



Department of Electronics and Telecommunication

S.E. Sem III (R2016): Course Outcomes

ECC301 - : Applied Mathematics-III

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| ECC301.1 | Apply the knowledge of Laplace transform and its properties to evaluate specific kind of integrals. |
| ECC301.2 | Apply knowledge of Inverse Laplace transform to solve ordinary, simultaneous and integro differential equations. |
| ECC301.3 | Follow Fourier series expansion of functions which satisfy dirichlet conditions and fourier transform |
| ECC301.4 | Apply Concepts of vector differentiation, integration for irrotational and solenoidal force fields |
| ECC301.5 | Apply the properties of Bessel functions in engineering problems in higher semesters. Follow methods of Cauchy theory of analytic function and bilinear transformations also apply for orthogonal trajectories. |

ECC302 - : Electronic Devices and Circuits-I

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| ECC302.1 | Explain physical operation and fabrication process of semiconductor components, devices and their application. |
| ECC302.2 | Design filter circuit and voltage regulators as per given specification. |
| ECC302.3 | Design DC Biasing circuits to use BJT/JFET devices as an amplifier. |
| ECC302.4 | Design and Analyze BJT/JFET amplifier in CE/CS configurations for given specifications /applications. |
| ECC302.5 | Derive and Calculate various amplifier parameters based on low and high frequency model of BJT/JFET configuration for frequency response. |



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ECC303 - : Digital System Design

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| ECC303.1 | Explain different number systems, digital codes and their conversions. |
| ECC303.2 | Minimize logic expressions using various reduction techniques and design combinational logic circuits. |
| ECC303.3 | Design flip-flops using logic gates and use them to realize different sequential circuits. |
| ECC303.4 | Classify different semiconductor memories and programmable devices. |
| ECC303.5 | Implement basic combinational & sequential circuits using VHDL codes. |

ECC304: Circuit Theory and Networks

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| ECC304.1 | Analyze complex networks involving dependent and independent sources using network theorems. |
| ECC304.2 | Apply network topology for analyzing the circuit |
| ECC304.3 | Evaluate time and frequency domain responses for understanding the behavior of electrical circuits |
| ECC304.4 | Evaluate various network functions and their stability using pole zero diagram |
| ECC304.5 | Compute various two port network parameters and to design T and Pi networks. |
| ECC304.6 | Synthesize various Network functions in different forms. (RC, RL, LC, RLC). |



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ECC305 -: Electronic Instrumentation and Control

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| ECC305.1 | Explain principles of operation for measuring instruments for passive components. |
| ECC305.2 | Explain principles of operation for various sensors and transducers. |
| ECC305.3 | Describe functional blocks of data acquisition systems. |
| ECC305.4 | Find transfer function for a given system. |
| ECC305.5 | Calculate time domain and frequency domain parameter for a given system. |
| ECC305.6 | Predict stability of a given system using appropriate criteria. |

ECL 301: Electronic devices & Circuits-I (Lab)

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|-----------|---|
| ECL 301.1 | Operate the required test and measuring equipment's, components laboratories accessories / hardware platforms to prepare the required experimental setup. |
| ECL 301.2 | Design and assemble circuits and systems for amplifiers and power supply as per given specifications and apply debugging techniques to obtain the desired performance parameters. |
| ECL 301.3 | 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. |
| ECL 301.4 | Use simulation tools (Orcad) for simulating and analysing amplifier circuits and its relevant parameters. |



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ECL 302: Digital Electronics LABORATORY

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| ECL302.1 | Use the required Equipment, software and Laboratory accessories while preparing the experimental set up. |
| ECL302.2 | Realize circuit using ICs by Carrying out required investigations and debugging techniques. |
| ECL302.3 | Write VHDL code using software as per the given specifications at individual level or as a part of team during laboratory hours. |
| ECL302.4 | Report and present the experimental study conducted along with valid conclusions as per the specified format. |

ECL303 - : OOPM using Java Lab

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| ECL 303.1 | Understand and apply the concept of OOP as well as the purpose and usage of principles of inheritance, polymorphism, encapsulation and method overloading. |
| ECL 303.1 | Identify classes, objects, members of a class and the relationships between them for a specific problem. |
| ECL 303.1 | Write Java application programs using OOP concept (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, error exception handling). |
| ECL 303.1 | Implementation of reusability can be demonstrated with the help of inheritance. |
| ECL 303.1 | Generate different patterns and flows using control structures and use recursion in their programs. |



