessor



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ELX403.3	design 8086 microprocessor based CPU Module
ELX403.4	Use different peripheral devices to design Single Board Computer (SBC).

ELX 404 Digital System Design

Learners will be able to:	
ELX 404.1	Analyse, design and implement state machines
ELX 404.2	Apply algorithmic state machines (ASMs) approach for digital system design
ELX 404.3	Write VHDL code for combinational & sequential digital circuits
ELX 404.4	Design synchronous and asynchronous counters using MSI ICs
ELX 404.5	Explain the purpose of using programmable logic devices and design digital circuits using PLDs.

ELX 405 Principles of Communication Engineering

Learners will be able to:	
ELX405.1	explain the need for various components in analog communication systems
ELX405.2	analyse various analog modulation methods
ELX405.3	design modulators, demodulators for amplitude and frequency modulated systems
ELX405.4	assess the characteristics of pulse modulation techniques
ELX405.5	recognize the need for multiplexing techniques

ELX 406 Linear Control Systems

Learners will be able to:	
ELX406.1	Derive the mathematical models in fundamental control system design and review the compensators and controllers for advanced control systems.
ELX406.2	Analyse system using time domain analysis techniques for stability analysis of control system.



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ELX406.3	Establish the relation between the transfer function and state variable for control systems and infer their controllability and observability.
ELX406.4	Investigate and analyse system behaviour using various time and frequency domain analysis tools like Root locus, Bode plot and Nyquist plot.

ELXL 401 Electronic Devices and Circuits II Laboratory

Learners will be able to:	
ELXL 401.1	Design and assemble circuits and systems for amplifiers, as per given specifications and apply debugging techniques to obtain the desired performance parameters.
ELXL 401.2	Design and assemble circuits and systems for multistage amplifiers, power amplifier and oscillator circuits as per given specifications and apply debugging techniques to obtain the desired performance parameters.
ELXL 401.3	Carry out necessary investigation in the assembled circuits, infer from the results obtained and correlates / present observations with theoretical interpretations/calculations; at individual level and also as a part of team during laboratory hours.
ELXL 401.4	Use simulation tools (Orcad) for simulating and analyzing amplifier circuits and its relevant parameters.

ELXL 402 Microprocessors and Applications Laboratory

Learners will be able to:	
ELXL 402.1	use 8086 assembler (TASM IDE)
ELXL 402.2	write assembly level language programmes for 8086 microprocessor
ELXL 402.3	interface different peripheral devices to 8086 microprocessor

ELXL 403 Digital System Design Laboratory

Learners will be able to:	
ELXL403.1	Identify faulty IC's within the circuit and rectify the errors to achieve desired output.
ELXL403.2	Analyse different digital applications using SSI /MSI devices like 7400, 7483, 7485, 7402, 74151
ELXL403.3	Practice life-long learning combined with strong ethics, soft-skills, team-building & leadership strategies to create working solutions/project. Publish them in the form of Report.



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ELXL 404 Principles of Communication Engineering Laboratory

Learners will be able to:	
ELXL404.1	Evaluate different analog modulation techniques for wireless communication system.
ELXL404.2	Evaluate different pulse modulation techniques for communication systems.
ELXL404.3	Construct small circuits of analog modulation/pulse modulation/multiplexing used for communication.



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T.E. Sem V (R2016): Course Outcomes

ELX 501 Microcontrollers & Applications

Learners will be able to:	
ELX501.1	Understand and explain 8051 and Cortex-M3 architecture.
ELX501.2	Design microcontroller based applications to address practical solutions.
ELX501.3	Use of simulation tools for implementing and evaluating software codes.
ELX501.4	Interface i/o devices and peripherals for 8051 like led,relay, SSDs motors adc dac.

ELX 502 Digital Communication

Learners will be able to:	
ELX 502.1	Apply statistical characteristics of random signals in the process of source coding to enhance transmission efficiency.
ELX 502.2	Apply Pulse Shaping techniques for optimum transmission of signal.
ELX 502.3	Analyse different digital modulation techniques.
ELX 502.4	Compare & analyse different error control coding techniques for distinguishing and differentiating between the same to meet specified needs.

ELX 503 Electromagnetic Engineering

Learners will be able to:	
ELX 503.1	Analyze the behaviour of electromagnetic waves in different media.
ELX 503.2	Evaluate various parameters of transmission lines and radiating systems.
ELX 503.3	Apply computational techniques to analyze electromagnetic field distribution.
ELX 503.4	Understand different mechanisms of radio wave propagation.



