



Agnel Charities'

Fr. C. Rodrigues Institute of Technology, Vashi, Navi Mumbai.

***Course Outcomes of Electronics
& Telecommunication
Department
Academic Year 2022-23***



Subject Code	Subject Name	CO-ID	CO-Statement
SEMESTER – III			
ECC301	ENGINEERING MATHEMATICS III	CO1	The Learner will be able to apply the concepts of Laplace Transform & inverse Laplace transform to solve differential problems.
		CO2	The Learner will be able to apply the concepts of Fourier series to write the function in terms of sine and cosine terms.
		CO3	The Learner will be able to apply concepts Complex variable theory to find the orthogonal trajectories.
		CO4	The Learner will be able to apply concepts of Matrix operations to solve Mathematical problems.
		CO5	The Learner will be able to apply concept of Vector calculus to solve engineering problem.
		CO6	The Learner will be able to use the concept of higher Mathematics to solve Engineering Problems.
ECC302	ELECTRONIC DEVICES AND CIRCUITS	CO1	Comprehend working and characteristics of semiconductor devices like diodes, BJTs, FETs ,EMOSFET.
		CO2	Design BJT and FET DC biasing circuits
		CO3	Carry out small signal (high and low) frequency analysis of single stage amplifier circuits of BJT , JFET, EMOSFET.
		CO4	Analyze large signal amplifiers.
		CO5	Comprehend the concepts of Differential amplifiers and power amplifiers.
		CO6	Exhibit skills in written, oral and presentation communication skills related to this subject and engage in a lifelong learning.
ECC303	DIGITAL SYSTEM DESIGN	CO1	Comprehend types of digital logic (Number Systems, Codes and logic gates), digital circuits and logic families.
		CO2	Design combinational logic circuits.
		CO3	Design sequential logic circuits.
		CO4	Classify different types of memories and PLDs.
		CO5	Implement digital Circuit using HDL.
		CO6	Develop a digital logic and apply it to solve real life problems.
ECC304	NETWORK THEORY	CO1	Apply their knowledge in analyzing Circuits by using network theorems.
		CO2	Apply the time and frequency method of analysis.
		CO3	Evaluate circuit using graph theory.
		CO4	Find the various parameters of two port network.
		CO5	Apply network topology for analyzing the circuit.
		CO6	Synthesize the network using passive elements.
ECC305	ELECTRONIC INSTRUMENTATION AND CONTROL SYSTEM	CO1	Comprehend the principle of measurement and working of different sensors, transducers used in various applications in engineering.
		CO2	Use block diagram reduction rules and Mason's gain



Subject Code	Subject Name	CO-ID	CO-Statement
			formula to find transfer functions of different ordered systems.
		CO3	Solve the transient & steady state response for the given systems.
		CO4	Analyze systems in time domain for their stability.
		CO5	Analyze systems in frequency domain for their stability.
ECL301	ELECTRONIC DEVICES AND CIRCUITS LABORATORY	CO1	Examine the performance characteristics of sensors and transducers.
		CO2	Analyze time response of different ordered system and calculate the steady-state error.
		CO3	Analyze frequency response of different ordered system.
		CO4	Inspect the stability of system
ECL 302	DIGITAL SYSTEM DESIGN LAB	CO1	Identify the of Digital ICs for combinational and sequential circuits.
		CO2	Design and implement combinational circuits such as adder, subtractor, code converters and decoders.
		CO3	Verify the truth tables of SR, JK, D and T- types of flip flops.
		CO4	Design and implement Sequential circuits such as Counters and Shift registers
		CO5	Simulate digital designs using Hardware Descriptive Language
ECL303	ELECTRONIC INSTRUMENTATION AND CONTROL SYSTEM LAB	CO1	Examine the performance characteristics of sensors and transducers.
		CO2	Analyze time response of different ordered system and calculate the steady-state error.
		CO3	Analyze frequency response of different ordered system.
		CO4	Inspect the stability of system
ECL304	SKILL LAB C++AND JAVA PROGRAMMING	CO1	Comprehend the principle of measurement and working of different sensors, transducers used in various applications in engineering.
		CO2	Use block diagram reduction rules and Mason's gain formula to find transfer functions of different ordered systems.
		CO3	Solve the transient & steady state response for the given systems.
		CO4	Analyze systems in time domain for their stability.
		CO5	Analyze systems in frequency domain for their stability.
ECM 301	MINI PROJECT1 ANALOG AND DIGITAL CIRCUIT DESIGN BASED PROJECT	CO1	Identify analog or digital electronic circuit for a particular application and illustrates the project schedule
		CO2	Simulate and analyze basic analog or digital circuits using simulation software
		CO3	Realize a circuit on General Purpose PCB and Design the layout of the circuit using PCB design software
		CO4	Administer the techniques of soldering, PCB making and perform fault detection and correction of the circuit
		CO5	Utilize and operate the basic electronic tools and equipments like DMM, CRO, DSO etc.
		CO6	Function effectively as an individual and as member or leader in implementing the mini project for applications related to the field



