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***Department of Electronics and Telecommunication Engineering***

# AY: 2021-2022

# SEMESTER-III

# C-SCHEME

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***Department of Electronics and Telecommunication Engineering***

| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECC301 | Academic Year | 2021-22 |
| Course Name | Applied Mathematics-III | | |
| Name of Faculty | Prof. Bhagyashri Netke | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC301.1 | **Laplace Transform** | Student will Understand the concept of Laplace transform and its application to solve the real integrals inengineering problems. |
| ECC301.2 | **Inverse Laplace Transform & its Applications** | Students will understand basics of Inverse Laplace and its application in solving RLC circuit, differential equation |
| ECC301.3 | **Fourier Series** | Student Expand the periodic function by using Fourier series for real life problems and complex engineering problems. |
| ECC301.4 | **Complex Variables** | Student able to Understand complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytic function. |
| ECC301.5 | **Linear Algebra: Matrix Theory** | Students will Use matrix algebra to solve the engineering problems. |
| ECC301.6 | **Vector Differentiation and Integral** | Student Apply the concepts of vector calculus in real life problems. |

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## *Department of Electronics and Telecommunication Engineering*

| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECC 302 | Academic Year | 2021-22 |
| Course Name | Electronics Devices & Circuits | | |
| Name of Faculty | Prof. Shoeb Shaikh | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 302.1 | Introduction of Electronic Devices | Students will know functionality and applications of various electronic devices |
| ECC 302.2 | Biasing Circuits of BJTs and MOSFETs | Students will able to explain working of various electronics devices with the help of V-I characteristics |
| ECC 302.3 | Small Signal Amplifiers | Students will able to derive expressions for performance parameters of BJT and MOSFET circuits. |
| ECC 302.4 | Frequency response of Small signal Amplifiers | Students will able to evaluate performance of Electronic circuits (BJT and MOSFET based). |
| ECC 302.5 | Large Signal Amplifiers | Students will able to select appropriate circuit for given application. |
| ECC 302.6 | Introduction to Differential Amplifiers | Students will able to design electronic circuit (BJT, MOSFET based) circuits for given specifications. |

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***Department of Electronics and Telecommunication Engineering***

| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECC303 | Academic Year | 2021-22 |
| Course Name | Digital System Design | | |
| Name of Faculty | Madhura Ranade | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC303.1 | Number Systems and Codes | Students will be able to understand types of digital logic, digital circuits and logic families. |
| ECC303.2 | Logic Family and Logic Gates | Students will be able to analyze, design and implement combinational logic circuits. |
| ECC303.3 | Combinational Logic Circuits | Students will be able to analyze, design and implement sequential logic circuits. |
| ECC303.4 | Sequential Logic Circuits | Students will be able to develop a digital logic and apply it to solve real life problems. |
| ECC303.5 | Different Types of Memories and Programmable Logic Devices | Students will be able to classify different types of memories and PLDs. |
| ECC303.6 | Introduction to VHDL | Students will be able to simulate and implement basic combinational and sequential circuits using VHDL/Verilog. |

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| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECC304 | Academic Year | 2021-22 |
| Course Name | Network Theory | | |
| Name of Faculty | Meera Kulkarni | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC304.1 | Electrical circuit analysis | Students must be able to apply their knowledge in analyzing Circuits by using network theorems. |
| ECC304.2 | Graph Theory | Students must apply the time and frequency method of analysis. |
| ECC304.3 | Time and frequency domain analysis | Students must evaluate circuit using graph theory. |
| ECC304.4 | Network functions | Students must find the various parameters of two port network. |
| ECC304.5 | Two port Networks | Students must apply network topology for analyzing the circuit. |
| ECC304.6 | Synthesis of RLC circuits | Students must synthesize the network using passive elements. |

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| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECC305 | Academic Year | 2021-22 |
| Course Name | Electronic Instrumentation & Control Systems | | |
| Name of Faculty | Kushal Suvarna | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC305.1 | Principle of Measurement, Testing and Measuring instruments | Students must be able to Identify various sensors, transducers and their brief performance specification. |
| ECC305.2 | Sensors and Transducers | Students must understand the principle of working of various transducer used to measure temperature, displacement, level, pressure and their application in industry |
| ECC305.3 | Introduction to control system Analysis | Students must determine the models of physical systems in forms suitable for use in the analysis and design of control systems. |
| ECC305.4 | Response of control system | Students must obtain the transfer functions for a given Control system. |
| ECC305.5 | Stability Analysis in Time Domain | Students must understand the analysis of systems in time domain and frequency domain |
| ECC305.6 | Stability Analysis in frequency domain | Students must predict stability of given system using appropriate criteria |

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## *Department of Electronics and Telecommunication Engineering*

| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECL301 | Academic Year | 2021-22 |
| Course Name | Electronic Devices & Circuits Lab | | |
| Name of Faculty | Prof. Shoeb Shaikh | | |

| Course Outcome | Description |
|---|---|
| ECL301.1 | Student will be able to know various equipments, electronics devices and components, and measuring instruments used to perform laboratory work. |
| ECL301.2 | Students will be able to explain functionality of various equipments, electronics devices and components and neasu6 instruments used to perform laboratory work. |
| ECL301.3 | Students will be able connect various equipments, devices, components and measuring devices using bread board as per the circuit diagram for experiment to be performed. |
| ECL301.4 | Students will able to perform experiment to gather appropriate data. |
| ECL301.5 | Students will able to analyze data obtained from experiment to relate theory with experiment results. |
| ECL301.6 | Students will able to prepare laboratory report (Journal) to summarise the outcome each experiment. |

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| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECL302 | Academic Year | 2021-22 |
| Course Name | Digital System Design Lab | | |
| Name of Faculty | Prof. Madhura Ranade | | |

| Course Outcome | Description |
|---|---|
| ECL302.1 | Student will be able to Identify various Digital ICs and basic building blocks of digital system design |
| ECL302.2 | Students will be able to Design and implement combinational circuits like adder, subtractor, multiplexer, code converters etc. |
| ECL302.3 | Students will be able to Identify and understand working of various types of flip flops and their inter conversions. |
| ECL302.4 | Students will able to Design and implement basic sequential circuits such as counters, registers etc. |
| ECL302.5 | Students will able to Acquire basic knowledge of VHDL/Verilog basic programming. |