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ELX 504 Design with Linear Integrated Circuits

Learners will be able to:	
ELX 504.1	Demonstrate an understanding of fundamentals of integrated circuits.
ELX 504.2	Analyse the various applications and circuits based on particular linear integrated circuit.
ELX 504.3	Select and use appropriate integrated circuits as building blocks towards developing a solution.
ELX 504.4	Design an application using appropriate integrated circuit.

ELX 505 Business Communication & Ethics

Learners will be able to:	
ELX 505.1	Prepare a project report by assimilating, analysing, organizing and formatting data in the prescribed format.
ELX 505.2	Prepare a technical proposal in the given format
ELX 505.3	Use interpersonal skills to function effectively at an individual and societal level
ELX 505.4	Document and conduct mock meetings using the strategies for conducting effective meetings
ELX 505.5	Apply the etiquettes and ethical codes of conduct in real life situations
ELX 505.6	Participate in Group discussions and interviews, draft a resume and deliver power point presentations

ELXDLO 5011 Database Management Systems (Elective)

Learners will be able to:	
ELXDLO 5011.1	Understand the fundamentals of a database systems
ELXDLO 5011.2	Design and draw ER and EER diagram for the real life problem
ELXDLO 5011.3	Convert conceptual model to relational model and formulate relational algebra queries.
ELXDLO 5011.4	Design and querying database using SQL.



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ELXDLO 5011.5	Analyze and apply concepts of normalization to relational database design.
ELXDLO 5011.6	Understand the concept of transaction, concurrency and recovery

ELXDLO 5012 Digital Control System (Elective)

Learners will be able to:	
ELXDLO 5012.1	Justify the need for digital control systems and comprehend the process of sampling and reconstruction of analog signals.
ELXDLO 5012.2	Modelling of digital systems using various discretization approaches and investigate pulse transfer function of various systems.
ELXDLO 5012.3	Analyse a digital control system using classical methods and using modern state space techniques.
ELXDLO 5012.4	Investigate the system controllability and observability to design state feedback controllers.

ELXL 501 Microcontrollers & Applications Laboratory

Learners will be able to:	
ELXL 501.1	To be able to programme in assembly for 8051 using simulator based environment.
ELXL 501.2	To be able to evaluate programme for 8051 using a target hardware.
ELXL 501.3	To be able to interface i/o devices and peripherals for 8051 based target hardware like led, relay, SSDs motors adc dac.

ELXL 502 Digital Communication Laboratory

Learners will be able to:	
ELXL 502.1	Assess different digital modulation techniques & evaluate their performance.
ELXL 502.2	Analyse and interpret different source coding techniques using signal processing tools.
ELXL 502.3	Analyse & interpret different error control coding techniques using signal processing tools.



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ELXL 503 Design with Linear Integrated Circuits Laboratory

Learners will be able to:	
EXL501.1	Analyse and design various applications using Op-amp.
EXL501.2	Analyse and infer a wide variety of integrated circuits applications.
EXL501.3	Identify faulty components within a circuit and rectify the errors to achieve desired output.

ELXLDLO 5011 Database Management Systems Laboratory (Elective)

Learners will be able to:	
ELXLDLO 5011.1	Understand the fundamentals of a database systems
ELXLDLO 5011.2	Design and draw ER and EER diagram for the real life problem
ELXLDLO 5011.3	Convert conceptual model to relational model and formulate relational algebra queries.
ELXLDLO 5011.4	Design and querying database using SQL.
ELXLDLO 5011.5	Analyze and apply concepts of normalization to relational database design.
ELXLDLO 5011.6	Understand the concept of transaction, concurrency and recovery

ELXLDLO 5012 Digital Control System Laboratory (Elective)

Learners will be able to:	
ELXLDLO 5012.1	Evaluate the various concepts of digital signals for sampling, reconstruction and discretization using PC based simulation tools.
ELXLDLO 5012.2	Evaluation of various classical methods to analyse digital control systems.
ELXLDLO 5012.3	Review the Discrete time system using the SIMULINK tool of MATLAB domain.