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S.E. Sem IV (R2016): Course Outcomes

ECC401 - : Applied Mathematics-IV

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| ECC401.1 | Understand Calculus of variation and Apply it in solving Isoperimetric problems. |
| ECC401.2 | Understand Gram-Schmidt Process and vector spaces |
| ECC401.3 | Understand Linear Algebra, Diagonalisation of matrices. |
| ECC401.4 | Understand Probability theory, Standard distributions. Relation between Bi-Variate data and lines of regression and apply it in engineering problems. |
| ECC401.5 | Understand complex integration formulas and Understand applications to real integration |

ECC402: Electronic devices & circuits-II

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| ECC402.1 | Justify the importance of MOSFET and MOSFET amplifiers. |
| ECC402.2 | Analyse the multistage amplifier for low and high frequencies with the help of low and high frequency model of BJT /FET. |
| ECC402.3 | Analyse and design two stage amplifier circuits using BJT/JFET for the given specifications. |
| ECC402.4 | Compare and contrast different power amplifier circuits on the basis of their design and applications in electronics communication circuits. |
| ECC402.5 | Analyse and apply negative and positive feedback in amplifier design and oscillators. |



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ECC403 -: Linear integrated Circuit

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| ECC403.1 | To explain the internal structure of operational amplifier. |
| ECC403.2 | To analyse/ design various linear and non-linear applications of operational amplifier Circuits. |
| ECC403.3 | To analyse/ design various types of ADC's and DAC's. Compare their functionality on the basis of their characteristics. |
| ECC403.4 | To analyse/ design various applications using special purpose IC's. |
| ECC403.5 | To analyse and design voltage regulators for given specifications. |

ECC404 -: Signals & Systems

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|----------|--|
| ECC404.1 | perform mathematical operations on signals and classify signals/systems on the basis of their properties |
| ECC404.2 | Compute impulse response and analyses LTI systems in time domain using convolution integral and convolution sum |
| ECC404.3 | analyses LTI systems in frequency domain (Fourier series, Fourier Transform , Laplace Transform and Z transform) |
| ECC404.4 | Carry out state space analysis using appropriate Transform and realize FIR and IIR systems in various forms. |
| ECC404.5 | Use appropriate concepts and computational methods in various Signals and systems applications |



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ECC 405 - : Principles of communication Engineering

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|-----------|---|
| ECC 405.1 | Describe different types of noise and solve basic problems on noise |
| ECC 405.2 | Use different continuous and pulse modulation techniques used in analog communication |
| ECC 405.3 | Analyse transmitter and receiver circuits of analog communication system |
| ECC 405.4 | Differentiate FDM and TDM and give their applications |

ECL401 - : Electronic Devices and Circuits-II Laboratory

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|-----------|---|
| ECL 401.1 | Design and assemble circuits and systems for MOSFET amplifiers, circuits as per given specifications and apply debugging techniques to obtain the desired performance parameters. |
| ECL 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. |
| ECL 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. |
| ECL 401.4 | Use simulation tools (ORCAD) for simulating and analysing amplifier circuits and its relevant parameters. |



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ECL402-: Linear Integrated Circuits Laboratory

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|----------|---|
| ECL402.1 | To analyse and design differential amplifier using BJT/FET for given specifications. |
| ECL402.2 | To analyse and design various applications of operational amplifier for given specifications. |
| ECL402.3 | To analyse and design various applications using special purpose IC's. |
| ECL402.4 | To analyse and design voltage regulators for given specifications. |
| ECL402.5 | Report and present experimental study conducted with valid conclusions. |

ECL 403 -: Principles of Communication Engineering laboratory

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| ECL 403.1 | Operate the required test and measuring equipment, components, laboratory accessories/ hardware platforms to prepare the required experimental set up |
| ECL 403.2 | Design and assemble circuits and systems for generating modulated/ demodulated signals as per the given specifications and apply debugging techniques to obtain the desired performance parameter. |
| ECL 403.3 | Carry out necessary investigations in the assembled circuits, infer from the results obtained and correlate/ present observations with theoretical interpretations/ calculations; at individual level and also as a part of team during laboratory hours. |
| ECL 403.4 | Use simulation tools (SIMULINK) for simulating and analysing modulated signals and its relevant parameters. |