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| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECL303 | Academic Year | 2021-22 |
| Course Name | Electronics Instrumentation & Control Systems Lab | | |
| Name of Faculty | Prof. Kushal Suvarna | | |

| Course Outcome | Description |
|---|---|
| ECL303.1 | Student will be able to Plot and validate the performance characteristics of transducers. |
| ECL303.2 | Students will be able to Validate the characteristics of various temperature, pressure and level transducers. |
| ECL303.3 | Students will be able to Plot frequency response of first-order electrical system. |
| ECL303.4 | Students will able to Plot time response of second-order electrical system and calculate the steady-state error. |
| ECL303.5 | Students will able to Validate the effect of damping factor on the response of second order system. |
| ECL303.6 | Students will able to Inspect the frequency response specifications of systems by using bode-plot, Polar plot, Nyquist-plot techniques, and comment on the stability of system |

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| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECL304 | Academic Year | 2021-22 |
| Course Name | Skill Lab: C++ and Java Programming | | |
| Name of Faculty | Prof. Kushal Suvarna | | |

| Course Outcome | Description |
|---|---|
| ECL303.1 | Student will be able to Describe the basic principles of OOP. |
| ECL303.2 | Students will be able to Design and apply OOP principles for effective programming. |
| ECL303.3 | Students will be able to Develop programming applications using OOP language. |
| ECL303.4 | Students will able to Implement different programming applications using packaging. |
| ECL303.5 | Students will able to Analyze the strength of OOP. |
| ECL303.6 | Students will able to Percept the Utility and applicability of OOP. |

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## *Department of Electronics and Telecommunication Engineering*

| | | | |
|---|---|---|---|
| Semester | III | Class | SE EXTC |
| Course No. | ECM301 | Academic Year | 2021-22 |
| Course Name | Mini Project 1A | | |
| Name of Faculty | Prof. Shoeb Shaiikh | | |

| Course Outcome | Description |
|---|---|
| ECM303.1 | Student will be able to Create the electronics circuit for particular application/experiment. |
| ECM303.2 | Students will be able to Design and simulate the circuits by putting together the analog and digital components |
| ECM303.3 | Students will be able to Learn the technique of soldering and circuit implementation on general purpose printed circuit board (GPP). |
| ECM303.4 | Students will able to Realize the PCB design process and gain up-to-date knowledge of PCB design software. |
| ECM303.5 | Students will able to Utilize the basic electronic tools and equipment's (like DMM, CRO, DSO etc.). |
| ECM303.6 | Students will able to Analysis of hardware fault (Fault detection and correction) |

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***Department of Electronics and Telecommunication Engineering***

# AY: 2021-2022

# SEMESTER-IV

# C-SCHEME

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## *Department of Electronics and Telecommunication Engineering*

| | | | |
|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECC401 | Academic Year | 2021-22 |
| Course Name | Engineering Mathematics-IV | | |
| Name of Faculty | Prof. Bhagyashri Netke | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC401.1 | **Complex Integration** | Student will be able to Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. |
| ECC401.2 | **Statistical Techniques** | Student will be able to apply the concept of Correlation and Regression to the engineering problems in data science, machine learning and AI. |
| ECC401.3 | **Probability Distributions** | Student will be able to apply the concepts of probability and expectation for getting the spread of the data and distribution of probabilities. |
| ECC401.4 | **Linear Algebra: Vector Spaces** | Student will be able to apply the concept of vector spaces and orthogonalization process in Engineering Problems. |
| ECC401.5 | **Linear Algebra: Quadratic Forms** | Student will be able to use the concept of Quadratic forms and Singular value decomposition which are very useful tools in various Engineering applications. |
| ECC401.6 | **Calculus of Variations** | Student will be able to find the extermals of the functional using the concept of Calculus of variation. |

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## *Department of Electronics and Telecommunication Engineering*

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|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECC 402 | Academic Year | 2021-22 |
| Course Name | Micro-controllers | | |
| Name of Faculty | Prof. Nutan Malekar | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 402.1 | **Overview of Microprocessor based System** | Students will able to understand microprocessor based system. |
| ECC 402.2 | **The Memory Systems** | Students will able to understand memory system. |
| ECC 402.3 | **8051 Microcontroller** | Students will able to understand architecture of 8051. |
| ECC 402.4 | **8051 Assembly Language Programming and Interfacing** | Students will able to write programs for 8051 microcontroller. |
| ECC 402.5 | **ARM7** | Students will able to understand architecture of ARM7. |
| ECC 402.6 | **Study 8 bit microcontroller Applications** | Students will able to design applications using microcontrollers. |

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| | | | |
|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECC 403 | Academic Year | 2021-22 |
| Course Name | Linear Integrated Circuits | | |
| Name of Faculty | Madhura Ranade | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 403.1 | **Introduction to operational amplifiers** | Students should be able to outline and classify all types of integrated circuits. |
| ECC 403.2 | **Linear Applications of operational amplifiers** | Students should be able to understand the fundamentals and areas of applications for the integrated circuits. |
| ECC 403.3 | **Non-Linear Applications of Operational Amplifier** | Students should be able to develop the ability to design practical circuits that perform the desired operations. |
| ECC 403.4 | **Timer IC 555 and it's applications** | Students should be able to understand the differences between theoretical & practical results in integrated circuits. |
| ECC 403.5 | **Voltage Regulators** | Students should be able to identify the appropriate integrated circuit Voltage Regulator modules for designing engineering application. |
| ECC 403.6 | **Special Purpose Integrated Circuits** | Students should be able to identify the appropriate special integrated circuit modules for designing engineering application. |

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| | | | |
|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECC404 | Academic Year | 2021-22 |
| Course Name | Signals and Systems | | |
| Name of Faculty | Prof. Archana Ingle | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ETC404.1 | **Introduction to signals and systems** | Students will be able to classify and analyse different types of signals and systems |
| ETC404.2 | **Time domain analysis of continuous time and discrete time systems** | Students will be able to analyse CT and DT LTI signals and systems in time domain |
| ETC404.3 | **Frequency domain analysis of continuous and discrete signals** | Students will be able to analyse CT and DT LTI systems using Fourier Transform |
| ETC404.4 | **Laplace Transform and Continuous time LTI systems** | Students will be able to analyse CT LTI systems using Laplace Transform . |
| ETC404.5 | **z-Transform and Discrete time LTI systems** | Students will be able to Able to analyse DT LTI systems using Z Transform |
| ETC404.6 | **FIR and IIR systems** | Students will be able to Realize(Construct) different structures for FIR and IIR systems |

