

Vidyavardhini's college of Engineering & Technology Vasai(w)
Department of Electronics & Telecommunication Engineering
Course Outcomes for R-2016 Syllabus

Program Outcomes (POs)

Engineering Graduates will be able to:

- **PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9. Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12. Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the program engineering graduate will be able to:

1. Apply the knowledge of Electronics and Communication to analyse, design and implement application specific problems with modern tools.
2. Adapt emerging technologies with continuous learning in the field of Electronics and Telecommunication engineering with appropriate solutions to real life problems.

FEC101	Applied Mathematics I
FEC101.1	Students will be able apply principles of basic operations of matrices, rank and echelon form of matrices to solve linear simultaneous equations.
FEC101.2	Students will be able solve and Analyze Partial Derivatives and apply it in related field of Engineering
FEC101.3	Students will be able apply the concepts of Complex Numbers,hyperbolic functions and logarithms to solve engineering problems.
FEC101.4	Students will be able apply Numerical Methods and Inculcate the habit of Mathematical thinking through Indeterminate forms, Taylor's Series Expansion and by using Scilab.
FEC102	Applied Physics I
FEC102.1	Draw miller indices using concept of crystallography and Identify crystal structure using X-ray diffraction techniques viz. Laue method, rotating crystal method & powder method
FEC102.2	Determine the output of LED, photoconductor and photovoltaic cell applying concepts of semiconductor physics.
FEC102.3	Calculate parameters of superconductor viz. Critical temperature, critical magnetic field and differentiate application of superconductor based on Mesinner effect and Josephson effect
FEC102.4	Design acoustic of hall/auditorium using reasons for acoustic defects and Select method for production of ultrasonic waves.
FEC103	Applied Chemistry I
FEC103.1	Analyze the quality of water and suggest methods of treatment.
FEC103.2	Illustrate the knowledge of polymers, fabrication methods, conducting polymers in industrial fields.
FEC103.3	Apply the knowledge of lubricants, their properties & mechanism to avoid frictional resistance and interpret phase transformations using thermodynamics
FEC103.4	Demonstrate knowledge of portland cement.

FEC104	C104	Engineering Mechanics
FEC104.1	C104.1	Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three dimensional systems with the help of FBD.
FEC104.2	C104.2	Demonstrate the understanding of Centroid and its significance and locate the same
FEC104.3	C104.3	Estimate required force to overcome friction and correlate real life application to specific type of friction.
FEC104.4	C104.4	Establish relation between velocity and acceleration of a particle and analyse the motion by plotting the relation.
FEC104.5	C104.5	Illustrate different types of motions and establish Kinematic relations for a rigid body.
FEC104.6	C104.6	Analyse body in motion using force and acceleration, work-energy, impulse-momentum principles
FEC105	C105	Basic Electrical Engineering
FEC105.1	C105.1	Students will be able to understand fundamentals of DC circuits and apply knowledge for analyzing network theorems in DC circuits.
FEC105.2	C105.2	Students will be able to learn the fundamentals and analyze single phase AC circuits.
FEC105.3	C105.3	Students will be able to learn the basic operation and analyze the performance of single-phase transformer.
FEC105.4	C105.4	Students will be able to learn the fundamentals and analyze three phase AC circuits and understand the construction, basic operation of DC motors and generators.
FEC106	C106	Environmental Studies
FEC106.1	C106.1	Classify essential resources and control measures for sustainable development.
FEC106.2	C106.2	Illustrate sources and effects of environmental decay.
FEC106.3	C106.3	Select renewable sources of energy and technology essential for sustainable development.
FEL101	C107	Basic Workshop Practice I
FEL101.1	C107.1	Model different prototypes in the carpentry trade such as Cross cut lap joint, Tee lap joint, Dovetel lap joint.
FEL101.2	C107.2	Model various basic prototypes in the trade of fitting such as Square, Hexagonal and V Male Female joint.
FEL101.3	C107.3	Perform various basic House Wiring techniques while taking care of electrical safety.
FEL101.4	C107.4	Perform various basic domestic plumbing operations such as pipe cutting, threading, fitting etc.