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T.E. Sem VI (R2016): Course Outcomes

ELX 601 Embedded System and RTOS

Learners will be able to:	
ELX 601.1	Classify a general purpose OS from RTOS and demonstrate understanding and functional behaviour of an RTOS.
ELX 601.2	Demonstrate an understanding of 32-bit embedded hardware (Cortex – M3).
ELX 601.3	Distinguish between and explain functional behaviour of serial communication protocols
ELX 601.4	Analyse problem definition for designing functional behaviours of an embedded system

ELX 602 Computer Communication Network

Learners will be able to:	
ELX 602.1	Demonstrate understanding of networking concepts and required protocols
ELX 602.2	Analyze the various layers and protocols of the layered architecture
ELX 602.3	Evaluate different addressing schemes, connecting devices and routing protocols
ELX 602.4	Appreciate the application layer protocols

ELX 603 VLSI Design

Learners will be able to:	
ELX 603.1	Demonstrate a clear understanding of choice of technology, technology scaling and system level design issues.
ELX 603.2	Design and analyse MOSFET based inverter circuits.
ELX 603.3	Realize MOSFET based logic circuits with different design styles.
ELX 603.4	Design semiconductor memories, adders and multipliers.



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ELX 604 Signals and Systems

Learners will be able to:	
EXC604.1	Differentiate between continuous time and discrete time Signals and Systems.
EXC604.2	Understand various transforms for time domain to frequency domain conversion
EXC604.3	Apply frequency domain techniques for analysis of LTI systems
EXC604.4	Apply frequency domain techniques for analysis of continuous and discrete signals

ELXDLO 6021 Microwave Engineering

Learners will be able to:	
ELXDLO 6021.1	Explain the importance and applications of microwaves.
ELXDLO 6021.2	Explain the process of generation and amplification of microwaves.
ELXDLO 6021.3	Analyse the electric & magnetic field distribution in various microwave components.
ELXDLO 6021.4	Measure various microwave parameters.

ELXDLO 6024 Computer Organisation & Architecture

Learners will be able to:	
ELXDLO 6024.1	Define the performance metrics of a Computer
ELXDLO 6024.2	Explain the design considerations of Processor, Memory and I/O in Computer systems
ELXDLO 6024.3	Explain the advantages and limitations of Parallelism in systems
ELXDLO 6024.4	Explain the various architectural enhancements in modern processors



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ELXL 601 Embedded System and RTOS Laboratory

Learners will be able to:	
ELXL601.1	Comprehend and analyse a C source file
ELXL601.2	Write a program in C source for embedded implementation
ELXL601.3	Identify and understand RTOS (MicroC/ OS-II) functions

ELXL 602 Computer Communication Network Laboratory

Learners will be able to:	
ELXL602.1	Assess different different packet switching algorithm evaluate their performance.
ELXL602.2	Analyse and interpret different different network protocol and network command
ELXL602.3	Analyse & interpret different error control coding techniques flow control technique

ELXL 603 VLSI Design Laboratory

Learners will be able to:	
ELXL603.1	Simulate MOSFET based circuits using modern tools available for simulation and comment on the related issues.
ELXL603.2	Simulate circuits with open source free tools available like ng-spice and LT-spice
ELXL603.3	Practice life-long learning combined with strong ethics, soft-skills, team-building & leadership strategies to create working solutions/project. Publish them in the form of Report.



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ELXDLO 6021 Microwave Engineering Laboratory

Learners will be able to:	
ELXDLO6021.1	Analyse & use different types of microwave sources
ELXDLO6021.2	Analyse & use different types of microwave components
ELXDLO6021.3	Measure various microwave parameters.
ELXDLO6021.4	Design & realize microwave integrated circuits

ELXDLO 6024 COA Laboratory

Learners will be able to:	
ELXDLO6024.1	Implement selected algorithms and control logics in VHDL
ELXDLO6024.2	Experimentally investigate cache mapping schemes and page replacement policies through simulators
ELXDLO6024.3	Study of hazards through implementations
ELXDLO6024.4	Experimental investigation of performance analyzer tools



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B.E. Sem VII (R2012): Course Outcomes

EXC 701 Embedded System Design

Learners will be able to:	
EXC 701.1	Classify a general purpose OS from RTOS and demonstrate understanding and functional behaviour of an RTOS.
EXC 701.2	Demonstrate an understanding of 32-bit embedded hardware (Cortex – M3).
EXC 701.3	Distinguish between and explain functional behaviour of serial communication protocols
EXC 701.4	Analyse problem definition for designing functional behaviours of an embedded system

EXC 702 IC Technology

Learners will be able to:	
EXC702.1	Explain different fabrication processes
EXC702.2	Illustrate the sequence of process of CMOS device fabrication, make layouts for Gates & logic expressions
EXC702.3	Illustrate the semiconductor parameter measurement techniques, packaging and testing
EXC702.4	Interpret the physical mechanism of novel semiconductor devices and justify use of these devices in an application

EXC 703 Power Electronics II

Learners will be able to:	
EXC703.1	An ability to understand basic operation of various power semiconductor devices and passive components
EXC703.2	An ability to understand the basic principle of switching circuit.
EXC703.3	An ability to analyse and design an AC/DC rectifier/converter circuit
EXC703.4	An ability to analyse DC/AC inverter circuit.