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|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECC 405 | Academic Year | 2021-22 |
| Course Name | Principles of Communication Engineering | | |
| Name of Faculty | Prof. Shoeb Shaikh | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 405.1 | **Basics of Communication System** | Students should be able to Understand the basic components and types of noises in communication system. |
| ECC 405.2 | **Amplitude Modulation and Demodulation** | Students should be able to Analyze the concepts of amplitude modulation and demodulation. |
| ECC 405.3 | **Angle Modulation and Demodulation** | Students should be able to Analyze the concepts of angle modulation and demodulation |
| ECC 405.4 | **Radio Receivers** | Students should be able to compare the performance of AM and FM receivers. |
| ECC 405.5 | **Analog Pulse Modulation and Demodulation** | Students should be able to Describe analog and digital pulse modulation techniques. |
| ECC 405.6 | **Multiplexing & De-multiplexing** | Students should be able to Illustrate the principles of multiplexing and demultiplexing techniques. |

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| | | | |
|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECL401 | Academic Year | 2021-22 |
| Course Name | Micro-controllers Lab | | |
| Name of Faculty | Prof. Nutan Malekar | | |

| Course Outcome | Description |
|---|---|
| ECL401.1 | Student will be able to understand different development tools required to develop microcontroller based systems. |
| ECL401.2 | Students will be able to write assembly language programs for arithmetic and logical operations, code conversion& data transfer operations. |
| ECL401.3 | Students will be able to write assembly language programs for general purpose I/O, Timers & Interrupts. |
| ECL401.4 | Students will able to interface & write programs for Input and Output devices |
| ECL401.5 | Students will able to develop microcontroller based Applications. |

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|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECL402 | Academic Year | 2021-22 |
| Course Name | Linear Integrated Circuits Lab | | |
| Name of Faculty | Prof. Meena Perla | | |

| Course Outcome | Description |
|---|---|
| ECL402.1 | Student will be able to understand the differences between theoretical, practical and simulated results in integrated circuits |
| ECL402.2 | Students will be able to apply the knowledge to do simple mathematical operations. |
| ECL402.3 | Students will be able to apply knowledge of op-amp, and timer ICs to design simple applications. |
| ECL402.4 | Students will able to apply knowledge of voltage regulator ICs to design simple applications. |

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|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECL403 | Academic Year | 2021-22 |
| Course Name | Principles of Communication Engineering Lab | | |
| Name of Faculty | Prof. Shoeb Shaikh | | |

| Course Outcome | Description |
|---|---|
| ECL403.1 | Student will be able to analyze analog modulation techniques. |
| ECL403.2 | Students will be able to analyze the waveforms of Radio receivers. |
| ECL403.3 | Students will be able to implement analog pulse modulation and demodulation circuits. |
| ECL403.4 | Students will able to demonstrate digital pulse modulation and demodulation techniques. |
| ECL403.5 | Students will able to verify the concepts of TDM and FDM. |

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| | | | |
|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECL404 | Academic Year | 2022-23 |
| Course Name | Skill Lab: Python Programming | | |
| Name of Faculty | Prof. Kushal Suvarna | | |

| Course Outcome | Description |
|---|---|
| ECL404.1 | Student will be able to Describe syntax and semantics in Python |
| ECL404.2 | Students will be able to Illustrate different file handling operations |
| ECL404.3 | Students will be able to Interpret object oriented programming in Python |
| ECL404.4 | Students will able to Design GUI Applications in Python |
| ECL404.5 | Students will able to Express proficiency in the handling Python libraries for data science |
| ECL404.6 | Students will able to Develop machine learning applications using Python |

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|---|---|---|---|
| Semester | IV | Class | SE EXTC |
| Course No. | ECM401 | Academic Year | 2021-22 |
| Course Name | Mini-Project 1B: Arduino & Raspberry Pi based Projects | | |
| Name of Faculty | Prof. Nutan Malekar | | |

| Course Outcome | Description |
|---|---|
| ECM401.1 | Student will be able to Write basic codes for the Arduino board using the IDE for utilizing the onboard resources. |
| ECM401.2 | Students will be able to Apply the knowledge of interfacing different devices to the Arduino board to accomplish a given task. |
| ECM401.3 | Students will be able to Design Arduino based projects for a given problem. |
| ECM401.4 | Students will able to Write code using python language using IDE for utilizing the onboard resources |
| ECM401.5 | Students will able to Apply the knowledge of interfacing different devices to raspberry Pi board to accomplish a given task. |
| ECM401.6 | Students will able to Design Raspberry Pi based projects for a given problem |

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# AY: 2021-2022

# SEMESTER-V

# C-SCHEME

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| | | | |
|---|---|---|---|
| Semester | V | Class | TE EXTC |
| Course No. | ECC501 | Academic Year | 2021-22 |
| Course Name | Digital Communication | | |
| Name of Faculty | Prof. Meera Kulkarni | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC501.1 | **Information Theory and Source Codes** | Student will be able to apply the concepts of information theory in source coding. |
| ECC501.2 | **Error Control System and Error Detection Codes** | Student will be able to compare different error control systems and apply various error detection codes. |
| ECC501.3 | **Error Correction Codes** | Student will be able to analyze different error correction codes. |
| ECC501.4 | **Baseband Transmission** | Student will be able to compare various baseband transmission methods for digital signals. |
| ECC501.5 | **Optimum Detection of Baseband Signal** | Student will be able to evaluate the performance of optimum baseband detection in the presence of white noise. |
| ECC501.6 | **Digital Modulations** | Student will be able to compare the performances of different digital modulation techniques |

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| | | | |
|---|---|---|---|
| Semester | V | Class | TE EXTC |
| Course No. | ECC 502 | Academic Year | 2021-22 |
| Course Name | Discrete-Time Signal Processing | | |
| Name of Faculty | Prof. Madhura Ranade | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 502.1 | **Discrete Fourier Transform & Fast Fourier Transform** | Students will be able to Recall the system representations and understand the relation between different transforms. |
| ECC 502.2 | **IIR Digital filters** | Students will be able to understand the concepts of discrete-time Fourier transform, fast Fourier transform and apply in system analysis. |
| ECC 502.3 | **FIR Digital Filters** | Students will be able to design digital IIR and FIR filters to satisfy the given specifications and evaluate the frequency response and polezero representations to choose a particular filter for the given application. |
| ECC 502.4 | **Digital Filter Structures** | Students will be able to interpret the different realization structures of Digital IIR and FIR filters. |
| ECC 502.5 | **Finite Word Length Effects in Digital Filters** | Students will be able to analyze the impact of hardware limitations on the performance of digital filters. |
| ECC 502.6 | **Applications of Digital Signal Processing** | Students will be able to apply signal processing concepts, algorithms in applications related to the field of biomedical and audio signal processing. |