FEC201	C108	Applied Mathematics II
FEC201.1	C108.1	Students will be able to apply euler, runge kutta method to solve differential equations of second and fourth order and apply trapezoidal, simpson's 1/3rd, simpson's 3/8 th rule to solve definite integrals numerically and by using scilab.
FEC201.2	C108.2	Students will be able to solve differential equations of first order, first degree and engineering problems representable in form of linear differential equations with constant coefficients, Cauchy's/Legendre's homogenous equations
FEC201.3	C108.3	Students will be able to apply Beta, Gamma functions and D.U.I.S. to evaluate definite integrals.
FEC201.4	C108.4	Students will be able to apply double /triple integration to find area, mass, volume and find length of the curve using scilab and rectification method.
FEC202	C109	Applied Physics II
FEC202.1	C109.1	Calculate thickness of thin wire or foil to wedge-shaped thin film, refractive index, wavelength of light /or radius of curvature to Newton's rings in interference application and calculate missing order, grating element wavelength of light using diffraction grating considering parameter viz resolving power of grating
FEC202.2	C109.2	Compare characteristics of images received by photography and holography using concept of LASER
FEC202.3	C109.3	Calculate critical angle, angle of acceptance, V number, number of modes of propagation, numerical aperture of step index fibre
FEC202.4	C109.4	Apply concept of electromagnetism in focussing system and CRO
FEC203	C110	Applied Chemistry II
FEC203.1	C110.1	Illustrate types of corrosion & suggest control measures in industries.
FEC203.2	C110.2	Analyze the quality of fuel & calculate the oxygen required for combustion of fuel.
FEC203.3	C110.3	Illustrate composition, properties of alloys & properties & application of composite material.
FEC203.4	C110.4	Illustrate the principles of green chemistry
FEC204	C111	Engineering Drawing
FEC204.1	C111.1	Apply the basic principles of projections in Projection of Lines, Planes and Engineering Curves
FEC204.2	C111.2	Apply the basic principles of projections in Projection of Solids & Section of solids
FEC204.3	C111.3	Visualize the given 3D object and draw Orthographic projections
FEC204.4	C111.4	Draw Isometric view from the given orthographic projections
FEC204.5	C111.5	Draw Orthographic and Isometric Projection using AutoCad
FEC205	C112	Structured Programming Approach
FEC205.1	C112.1	Identify the terminologies in operating system used for computer programming and illustrate the algorithms to support Structure Programming Approach.
FEC205.2	C112.2	Use Variables, derived data types and control structures to write C program.
FEC205.3	C112.3	Implement solutions to the problem using strings and functions.
FEC205.4	C112.4	Use Pointers, Structure-Union and Files for solving complex Computational

		problem.
FEC206	C113	Communication Skills
FEC206.1	C113.1	To develop the ability to understand the importance of communication fundamentals and its usage in social context
FEC206.2	C113.2	Develop message generating and delivery skills, gain insight into their own speaking skills
FEC206.3	C113.3	Can draft letters and other technical documents paying attention to the writer's objectives and reader's needs
FEC206.4	C113.4	Implement all the important aspects of reading including skimming, scanning, note making and discourse coherence
FEL201	C114	Basic Workshop Practice II
FEL201.1	C114.1	Model different prototypes in the carpentry trade such as Cross cut lap joint, Tee lap joint, Dovetel lap joint.
FEL201.2	C114.2	Model various basic prototypes in the trade of fitting such as Square, Hexagonal and V Male Female joint.
FEL201.3	C114.3	Read various basic Layout drawing; make positive and negative film, and perform PCB etching and drilling, Tinning and soldering operations.
FEL201.4	C114.4	Dismantle and Assemble a Personal Computer, perform Basic troubleshooting and maintenance, identify network components and perform Basic networking and crimping.
ECC301	C201	Applied Mathematics III
ECC301.1	C201.1	Apply Laplace transform, Inverse Laplace transform to different applications.
ECC301.2	C201.2	Apply the concept of Fourier Series for expansion of periodic functions.
ECC301.3	C201.3	Apply Principles of Vector differentiation and Integral calculus to the analysis of engineering problems.
ECC301.4	C201.4	Understand complex variables and functions and perform mapping using different techniques and Bessels functions
ECC302	C202	Electronics Devices and Circuits-I
ECC302.1	C202.1	understand knowledge of diode, Zener diode and apply to solve design problem of rectifier with filter, Zener voltage regulator for given specification and analyze it.
ECC302.2	C202.2	Analyze current voltage characteristics and dc analysis of semiconductor devices (BJT and JFET).
ECC302.3	C202.3	Perform ac analysis of BJT Amplifier, analyze its frequency response design and evaluate BJT amplifier for given specification.
ECC302.4	C202.4	Perform ac analysis of JFET Amplifier, analyze its frequency response, design, and evaluate JFET amplifier for given specification.
ECC303	C203	Digital System Design
ECC303.1	C203.1	Students will be able to explain number systems and their conversion, boolean function representation and its minimisation techniques as well as categorize different semiconductor memories.
ECC303.2	C203.2	Students will be able to design and develop various types of combinational logic circuits.

ECC303.3	C203.3	Students will be able to design and develop sequential logic circuits with real time applications.
ECC303.4	C203.4	Students will be able to explain different types of memories, concept of programmable devices and write VHDL code for combinational and sequential circuits .

ECC304	C204	Circuit Theory and Networks
ECC304.1	C204.1	Analyse the steady state behavior of DC and AC circuits with dependent and independent source
ECC304.2	C204.2	Apply the concept of graph theory for analysis electric circuit
ECC304.3	C204.3	Apply time and frequency analysis to find network function and two port network parameters.
ECC304.4	C204.4	Design of two elements impedance and admittance driving point in canonical form.
ECC305	C205	Electronics Instrumentation and Control
ECC305.1	C205.1	Students will be able to apply the basic knowledge of working sensors & transducers used in electronic Measurement.
ECC305.2	C205.2	Students will be able to test & Measure Resistance, capacitance, inductance values of bridges.
ECC305.3	C205.3	Students will be able to understand concepts of control system, compute and compare Transfer Function of a system with various techniques.
ECC305.4	C205.4	Students will be able to evaluate stability of systems in time and frequency domain.
ECL301	C206	Electronic Devices and Circuits I Laboratory
ECL301.1	C206.1	Students will be able to apply knowledge of diode, Zener diode to solve design problem of rectifier with filter, Zener voltage regulator for given specification.
ECL301.2	C206.2	Students will be able to sketch and analyze characteristics of Semiconductor devices (diode, BJT, JFET).
ECL301.3	C206.3	Students will be able to calculate and analyze Q point of biasing circuits of BJT amplifier.
ECL301.4	C206.4	Students will be able to plot and analyze Frequency response of CE, CS amplifier.
ECL302	C207	Digital System Design Laboratory
ECL302.1	C207.1	Students will be able to analyse performance of various basic gates, universal gates and code converters.
ECL302.2	C207.2	Students will be able to design and analyze performance of various combinational circuits.
ECL302.3	C207.3	Students will be able to design and analyze performance of various sequential circuits.
ECL302.4	C207.4	Students will be able to write Verilog/ VHDL codes for Combinational and sequential circuits.
ECL303	C208	OOP using JAVA Laboratory
ECL303.1	C208.1	Students will be able to understand the concept of Object Oriented Programming and write a basic code using JAVA.
ECL303.2	C208.2	Students will be able to write a program using branching and looping statements to resolve problems.
ECL303.3	C208.3	Students will be able to formulate a program that correctly implements the given algorithm and the concept of inheritance, polymorphism and package.
ECL303.4	C208.4	Students will be able to implement the concept of exception, multithreading and applet to solve real world problems.