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			of electronics and communication engineering in a group of four students.
		CO7	Enhance their written and oral technical communication skills related to their project and follow the ethics of report writing.
SEMESTER – IV			
ECC401	ENGINEERING MATHEMATICS IV	CO1	Learner will be able to use the concepts of Complex Integration for evaluating integrals.
		CO2	Learner will be able to apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science.
		CO3	Learner will be able to apply the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.
		CO4	Learner will be able to Apply the concept of Vector space to solve the Engineering problems.
		CO5	Learner will be able to Apply the concept of Quadratic form & SVD to solve the Engineering problems.
		CO6	Learner will be able to Apply the concept of Calculus of variation to solve mathematical models.
ECC402	MICROCONTROLLERS	CO1	Illustrate the knowledge of RISC, CISC, Harvard & Von Neumann architectures used in computer organization.
		CO2	Classify the primary and secondary memories used in microprocessor based system.
		CO3	Illustrate the knowledge of 8051 microcontroller architecture and concepts related to its timer/counter, serial communication and interrupts.
		CO4	Develop language programs for arithmetic and logical operations, data transfer and I/O interface for 8051 microcontrollers.
		CO5	Illustrate the knowledge of ARM 7 architecture and its instruction set for data transfer, processing and flow control.
		CO6	Design an application such as speed control of DC Motor, Temperature monitoring system using PIC16F886/Atmega 328P microcontrollers
ECC403	LINEAR INTEGRATED CIRCUITS	CO1	Comprehend basic fundamentals of OP-AMP and its configuration.
		CO2	Interpret and design various linear application using operational amplifier.
		CO3	Interpret and design various non-linear application using operational amplifier.
		CO4	Analyze functionality of Timer ICs and design Astable and Monostable multivibrator circuits related to IC 555.
		CO5	Comprehend voltage regulator like 78XX,79XX,LM 317 and 723 and special purpose ICs like IC 566,565 along with their applications.
		CO1	Classify and Analyze different types of signals and systems



Subject Code	Subject Name	CO-ID	CO-Statement
ECC404	SIGNALS & SYSTEMS	CO2	Analyze continuous time LTI signals and systems in transform domain
		CO3	Analyze and realize discrete time LTI signals and systems in transform domain
		CO4	Represent signals using Fourier Series and Analyze the systems using the Fourier Transform.
		CO5	Demonstrate the concepts learnt in Signals and systems Course by processing real world signals using the modern engineering tools.
ECC405	PRINCIPLES OF COMMUNICATION ENGINEERING	CO1	Summarize the basic concepts and components of Communication Systems.
		CO2	Summarize amplitude modulation and demodulation techniques.
		CO3	Interpret working of angle modulation /demodulation and compare the performance of AM and FM radio receivers.
		CO4	Differentiate analog and digital pulse modulation techniques and illustrate the principles of multiplexing and demultiplexing techniques with appropriate block diagrams.
		CO5	Develop an electronic communication application, recognize its need and summarize the communication technology used.
ECC401	MICROCONTROLLERS LAB	CO1	Develop microcontroller-based systems using the integrated design Environment. .
		CO2	Develop assembly language programs for arithmetic and logical operations, code conversion & data transfer operations
		CO3	Develop assembly language programs to configure timers, serial trans-receivers and interrupts of microcontrollers..
		CO4	Develop interface Input & Output devices such as keys, LEDs, LCDs, 7 Segment Display, stepper motor to microcontrollers & write programs for its mode of operation
		CO5	Develop microcontroller-based Applications using input/output devices.
ECL402	LINEAR INTEGRATED CIRCUITS LAB	CO1	Realize various closed loop configurations of OP-AMP.
		CO2	Demonstrate various linear and non-linear applications of OP-AMP.
		CO3	Design and implement circuits related to OP-AMP and Timer IC-555.
		CO4	Simulate IC based circuits like waveform generators and voltage regulators using software tools like multisim/LT spice.
ECL403	PRINCIPLES OF COMMUNICATION ENGINEERING LAB	CO1	Perform and analyze experiments to demonstrate amplitude modulation/ demodulation with respect to physical principles using modern tools.
		CO2	Demonstrate Pre-emphasis and De-emphasis in FM and FM demodulation techniques using lab experiments.
		CO3	Demonstrate and analyze the working of pulse modulation circuits.
		CO4	Perform software simulations to demonstrate concepts of multiplexing.
		CO1	Classify the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.