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T.E. Sem V: Course Outcomes

ECC501 - Microprocessor and Peripherals Interfacing

| Learners will be able to: | |
|---------------------------|---|
| ECC501.1 | Identify different functionalities, architecture and software aspects of microcomputer systems. |
| ECC501.2 | Identify different functionalities and architecture of microprocessor 8086. |
| ECC501.3 | Write programs for 8086 microprocessor based systems with the help of appropriate instructions. |
| ECC501.4 | Design 8086 based system using peripheral chips and data converters. |
| ECC501.5 | Design 8086 host based multiprocessor system. |

ECC502 - Digital Communication

| Learners will be able to: | |
|---------------------------|---|
| ECC502.1 | Understand random variables and random processes of signal. |
| ECC502.2 | Encode the messages for the given information source and compare various source coding algorithms for the given information source and to quantify the average information content of it. |
| ECC502.3 | Apply different error control coding techniques, design encoders for the given specifications. |
| ECC502.4 | compare and analyse various modulation techniques on the basis of signal space representation, power spectral density, spectral efficiency and probability of error |
| ECC502.5 | Apply appropriate baseband processing and filtering techniques at transmitting and receiving end. |

ECC503 - Electromagnetic Engineering

| Learners will be able to: | |
|---------------------------|---|
| ECC503.1 | Identify basic elements of radiation mechanism i.e electromagnetic charge configurations |
| ECC503.2 | Analyse the behaviour of EM waves in free space and other media involving multiple boundary conditions by solving wave equation |
| ECC503.3 | Explain polarization behaviour in dielectrics |
| ECC503.4 | Explain Electromagnetic radiation and propagation in space and within transmission lines |
| ECC503.5 | Understand different applications of electromagnetic fields and smith chart |



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ECC504 - Discrete Time Signal Processing

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|----------|---|
| ECC504.1 | Apply the efficient computing algorithms of DFT and FFT in finding the response of the system in real time. |
| ECC504.2 | Design different types of IIR filters |
| ECC504.3 | Design different types of FIR filters |
| ECC504.4 | Evaluate the effects of Finite Word Length in design of digital filters. |
| ECC504.5 | Realize the architecture of different DSP Processors |
| ECC504.6 | Explain the applications of Digital Signal Processing in different areas of Telecommunication. |

ECCDLO5014 - Data Compression and Encryption (Elective)

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|---------------------------|---|
| Learners will be able to: | |
| ECCDLO5014.1 | Apply various compression techniques for compression of text, image, audio and video. |
| ECCDLO5014.2 | Compare and contrast various compression techniques. |
| ECCDLO5014.3 | Analyse how the basic design criteria for various cryptosystems like confusion, diffusion and number theory are used in cryptographic techniques. |
| ECCDLO5014.4 | Compare and contrast a range of different cryptosystems: private and public key. |
| ECCDLO5014.5 | Analyse various network security related protocols. |

ECL501- Microprocessor and Peripherals Interfacing Laboratory

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|---------------------------|---|
| Learners will be able to: | |
| ECL501.1 | Identify different hardware components and relevant software for programming of microprocessor 8086 based development system. |
| ECL501.2 | Use structural programming to solve the problems. |
| ECL501.3 | Write and debug assembly language programs using 8086. |
| ECL501.4 | Write and present the experimental study conducted along with valid conclusion as per the specified. |



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ECL502 - Digital Communication Laboratory

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|---------------------------|--|
| Learners will be able to: | |
| ECL502.1 | Select the appropriate software/hardware to design various blocks of Digital Communication System. |
| ECL502.2 | Compare various encoding schemes, modulation techniques and channel encoding schemes to implement the Communication System. |
| ECL502.3 | Carry out necessary investigations in the designed Communication system or in the simulated process, infer from the results obtained and correlate them with theoretical interpretations at individual level or as a part of team during laboratory hours. |
| ECL502.4 | Report and present the experimental study conducted along with valid conclusions as per the specified format. |

ECL503 - Business Communication and Ethics

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|---------------------------|---|
| Learners will be able to: | |
| ECL503.1 | Prepare a project report by assimilating, analysing, organizing and formatting data in the prescribed format. |
| ECL503.2 | Prepare a technical proposal according to the prescribed format. |
| ECL503.3 | Understand the various interpersonal skills and their function in an everyday business environment Prepare an inventory of interpersonal skills based on self-assessment Prepare notice agenda and minutes of a meeting and plan and conduct an effective meeting |
| ECL503.4 | Prepare notice agenda and minutes of a meeting and plan and conduct an effective meeting |
| ECL503.5 | Understand the concept and application of corporate ethics / soft skills in real life situations |
| ECL503.6 | Participate in group discussions and interviews and write a cover letter and resume Apply presentation techniques to deliver power point presentations in the latest formats |