ECC401	C209	Applied Mathematics-IV
ECC401.1	C209.1	Apply matrix theory to solve the system of linear equations and eigen values and eigen vectors and their applications.
ECC401.2	C209.2	Evaluate contour Integration and expand the analytic functions inside circle.
ECC401.3	C209.3	Apply Gram Schmidt Process to find orthonormal basis and Illustrate properties of vector space, subspace over real field. and correlation theory to find Correlation coefficients.
ECC401.4	C209.4	Apply probability theory and find statistical measures for discrete and continuous random variables and theory of calculus of variation to solve Isometric problems, functions independent of a variable and independent of both variables.
ECC402	C210	Electronics Devices and Circuits-II
ECC402.1	C210.1	Analyze and design the multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain.
ECC402.2	C210.2	Analyze and design the power Amplifier in electronics and communication circuits.
ECC402.3	C210.3	Apply concept of feedback amplifier and their characteristic to distinguish negative feedback amplifier.
ECC402.4	C210.4	Analyze and design oscillator for various frequencies and understand concept of MOSFET and apply in Amplifier.
ECC403	C211	Linear Integrated Circuits
ECC403.1	C211.1	Students will be able to distinguish different types of differential amplifiers.
ECC403.2	C211.2	Students will be able to analyse and demonstrate linear applications of OP-AMP.
ECC403.3	C211.3	Students will be able to analyse non linear applications of OP-AMP as well as different types of ADC and DAC.
ECC403.4	C211.4	Students will be able to analyse different applications of IC 555, IC 566, IC565, IC 78XX, IC 79XX, IC 723 and their limitations.
ECC404	C212	Signals and Systems
ECC404.1	C212.1	Understand basics of signals and systems and categorize signals and systems based on input, output, and processing.
ECC404.2	C212.2	Analyze CT/DT systems and evaluate response for CT/DT systems.
ECC404.3	C212.3	Analyze CT/DT systems in time domain and transformed domain using Laplace/Z transform and Fourier Analysis.
ECC404.4	C212.4	Realize the systems using different forms, use tools like state space analysis and will have basic understanding of various application areas of signals and systems.
ECC405	C213	Principles of Communication Engineering
ECC405.1	C213.1	Students will be able to Understand the fundamentals of communication and significance of noise in communication systems, apply this knowledge to evaluate the effects of noise.
ECC405.2	C213.2	Students will be able to Explain the concepts of AM Modulation/ Demodulation and distinguish among all AM systems (transmitter / receiver) along with their applications (transmitter/ receiver) along with their applications
ECC405.3	C213.3	Students will be able to Analyse Angle modulation and demodulation techniques and illustrate the working principles of FM transmitter/ receiver along with their

		applications .
ECC405.4	C213.4	Students will be able to Understand the concept of analog Pulse modulation/ demodulation and also, compare multiplexing/ De-multiplexing techniques with their applications.
ECL401	C214	Electronic Devices and Circuits II Laboratory
ECL401.1	C214.1	Students will be able to design and evaluate two stage amplifiers for given specification.
ECL401.2	C214.2	Students will be able to demonstrate and analyze performance power amplifier.
ECL401.3	C214.3	Students will be to examine oscillator and able to sketch characteristics of MOSFET.
ECL401.4	C214.4	Students will be able to sketch and analyze frequency response of multistage amplifier and negative feedback amplifier. .
ECL402	C215	Linear Integrated Circuits Laboratory
ECL402.1	C215.1	Students will be able to analyse performance of differential amplifier using simulation software.
ECL402.2	C215.2	Students will be able to analyse various application circuits using OP-AMP.
ECL402.3	C215.3	Students will be able to analyse various application circuits using IC 555.
ECL402.4	C215.4	Students will be able to demonstrate the performance of regulator circuits.

ECL403	C216	Principles of Communication Engineering Laboratory
ECL403.1	C216.1	Students will be able to Analyse AM transmitter/ Receiver waveforms in time and frequency domain and simulate all forms of AM modulation in MATLAB.
ECL403.2	C216.2	Students will be able to Analyse FM transmitter/ Receiver waveforms in time and frequency domain and simulate FM and PM modulation in MATLAB.
ECL403.3	C216.3	Students will be able to Design and analyse Pre-emphasis and De-emphasis circuit for given cut-off frequency.
ECL403.4	C216.4	Students will be able to Demonstrate working principle of Time Division Multiplexing.

