



Vishnu Waman Thakur Charitable Trust's
VIVA Institute of Technology
Shirgaon, Virar (East), Dist: Palghar-401305, Maharashtra
Website: www.viva-technology.org

Department of Electronics and Telecommunication Engineering

AY: 2022-2023

SEMESTER-III

C-SCHEME



Department of Electronics and Telecommunication Engineering

Semester	III	Class	SE EXTC
Course No.	ECC301	Academic Year	2022-23
Course Name	Applied Mathematics-III		
Name of Faculty	Prof. Shiksha Singh		
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 in engineering 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.	



Department of Electronics and Telecommunication Engineering

Semester	III	Class	SE EXTC
Course No.	ECC 302	Academic Year	2022-23
Course Name	Electronics Devices & Circuits		
Name of Faculty	Prof. Nutan Malekar		
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 BJT's and MOSFET's	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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Semester	III	Class	SE EXTC
Course No.	ECC303	Academic Year	2022-23
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	2022-23
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	2022-23
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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Semester	III	Class	SE EXTC
Course No.	ECL301	Academic Year	2022-23
Course Name	Electronic Devices & Circuits Lab		
Name of Faculty	Prof. Nutan Malekar		
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 measuring 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	2022-23
Course Name	Digital System Design Lab		
Name of Faculty	Prof. Madhura Ranade / Prof. Karishma Raut		
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 be able to Design and implement basic sequential circuits such as counters, registers etc.		
ECL302.5	Students will be able to Acquire basic knowledge of VHDL/Verilog basic programming.		



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Semester	III	Class	SE EXTC
Course No.	ECL303	Academic Year	2022-23
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	2022-23
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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Semester	III	Class	SE EXTC
Course No.	ECM301	Academic Year	2022-23
Course Name	Mini Project 1A		
Name of Faculty	Prof. Madhura Ranade		
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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AY: 2021-2022

SEMESTER-IV

C-SCHEME



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Semester	IV	Class	SE EXTC
Course No.	ECC401	Academic Year	2022-23
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 external of the functional using the concept of Calculus of variation.	



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Semester	IV	Class	SE EXTC
Course No.	ECC 402	Academic Year	2022-23
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	2022-23
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	2022-23
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	2022-23
Course Name	Principles of Communication Engineering		
Name of Faculty	Prof. Meena Perla		
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 & Demultiplexing	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	2022-23
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 be able to interface & write programs for Input and Output devices		
ECL401.5	Students will be able to develop microcontroller based Applications.		

Semester	IV	Class	SE EXTC
Course No.	ECL402	Academic Year	2022-23
Course Name	Linear Integrated Circuits Lab		
Name of Faculty	Prof. Madhura Ranade		
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 be 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	2022-23
Course Name	Principles of Communication Engineering Lab		
Name of Faculty	Prof. Meena Perla		
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 be able to demonstrate digital pulse modulation and demodulation techniques.		
ECL403.5	Students will be 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	2022-23
Course Name	Mini-Project 1B: Arduino & Raspberry Pi based Projects		
Name of Faculty	Prof. Kushal Suvarna		
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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SEMESTER-V

C-SCHEME



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Semester	V	Class	TE EXTC
Course No.	ECC501	Academic Year	2022-23
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	2022-23
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	2022-23
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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Semester	V	Class	TE EXTC
Course No.	ECC504	Academic Year	2022-23
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	2022-23
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	2022-23
Course Name	Digital Communication Lab		
Name of Faculty	Prof. Meena Perla		
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	2022-23
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	2022-23
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 CMOS circuits.	
ECL 503.3	MOS Design Logic Styles	Able to Evaluate performance of given CMOS circuits. Able to design CMOS circuits.	
ECL 503.4	Semiconductor Memories	Able to Draw layout of given CMOS circuit and also able to extract various parasitics 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	2022-23
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	2022-23
Course Name	Mini Project 2A: Embedded System Project		
Name of Faculty	Prof. Nutan Malekar		
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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AY: 2021-2022

SEMESTER-VI

C-SCHEME



Department of Electronics and Telecommunication Engineering

Semester	VI	Class	TE EXTC
Course No.	ECC 601	Academic Year	2022-23
Course Name	Electromagnetics and Antenna		
Name of Faculty	Prof. Ashwini Haryan		
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	2022-23
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	2022-23
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	2022-23
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	2022-23
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	2022-23
Course Name	Electromagnetics and Antenna Lab		
Name of Faculty	Prof. Ashwini Haryan		
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	2022-23
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	2022-23
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	2022-23
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	2022-23
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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SEMESTER-VII