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| | | | |
|---|---|---|---|
| Semester | V | Class | TE EXTC |
| Course No. | ECC 503 | Academic Year | 2021-22 |
| Course Name | Digital VLSI | | |
| Name of Faculty | Prof. Nutan Malekar | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 503.1 | **Review of MOSFET operation and Fabrication** | Students will be able to know various tools and processes used in VLSI Design. |
| ECC 503.2 | **Combinational CMOS Logic Circuits** | Students will be able to explain working of various CMOS combinational and sequential circuits used in VLSI Design. |
| ECC 503.3 | **MOS Design Logic Styles** | Students will be able to derive expressions for performance parameters of basic building blocks like CMOS inverter. |
| ECC 503.4 | **Semiconductor Memories** | Students will be able to relate performance parameters with design parameters of VLSI circuits. |
| ECC 503.5 | **Data path and system design issues** | Students will be able to select suitable circuit and design style for given application. |
| ECC 503.6 | **RTL Design** | Students will be able to design and realize various combinational and sequential circuits for given specifications. |

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***Department of Electronics and Telecommunication Engineering***

| | | | |
|---|---|---|---|
| Semester | V | Class | TE EXTC |
| Course No. | ECC504 | Academic Year | 2021-22 |
| Course Name | Random Signal Analysis | | |
| Name of Faculty | Prof. Ashwini Haryan | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 504.1 | **Basic Concepts in Probability** | Students will be able to understand basics of probability |
| ECC 504.2 | **Introduction to Random Variables** | Students will be able to understand types of random variables and different distribution functions |
| ECC 504.3 | **Operations on One Random Variable** | Students will be able to understand functions of one random variable distribution functions, its mean, variance, moments, MGF and characteristic function is useful. |
| ECC 504.4 | **Multiple Random Variables and Convergence** | Students will be able to able to understand one functions of two random variables, joint moments, covariance and correlation-independent. |
| ECC 504.5 | **Random Processes** | Students will be able to understand Random process |
| ECC504.6 | **Introduction to Statistical Learning and Applications** | Students will be able to understand Regression model and Applications of simple linear regression |

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|---|---|---|---|
| Semester | V | Class | TE EXTC |
| Course No. | ECCDLO5012 | Academic Year | 2021-22 |
| Course Name | Data Compression and Cryptography | | |
| Name of Faculty | Prof. Meena Perla | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECCDLO 5012.1 | **Introduction to Data Compression** | Students will be able to apply various compression techniques for text and understand image compression and its standards. |
| ECCDLO 5012.2 | **Video and Audio Compression** | Students will be able to select suitable compression techniques for specified lossless and lossy audio and video applications. |
| ECCDLO 5012.3 | **Data Security** | Students will be able to compare between symmetric and asymmetric cryptography and also describe different symmetric cryptographic techniques and standards. |
| ECCDLO 5012.4 | **Number Theory** | Students will be able to apply number theory concepts to solve the cryptographic problems |
| ECCDLO 5012.5 | **Asymmetric Key Cryptography** | Students will be able to analyze different public key cryptography algorithms and also describe methods that provide the goals for integrity, confidentiality and authentication. |
| ECCDLO 5012.6 | **System Security** | Students will be able to describe system security facilities designed to protect a computer system from security threats and also appreciate ethical issues related to system security. |

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| | | | |
|---|---|---|---|
| Semester | V | Class | T.E |
| Course No. | ECL501 | Academic Year | 2021-22 |
| Course Name | Digital Communication Lab | | |
| Name of Faculty | Prof. Meera Kulkarni | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL501.1 | **Information Theory and Source Codes** | Able to Compare various source coding schemes |
| ECL501.2 | **Error Control System and Error Detection Codes** | Able to Design and implement different error detection codes |
| ECL501.3 | **Error Correction Codes** | Able to Design and implement different error correction codes |
| ECL501.4 | **Baseband Transmission** | Able to Compare various line coding techniques |
| ECL501.5 | **Optimum Detection of Baseband Signal** | Able to Illustrate the impulse response of a matched filter for optimum detection |
| ECL501.6 | **Digital Modulations** | Able to Demonstrate various digital modulation techniques |

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|---|---|---|---|
| Semester | V | Class | TE EXTC |
| Course No. | ECL 502 | Academic Year | 2021-22 |
| Course Name | Discrete-Time Signal Processing Laboratory | | |
| Name of Faculty | Prof. Madhura Ranade | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL 502.1 | **Discrete Fourier Transform & Fast Fourier Transform** | Able to Perform basic discrete time signal processing operations such as Linear Convolution, Circular |
| ECL 502.2 | **IIR Digital filters** | Able to Convolution, Auto Correlation, Cross Correlation, etc. and interpret the results. |
| ECL 502.3 | **FIR Digital Filters** | Able to Demonstrate their ability towards interpreting and performing frequency analysis of different |
| ECL 502.4 | **Digital Filter Structures** | To understand and analyse discrete time sequences and systems. |
| ECL 502.5 | **Finite Word Length Effects in Digital Filters** | Able to Design and implement the FIR and IIR Filters for given specifications. |
| ECL 502.6 | **Applications of Digital Signal Processing** | Able to Implement and analyse applications related to the field of biomedical signal processing and audio signal processing. |

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|---|---|---|---|
| Semester | V | Class | TE EXTC |
| Course No. | ECL 503 | Academic Year | 2021-22 |
| Course Name | Digital VLSI | | |
| Name of Faculty | Prof. Nutan Malekar | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL 503.1 | **Review of MOSFET operation and Fabrication** | Able to Write spice code for given combinational and sequential CMOS circuits. |
| ECL 503.2 | **Combinational CMOS Logic Circuits** | Able to Perform various analysis like operating point, dc, transient etc of given CMSO circuits. |
| ECL 503.3 | **MOS Design Logic Styles** | Able to Evaluate performance of given CMOS Able to circuits. |
| ECL 503.4 | **Semiconductor Memories** | Able to Draw layout of given CMOS circuit and also able extract various parasitic using open source layout tool like Magic. |
| ECL 503.5 | **Data path and system design issues** | Able to Design, simulate, and verify CMOS circuit for given specification |