ECC501	C301	Microprocessor & Peripherals Interfacing
ECC501.1	C301.1	Students will be able to identify basic components of microcomputer system and examine the Architecture of microprocessor 8086.
ECC501.2	C301.2	Students will be able to develop assembly language program of 8086 microprocessor for arithmetic, logical, string operation
ECC501.3	C301.3	Students will be able to analyze peripheral devices, co-processor and its interfacing with 8086 microprocessors
ECC501.4	C301.4	Students will be able to design 8086 microprocessor based system with memory for given specifications.
ECC502	C302	Digital Communication
ECC502.1	C302.1	Students will be able to describe and distinguish Random Variables and Random Process of a signal.
ECC502.2	C302.2	Students will be able to demonstrate concepts of Information Theory and Source coding.
ECC502.3	C302.3	Students will be able to evaluate various types of error control codes for reliable transmission.
ECC502.4	C302.4	Students will be able to compare and contrast different band-pass modulation techniques
ECC503	C303	Electromagnetic Engineering
ECC503.1	C303.1	To use the vector calculus to understand theory, laws and the behaviour of the static electric and magnetic field.
ECC503.2	C303.2	To explain and analyse the propagation of electromagnetic wave in different mediums.
ECC503.3	C303.3	To describe and analyse the different parameters of transmission lines.
ECC503.4	C303.4	To explain the various applications of electromagnetics.
ECC504	C304	Discrete Time Signal Processing
ECC504.1	C304.1	Students will be able to analyse behaviour of discrete time system using DFT and its properties.
ECC504.2	C304.2	Students will be able to design Infinite Impulse Response to meet desired specifications.
ECC504.3	C304.3	Students will be able to design Finite Impulse Response to meet desired specifications.
ECC504.4	C304.4	Students will be able to analyze Finite Word Length effects, Understand working principle of DSP processor and apply the knowledge of DSP processors for various applications.
ECCDLO 5011	C305	Microelectronics
ECCDLO 5011.1	C305.1	Students will be able to analyse fabrication process of MOSFET and effects of scaling of MOSFET.
ECCDLO 5011.2	C305.2	Students will be able to analyze different Integrated circuit biasing techniques.
ECCDLO 5011.3	C305.3	Students will be able to analyze MOS active load amplifiers as well as Differential amplifiers.

ECCDLO 5011.4	C305.4	Students will be able to differentiate different types of Power amplifiers using MOSFET and analyse fabrication of passive devices in IC.
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ECCDLO 5014	C308	Data Compression and Encryption
ECCDLO 5014.1	C308.1	Students will be able to Analyze & Write algorithm for Lossless compression Techniques
ECCDLO 5014.2	C308.2	Students will be able to differentiate between image & video compression techniques
ECCDLO 5014.3	C308.3	Student will be able to Analyze Symmetric key for encryption and decryption algorithm.
ECCDLO 5014.4	C308.4	Student will be Able to describe the network Security Considerations and Analyze asymmetric key cryptography
ECL501	C309	Microprocessor & Peripherals Interfacing Lab
ECL501.1	C309.1	Students will be able to analyse arithmetic instructions and apply it to write assembly language program for arithmetic operations.
ECL501.2	C309.2	Students will be able to analyse string manipulation instructions and apply it to write assembly language program for string operations
ECL501.3	C309.3	Students will be able to analyse assembler directives and INT21 DOS instructions to write assembly language program using INT 21 instructions
ECL501.4	C309.4	Students will be able to analyse 8255 PPI ,D/A converter and use it to write program related to waveform generation.
ECL502	C310	Digital Communication Lab
ECL502.1	C310.1	Students will be able to implement and analyze various digital modulation techniques
ECL502.2	C310.2	Students will be able to simulate and analyze source coding techniques
ECL502.3	C310.3	Students will be able to simulate and analyze channel coding techniques
ECL502.4	C310.4	students will be able to design and simulate cyclic encoder and decoder
ECL503	C311	Business Communication & Ethics Lab
ECL503.1	C311.1	Develop the interpersonal skills to progress professionally by building stronger relationships
ECL503.2	C311.2	Design a technical document using precise language, suitable vocabulary and apt style
ECL503.3	C311.3	Apply the techniques to participate in Group Discussions, Interviews and resume writing for self recruitment.
ECL503.4	C311.4	Display competence required for professional career growth
ECL504	C312	Open Source Technology for Communication Lab
ECL504.1	C312.1	Understand, Implement, simulate and analyse signal processing signals using Scilab
ECL504.2	C312.2	Understand, Implement, simulate and analyse communication signal and sound signal using Scilab
ECL504.3	C312.3	Design combinational and sequential circuits using Xilinx
ECL504.4	C312.4	Design digital circuits with nested statements using Xilinx