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ECL504 - Open Source Technology for Communication Laboratory

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|---------------------------|--|
| Learners will be able to: | |
| ECL504.1 | Identify open source programming tools for communication technology. |
| ECL504.2 | Simulate and analyse the performance of communication system. |
| ECL504.3 | Imp Implement the communication system/subsystem |

ECLDLO 5014 - Data Compression and Encryption (Elective) Laboratory

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|---------------------------|---|
| Learners will be able to: | |
| ECLDLO5014.1 | Implement compression/encryption algorithms for text, audio and image data Using appropriate simulation tools. |
| ECLDLO5014.2 | Analyse the performance of various compression/encryption algorithms Using appropriate simulation tools |
| ECLDLO5014.3 | Simulate concepts of number theory and apply them to cryptographic techniques Using appropriate simulation tools |
| ECLDLO5014.4 | Report and present experimental study conducted with valid conclusions. |



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SEM-VI

ECC601 – Microcontrollers and Applications

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|---------------------------|---|
| Learners will be able to: | |
| ECC601.1 | Identify different functionalities and architecture of 8051 microcontroller |
| ECC601.2 | Write programs for 8051 microcontroller based systems with the help of appropriate instruction set. |
| ECC601.3 | Interface different I/Os with 8051 microcontroller for various applications. |
| ECC601.4 | Identify different functionalities and architecture of ARM 7 |
| ECC601.5 | Write assembly and embedded C language programs for ARM 7 based systems |

ECC602 - Computer Communication Networks

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|---------------------------|--|
| Learners will be able to: | |
| ECC602.1 | Differentiate functions of various layers of OSI model and compare the layered architecture with TCP/IP protocol suite. |
| ECC602.2 | Define characteristics of different physical media and differentiate other communication networks and multiplexing techniques. |
| ECC602.3 | Differentiate various components in data link layer, various random access techniques, wired and wireless networks. |
| ECC602.4 | Differentiate various channel allocation and access protocols used in networking. |
| ECC602.5 | Design a network and subnetwork on the basis of network protocol and routing algorithms |
| ECC602.6 | Distinguish transport layer protocols based on application and will be able to describe flow and congestion control mechanism used in transport layer. |

ECC603 – Antenna & Radio Wave Propagation

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|---------------------------|--|
| Learners will be able to: | |
| ECC603.1 | Discuss the concepts of antenna fundamentals like radiation pattern, directivity and gain. |
| ECC603.2 | Analyse the basic radiating elements like linear wire antenna and loop antenna. |
| ECC603.3 | Design Antenna Arrays For Isotropic And Directional Sources. |
| ECC603.4 | Design special type of antennas like micro strip antennas, frequency independent antennas and reflectors. |
| ECC603.5 | Measure antenna parameters and Identify modes of signal propagation over varying frequencies through wireless channel. |



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ECC604 – Image Processing and Machine vision

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|---------------------------|---|
| Learners will be able to: | |
| ECC604.1 | Analyze the effect of sampling, quantization in 2D and 3D signals. |
| ECC604.2 | Compare various 2-D Orthogonal and Unitary transforms for compression and energy conservation of an image. |
| ECC604.3 | Implement various image enhancement algorithms in spatial domain as well as frequency domain in context with filtering. |
| ECC604.4 | Justify the need of image restoration and implement it by using different filters as well as morphological techniques for object linking and detection. |
| ECC604.5 | Apply quantitative models of image processing for segmentation and boundary representation. |
| ECC604.6 | Recognize different shapes using various representation techniques and classify the object using different classification methods. |

ECCDLO6021: Digital VLSI Design

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|---------------------------|---|
| Learners will be able to: | |
| ECCDLO6021 | Realize logic circuits with different design styles. |
| ECCDLO6021 | Explain operation of SRAM, DRAM, ROM, memories and Data path elements. |
| ECCDLO6021 | Synthesize digital circuits using HDL language. |
| ECCDLO6021 | Explain system level design issues related to power dissipation and clock distribution on chip. |
| ECCDLO6021 | Explain the RTL design techniques and methodologies |

ECCDLO6023: Data Base Management Systems

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| Learners will be able to: | |
| ECCDLO6023.1 | Understand the different issues involved in the design and implementation of a database system |
| ECCDLO6023.2 | Transform an information model into a relational database schema and to use a data definition language and/or utility to implement the schema using a DBMS. |
| ECCDLO6023.3 | Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. |
| ECCDLO6023.4 | Understand the concepts of constraints, views, concurrency control, deadlock |