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ECL404	SKILL LAB: PYTHON PROGRAMMING	CO2	To execute different Decision-Making statements and Functions by identifying their application to given task.
		CO3	Apply Object oriented programming concepts to data structures in Python.
		CO4	Perform different database operations and Develop GUI Applications in Python.
		CO5	Develop Data visualization and analytical applications for machine learning using Python.
SEMESTER – V			
ECC 501	DIGITAL COMMUNICATION	CO1	Apply the concepts of information theory in source coding.
		CO2	Compare different error control systems and analyze different error correction codes.
		CO3	Analyse the performances of different digital modulation techniques.
		CO4	Compare various baseband transmission methods and evaluate the performance of optimum baseband detection in the presence of white noise.
		CO5	Function as a team to choose and implement the circuit of a digital modulation/demodulation scheme and present a report.
ECC 502	DISCRETE TIME SIGNAL PROCESSING	CO1	Analyze signals and systems using Discrete Fourier transform and its properties, select an appropriate method for implementation of DFT and employ DFT for linear filtering of long data sequences
		CO2	Design and realize Butterworth and Chebyshev IIR filters to satisfy the given specifications and design
		CO3	Characterize FIR filters, design and realize FIR filters using techniques such as Windowing and Frequency sampling.
		CO4	Analyze the impact of hardware limitations on the performance of Digital filters, Realize FIR and IIR digital structures and apply signal processing concepts, algorithms in applications related to the field of biomedical and audio signal engineering
ECC 503	DIGITAL VLSI	CO1	Comprehend various tools, processes, basics of MOS, scaling and short channel effects in VLSI Design.
		CO2	Derive expressions for performance parameters of basic building blocks like CMOS Inverter, NAND and NOR with layouts.
		CO3	Analyze the working of various design style, CMOS combinational, sequential and semiconductor memories used in VLSI Design.
		CO4	Relate performance parameters with design parameters of VLSI circuits.
		CO5	Demonstrate the ability to learn independently, implementing basic application-based programs on HDLs and produce systematic document on it.
ECC504	RANDOM SIGNAL ANALYSIS	CO1	Apply theory of probability in identifying and solving relevant problems.
		CO2	Differentiate continuous and discrete random variables and their distributions.