ECLDLO 5011	C313	Microelectronics Lab
ECLDLO 5011.1	C313.1	Students will be able to analyse basics of MOSFET
ECLDLO 5011.2	C313.2	Students will be able to solve & evaluate different parameters of IC biasing circuits.
ECLDLO 5011.3	C313.3	Students will be able to solve and evaluate different parameters of MOS active load amplifiers as well as Differential amplifiers.
ECLDLO 5011.4	C313.4	Students will be able to analyse fabrication of passive devices in IC.
ECLDLO 5014	C316	Data Compression and Encryption Lab
ECLDLO 5014.1	C316.1	Students will be able to select and apply appropriate algorithm for text compression using C and Java
ECLDLO 5014.2	C316.2	Students will be able to implement image compression using DCT technique in C
ECLDLO 5014.3	C316.3	Students will be able to write algorithm to generate symmetric key for encryption & decryption in Java
ECLDLO 5014.4	C316.4	Students will be able to write algorithm to generate asymmetric key for encryption & decryption in Java

ECC601	C317	Microcontroller & Applications
ECC601.1	C317.1	Students will be able to analyse Architecture of 8051 microcontroller and examine its concepts.
ECC601.2	C317.2	Students will be able to develop assembly language program for 8051 microcontroller for arithmetic, logical, delay, input, output, serial communication and interrupts.
ECC601.3	C317.3	Students will be able to interface various peripheral devices with 8051 microcontroller.
ECC601.4	C317.4	Students will be able to examine concept of advanced microcontroller ARM7 & develop its program in assembly and embedded C language
ECC602	C318	Computer Communication Networks
ECC602.1	C318.1	Students will be able to analyse fundamental parameters of Antennas and mechanism of EM wave radiation.
ECC602.2	C318.2	Students will be able to analyse linear wire antenna elements & Antenna arrays.
ECC602.3	C318.3	Students will be able to analyse & differentiate special types of Antennas and their properties.
ECC602.4	C318.4	Students will be able to describe radio wave propagation.
ECC603	C319	Antenna & Radio Wave Propagation
ECC603.1	C319.1	Describe and compare computer networking terminologies, reference models, physical layer services and systems.
ECC603.2	C319.2	Analyze data link layer protocols at logical link control and medium access control sublayers.
ECC603.3	C319.3	Classify the routing protocols and Design the network using IP addressing and subnetting schemes.
ECC603.4	C319.4	Describe and analyze transport layer protocols and its services.

ECC604	C320	Image Processing and Machine Vision
ECC604.1	C320.1	Students will be able to understand basics of monochrome and color image processing and apply them for image processing applications.
ECC604.2	C320.2	Students will be able to select among various spatial domain and frequency domain filtering techniques and apply them for image enhancement.
ECC604.3	C320.3	Students will be able to perform image segmentation, morphological operations and image restoration operations for the application in hand.
ECC604.4	C320.4	Students will be able to find shape using various representation techniques and classify the objects using different classification methods.
ECCDLO 6021	C321	Digital VLSI Design
ECCDLO 6021.1	C321.1	Students will be able to realize combinational and sequential circuits using different design style and compare their performance parameter.
ECCDLO 6021.2	C321.2	Students will be able to demonstrate understanding of operation of memory and system level design issues such as protection, routing, clocking and analyze it.
ECCDLO 6021.3	C321.3	Students will be able to understand and synthesize digital circuits (data path elements).
ECCDLO 6021.4	C321.4	Students will be able to examine RTL Design Process with Case Studies.
ECCDLO 6022	C322	Radar Engineering
ECCDLO 6022.1	C322.1	Students will be able to Illustrate the basic working principle of RADAR and evaluate Radar range equation.
ECCDLO 6022.2	C322.2	Students will be able to Differentiate among CW and Pulse RADARS for different applications. communication and interrupts.
ECCDLO 6022.3	C322.3	Students will be able to analyse various RADAR tracking systems
ECCDLO 6022.4	C322.4	Students will be able to Explain and analyse the RADAR transmitters and RADAR receiver.
ECCDLO 6023	C323	Database Management System
ECCDLO 6023.1	C323.1	Student will be able to Discuss the importance of data models
ECCDLO 6023.2	C323.2	Students will be able to Design conceptual models of a database using ER modeling and Develop relational database schema from an information model .
ECCDLO 6023.3	C323.3	Students will be able to differentiate between relational algebra & calculus
ECCDLO 6023.4	C323.4	Students will be able to demonstarte the concepts of SQL and describe transaction management

ECL601	C325	Microcontroller & Applications Lab
ECL601.1	C325.1	Students will be able to analyse data transfer and arithmetic instructions and apply it to write assembly language program for data transfer and arithmetic operations.
ECL601.2	C325.2	Students will be able to develop assembly language program for arrays.
ECL601.3	C325.3	Students will be able to analyse timer, serial communication section by developing assembly language program for waveform generation and serial data transmission with 8051 Microcontroller.
ECL601.4	C325.4	Students will be able to analyse ARM instructions and apply it to generate assembly language program and embedded C program for ARM7
ECL602	C326	Computer Communication Network Lab
ECL602.1	C326.1	Perform configurations on routers and switches to design a network using simulator.
ECL602.2	C326.2	Demonstrate an understanding of the significance and purpose of protocols in computer networks using simulator.
ECL602.3	C326.3	Troubleshoot connectivity problems in a host computer using networking commands and examine results.
ECL602.4	C326.4	Write program to create network topology using NS2.
ECL603	C327	Antenna & Radio Wave Propagation Lab
ECL603.1	C327.1	Students will be able to Explain different types of antennas and fundamental parameters of antenna.
ECL603.2	C327.2	Students will be able to design and analyse the behaviour of different wire antennas using antenna simulation software 4NEC2.
ECL603.3	C327.3	Students will be able to design and analyse radiation patterns of antenna arrays using MATLAB.
ECL603.4	C327.4	Students will be able to calculate & analyse various parameters of antennas through performance on antenna trainer system.
ECL604	C328	Image Processing and Machine Vision Lab
ECL604.1	C328.1	Modify spatial and gray scale resolution of the image using MATLAB.
ECL604.2	C328.2	Perform contrast stretching and histogram equalization for image enhancement using MATLAB.
ECL604.3	C328.3	Perform spatial and frequency domain filtering for image enhancement using MATLAB.
ECL604.4	C328.4	Perform image restoration operation for image denoising and use/apply image transform using MATLAB for application in hand.