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ECCDLO6024: Audio Processing

| Learners will be able to: | |
|---------------------------|--|
| ECCDLO6024.1 | Demonstration of signal processing techniques for sampling and digital representation of speech waveforms. |
| ECCDLO6024.2 | Generate theoretical models for speech production mechanism. |
| ECCDLO6024.3 | Estimation of speech parameters in Time and Frequency domain |
| ECCDLO6024.4 | Perform predictive coding of speech signals. |

ECL601 – Microcontrollers and Applications Lab

| Learners will be able to: | |
|---------------------------|---|
| ECL601.1 | Identify different hardware components and use relevant software for programming of microcontroller based development system. |
| ECL601.2 | Use structural programming concept to solve the problems. |
| ECL601.3 | Write and Debug assembly language and embedded C programs using 8051/ARM 7. |
| ECL601.4 | Write and present the experimental study conducted along with valid conclusion as per the specified format. |

ECL602 - Computer Communication Networks Lab

| Learners will be able to: | |
|---------------------------|--|
| ECL602.1 | Select a software tool to design computer networks and configure protocols/servers/firewalls to achieve desired performance of the network |
| ECL602.2 | Select a software tool to design computer networks and configure algorithms to achieve desired performance of the network |
| ECL602.3 | Select a software tool to design computer networks and configure Different applications of network. |
| ECL602.4 | Select a software tool to design and configure different sliding window protocols. |
| ECL602.5 | Write and present the experimental study conducted along with valid conclusion as per the specified format. |



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ECL603 – Antenna & Radio Wave Propagation

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|---------------------------|--|
| Learners will be able to: | |
| ECL603.1 | Demonstrate the structure and operation of various antennas and plot radiation patterns using MATLAB |
| ECL603.2 | Design and fabricate Linear wire antennas such as monopoles and dipoles and special antennas like MSAs, Horn and Yagi-Uda antennas for a given frequency |
| ECL603.3 | Design Antenna Arrays for Isotropic and Directional sources. |
| ECL603.4 | Use antenna simulation software in design of various antennas. |

ECL604 – Image Processing and Machine vision Lab

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|---------------------------|---|
| Learners will be able to: | |
| ECL604.1 | Carry out different transformation operations in various domains on image. |
| ECL604.2 | Simulate basic segmentation as well as morphological operations on image and apply them for object linking , detection and recognition. |
| ECL604.3 | Model image restoration using appropriate de-blurring filters. |
| ECL604.4 | Report and present the experimental study conducted along with valid conclusions as per the specified format. |

ECLDLO6021: Digital VLSI Design

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|---------------------------|---|
| Learners will be able to: | |
| ECLDLO6021.1 | Simulate voltage transfer characteristics of MOSFET transistor with variations in the various parameters. |
| ECLDLO6021.2 | Draw layout diagrams of NMOS and CMOS logic circuits using lambda based design rules. |
| ECLDLO6021.3 | Design MOSFET based combinational and sequential circuits in different logic styles using different SPICE models. |
| ECLDLO6021.4 | Simulate and synthesize digital circuits using HDL language and RTL Design |
| ECLDLO6021.5 | Report and present the experimental study conducted along with valid conclusions as per the specified format. |



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ECLDLO6023: Data Base Management Systems Lab

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|---------------------------|--|
| Learners will be able to: | |
| ECLDLO6023.1 | To understand the SQL and basic commands of SQL like CREATE, INSERT, UPDATE |
| ECLDLO6023.2 | Apply the Constraints and different keys on table. |
| ECLDLO6023.3 | Implement the queries, JOIN, VIEW, and Library Function. |
| ECLDLO6023.4 | Perform the queries and Triggers. |
| ECLDLO6023.5 | Design own Database Management System. |
| ECLDLO6023.6 | Report and present the experimental study conducted along with valid conclusion as per the specified format. |

ECLDLO6024: Audio Processing

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|---------------------------|--|
| Learners will be able to: | |
| ECLDLO6024.1 | Apply the knowledge gained in Speech Processing theory to analyze speech and estimate some of its parameters. |
| ECLDLO6024.2 | Implement speech processing features and models, analyze and interpret results, and write appropriate conclusions. |
| ECLDLO6024.3 | Demonstrate skills in writing programs in Matlab relevant to speech processing. |
| ECLDLO6024.4 | Report and present the experimental study conducted along with valid conclusions as per the specified format. |