C-SCHEME



Department of Electronics and Telecommunication Engineering

Semester	VII	Class	BE EXTC
Course No.	EEC701 ME	Academic Year	2022-2023
Course Name	Microwave Engineering		
Name of Faculty	Prof. Ashwini Haryan		
Course Outcome	Course Module	Description	
ECC701.1	TRANSMISSION LINES	Apply Smith chart use for solution of transmission line problems and impedance matching .	
ECC701.2	WAVEGUIDES	Describe the types of waveguides, rectangular waveguides and field equations	
ECC701.3	WAVEGUIDE COMPONENTS	Understand the coupling mechanisms in waveguides and analyze the waveguide multiport junctions	
ECC701.4	MICROWAVE TUBES	Explore the microwave linear tubes and analyze with microwave cross field tubes	
ECC701.5	MICROWAVE SEMICONDUCTOR DEVICES	Understand the microwave solid state devices and avalanche transit time devices	
ECC701.6	MICROWAVE MEASUREMENTS	Demonstrate the microwave bench set up and conducting measurements of different parameters.	



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Semester	VII	Class	BE EXTC
Course No.	ECC702	Academic Year	2022-2023
Course Name	Mobile Communication System		
Name of Faculty	Prof. Archana Ingle		
Course Outcome	Course Module	Description	
ECC702.1	Fundamentals of Mobile Communication	Students will be able to Explain the cellular fundamentals and estimate the coverage and capacity of cellular systems.	
ECC702.2	Mobile Radio Propagation	Students will be able to Classify different types of propagation models and analyse the link budget.	
ECC702.3	2G Technologies	Students will be able to Compare and contrast GSM, GPRS, HSCSD, EDGE and IS-95 Technologies.	
ECC702.4	3G Technologies	Students will be able to Apply the concepts of 3G technologies for UMTS and CDMA 2000	
ECC702.5	3GPP LTE	Students will be able to Describe the features and working principle of 3GPP LTE.	
ECC702.6	Advanced techniques for 4G deployment and beyond	Students will be able to Discuss the emerging technologies for upcoming mobile communication systems.	



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Semester	VII	Class	B.E.
Course No.	ECCDLO 7023	Academic Year	2022-2023
Course Name	Internet Communication Engineering		
Name of Faculty	Prof. Meena Perla		
Course Outcome	Course Module	Description	
ECCDLO 7023.1	Introduction to Internet	The student will be able to compare the protocols at each layer of TCP/IP protocol suite	
ECCDLO 7023.2	Application layer in the Internet	The student will be able to explain the internet security aspects of protocols at various layers of TCP/IP protocol suite.	
ECCDLO 7023.3	Internet security	The student will be able to apply the various compression algorithms for audio, image & video coding.	
ECCDLO 7023.4	Multimedia Communication	The student will be able to categorize and design simple networked multimedia systems.	
ECCDLO 7023.5	Quality of Service	The student will be able to compare integrated & differentiated services for quality of service.	
ECCDLO 7023.6	Network Industry Trends & Automation	The student will be able to explain software defined network.	



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Semester	VII	Class	B.E.
Course No.	ECCDLO7033	Academic Year	2022-23
Course Name	Deep Learning		
Name of Faculty	Prof. Karishma Raut		
Course Outcome	Course Module	Description	
ECCDLO 7012.1	Introduction to Deep learning	Student will be able to Understand the fundamentals of Deep Learning	
ECCDLO 7012.2	TensorFlow for Deep learning	Student will be able to Understand the concepts of TensorFlow, its main functions, operations and the execution pipeline	
ECCDLO 7012.3	Regularization and Optimization Techniques	Student will be able to Improve deep learning models using Regularization and Optimization techniques	
ECCDLO 7012.4	Evolution of CNN in Deep Learning	Student will be able to Compare the Convolution Neural Network architectures and use them as per the application	
ECCDLO 7012.5	Sequence Modeling	Student will be able to Design and implement Sequence Neural Network systems and solve real-world problems	
ECCDLO 7012.6	Sequence Modeling	Student will be able to Illustrate the working of Auto encoders and use them for real-life applications	



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Semester	VII	Class	BE EXTC
Course No.	ILO7013	Academic Year	2022-2023
Course Name	Management Information System		
Name of Faculty	Prof. Pratik Parsewar		
Course Outcome	Course Module	Description	
ECCILO 7013.1	Introduction To Information Systems (IS)	Computer Based Information Systems, Impact of IT on organizations, Imporance of IS to Society. Organizational Strategy, Competitive Advantages and IS.	
ECCILO 7013.2	Data and Knowledge Management	Database Approach, Big Data, Data warehouse and Data Marts, Knowledge Management. Business intelligence (BI): Managers and Decision Making, BI for Data analysis and Presenting Results	
ECCILO 7013.3	Ethical issues and Privacy	Information Security. Threat to IS, and Security Controls	
ECCILO 7013.4	Social Computing (SC)	Web 2.0 and 3.0, SC in business-shopping, Marketing, Operational and Analytic CRM, E-business and E-commerce – B2B B2C. Mobile commerce	
ECCILO 7013.5	Computer Networks	Wired and Wireless technology, Pervasive computing, Cloud computing model.	
ECCILO 7013.6	Information System within Organization	Transaction Processing Systems, Functional Area Information System, ERP and ERP support of Business Process. Acquiring Information Systems and Applications: Various System development life cycle models.	