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		CO3	Analyze mean, variance, and distribution function of random variables and functions of random variables.
		CO4	Summarize a random process, determine the type of the process and find the response of LTI system for WSS process.
		CO5	Illustrate linear regression algorithms and apply for predictive applications.
ECCDLO 5013	IT INFRA AND SECURITY	CO1	To understand basic fundamentals of IT Infrastructure and its management
		CO2	Classify different concepts of information security while building security infrastructure
		CO3	Analyze software vulnerabilities and attacks on database and operating systems
		CO4	Illustrate the need for security protocols in the context of wireless communication
		CO5	Demonstrate the different attacks on open web application and web services.
ECCDLO 5014	DATA STRUCTURES AND ALGORITHM	CO1	Illustrate the concept of data structures, types, operations and asymptotic analysis.
		CO2	Apply Stack and Queue data structures for various applications.
		CO3	Apply Linked list type of data structures for various applications.
		CO4	Apply Trees & Graph data structures for various applications.
		CO5	Comprehend the Sorting and Searching Algorithms, concept of hashing techniques useful in real life problem solving.
ECL 501	DIGITAL COMMUNICATION LAB	CO1	Perform an experiment to analyze the effect of sampling rate with the different source codes.
		CO2	Perform an experiment to obtain Block code for given parity check equations and study properties of line codes and study the effect of these codes on the bandwidth of BASK signal.
		CO3	Perform an experiment to demonstrate BASK/BPSK /BFSK modulation/demodulation for a given bitstream.
		CO4	Analyse the performance of digital modulation schemes using simulation software.
ECL 502	DISCRETE TIME SIGNAL PROCESSING LAB	CO1	Perform basic discrete time signal processing operations such as Linear Convolution, Circular Convolution, Auto Correlation, Cross Correlation, etc. and interpret the results
		CO2	Demonstrate their ability towards interpreting and performing frequency analysis of different discrete time sequences and systems
		CO3	Design and implement the FIR and IIR Filters for given specifications
		CO4	Implement and analyse applications related to the field of biomedical signal processing and audio signal processing
ECL 503	DIGITAL VLSI LAB	CO1	Demonstrate the characteristics of MOSFET and short channel effects.



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		CO2	Analyze the static and transient behavior of CMOS Inverter using SPICE.
		CO3	Interpret and analyze the behavior of transmission gate and 6T1RAM Cell.
		CO4	Draw the layout of combinational circuits
		CO5	Write and Simulate the HDL code for finite state machines.
ECL506	PROFESSIONAL COMMUNICATION & ETHICS-II	CO1	Learner will be able to communicate effectively and ethically in both oral and written forms. [Tools: Book Report on any aspect of societal engineering, GDs based on Case studies of corporate/social dilemmas]
		CO2	Learner will be able to possess the skill set required for successful employability and exhibit leadership skills. [Tools: Debates, Mock MUNs, Book Report Planning & Presentation, assignment on interpersonal skills]
		CO3	Learner will be able to develop an acumen to prepare for various competitive exams, as also prepare reports and presentations on topics pertaining to the wellbeing of society and the environment. [Tools: Topic Proposal assignment, Assignment with citations and referencing in APA/IEEE format]
		CO4	Learner will be able to demonstrate knowledge of professional and personal etiquettes & ethics in the global environment. [Tools: MCQ on IPR & Ethics, GD on social dilemmas, Final Presentation, Book Report]
ECM502	MINI PROJECT 2A- EMBEDDED SYSTEM PROJECT	CO1	Apply the knowledge acquired in the field of Embedded system to work on the microcontroller-based project
		CO2	Systematically analyze electronics & telecommunication related project based on literature review.
		CO3	Design embedded system applications using sensors, peripherals and RTOS.
		CO4	Carry out different experiments to generate data, analyze and interpret the data, and draw valid conclusions related to their project work.
		CO5	Select and apply appropriate modern tools for the solution of their project problem
		CO6	Know responsibilities of an engineer towards the society with respect to their project work
		CO7	Apply professional ethical principles while project implementation, report writing, and publication.
		CO8	Work in a team with mutual consent and agreement.
		CO9	Communicate effectively during project oral/visual presentations and report writing.
		CO10	Gain knowledge of engineering and management aspects while project is being implemented
		CO11	Engage themselves in independent and lifelong learning.
SEMESTER- VI			