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|---|---|---|---|
| Semester | V | Class | TE EXTC |
| Course No. | ECL 504 | Academic Year | 2021-22 |
| Course Name | Digital VLSI | | |
| Name of Faculty | Prof. Nutan Malekar | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL 504.1 | **ADVANCED TECHNICAL WRITING :PROJECT/PROBLEM BASED LEARNING (PBL)** | Able to plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles. |
| ECL 504.2 | **EMPLOYMENT SKILLS** | Able to strategize their personal and professional skills to build a professional image and meet the demands of the industry |
| ECL 504.3 | **BUSINESS MEETINGS** | Able to emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations. |
| ECL 504.4 | **TECHNICAL/ BUSINESS PRESENTATIONS** | Able to deliver persuasive and professional presentations. |
| ECL 504.5 | **INTERPERSONAL SKILLS** | Able to develop creative thinking and interpersonal skills required for effective professional communication. |
| ECL 504.6 | **CORPORATE ETHICS** | Able to apply codes of ethical conduct, personal integrity and norms of organizational behaviour. |

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|---|---|---|---|
| Semester | V | Class | TE EXTC |
| Course No. | ECM 501 | Academic Year | 2021-22 |
| Course Name | Mini Project 2A: Embedded System Project | | |
| Name of Faculty | Prof. Madhura Ranade | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECM 501.1 | **Introduction** | Able to Understand the embedded systems with design metrics. |
| ECM 501.2 | **Controller boards and Programming – Embedded C** | Able to Understand microcontrollers and programming in Embedded C. |
| ECM 501.3 | **Interfacing Sensors and peripherals using Embedded C** | Able to Implementation of Embedded systems with different sensors and peripherals as IoT. |
| ECM 501.4 | **Communication with programming in Embedded C** | Able to Implementation of Embedded systems with different communication protocols as IoT. |
| ECM 501.5 | **Real Time Operating Systems[RTOS]** | Able to Analyze concepts of Real time operating systems. |
| ECM 501.6 | **Cloud/Web server** | Able to Design embedded system applications using sensors, peripherals and RTOS |

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# SEMESTER-VI

# C-SCHEME

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| | | | |
|---|---|---|---|
| Semester | VI | Class | TE EXTC |
| Course No. | ECC 601 | Academic Year | 2021-22 |
| Course Name | Electromagnetics and Antenna | | |
| Name of Faculty | Prof. Meera Kulkarni | | |

| **Course Outcome** | **Course Module** | **Description** |
|---|---|---|
| ECC 601.1 | Introduction to Static fields | Students will be able to describe electromagnetics field including static and dynamic in terms of Maxwell's equations |
| ECC 601.2 | Electromagnetic Field and Maxwell's Equations | Students will be able to apply Maxwell's equation to solve various electromagnetic phenomenon such as electromagnetic wave propagation in different medium, power in EM wave. |
| ECC 601.3 | Basic of Antennas | Students will derive the field equations for the basic radiating elements |
| ECC 601.4 | Antenna Arrays | Students will describe basic antenna parameters like radiation pattern, directivity, gain etc. |
| ECC 601.5 | Types of antennas | Students will be able to implement different types of the antenna structures such as Antenna arrays, Microstrip antenna and reflector antenna etc. |
| ECC 601.6 | Electromagnetic Wave Propagation | Students will be able to apply Maxwell's equation to solve various electromagnetic phenomenon such as electromagnetic wave propagation in different medium, power in EM wave. |

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| | | | |
|---|---|---|---|
| Semester | VI | Class | T.E(EXTC) |
| Course No. | ECC 602 | Academic Year | 2021-22 |
| Course Name | Computer Communication Networks | | |
| Name of Faculty | Prof. Meena Perla | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 602.1 | Introduction to Network Architectures, Protocol Layers, and Service models | Students will be able to Analyze network topologies, hardware devices, addressing schemes and the protocol stacks |
| ECC 602.2 | Physical Layer | Students will be able to Compare various transmission media and broadband technologies |
| ECC 602.3 | Data Link Layer | Students will be able to Analyze the flow control, error control and the medium access control techniques. |
| ECC 602.4 | Network Layer | Students will be able to Judge network layer addressing and routing schemes |
| ECC 602.5 | Transport Layer | Students will be able to Analyze connection oriented and connectionless services. |
| ECC 602.6 | Application Layer | Students will be able to Apply the knowledge of application layer protocols |

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|---|---|---|---|
| Semester | VI | Class | TE EXTC |
| Course No. | ECC 603 | Academic Year | 2021-22 |
| Course Name | Digital Image Processing and Machine Vision | | |
| Name of Faculty | Prof. Madhura Ranade | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 603.1 | Digital Image Fundamentals And Point Processing | Students will be able to Understand fundamentals of image processing and machine vision |
| ECC 603.2 | Image Enhancement | Students will be able to Enhance the quality of image using spatial and frequency domain techniques for image enhancement |
| ECC 603.3 | Image Morphology And Restoration | Students will be able to Learn image morphology and restoration techniques |
| ECC 603.4 | Image Segmentation | Students will be able to Learn image segmentation techniques based on principle of discontinuity and similarity using various algorithms |
| ECC 603.5 | Introduction To Machine Vision And Descriptors | Students will be able to Represent boundaries and shapes using standard techniques. |
| ECC 603.6 | Machine Vision Algorithms | Students will be able to Classify the object using different classification methods |

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|---|---|---|---|
| Semester | VI | Class | TE EXTC |
| Course No. | ECC 604 | Academic Year | 2021-22 |
| Course Name | Artificial Neural Networks and Fuzzy Logic | | |
| Name of Faculty | Prof. Karishma Raut | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 604.1 | Introduction to Neural Networks and their Basic Concepts | Students will be able to Comprehend the concepts of biological neurons and artificial neurons |
| ECC 604.2 | Supervised Learning Neural Networks | Students will be able to Analyze the feed-forward and feedback neural networks and their learning algorithms |
| ECC 604.3 | Unsupervised Learning Neural Networks | Students will be able to analyze unsupervised neural networks and algorithms. |
| ECC 604.4 | Algorithms of Neural Networks | Students will be able to study neural networks based methods to solve real world complex problems |
| ECC 604.5 | Convolution Neural Network (CNN) | Students will be able to build a simple CNN model for image classification by learning the neural network training and design concepts. |
| ECC 604.6 | Introduction to Fuzzy Inference System | Students will be able to Analyze the application of fuzzy logic and fuzzy inference systems to real world problems. |