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B.E. Sem VII Course Outcomes

ETC701 - Image and Video Processing

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|---------------------------|---|
| Learners will be able to: | |
| ETC701.1 | Analyse the effect of sampling, quantization in 2D and 3D signals |
| ETC701.2 | Compare various 2-D Orthogonal and Unitary transforms for compression and energy conservation of an image. |
| ETC701.3 | Implement various image enhancement algorithms in spatial domain as well as frequency domain in context with filtering. |
| ETC701.4 | Apply suitable segmentation as well as morphological techniques for object linking and detection. |
| ETC701.5 | Justify the need of image restoration and implement it by using different filters. |
| ETC 701.6 | Explain different techniques of video formation, perceptions and 2-D motion estimation. |

ETC702 - Mobile Communication

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|---------------------------|---|
| Learners will be able to: | |
| ETC702.1 | Understand basic concepts of cellular communication, analyse the various multiple access techniques and their application in Mobile communication. |
| ETC702.2 | Describe the functionality of GSM, GPRS and EDGE, IS-95 by applying various protocols learnt in previous Generation |
| ETC702.3 | Compare performance and functions of 3G standards from 3GPP with its predecessor 2G standards |
| ETC702.4 | Analyse the need of 3GPP LTE and 4G networks by comparing its performance with previous generations and standards and understand Need to attain higher data rate with the advanced technique like MIMO, SDR |
| ETC702.5 | Study Raleigh, Rican propagation models and understand channel impairment issues. |

ETC703 - Optical Communication and Networks

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|---------------------------|--|
| Learners will be able to: | |
| ETC703.1 | Analyse propagation of light in optical fiber in different fiber types using the ray theory and electromagnetic mode theory. |
| ETC703.2 | Analyse transmission characteristics (attenuation /dispersion) of an optical fiber using different techniques. |
| ETC703.3 | Design optical fiber communication links using appropriate optical fibers, light sources, detectors. |



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| ETC703.4 | Evaluate functionalities of various optical network system components, modern optical communication systems and networks using SONET/SDH and WDM. |
| ETC703.5 | Compare principles of different classes of OTDM networks, Optical access networks and future access network. |
| ETC703.6 | Apply concepts of optical network in modern optical system design and management. |

ETC704 – Microwave and Radar Engineering

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|---------------------------|--|
| Learners will be able to: | |
| ETC704.1 | Justify the need of wave theory and propagation applicable to Microwave Engineering. |
| ETC704.2 | Analyse propagation of microwave signal through guiding media using Wave equation and derive mathematical expressions of performance parameters for waveguide. |
| ETC704.3 | Apply basics of field theory to design various Impedance Matching Techniques for waveguide. |
| ETC704.4 | Design and Characterize Microwave Semiconductor Devices. |
| ETC704.5 | Analyse Microwave Tubes and derive expressions of necessary performance parameters for them. |
| ETC704.6 | Explain various application of Microwave frequency including Radar. |

ETC705 - Neural Network and Fuzzy Logic

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|---------------------------|---|
| Learners will be able to: | |
| ETC705.1 | Train, Calculate and update the weights of the neural networks according to various training rules. |
| ETC705.2 | Specify the working and applications of different types of neural networks like Hopfield, Feed Forward networks, Perceptron, Radial Basis Networks. |
| ETC705.3 | Apply neural networks in different applications like pattern / character / face recognition. |
| ETC705.4 | Design fuzzy sets for various applications and Solve fuzzy set theory problems. |
| ETC705.5 | Design fuzzy controller for various engineering applications. |



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ETL701 - Image and Video Processing Lab

| Learners will be able to: | |
|---------------------------|--|
| ETL701.1 | Carry out different transformation operations in various domains on image as well as video. |
| ETL701.2 | Simulate basic segmentation as well as morphological operations on image and apply them for object linking and detection |
| ETL701.3 | Model image restoration using appropriate de-blurring filters. |
| ETL701.4 | Report and present the experimental study conducted along with valid conclusions as per the specified format.. |

ETL702 - Advanced Communication Engineering Laboratory I

| Learners will be able to: | |
|---------------------------|---|
| ETL702.1 | Manipulation, creating an user interface and debugging through MATLAB for Mobile Communication |
| ETL702.2 | Model and interpret the need of Bit error rate analysis for 2G,3G and 4G system and implement the same using SIMULINK |
| ETL702.3 | Analysis of 3GPP Standards in real time scenario |
| ETL702.4 | Analyse various modulation techniques and Implementation of error correction for wireless standards |