ECLDLO 6021	C329	Department Level Optional Lab II
ECLDLO 6021.1	C329.1	Student will be able to Sketch and analyze layout for combinational circuit.
ECLDLO 6021.2	C329.2	Student will be able to Sketch layout and able to examine pass transistor logic.
ECLDLO 6021.3	C329.3	Student will be able to Sketch layout and analyze for sequential circuits.
ECLDLO 6021.4	C329.4	Students will be able to synthesize HDL code Combinational and sequential circuits.

ECLDLO 6022	C330	Department Level Optional Lab II
ECLDLO 6022.1	C330.1	Student will be able to analyse and compare the performance parameters of RADAR .
ECLDLO 6022.2	C330.2	Student will be able to analyse different RCS of RADAR.
ECLDLO 6022.3	C330.3	Student will be able to explain and analyse the eco cancelar of RADAR Transmitter.
ECLDLO 6022.4	C330.4	Student will be able to understand working principle of RADAR transmitter and receiver.
ECLDLO 6023	C331	Department Level Optional Lab II
ECLDLO 6023.1	C331.1	Construct problem definition statements for real life applications and implement a database for the same.
ECLDLO 6023.2	C331.2	Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.
ECLDLO 6023.3	C331.3	Create and populate a RDBMS.
ECLDLO 6023.4	C331.4	Write queries in SQL to retrieve any type of information from a data base

ECC701	C401	Microwave Engineering
ECC701.1	C401.1	Students will be able to analyse transmission lines and design the lumped and distributed Impedance matching networks.
ECC701.2	C401.2	Students would be able to analyze and describe the working of waveguides and passive components.
ECC701.3	C401.3	Students would be able to analyze and describe the operation of microwave tubes and microwave semiconductor devices.
ECC701.4	C401.4	Students would be able to describe different measurement techniques and fabrication techniques of Microwave Integrated Circuits.
ECC702	C401	Mobile Communication System
ECC702.1	C401.1	Understand the design concepts of cellular system and apply to compute coverage and capacity of system
ECC702.2	C401.2	Classify the types of propagation model and design practical link budget to estimate path loss
ECC702.3	C401.3	Analyze the evolution of mobile technologies from 2G to 4G with their system architecture, specifications, advantages and challenges
ECC702.4	C401.4	Illustrate emerging technologies required for 4G mobile system
ECC703	C402	Optical Communication
ECC703.1	C402.1	Explain significance of fiber optics and analyze fundamental parameters of optical communication
ECC703.2	C402.2	Describe and analyze transmission characteristics of optical fiber Communication
ECC703.3	C402.3	Compare principles and characteristics of optical sources and detectors
ECC703.4	C402.4	Describe network system components, optical link and design link power budget.
ECCDLO7032	C404	Big Data Analytics
ECCDLO7032.1	C404.1	Analyze big data using Hadoop and MapReduce architecture and write programs accordingly.
ECCDLO7032.2	C404.2	Distinguish NoSQL databases from traditional one and create NoSQL database for application requirement.
ECCDLO7032.3	C404.3	Apply mining techniques on static data for big data analytics.
ECCDLO7032.4	C404.4	Apply mining techniques on streaming data big data analytics.
ECCDLO7035	C407	Embedded System
ECCDLO7035.1	C407.1	Students will be able to demonstrate fundamentals of Embedded system and compare different Program Model.
ECCDLO7035.2	C407.2	Students will be able to examine concept of processor, its architecture and different communication techniques.
ECCDLO7035.3	C407.3	Students will be able to analyze real time operating system (RTOS).
ECCDLO7035.4	C407.4	Students will be able to examine embedded system applications using RTOS with Case Studies.