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|---|---|---|---|
| Semester | VI | Class | TE-EXTC |
| Course No. | ECCDLO 6014 | Academic Year | 2021-22 |
| Course Name | Database Management System | | |
| Name of Faculty | Prof. Kushal Suvarna | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECCDLO 6014.1 | Introduction to Databases | Student will Describe the fundamentals of database systems |
| ECCDLO 6014.2 | Data Models | Student will Describe different data models and design issues in database. |
| ECCDLO 6014.3 | Database Design, ER-Diagram and Unified Modeling Language | Design ER diagram, relational schemas |
| ECCDLO 6014.4 | Relational Algebra and Calculus | Understand the basics model of relational Algebra, calculus, transaction management, concurrency control , database security and privacy |
| ECCDLO 6014.5 | Constraints, Views and SQL | Implement views, triggers and querying the database using SQL. |
| ECCDLO 6014.6 | Transaction management and Concurrency control | apply concepts of normalization to relational database design |

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| | | | |
|---|---|---|---|
| Semester | VI | Class | TE EXTC |
| Course No. | ECL 601 | Academic Year | 2021-22 |
| Course Name | Electromagnetics and Antenna Lab | | |
| Name of Faculty | Prof. Meera Kulkarni | | |

| **Course Outcome** | **Course Module** | **Description** |
|---|---|---|
| ECL 601.1 | Introduction to Static fields | Students will be able to describe electromagnetics field including static and dynamic in terms of Maxwell's equations |
| ECL 601.2 | Electromagnetic Field and Maxwell's Equations | Students will be able to apply Maxwell's equation to solve various electromagnetic phenomenon such as electromagnetic wave propagation in different medium, power in EM wave. |
| ECL 601.3 | Basic of Antennas | Students will derive the field equations for the basic radiating elements |
| ECL 601.4 | Antenna Arrays | Students will describe basic antenna parameters like radiation pattern, directivity, gain etc. |
| ECL 601.5 | Types of antennas | Students will be able to implement different types of the antenna structures such as Antenna arrays, Microstrip antenna and reflector antenna etc. |
| ECL 601.6 | Electromagnetic Wave Propagation | Students will be able to apply Maxwell's equation to solve various electromagnetic phenomenon such as electromagnetic wave propagation in different medium, power in EM wave. |

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|---|---|---|---|
| Semester | VI | Class | T.E(EXTC) |
| Course No. | ECL 602 | Academic Year | 2021-22 |
| Course Name | Computer Communication Networks Laboratory | | |
| Name of Faculty | Prof. Meena Perla | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL 602.1 | Introduction to Network Architectures, Protocol Layers, and Service models | Design a small or medium sized computer network including media types, end devices, and interconnecting devices that meets a customer's specific needs. |
| ECL 602.2 | Physical Layer | Perform configurations on routers and Ethernet switches. |
| ECL 602.3 | Data Link Layer | Demonstrate knowledge of programming for network communications |
| ECL 602.4 | Network Layer | Simulate computer networks and analyze the simulation results |
| ECL 602.5 | Transport Layer | Troubleshoot connectivity problems in a host occurring at multiple layers of the OSI model. |
| ECL 602.6 | Application Layer | Develop knowledge and skills necessary to gain employment as computer network engineer and network administrator. |

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|---|---|---|---|
| Semester | VI | Class | TE EXTC |
| Course No. | ECL 603 | Academic Year | 2021-22 |
| Course Name | Digital Image Processing and Machine Vision | | |
| Name of Faculty | Prof. Madhura Ranade | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL 603.1 | Image Enhancement | perform enhancement of digital images in spatial and frequency domain |
| ECL 603.2 | Image Morphology And Restoration | perform edge detection and morphological operations on digital images |
| ECL 603.3 | Image Segmentation | classify patterns using standard Machine vision classification techniques like SVM |
| ECL 603.4 | Introduction To Machine Vision And Descriptors | apply theoretical knowledge in image processing and machine vision to practical case studies |

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|---|---|---|---|
| Semester | VI | Class | T.E. EXTC |
| Course No. | ECL604 | Academic Year | 2021-22 |
| Course Name | Skill Laboratory: Linux & Networking & Server Configuration | | |
| Name of Faculty | Prof. Meena Perla | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL604.1 | Overview of Linux | Install Linux using different platform and execute standard Linux commands |
| ECL604.2 | Linux OS | Describe the basic knowledge of Linux Operating System |
| ECL604.3 | System Administration | Deploy the system administrative functionality |
| ECL604.4 | Shell programming | Solve the problems using shell script programming |
| ECL604.5 | Linux Networking | Develop network based applications |
| ECL604.6 | Servers and Configurations | Apply the Linux commands using programming skill to deploy different servers like ftp, telnet etc. |

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|---|---|---|---|
| Semester | VI | Class | T.E. EXTC |
| Course No. | ECM601 | Academic Year | 2021-22 |
| Course Name | Mini Project 2B: FPGA based Project | | |
| Name of Faculty | Prof. Madhura Ranade | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECM601.1 | Introduction to FPGA and Synthesis | Understand various FPGA families and method of FPGA synthesis and implementation |
| ECM601.2 | Writing First program in Verilog | Learn the working of basic EDA tools like Xilinx, Modelsim cadence, etc |
| ECM601.3 | Combinational design Using VERILOG | Able to program, simulate and synthesize circuits in Verilog HDL. |
| ECM601.4 | Sequential design Using VERILOG | Learn the technique of interfacing of LED, switches and seven segment with FPGA. |
| ECM601.5 | Project Outline | Learn the project documentation, designing and handling techniques |
| ECM601.6 | Project Implementation and management | Analysis of FPAG fault detection and verification principles |

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# AY: 2021-2022

# SEMESTER-VII

# C-SCHEME

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|---|---|---|---|
| Semester | VII | Class | BE EXTC |
| Course No. | ECC701 | Academic Year | 2021-2022 |
| Course Name | Microwave Engineering | | |
| Name of Faculty | Prof. Ashwini Haryan | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC701.1 | **Introduction to Microwaves** | Ability to understand the basics of microwave ,importance of Scattering matrix and desiging of impedence matching network using lumped and distributed parameters. |
| ECC701.2 | **Waveguides and Passive Devices** | Ability to understand Microwave waveguides and passive devices. |
| ECC701.3 | **Microwave Tubes** | Ability to understand generation of microwave signals using microwave tube. |
| ECC701.4 | **Microwave Semiconductor Devices** | Ability to understand and explain working and construction of semiconductor devices |
| ECC701.5 | **Microwave Measurements** | Ability to understand the different Microwave measurements. |
| ECC701.6 | **Microwave Integrated Circuits (MIC)** | This module provides the introducrtion of MIC materials and its types. |