ETL703 – Advanced Communication and Engineering Laboratory-II

| Learners will be able to: | |
|---------------------------|---|
| ETL703.1 | Identify various blocks in microwave/radar/optical communication bench set-up to carry out analysis and experimental verification for various microwave measurements. |
| ETL703.2 | Design and implement communication systems specifications using microwave/radar/optical communication bench set-up or software tool to obtain desired performance parameters |
| ETL703.3 | Carry out necessary investigations and mathematical calculations related to microwave, radar and optical systems, correlate with theoretical interpretation as an individual or as a part of team during lab hours. |
| ETL703.4 | Report the experimental study conducted along with valid conclusions as per the specified format. |



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ETL703 - Neural Network and Fuzzy Logic

| Learners will be able to: | |
|---------------------------|--|
| ETEL703.1 | Simulate Supervised / Unsupervised Neural Network for generating desired output using MATLAB simulator. |
| ETEL703.2 | Simulate Supervised / Unsupervised Neural Network for various applications like character recognition, pattern classification. |
| ETEL703.3 | Design Fuzzy Controllers for different applications of automation using MATLAB simulator. |
| ETEL703.4 | Report and present experimental study conducted with valid conclusions |

ETP701 - Project Stage-I

| Learners will be able to: | |
|---------------------------|---|
| ETP701.1 | Apply the technical knowledge gained from previous courses, Identify problems and design solutions to solve real-life problems |
| ETP701.2 | Apply project management skills (scheduling work, procuring parts, documenting technical and non-technical details and working within the confined deadline). |
| ETP701.3 | Create technical reports, research paper and present the same to the evaluation authorities |



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SEM VIII

ETC801 - Wireless Network

| Learners will be able to: | |
|---------------------------|---|
| ETC.801.1 | Compare third generation fourth generation technologies with 2G technology and explain the evolution path |
| ETC.801.2 | Design various parameters for uplink and downlink of CDMA and GSM system. |
| ETC.801.3 | Explain use of emerging technology for designing various wireless applications. |
| ETC.801.4 | Explain functionality of sensor network and traffic related protocols for designing VANET, MANET. |
| ETC.801.5 | Explain the middleware protocol and network management issues of sensor network. |

ETC802 - Satellite Communication and Networks

| Learners will be able to: | |
|---------------------------|---|
| ETC802.1 | Describe the underlying concepts of a satellite communication, the various parameters for adjudging a practical satellite communication & the various factors which affect the orbit of any satellite directly & indirectly |
| ETC802.2 | Describe the various attitude control in a practical satellite link & the space segment caused by various extraneous sources. |
| ETC802.3 | Calculate communication system design parameters such as noise figure, signal-to-noise ratio, and bit error rate, analyse communication links and detailed link budget. |
| ETC802.4 | Understand the design parameter of earth station and different types of earth station used for satellite communication. |
| ETC802.5 | Understand and compare different multiple access technologies including FDMA, TDMA and CDMA technologies, evaluate system capacity based on the above techniques. |
| ETC802.6 | Understand how satellite networks works in terms of networking and laser link analysis used in satellite communication. |

ETC803 - Internet and Voice Communication (ETC 803)

| Learners will be able to: | |
|---------------------------|---|
| ETC803.1 | Differentiate functions of various layers of TCP/IP networking model and compare the TCP/IP layered architecture with OSI layering. |
| ETC803.2 | Configure various application layer protocols |
| ETC803.3 | Distinguish the transport layer protocols based on application and demonstrate how TCP's byte-stream sliding window is related to a traditional packet-based sliding window algorithm.. |



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| | |
|----------|---|
| ETC803.4 | Implement local area networks using classless and classful addressing techniques including sub-netting and super-netting. |
| ETC803.5 | Compare and analyse various audio and video digitization and compression mechanism |
| ETC803.6 | Explain voice over IP in the context of real-time interactive audio/video service. |

ETE801 - Speech Processing

| | |
|---------------------------|---|
| Learners will be able to: | |
| ETL801.1 | Demonstrate applications of signal processing theory for estimation of speech parameters in time and frequency domain including pitch and formants. |
| ETL801.2 | Perform Cepstral analysis, mel frequency Cepstral coefficients (MFCC) and their application for Pitch period estimation and formant evaluation. |
| ETL801.3 | Generate digital models for speech production using LPC Analysis. |
| ETL801.4 | Analyse application of speech processing in speech compression and coding. |
| ETL801.5 | Analyse the application of speech processing in speech synthesis. |