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Semester	VII	Class	BE EXTC
Course No.	ECL701	Academic Year	2022-2023
Course Name	Microwave Engineering Laboratory		
Name of Faculty	Prof. Ashwini Haryan		
Course Outcome	Description		
ECL701.1	Able to handle microwave equipments		
ECL 701.2	Able to understand microwave measurements and test the characteristics of microwave components		
ECL 701.3	Able to understand Wave guide and transmission line measurements		
ECL 701.4	Demonstrate working of microwave semiconductor devices		
ECL 701.5	Demonstrate the microwave bench set up and conducting measurements of different parameters		

Semester	VII	Class	BE EXTC
Course No.	ECL702	Academic Year	2022-2023
Course Name	Mobile Communication System Laboratory		
Name of Faculty	Prof. Archana Ingle		
Course Outcome	Description		
ECL702.1	Demonstrate the microwave bench set up and conducting measurements of different parameters		
ECL702.2	Compare and contrast trunking radio systems		
ECL702.3	Examine the effect of small-scale fading parameters on the performance of radio channel characteristics.		



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ECL702.4	Analyze link budget for various propagation path-loss models
ECL702.5	Summarize the attributes of OFDM, MIMO, and Cognitive radio
ECL702.6	Summarize the attributes of OFDM, MIMO, and Cognitive radio

Semester	VII	Class	BE EXTC
Course No.	ECL 704	Academic Year	2022-2023
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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SEMESTER-VIII

C-SCHEME



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Semester	VIII	Class	BE EXTC
Course No.	ECC801	Academic Year	2022-2023
Course Name	Optical Communication and Networks		
Name of Faculty	Prof. Ashwini Haryan		
Course Outcome	Course Module	Description	
ECC801.1	Introduction and Basics of Optical fiber communication	Understand optical networks at large by identifying the types of fibers, cables and deployment	
ECC801.2	Transmission Characteristic of Optical Fiber	Design point to point optical fiber communication links using appropriate optical fibers, light sources, couplers, detectors, and multiplexers	
ECC801.3	Optical Communication Systems	Design a short haul or long-haul optical network with repeater by incorporating suitable amplifiers.	
ECC801.4	Optical Network System Components and Optical Networks	Compare SDH, PDH and WDM techniques and implement.	
ECC801.5	Packet Switching and Access Networks	Explore concepts of designing and operating principles of modern optical communication systems and networks	
ECC801.6	Network Design and Management	Apply the knowledge acquired to design the next generation fiber and FSO networks for indoor and outdoor applications	



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Semester	VIII	Class	B.E EXTC
Course No.	ECCDL OC8013	Academic Year	2022-2023
Course Name	Wireless Networks		
Name of Faculty	Prof. Pratik Parsewar		
Course Outcome	Course Module	Description	
ECCDL OC8013.1	Overview of wireless networks	Explain fundamental architecture, design issues and standards of wireless networks.	
ECCDL OC8013.2	Wireless Personal Area Networks	Compare different types of Personal Area Network (PAN) technologies such as ZigBee, Bluetooth, UWB, NFC and 6LoWPAN.	
ECCDL OC8013.3	Wireless Local Area Network & Wireless Adhoc Networks	Analyze different LAN topologies and technologies and ad hoc networks	
ECCDL OC8013.4	Wireless Metropolitan & Vehicular Adhoc Networks	Compare various types of network protocols, ad hoc vehicle networks and Wireless MANs.	
ECCDL OC8013.5	Wireless Wide Area Networks	Evaluate the planning and design of performance of GSM and CDMA system in Wireless WANs.	
ECCDL OC8013.6	Advanced Technologies of Wireless Networks	Understand the basic network architecture of Wireless sensor networks concepts to develop an IoT applications.	



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Semester	VIII	Class	BE EXTC
Course No.	ECCILO8021	Academic Year	2022-2023
Course Name	Project Management		
Name of Faculty	Prof. Kushal Suvarna		
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 Leadership & Ethics	Able to understand project ethics & Closing of the Project.	



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Semester	VIII	Class	BE EXTC
Course No.		Academic Year	2022-2023
Course Name	Optical Communication and Network Lab		
Name of Faculty	Prof. Ashwini Haryan		
Course Outcome	Course Module	Description	

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	



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