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ECC601	ELECTROMAGNETICS & ANTENNA	CO1	Describe fundamentals related to electrostatic and magnetic fields.
		CO2	Apply Maxwells equation to propagation of electromagnetic waves through different mediums.
		CO3	Apply fundamentals related to antennas and special antennas.
		CO4	Apply antenna arrays and wave propagation
		CO5	Communicate effectively the concepts taught in EM & A by presenting as an individual or teams to deliver a seminar in a group of 4-5 students
ECC602	COMPUTER COMMUNICATION NETWORKS	CO1	Paraphrase all the protocols used at various layers in OSI model, network hardware devices and transmission media.
		CO2	Solve problems related to interpretation of the fields used in IP and TCP headers and perform the sub-netting
		CO3	Compare the different network architectures, the four layer protocol suites and medium access control methods
		CO4	Justify the use of various routing protocols and protocols used at Internet, transport and application layer
		CO5	Able to assess social and security issues faced while making use of application layer protocols in computer communication networks
ECC603	IMAGE PROCESSING AND MACHINE VISION	CO1	Demonstrate knowledge of concepts related to image processing in spatial and frequency domain.
		CO2	To perform spatial domain enhancement on grayscale image numerically.
		CO3	Use basic concepts of image processing and machine vision to classify or represent or extract the given data.
		CO4	To use feature extraction and classification methods for Machine vision application.
		CO5	To present state of art implementation in the field of IPMV from selected research paper.
ECC604	ARTIFICIAL NEURAL NETWORKS & FUZZY LOGIC	CO1	illustrate the knowledge of architecture, terminology and concepts related to various artificial neural networks.
		CO2	arrive at specifications of an artificial neural network designed to perform given task, using supervised/ unsupervised learning algorithms.
		CO3	apply concepts of CNN, SVM and LMS to solve moderately complex practical problems.
		CO4	solve problems related to fuzzy logic-based operations, systems and models.
		CO5	Apply fuzzy design principles for designing some moderately complex real-world systems.
ECL601	ELECTROMAGNETICS AND ANTENNA LABORATORY	CO1	Perform experiments on various antennas to study their parameters, importance, analyze, and interpret the parameters.
		CO2	Perform experiments on arrays (Broadside, end-fire, parametric study for various array parameters)



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		CO3	Perform simulation experiments on antennas using open source software to study their parameters
		CO4	Function effectively as individual in a team of 4-5 members to present the report.
ECL602	COMPUTER COMMUNICATION NETWORKS LAB(CCNL)	CO1	Implement and troubleshoot networks with available IP utilities.
		CO2	Analyze network and transport layer using Wireshark software
		CO3	Use Cisco packet tracer software to perform elementary configurations
		CO4	Function effectively as an individual as well as in a team in performing experiments and course projects using appropriate modern tools.
ECL603	IMAGE PROCESSING AND MACHINE VISION LAB	CO1	To perform various spatial domain enhancement on given image.
		CO2	To implement basic techniques required for edge detection in image
		CO3	Report and comment on effect of different decision parameters while implementing image processing algorithm.
		CO4	Develop an application or algorithm , as a team, based upon knowledge gained in IPMV for any given problem.
ECM603	MINI PROJECT 2B (FPGA BASED)	CO1	Identify problems based on societal needs and define problem statements for implementation.
		CO2	Carry out survey/ experiments to generate and analyze data to identify design requirements.
		CO3	Select and apply appropriate modern tools for obtaining solutions related to project work.
		CO4	Develop software and/or hardware based on the specifications related to the project and validate obtained output to draw conclusive interpretations.
		CO5	Apply professional ethics/principles and communication skills and work effectively as individual and as a member of team for project implementation, report writing, presentations and demonstrations.
		CO6	Know responsibility of engineer towards society, gain knowledge of engineering and management aspects and engage themselves in independent and lifelong learning.
ECCDLO 6014	DATABASE MANAGEMENT SYSTEM	CO1	Illustrate the knowledge of database systems, architecture, terminology and concepts related to various data models.
		CO2	Design ER models, relational schemas by following Codd rules for a relational database management system (RDBMS).
		CO3	Apply concepts of calculus and normalization methods to solve design issues of relational databases
		CO4	Demonstrate the use of Structured Query Language (SQL) , relational algebra, tools to implement commands, functions, views and triggers to execute various queries to databases.
		CO5	Comprehend the concept of transaction management, ACID properties, serializability, security and privacy concerns of databases.