ETE802 - Telecommunication Network Management

| | |
|---------------------------|---|
| Learners will be able to: | |
| ETE802.1 | Justify the need of network management with the help of its basic goals, organization and different functions. |
| ETE802.2 | Compare different standards, models, languages needed to build various network management architectures, protocols by considering OSI model as reference. |
| ETE802.3 | Analyze SNMP-based protocols that manage networks with its additional specifications and remote monitoring capabilities |
| ETE802.4 | Identify the demarcation of telecommunication, computer communication in broadband applications and ATM technology |
| ETE802.5 | Extend management concepts to cover the broader aspects of network management TMN |
| ETE802.6 | Describe techniques for managing fault, configuration, performance, security and accounting in a network |



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ETL801 - Wireless Networks Lab

| | |
|---------------------------|---|
| Learners will be able to: | |
| ETL801.1 | Simulate different types of modulation techniques used in wireless networks. |
| ETL801.2 | Calculate the parameters of indoor RF networks |
| ETL801.3 | Simulate wireless System protocols. |
| ETL801.4 | Use various simulation techniques for observing the characteristics of wireless system. |
| ETL801.5 | Report and present experimental study conducted with valid conclusions. |

ETL802 - Satellite Communications and Networks Laboratory

| | |
|---------------------------|--|
| Learners will be able to: | |
| ETL802.1 | Simulate parameters for adjudging a practical satellite using antenna looks angle and limits of visibility using software tool. |
| ETL802.2 | Identify various blocks in Satellite communication system. Set up the uplink and downlink for satellite communication using bench set-up. Carry out analysis and experimental verification for various link parameters |
| ETL802.3 | Carry out necessary investigations and mathematical calculations related to satellite communication and systems, correlate with theoretical interpretation as an individual or as a part of team during lab hours. |
| ETL802.4 | Calculate communication system design parameters such as noise figure, signal-to-noise ratio, and bit error rate, analyze communication links and detailed link budget. |
| ETL802.5 | Report the experimental study and Case Study conducted along with valid conclusions as per the specified format. |

ETL803 - Internet and voice communication Lab

| | |
|---------------------------|---|
| Learners will be able to: | |
| ETL803.1 | Select the appropriate software to design the network/ model a process. |
| ETL803.2 | Design the computer networks/subnetworks/VLANs and configure desired protocols/servers/IP or analog phones to implement the given task. |
| ETL803.3 | Carry out necessary investigations in the designed network or in the simulated process, infer from the results obtained and correlate them with theoretical interpretations at individual level or as a part of team during laboratory hours. |
| ETL803.4 | Report and present the experimental study conducted along with valid conclusions as per the specified format. |



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ETEL801 - Speech Processing

| Learners will be able to: | |
|---------------------------|---|
| ETEL 801.1 | Apply the knowledge gained in "Speech Processing" theory to analyse speech and estimate some of its parameters |
| ETEL 801.2 | Implement speech processing related experiments, analyse and interpret results, and write appropriate conclusions |
| ETEL 801.3 | Demonstrate skills in writing programs in Matlab relevant to speech processing |

ETEL802 - Telecommunication Network Management Lab

| Learners will be able to: | |
|---------------------------|--|
| ETEL802.1 | Select appropriate basic tools for Monitoring, auditing a network and analyzing network statistics. |
| ETEL802.2 | Carry out necessary investigations in a real time network and servers using protocols like SNMP by means of components similar to MIB. |
| ETEL802.3 | Compare different open NMS and commercial network management tools |
| ETEL802.4 | Report and present the experimental study conducted along with valid conclusions as per the specified format. |

ETP801 - Project Stage-II

| Learners will be able to: | |
|---------------------------|--|
| ETP801.1 | Apply the technical knowledge gained from previous courses, Identify problems and design solutions to solve real-life problems |
| ETP801.2 | Demonstrate technical skills required in an electronics industry for designing, building, testing electronic circuitry using modern software and hardware tools. |
| ETP801.3 | Apply project management skills (scheduling work, procuring parts, documenting technical and non-technical details and working within the confined deadline). |
| ETP801.4 | Develop and demonstrate troubleshooting ability in electronic circuits and systems (including software and hardware part of the systems). |
| ETP801.5 | Create technical reports, research paper and present the same to the evaluation authorities. |