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EXC 704 Computer Communication Networks

Learners will be able to:	
EXC 704.1	Understand and comprehend the fundamentals of communication and Computer networks.
EXC704.2	Design and analyze data transmission protocols and data link control protocols.
EXC704.3	Interpret major trends in industry and current research activities within the discipline. And Implement secure client server environment
EXC704.4	Implement networking protocols using TCP/IP based on socket programming.

EXC 7051 Digital Image processing (Elective)

Learners will be able to:	
EXC7051.1	Illustrate & make use of the fundamental concepts and basic elements of digital image processing.
EXC7051.2	Analyse & apply image enhancement in spatial domain, frequency domain and using histogram modelling.
EXC7051.3	Analyse & apply different image segmentation and representation techniques on images.
EXC7051.4	Examine & apply different morphological operations used in binary image processing.
EXC7051.5	Analyse image in frequency domain through different transforms and apply it to different image compression and decompression techniques.

EXC 706 Project-I

Learners will be able to:	
EXC 706.1	Inculcate the ability to read, understand and study research papers/literature in various domains of interest and formulate the problem statement.
EXC 706.2	Identify technique/algorithm for implementation/developing of a project



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EXC 706.3	Employ modern tools & complement the knowledge of project finance & management to create solutions which focus on sustainability and take the approach towards project → prototype → product.
EXC 706.4	Practice life-long learning combined with strong ethics, soft-skills, team-building & leadership strategies to create solutions which works towards the good of the society & publish them in all forms of communication for dissemination of information. (Report compilation, paper/poster presentation etc.)

EXL 701 Embedded System Design Laboratory

Learners will be able to:	
EXL 701.1	Comprehend and analyse a C source file
EXL 701.2	Write a program in C source for embedded implementation
EXL 701.3	Identify and understand RTOS (MicroC/ OS-II) functions

EXL 702 IC Technology Laboratory

Learners will be able to:	
EXL702.1	Draw layout and sketch characteristics of CMOS circuit and equation, to arrive at valid conclusion.
EXL702.2	Simulate different fabrication processes to arrive at valid conclusion. Using open source simulation tool (Nano Hub).
EXL702.3	Verify device characteristics via simulations to arrive at valid conclusion. Using open source simulation tool (Nano Hub).
EXI 702.4	Practice life-long learning combined with strong ethics, soft-skills, team-building & leadership strategies to create solutions which works towards the good of the society & publish them in all forms of communication for dissemination of information. (Report compilation, paper/poster presentation etc.)



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EXL 703 Power Electronics II Laboratory

Learners will be able to:	
EXL703.1	Analyse & Design Trigger, Commutation & Protection Circuits using Power Devices
EXL703.2	Analyse, Apply, Design & Troubleshoot design of Rectifiers, Inverters & Cyclo-converter subsystems
EXL703.3	Program & Perform Power Systems Analysis using Matlab
EXL703.4	Practice life-long learning combined with strong ethics, soft-skills, team-building & leadership strategies to create solutions which works towards the good of the society & publish them in all forms of communication for dissemination of information. (Report compilation, paper/poster presentation etc.)

EXL 704 Computer Communication Networks Laboratory

Learners will be able to:	
EXL 704.1	Assess different different packet switching algorithm evaluate their performance.
EXL704.2	Analyse and interpret different different network protocol and network command
EXL704.3	Analyse & interpret different error control coding techniques flow control technique
EXL704.4	Practice life-long learning combined with strong ethics, soft-skills, team-building & leadership strategies to create solutions which works towards the good of the society & publish them in all forms of communication for dissemination of information. (Report compilation, paper/poster presentation etc.)

EXL 7051 Digital Image processing Laboratory (Elective)

Learners will be able to:	
EXL7051.1	Implement & analyse different image enhancement techniques on binary, gray scale & colour images
EXL7051.2	Implement and analyse different segmentation techniques used for image analysis
EXL7051.3	Implement and analyse different morphological operations on images
EXL7051.4	Practice life-long learning combined with strong ethics, soft-skills, team-building & leadership strategies to create solutions which works towards the good of the society & publish them in all forms of communication for dissemination of information. (Report compilation, paper/poster presentation etc.)