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ECL604	SKILL LAB: LINUX AND NETWORKING AND SERVER CONFIGURATION	CO1	Illustrate the understanding of open source Linux OS, its architectural features, types and installation methods and implement basic user commands
		CO2	Implement the system administrative functionality, user and hardware control, role as super user
		CO3	Apply linux shell script programming for various applications-general use, automating system tasks, scheduling using cron.
		CO4	Implement linux networking concepts to configure and develop server, network based applications like samba, ftp, telnet etc
		CO5	Demonstrate listening, oral, written and presentation communication skills related to Skill Lab: Linux & Networking, Server Configuration.
SEMESTER- VII			
ECC701	MICROWAVE ENGINEERING	CO1	Illustrate concepts related to transmission lines.
		CO2	Analyze the waveguides and waveguide components.
		CO3	Analyze the microwave tubes.
		CO4	Understand and apply the semiconductor devices for microwave applications and measurements.
		CO5	Recognize societal and health hazards of microwave radiations.
ECC701	MOBILE COMMUNICATION SYSTEM	CO1	Associate cellular fundamentals of frequency reuse, channel assignment techniques and multiple access techniques with capacity improvement.
		CO2	Identify challenges in wireless environment in the form of different fading channels and compare propagation models.
		CO3	Summarize functionalities of 2nd and 3rd Generation technologies like GSM, IS95, WCDMA and CDMA2000.
		CO4	Summarize the techniques used for 4G and 5G deployment.
		CO5	Restate the responsibilities of service providers and users w.r.t. radiation hazards and frequency resource utilization.
ECLDLO 7013	CLOUD COMPUTING AND SECURITY	CO1	Recognize the need to use cloud computing as an alternative to traditional computing and describe concepts related to cloud computing.
		CO2	Determine objectives & design requirements for virtualization and identify various mechanisms to meet them.
		CO3	Report accuracy and limitations of various freely available cloud service platforms
		CO4	Define scope of cloud application design and develop an experimental approach to address technical aspects related to the application.
		CO5	Identify data security concerns in cloud computing and relate available standards/models to address these concerns.
ECLDLO 7014	BIG DATA ANALYTICS	CO1	Comprehend the concept of Big Data characteristics and technologies along with its challenges
		CO2	Explain the concept of Hadoop and its architecture along with its limitations.



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		CO3	Illustrate the concept of NoSQL to manage big data and its problems.
		CO4	Interpret the concept of MapReduce and its organization and algorithms
		CO5	Describe various techniques in Big Data analytics and its applications
ECLDLO 7021	ROBOTICS	CO1	Explain basic concept of robotics
		CO2	Illustrate the differential motion and statics in robotics
		CO3	Characterize the various path planning techniques.
		CO4	Describe the dynamics and control in robotics industries.
		CO5	Write a program to use a robot for different application
ECLDLO 7023	INTERNET COMMUNICATION ENGINEERING	CO1	Comprehend knowledge gained related to layers in TCP/IP model and operation of various application layer protocols
		CO2	Justify the use of Internet security protocols, network industry trends and automation to access societal and legal issues.
		CO3	Compare the various TCP/IP protocols, multimedia transmission related techniques and QoS models.
		CO4	Solve numerical examples related to Information representation, digitization and compression algorithms
		CO5	Apply knowledge gained about application layer protocols as well as multimedia communication protocols to give illustrative examples
ILO7012	RELIABILITY ENGINEERING		A learner will be able to apply the concept of Probability theory to engineering problems.
		CO2	A learner will be able to apply various reliability concepts to calculate different reliability parameters.
		CO3	A learner will be able to illustrate the understanding of System Reliability.
		CO4	A learner will be able to illustrate reliability improvement techniques and System Reliability Analysis.
		CO5	A learner will be able to illustrate the various aspects of Maintainability, Availability and Failure Mode Effect and Criticality Analysis.
ILO7015	OPERATION RESEARCH	CO1	Apply and Summarize workings of the simplex method, the relationship between a linear program and its dual, including strong duality and complementary slackness.
		CO2	Analyse, Identify and Solve specialized LPP like transportation, assignment and dynamic programming problems.
		CO3	Select, Apply and Find the usage of Queuing Theory for solving engineering problems.
		CO4	Apply simulation method and usage of simulation in managerial decision making problems.
		CO5	Apply and Solve given problems using Game Theory.
		CO6	Select and Apply appropriate models and infer the outcome.