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|---|---|---|---|
| Semester | VII | Class | BE EXTC |
| Course No. | ECC702 | Academic Year | 2021-2022 |
| Course Name | Mobile Communication System | | |
| Name of Faculty | Prof. Archana Ingle | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC702.1 | **Fundamentals of Mobile Communication** | Explain the cellular fundamentals and estimate the coverage and capacity of cellular systems. |
| ECC702.2 | **Mobile Radio Propagation** | Classify different types of propagation models and analyze the link budget. |
| ECC702.3 | **2G Technologies** | Illustrate the fundamentals and system architecture of GSM, 2.5G and IS-95. |
| ECC702.4 | **3G Technology** | Apply the concepts of 3G technologies of UMTS and CDMA 2000. |
| ECC702.5 | **3GPP LTE** | Elaborate the principles of 3GPP LTE. |
| ECC702.6 | **Advanced techniques for 4G deployment** | Identify the emerging technologies for upcoming mobile communication systems. |

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|---|---|---|---|
| Semester | VII | Class | B.E. |
| Course No. | ECC 703 | Academic Year | 2021-2022 |
| Course Name | Optical Communication | | |
| Name of Faculty | Prof. Meena Perla /Prof. Pratik Parsewar | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 703.1 | **Optical Fiber and their properties** | Understand the principle on which fiber optic communication and list the different types of optical fiber |
| ECC 703.2 | **Transmission Characteristics of Optical Fiber** | Explain transmission characteristics of optical fiber communication |
| ECC 703.3 | **Optical Sources** | Explain working principles of optical sources like LED, Laser |
| ECC 703.4 | **Optical Detectors** | Explain principles and characteristics of various detectors |
| ECC 703.5 | **Fiber Optic Components** | List and understand different types of fabrication techniques |
| ECC 703.6 | **Optical Link** | Calculate parameters for optical Link budgeting and analyze the link? |

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|---|---|---|---|
| Semester | VII | Class | B.E. |
| Course No. | ECCDLO7033 | Academic Year | 2021-22 |
| Course Name | Internet Communication Engineering | | |
| Name of Faculty | Prof. Karishma Raut | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECCDLO 7033.1 | **Introduction to Internet** | Ability to understand and analyze working of global internet including client server operating system and application layer protocols |
| ECCDLO 7033.2 | **Transport Layer** | Ability to understand and analyze services offered by transport layer protocols to meet reqirements of today's Internet. |
| ECCDLO 7033.3 | **Internetworking layer** | Ability to design and implement LAN using static and dynamic addressing techniques including subnetting. |
| ECCDLO 7033.4 | **Internet Security** | Ability to discuss the Internet security protocols and security services |
| ECCDLO 7033.5 | **Multimedia Communications** | This course provided ability to discuss and demonstrate multimedia communication standards and compression techniques. |
| ECCDLO 7033.6 | **Quality of Services (QoS)** | This course provided ability to discuss the multimedia communication across the networks and QoS |

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|---|---|---|---|
| Semester | VII | Class | BE EXTC |
| Course No. | ILO7013 | Academic Year | 2021-2022 |
| Course Name | Management Information System | | |
| Name of Faculty | Prof. Pratik Parsewar | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ILO7013.1 | **Introduction To Information Systems (IS)** | able to understand various types computer based Information systems and impact of IT on society |
| ILO7013.2 | **Data and Knowledge Management** | able to understand various ways of managing big data and ways in which business intelligence aids decision making |
| ILO7013.3 | **Ethical issues and Privacy** | able to understand need of privacy and ethics along with types of security control |
| ILO7013.4 | **Social Computing (SC)** | able to understand how social computing serves as a tool for advertisement and marketing |
| ILO7013.5 | **Computer Networks** | able to list and explain different wireless technologies and pervasive computing tools |
| ILO7013.6 | **Information System within Organization** | able to define various information systems within an organization |

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***Department of Electronics and Telecommunication Engineering***

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## *Department of Electronics and Telecommunication Engineering*

| | | | |
|---|---|---|---|
| Semester | VII | Class | BE EXTC |
| Course No. | **ECL701** | Academic Year | 2021-2022 |
| Course Name | Microwave Engineering Laboratory | | |
| Name of Faculty | Prof. Ashwini Haryan | | |

| Course Outcome | Description |
|---|---|
| ECL701.1 | Ability to understand the basics of microwave and required instruments and components |
| ECL701.2 | Ability to understand and determine the cutoff frequency of TE Rectangular waveguide |
| ECL701.3 | Ability to understand the characteristics of microwave tubes |
| ECL701.4 | Ability to understand the different microwave measurement |

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|---|---|---|---|
| Semester | VII | Class | BE EXTC |
| Course No. | **ECL702** | Academic Year | 2021-2022 |
| Course Name | Mobile Communication System Laboratory | | |
| Name of Faculty | Prof. Ameya Kulkarni / Prof. Archana Ingle | | |

| Course Outcome | Description |
|---|---|
| ECL702.1 | Ability to understand impact of fading by implementing experiments on path loss for different propagation models |
| ECL702.2 | Ability to understand the concept of cellular system design by implementing experiment on cluster size. |
| ECL702.3 | Ability to understand GSM and CDMA technology by implementing |

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| | experiment on PN sequence, CDMA, Walsh code |
| ECL702.4 | Learning latest technologies In mobile communcation. |

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|---|---|---|---|
| Semester | VII | Class | BE EXTC |
| Course No. | ECL703 | Academic Year | 2021-2022 |
| Course Name | Optical Communication Laboratory | | |
| Name of Faculty | Prof. Pratik Parsewar / Prof. Meena Perla | | |

| Course Outcome | Description |
|---|---|
| ECL703.1 | Able to Calculate the Numerical Aperture of the fiber |
| ECL703.2 | Able to calculate the propagation or attenuation bending loss of the fiber |
| ECL703.3 | Able to understand the behavior of LED and Photo transistor through their V-I characteristics |
| ECL703.4 | Able to apply the formula to calculate the link power budget |

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| Semester | VII | Class | BE EXTC |
| Course No. | **ECLDLO 7033** | Academic Year | 2021-2022 |
| Course Name | Internet Communication Engineering Laboratory | | |
| Name of Faculty | Prof. Karishma Raut | | |

| Course Outcome | Description |
|---|---|
| ECL7033.1 | To analyze working of global Internet including client-server paradigm |

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|---|---|
| ECL7033.2 | To implement static and dynamic addressing techniques |
| ECL7033.3 | To demonstrate multimedia communication standards |
| ECL7033.4 | To demonstrate compression and security mechanisms |