ILO7013	C410	Management Information System
ILO7013.1	C410.1	Identify the impact of information systems on an organization
ILO7013.2	C410.2	Use tools and technologies to access database information for improving business performance and decision making
ILO7013.3	C410.3	Design an IT infrastructure for MIS
ILO7013.4	C410.4	Identify the Transaction Processing, Functional Area Information and ERP system for enterprise-wide knowledge management
ILO7016	C413	Cyber Security and Laws
ILO7016.1	C413.1	Illustrate the concept of cybercrime, cyber-frauds, cybercriminal types with their motives and relate legal issues with respect to cybercrime.
ILO7016.2	C413.2	Analyze and discriminate cyberattack types with tools used for attacks.
ILO7016.3	C413.3	Identify the security challenges presented by mobile devices and infer measures for protecting the same.
ILO7016.4	C413.4	Discover and apply different aspects of cyber law and Information Security Standards compliance.
ILO7017	C414	Disaster Management and Mitigation Measures
ILO7017.1	C414.1	Illustrate scenario of disaster and its effects in India
ILO7017.2	C414.2	Compare Manmade and Natural disasters and their extent and possible effects on the economy
ILO7017.3	C414.3	Outline the Government Policies, acts and administration
ILO7017.4	C414.4	Employ the knowledge of Institutional Framework for Disaster Management in India
ILO7017.5	C414.5	Apply the knowledge of Financing and Relief Measures
ILO7017.6	C414.6	Utilize the knowledge of preventive and mitigation measures to know the simple do's and don'ts in disasters
ILO7018	C415	Energy Audit and Management
ILO7018.1	C415.1	Compare the present state of energy security and its importance to achieve sustainability
ILO7018.2	C415.2	Explore the basic principles and methodologies adopted in energy audit of an utility
ILO7018.3	C415.3	Evaluate the energy performance of electrical installations and identify the energy saving opportunities
ILO7018.4	C415.4	Evaluate the energy performance of some common thermal installations and identify the energy saving opportunities
ILO7018.5	C415.5	Analyse the data collected during performance evaluation and recommend energy saving measures

ECL701	C417	Microwave Engineering LAB
ECL701.1	C417.1	To analyze S- parameters and design distributed and Lumped Elements type of impedance matching networks using APLAC.
ECL701.2	C417.2	To design and simulate the transmission lines using SONNET and COMSOL.
ECL701.3	C417.3	Student will be able to analyse the different modes and design the waveguide using COMSOL.
ECL701.4	C417.4	To explain and determine the VSWR, Frequency and wavelength of the signal.
ECL702	C418	Mobile Communication System Lab
ECL702.1	C418.1	Examine the effect of cluster size on system capacity and quality of service (S/I) using MATLAB.
ECL702.2	C418.2	Analyse Trunk radio system by calculating blocking probability for Erlang B and Erlang C system using MATLAB
ECL702.3	C418.3	Construct orthogonal codes (PN sequence, convolutional code and Walsh code) of length n for 2G and 3G mobile system using MATLAB
ECL702.4	C418.4	Analyse the effect of small-scale fading parameters on the performance of radio channel using MATLAB
ECL703	C419	Optical Communication Lab
ECL703.1	C419.1	Analyse different parameters for propagation of light inside optical fiber
ECL703.2	C419.2	Examine fiber optic link to find propagation losses.
ECL703.3	C419.3	Examine performance of optical sources and detectors.
ECL703.4	C419.4	Examine optical link to find bandwidth.
ECLDLO7032	C421	Big Data Analytics Lab
ECLDLO7032.1	C421.1	Prepare Hadoop system and practice program using MapReduce.
ECLDLO7032.2	C421.2	Experiment big data queries on NoSQL databases (MongoDB).
ECLDLO7032.3	C421.3	Write programs for data mining algorithms and test for static data.
ECLDLO7032.4	C421.4	Use modern tools to analyze streaming data.
ECLDLO7035	C424	Embedded System Lab
ECLDLO7035.1	C424.1	Students will be able to demonstrate communication for interfacing using wired protocol like SPI, I2C.
ECLDLO7035.2	C424.2	Students will be able to demonstrate communication for interfacing using wireless protocol like Bluetooth, Wi-Fi.
ECLDLO7035.3	C424.3	Students will be able to interface using wireless protocol like Wi-Fi and able to develop IOT application.
ECLDLO7035.4	C424.4	Students will be able to examine multitasking and message passing using RTOS.

ECL704	C425	Project - I
ECL704.1	C425.1	Explore beyond the curriculum to identify problem of society, industrial or research needs; investigate the problem through in-depth literature survey and propose appropriate solution to solve the problem.
ECL704.2	C425.2	Implement the methodology with modern tools and provide sustainable solution with effective utilization of the resources available.
ECL704.3	C425.3	Analyze and compare the results with the standard results.
ECL704.4	C425.4	Work as an individual and contribute as a team member with effective management skills to achieve a common objective.
ECL704.5	C425.5	Write and present their work effectively with ethical values.
ECL704.6	C425.6	Engage themselves in area of their interest applying the knowledge gained and explore new technical trends.
ECC801	C426	RF Design
ECC801.1	C426.1	Student will be able to analyse and design the various types of passive RF filters.
ECC801.2	C426.2	Student will be able to analyse and design the different types of RF amplifiers.
ECC801.3	C426.3	Student will be able to analyse and design the various types of RF oscillators , mixers and the frequency synthesizers.
ECC801.4	C426.4	Student will be able to describe and analyse the Electromagnetic Interference and in RF circuits
ECC802	C427	Wireless Networks
ECC802.1	C427.1	Student will be able to explain and illustrate fundamentals, architecture, design issues and standards of Wireless Networks.
ECC802.2	C427.2	Student will be able to Compare and Contrast WBAN, WPAN and WLAN technologies on the basis of IEEE std., coverage, data rate and applications.
ECC802.3	C427.3	Student will be able to design a Wireless network by applying fundamentals of WMAN standards.
ECC802.4	C427.4	Student will be able to apply Wireless Sensor Network concepts to Develop an IoT application.