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ILO7016	CYBER SECURITY AND LAWS	CO1	To be aware about cybercrimes, information security and Indian IT Act 2000.
		CO2	To understand different types of cyberattacks and security measures to mitigate the attacks
		CO3	To understand different types of attacks and its countermeasures
		CO4	To interpret IT laws in various legal issues
		CO5	To recognize and apply Indian IT Act and its amendments
		CO6	To recognize and apply information security compliances.
ILO7017	DISASTER MANAGEMENT AND MITIGATION MEASURES	CO1	Students will be able to comprehend hazards, risks, vulnerability, capacities from social and technological, perspectives.
		CO2	students will be able to recognize natural as well as man-made disaster and their extent along with its possible effects on the economy and dynamics of management.
		CO3	Students will be able to Comprehend national structures of development planning and disaster management based on previous history.
		CO4	Students will be able to describe the government policies, acts and various organizational structures associated with emergency.
		CO5	Students will be able to explain the simple do's and donts in extreme events and climate change for effective management of disasters.
ILO7018	ENERGY AUDIT AND MANAGEMENT	CO1	To know about Energy Conservation Act-2001 and its features towards enhancement of Energy Security
		CO2	To use basic concept of energy optimization techniques and analyze its role in the energy audit process
		CO3	To apply various data information and financial analysis techniques to check feasibility of project in the energy audit process
		CO4	To apply energy conservation opportunities in energy systems, to enhance efficiency
		CO5	To analyse energy performance of various electrical and mechanical systems
ECL701	MICROWAVE ENGINEERING LABORATORY	CO1	Determine the frequency and guide wavelength of microwave.
		CO2	Determine reflection coefficient, VSWR, unknown load, and characterization of various TEEs.
		CO3	To explore virtual lab techniques to study field pattern inside a rectangular waveguide /cavity.
		CO4	Apply the knowledge (Microwave Engineering) to analyze the VI characteristics of Gunn diode.
ECL702	MOBILE COMMUNICATION SYSTEM LABORATORY	CO1	Demonstrate the effect of cellular system design parameters on system capacity using open source software.
		CO2	Develop software program to relate the signal and channel parameters with the type of fading.



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		CO3	Use open source software to generate orthogonal codes for 2G/3G systems.
		CO4	Develop codes to summarize the attributes of OFDM, MIMO used in 4G.
ECP701	PROJECT-I	CO1	Apply the knowledge acquired based on curricular and co-curricular activities to solve electronics & telecommunication related project work.
		CO2	Systematically analyze electronics & telecommunication related project based on literature review.
		CO3	Design and develop hardware circuits and/or software code based on problem specifications of the project
		CO4	Carry out different experiments to generate data, analyze and interpret the data, and draw valid conclusions related to their project work.
		CO5	Select and apply appropriate modern tools for the solution of their project problem
		CO6	Know responsibilities of an engineer towards the society with respect to their project work
		CO7	Understand the impact of the engineering solutions related to their project work in societal and environmental context for sustainable development
		CO8	Apply professional ethical principles while project implementation, report writing, and publication.
		CO9	Work effectively as an individual and as a member of the team while project work is carried out.
		CO10	Communicate effectively while project report writing and oral/visual presentations
		CO11	Gain knowledge of engineering and management aspects while project is being implemented
		CO12	Engage themselves in independent and life long learning.
SEMESTER- VIII			
ECC801	OPTICAL COMMUNICATION AND NETWORKS	CO1	Apply basic concepts and theory to understand signal propagation through optical fiber.
		CO2	Summarize the channel impairments like losses and dispersion, and determine transmission losses in optical fiber.
		CO3	Classify the Optical sources as well as detectors with their working principle and characteristics, and illustrate link budget using given data.
		CO4	Associate optical network system components with optical networks and paraphrase recent advances in optical communication.
		CO5	Summarize concept of Packet Switching, Access Networks, Network Design and Management