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|---|---|---|---|
| Semester | VII | Class | BE EXTC |
| Course No. | ECL 704 | Academic Year | 2021-2022 |
| Course Name | Project stage I | | |
| Name of Faculty | Prof. Karishma Raut | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL704.1 | - | Students will be able to apply the knowledge and skills learned out of courses studied to solve/implement predefined practical problem |
| ECL704.2 | - | Students will be able to develop ability to define, design, analysis and implementation of the problem and lead to its accomplishment with proper planning |
| ECL704.3 | - | Students will be able to Learn the behavioral science by working in a group |
| ECL704.4 | - | Students will be able to Learn additional skills |

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# AY: 2021-2022

# SEMESTER-VIII

# C-SCHEME

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|---|---|---|---|
| Semester | VIII | Class | BE EXTC |
| Course No. | ECC 801 | Academic Year | 2021-2022 |
| Course Name | RF Design | | |
| Name of Faculty | Prof. Ashwini Haryan | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECC 801.1 | RF Filter Design | Able to design filter |
| ECC 801.2 | Amplifier Design | Able to design specific gain and low noise amplifier |
| ECC 801.3 | Frequency Generation & Mixer | Able to design one port transistor oscillator |
| ECC 801.4 | Frequency Synthesizers | Able to understand basics of frequency synthesizers |
| ECC 801.5 | Electromagnetic Interference in RF circuits | Able to understand effects of EMI in RF circuits |
| ECC 801.6 | Electromagnetic Compatibility | Able to understand the EMC standards |

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| | | | |
|---|---|---|---|
| Semester | VIII | Class | B.E EXTC |
| Course No. | ECC 802 | Academic Year | 2021-2022 |
| Course Name | Wireless Networks | | |
| Name of Faculty | Prof. Pratik Parsewar | | |
| Course Outcome | Course Module | Description | |
| ECC 802.1 | **Wireless Body Area Networks** | Able to explain fundamentals of wireless network | |
| ECC 802.2 | **Wireless LAN** | Able to list different wireless body area network and personal area network technologies | |
| ECC 802.3 | **Wireless PAN** | Able to classify different LAN topologies and technologies | |
| ECC 802.4 | **Wireless MAN** | Able to illustrate the fundamentals and architecture of WMAN | |
| ECC 802.5 | **Ultra wideband Communication** | Able to discuss various wireless ADHOC network architecture | |
| ECC 802.6 | **Femtocells** | Able to understand the basic architecture and working of IOT | |

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| | | | |
|---|---|---|---|
| Semester | VIII | Class | BE EXTC |
| Course No. | **ECCDLO 8043** | Academic Year | 2021-2022 |
| Course Name | Satellite Communication | | |
| Name of Faculty | Prof. Karishma Raut / Prof. Nutan Malekar | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ETE 802.1 | **Overview of Satellite Systems, Orbits and Launching** | To demonstrate basics of satellite communication and launching techniques |
| ETE 802.2 | **Space Segment** | To determine different satellite orbits and orbital parameters |
| ETE 802.3 | **Earth station** | To provide in depth understanding of earth segment, space segment and its space qualification |
| ETE 802.4 | **Satellite Links** | To understand and analyze satellite link design |
| ETE 802.5 | **The Space Segment Access and Utilization** | To analyze various methods of satellite access |
| ETE 802.6 | **Satellite Applications** | To understand various applications of satellite communication and future trends |

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|---|---|---|---|
| Semester | VIII | Class | BE EXTC |
| Course No. | ECCILO8021 | Academic Year | 2021-2022 |
| Course Name | Project Management | | |
| Name of Faculty | Prof. Shoeb Shaikh | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECCILO8021.1 | **Project Management Foundation** | Able to understand Project management in various organization structures. |
| ECCILO8021.2 | **Initiating Projects** | Able to Understand & Apply Project Management team building strategies. |
| ECCILO8021.3 | **Project Planning and Scheduling** | Able to develop Work break Down Structure & schedule Project. |
| ECCILO8021.4 | **Planning Projects** | Able to Plan Project and Develop Risk Management Strategies. |
| ECCILO8021.5 | **Executing Projects** | Able to understand and Monitor & Control Projects. |
| ECCILO8021.6 | **Project Leardership & Ethics** | Able to understand project ethics & Closing of the Project. |

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|---|---|---|---|
| Semester | VIII | Class | BE EXTC |
| Course No. | **ECL801** | Academic Year | 2021-2022 |
| Course Name | RF Design Laboratory | | |
| Name of Faculty | Prof. Ashwini Haryan | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL801.1 | - | Able to design RF filters |
| ECL801.2 | - | Able to design low noise and specific gain amplifier using Vsmith |
| ECL801.3 | - | Able to design one port transistor |
| ECL801.4 | - | Able to understand effects of EMI in R F circuits and EMC |

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|---|---|---|---|
| Semester | VIII | Class | BE EXTC |
| Course No. | **ECL801** | Academic Year | 2021-2022 |
| Course Name | Wireless Networks Laboratory | | |
| Name of Faculty | Prof. Karishma Raut | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECL801.1 | - | Able to design the network for WSN using NS2 |
| ECL801.2 | - | Ability to understand different hardware and software's for Wireless Network |
| ECL801.3 | - | Able to do link budget analysis of GSM and WCDMA network using MATLAB |

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|---|---|---|
| ECL801.4 | - | To understand and design IOT environment |

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|---|---|---|---|
| Semester | VIII | Class | BE EXTC |
| Course No. | **ECLDLO 8043** | Academic Year | 2021-2022 |
| Course Name | Satellite Communication Laboratory | | |
| Name of Faculty | Prof. Karishma Raut | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ECLDLO 8043.1 | - | To demonstrate satellite communication for different types of data |
| ECLDLO 8043.2 | - | To calculate basic parameters in satellite communication |
| ECLDLO 8043.3 | - | To calculate satellite link budget for proper communication |
| ECLDLO 8043.4 | - | To understand satellite launching techniques |

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|---|---|---|---|
| Semester | VIII | Class | BE EXTC |
| Course No. | ETP 801 | Academic Year | 2021-2022 |
| Course Name | Project stage II | | |
| Name of Faculty | Prof. Karishma Raut | | |

| Course Outcome | Course Module | Description |
|---|---|---|
| ETP 801.1 | - | Students will be able to apply the knowledge and skills learned out of courses studied to solve/implement predefined |

| | | |
|---|---|---|
| | | practical problem |
| ETP 801.2 | - | Students will be able to develop ability to define, design, analysis and implementation of the problem and lead to its accomplishment with proper planning |
| ETP 801.3 | - | Students will be able to Learn the behavioral science by working in a group |
| ETP 801.4 | - | Students will be able to Learn additional skills |