ECCDLO8041	C428	Optical Networks
ECCDLO8041.1	C428.1	Students will be able Identify the issues related to signal degradation and multiplexing. .
ECCDLO8041.2	C428.2	Students will be able to differentiate the concepts of designing and operating principles of modern optical communication systems and networks.
ECCDLO8041.3	C428.3	Students will be able to analyse optical networks, design and management.
ECCDLO8041.4	C428.4	Students will be able to apply the knowledge for management of optical network for different virtual topologies
ECCDLO8043	C430	Satellite Communication
ECCDLO8043.1	C430.1	Students will be able to compare and contrast between different terminologies and nomenclatures in relation to satellites and satellite communication
ECCDLO8043.2	C430.2	Students will be able to differentiate between various satellite subsystems and earth stations
ECCDLO8043.3	C430.3	Students will be able to analyse and design a link budget considering various losses
ECCDLO8043.4	C430.4	students will able to categorize various application of satellite communication
ILO8021	C432	Project Management
ILO8021.1	C432.1	Identify appropriate projects from various options and mention their selection criteria.
ILO8021.2	C432.2	Prepare Work Break Down Structure for a project and also prepare a schedule using GANTT chart, CPM, PERT
ILO8021.3	C432.3	Identify opportunities and threats to decide risk response strategy of a project.
ILO8021.4	C432.4	Apply Earned Value Management techniques to determine & predict status of the project and implement project termination process.
ILO8023	C434	Entrepreneurship Development and Management
ILO8023.1	C434.1	Student will be able to create a business plan with technical and commercial details
ILO8023.2	C434.2	Interpret key regulations and legal aspects of entrepreneurship in India and apply appropriately to given business.
ILO8023.3	C434.3	Student will be able to employ government policies for promotion of business.
ILO8023.4	C434.4	Student will be able to select funding option for given business plan
ILO8025	C436	Professional Ethics and CSR
ILO8025.1	C436.1	Use professional ethics to express rights and duties of business also explore professional ethics in the marketplace.
ILO8025.2	C436.2	Demonstrate professional ethics of consumer protection and job

		discrimination.
ILO8025.3	C436.3	Distinguish different aspects of corporate social responsibility.
ILO8025.4	C436.4	Criticise corporate social responsibility in globalizing India

ILO8029	C440	Environmental Management
ILO8029.1	C440.1	Illustrate the significance of Environment Management and sustainable development
ILO8029.2	C440.2	Identify Global Environmental Concerns and Hazards
ILO8029.3	C440.3	Employ the Concept of Ecology and interdependence between ecosystem and living organisms
ILO8029.4	C440.4	Utilize the knowledge of Scope of Env Management and Corporate Env Responsibility
ILO8029.5	C440.5	Outline the EMS Certification and ISO-14000
ILO8029.6	C440.6	Interpret Environment related legislations and acts
ECL801	C441	RF Design Lab
ECL801.1	C441.1	Student will be able to design and simulate the various types of passive RF filters using APLAC.
ECL801.2	C441.2	To design and simulate the Matching networks for RF amplifiers using APLAC and Vsmith.
ECL801.3	C441.3	To design and simulate the Matching networks for RF oscillator using APLAC
ECL801.4	C441.4	To analyze and simulate the different parameters of the Electromagnetic Interference and Electromagnetic Compatibility in RF circuits.
ECL802	C442	Wireless Networks Lab
ECL802.1	C442.1	Student will be able to Explain and Compare different Software/Hardware tools available for simulation in Wireless Networks.
ECL802.2	C442.2	Student will be able to Describe and demonstrate WCDMA and Bluetooth concepts using MATLAB(SIMULINK).
ECL802.3	C442.3	Student will be able to Design and develop ZIGBEE, CDMA network using NETSIM.
ECL802.4	C442.4	Student will be able to Explain and illustrate different applications of Wireless Sensor Networks in IOT.
ECLDLO 8041	C443	Optical Networks Lab
ECLDLO 8041.1	C443.1	Student will be able to design and simulate the various components of Optical Network
ECLDLO 8041.2	C443.2	Student will be able to design different Optical Networks using Opti system
ECLDLO 8041.3	C443.3	Student will be able to analyse and design DWDM using Optisystem
ECLDLO 8041.4	C443.4	Student will be able to analyse the different parametrs of the optical Network using optisystem software.
ECLDLO 8043	C445	Satellite Communication Lab
ECLDLO 8043.1	C445.1	Students will be able to develop a communication link through transponder.
ECLDLO 8043.2	C445.2	Students will be able to design and simulate link budget for satellite link.
ECLDLO 8043.3	C445.3	Students will be able to analyse C/N ratio and FHSS in MATLAB
ECLDLO 8043.4	C445.4	Students will be able to explain recent application in satellite communication

ECL803	C448	Project - II
ECL803.1	C448.1	Explore beyond the curriculum to identify problem of society, industrial or research needs; investigate the problem through in-depth literature survey and propose appropriate solution to solve the problem.
ECL803.2	C448.2	Implement the methodology with modern tools and provide sustainable solution with effective utilization of the resources available.
ECL803.3	C448.3	Analyze and compare the results with the standard results.
ECL803.4	C448.4	Work as an individual and contribute as a team member with effective management skills to achieve a common objective.
ECL803.5	C448.5	Write and present their work effectively with ethical values.
ECL803.6	C448.6	Engage themselves in area of their interest applying the knowledge gained and explore new technical trends.