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ECCDLO 8012	NATURAL LANGUAGE PROCESSING	CO1	Interpret need, levels, stages, challenges, and ambiguities in NLP.
		CO2	Associate the mathematical and linguistic preliminaries necessary for various processes in NLP.
		CO3	Illustrate word-level analysis like word tokenization, segmentation, lemmatization, and role of edit distance and Porter Stemmer algorithms and N-gram language model.
		CO4	Illustrate syntax analysis using Parts of Speech Tagging, Hidden Markov Models and Viterbi algorithms.
		CO5	Illustrate semantic analysis using WSD and dictionary based approach.
		CO6	Summarize basic understanding of pragmatics and various real world NLP applications.
ECCDLO 8014	WEB DESIGN	CO1	Summarize basics of Internet protocols and analyze the different web servers available.
		CO2	Design web pages using HTML5 and CSS3.
		CO3	Apply the concepts of client-side validation to static web pages using Javascript and its framework.
		CO4	Develop dynamic web page with a database on server-side.
		CO5	Design responsive web pages using front-end framework Bootstrap.
ECCDLO 8023	NETWORK MANAGEMENT IN TELECOMMUNICAT ION	CO1	Student should be able to Comprehend network and management concepts.
		CO2	Student should be able to illustrate the concept relevant to OSI network management
		CO3	Student should be able to apply the concept and technologies associated with SNMP and RMON
		CO4	Student should e able to apply concept and technologies associated with TNM to networks.
		CO5	Student should be able to apply the network statics, broad band network and services to telecommunication networks
ILO8011	PROJECT MANAGEMENT-I	CO1	Learner will be able to illustrate Project Life Cycles and PM Knowledge areas as per Project Management Institute.
		CO2	Learner will be able to apply different selection criteria to select an appropriate project from different options.
		CO3	Learner will be able to develop work break down structure for a Project and schedule based on it.
		CO4	Learner will be able to identify opportunities and threats to the project and decide an approach to deal with them strategically.
		CO5	Learner will be able to apply Earned Value Technique, determine and predict the status of the Project.
		CO6	Learner will be able to understand various types of Project termination methods and ethics in Projects.
		CO1	State Basic Concepts and areas of Project Management.
		CO2	Apply selection criteria and select an appropriate project from



Subject Code	Subject Name	CO-ID	CO-Statement
ILO8011	PROJECT MANAGEMENT-I		different options.
		CO3	Illustrate work break down structure for a project and develop a schedule based on it.
		CO4	Identify opportunities and threats to the project and decide an approach to deal with them strategically.
		CO5	Use Earned value technique and determine & predict status of the project.
		CO6	Capture lessons learned during project phases and document them for future reference.
ILO8018	DIGITAL BUSINESS MANAGEMENT	CO1	Student should be able to comprehend the concept of E-Business, contemporary trends and technology in digital business
		CO2	Student should be able to describe various agent of E-Commerce.
		CO3	Student should be able to Illustrate digital business support services.
		CO4	Students should be able to address security issues in E-Commerce and their countermeasures.
		CO5	Students should be able to examine E-Business strategy formulation for the development of a successful plan and presentation of digital transformation.
ECL801	OPTICAL COMMUNICATION & NETWORKS LABORATORY	CO1	To measure the fundamental parameters such as numerical aperture, dispersion, attenuation.
		CO2	To analyze performance of analog and digital links with sources of different wavelengths.
		CO3	To analyze performance of star coupler and WDM mux.
		CO4	To examine TDM technique and determine parameters such as voice bandwidth, and delay between input and output pulses and overlap.
ECP-801	MAJOR PROJECT II	CO1	Apply the knowledge acquired based on curricular and co-curricular activities to solve electronics & telecommunication related project work.
		CO2	Systematically analyze electronics & telecommunication related project based on literature review.
		CO3	Design and develop hardware circuits and/or software code based on problem specifications of the project
		CO4	Carry out different experiments to generate data, analyze and interpret the data, and draw valid conclusions related to their project work
		CO5	Select and apply appropriate modern tools for the solution of their project problem
		CO6	Know responsibilities of an engineer towards the society with respect to their project work
		CO7	Understand the impact of the engineering solutions related to their project work in societal and environmental context for sustainable development
		CO8	Apply professional ethical principles while project implementation, report writing, and publication
		CO9	Work effectively as an individual and as a member of the team



Subject Code	Subject Name	CO-ID	CO-Statement
			while project work is carried out
		CO10	Communicate effectively while project report writing and oral/visual presentations
		CO11	Gain knowledge of engineering and management aspects while project is being implemented
		CO12	Engage themselves in independent and life long learning