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B.E. Sem VIII (R2012): Course Outcomes

EXC 801 CMOS VLSI Design

Learners will be able to:	
EXC 801.1	Recognise and understand the need for MOS based analog VLSI design
EXC 801.2	Demonstrate an understanding of MOS analog building block.
EXC 801.3	Demonstrate an understanding of MOS single stage, differential and operational amplifiers.
EXC 801.4	Demonstrate an understanding of mixed signal circuits

EXC 802 Advanced Networking Technologies

Learners will be able to:	
EXC 802.1	Identify the significance of WPAN standards
EXC802.2	Define the role of SONET, frame relay and ATM in efficient data transfer through the network
EXC802.3	Discuss issues related to network design, security threats and selection of appropriate tools and techniques to resolve the same.
EXC802.4	Illustrate the utility of various network management tools

EXC 803 MEMS Technology

Learners will be able to:	
EXC803.1	To explain the basic properties of MEMS materials & selection criteria of these materials for MEMS device fabrication.
EXC803.2	To apply basic knowledge of fabrication processes, for the fabrication of MEMS devices.
EXC803.3	To describe basic architecture, operating principle and steps involved in fabrication of MEMS devices.
EXC803.4	Develop different concepts of micro system sensors and actuators for real-world applications, their characteristics & reliability.



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EXC 8041 Robotics

Learners will be able to:	
EXC8041.1	Discuss the fundamentals of robotics
EXC8041.2	Apply the direct and inverse kinematics algorithm for robotic arm manipulation
EXC8041.3	Analyze the equations for velocity kinematics and Dynamics.
EXC8041.4	Examine the need of trajectory planning and robot vision algorithms for robotic arm manipulation
EXC8041.5	Discuss the concept of robot motion planning using different algorithms.

EXC 8042 Mobile Communication

Learners will be able to:	
EXC8042.1	Understand the fundamentals of mobile communications and multiple access technologies.
EXC8042.2	Differentiate between GSM and CDMA cellular standards.
EXC8042.3	Understand the wireless communication systems with key 3G (e.g., CDMA) and 4G (OFDM) technologies and differentiate them on the basis of their key aspects
EXC8042.4	Analyse the working of emerging technologies in the field of mobile communication, which support connectivity to cellular networks, wireless internet and sensor devices.

EXC 806 Project-II

Learners will be able to:	
EXC 806.1	Identify technique/algorithm for implementation/developing of a project
EXC 806.2	Employ modern tools & complement the knowledge of project finance & management to create solutions which focus on sustainability and take the approach towards project → prototype → product.
EXC 806.3	Practice life-long learning combined with strong ethics, soft-skills, team-building & leadership strategies to create solutions which works towards the good of the society & publish them in all forms of communication for dissemination of information. (Report compilation, paper/poster presentation etc.)



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EXL 801 CMOS VLSI Design Laboratory

Learners will be able to:	
EXL 801.1	Demonstrate and understanding and use of SPICE based open source tool for CMOS circuit design and analysis.
EXL 801.2	Demonstrate an understanding of various MOS device characteristics through experimentation
EXL 801.3	Demonstration and understanding of differential and operational amplifiers through experimentation

EXL 802 Advanced Networking Technologies Laboratory

Learners will be able to:	
EXL 802.1	To be familiar with wireless networking concepts
EXL802.2	To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks
EXL802.3	To be familiar with network tools and network programming

EXL 803 MEMS Technology Laboratory

Learners will be able to:	
EXL803.1	Study characterization of MEMS sensors/ devices using Hardware setup.
EXL803.2	Study characterization of Micro heater MEMS device using Hardware setup.
EXL803.3	Verify MEMS device behaviour and characteristics via open source simulation tool (Nano Hub), to arrive at valid conclusion.



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EXL 8041 Robotics Laboratory

Learners will be able to:	
EXL 8041.1	Discuss the fundamentals of robotics
EXL 8041.2	Apply the direct and inverse kinematics algorithm for robotic arm manipulation
EXL 8041.3	Analyze the equations for velocity kinematics and Dynamics.
EXL 8041.4	Examine the need of trajectory planning and robot vision algorithms for robotic arm manipulation
EXL 8041.5	Discuss the concept of robot motion planning using different algorithms.

EXL 8042 Mobile Communication Laboratory

Learners will be able to:	
EXL8042.1	Analyse and critically judge a problem to implement system design for achieving better spectrum capacity.
EXL8042.2	Use various modern age tools to implement system design and for analysis of various cellular network models.
EXL8042.3	Industry academia alliance for current updates in mobile communication technology with hands-on experience.
EXL 8041.4	Examine the need of trajectory planning and robot vision algorithms for robotic arm manipulation
EXL 8041.5	Discuss the concept of robot motion planning using different algorithms.