LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Mapping of Courses to POs and PSOs:: Course Articulation Matrix :: R20 Regulation

B.Tech I Semester															
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**	
Professional Communication-I - 20FE01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE01.1	Write sentences and paragraphs using proper grammatical structures and word forms (Remember: L1).	-	-	-	2	-	-	-	-	3	3		2	-	-	-
20FE01.2	Comprehend the given text by employing suitable strategies for skimming and scanning and draw inferences (Understand: L2).	-	1	-	2	-	1	-	-	3	3		2	-	-	-
20FE01.3	Write summaries of reading texts using correct tense forms & appropriate structures (Remember: L1)	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
20FE01.4	Write Formal Letters; Memos & E-Mails (Apply: L3).	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
20FE01.5	Edit the sentences/short texts by identifying basic errors of grammar/vocabulary/syntax (Understand: L2).	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
Differential Equations - 20FE03		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE03.1	Apply first order and first-degree differential equations to find orthogonal trajectories (Apply : L3).	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
20FE03.2	Distinguish between the structure and methodology of solving higher order differential equations with constant coefficients (Understand: L2).	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
20FE03.3	Apply various Numerical methods to solve initial value problem (Apply: L3).	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
20FE03.4	Generate the infinite series for continuous functions and investigate the functional dependence (Understand: L2).	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
20FE03.5	Solve partial differential equations using Lagrange method (Apply: L3).	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Applied Physics - 20FE07		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE07.1	Define the nature of interference and diffraction. (Remember : L1).	3	3	1	1	-	-	-	-	-	-	-	1	-	-	-
20FE07.2	Apply the lasers and optical fibers in different fields (Apply : L3).	3	3	2	1	-	-	-	-	-	-	-	1	-	-	-
20FE07.3	Estimate the electrical conductivity of metals (Understand: L2).	3	3	1	1	-	-	-	-	-	-	-	1	-	-	-
20FE07.4	Analyze the properties of semiconducting materials (Understand: L2).	3	3	1	1	-	-	-	-	-	-	-	1	-	-	-
20FE07.5	Classify the different types of magnetic and dielectric materials (Understand: L2).	3	3	1	1	-	-	-	-	-	-	-	1	-	-	-
Basic Electrical Engineering - 20EE01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EE01.1	Illustrate the behavior of active and passive components, series and parallel circuits, self and mutual inductance of magnetic circuits, network functions and two port networks using circuit and mathematical approaches.(Understand – L2)	2	1	-	-	-	-	-	-	-	1	-	-	-	-	2
20EE01.2	Interpret the working principles of AC and DC machines along with grounding and earthing using electrical engineering fundamentals and mathematical approaches.(Understand – L2)	2	1	1	1	-	-	-	-	-	1	-	-	-	-	2
20EE01.3	Apply mesh analysis, nodal analysis and network theorems to solve Thevenin's voltage, Norton's current and maximum power transfer of the linear circuits. (Apply – L3)	3	3	1	1	-	--	-	-	-	1	-	-	-	-	2
20EE01.4	Analyze the concepts of bandwidth, quality factor of series and parallel resonant circuits using circuit and mathematical approaches.(Analyze – L4)	3	2	1	1	-	-	1	-	-	1	-	-	-	-	3
Electronic Devices and Circuits - 20EC01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC01.1	Identify the types of Diodes, Transistors, FETs, Biasing techniques and their comparisons to select the best approaches for designing the electronic circuits using Devices and components.(Apply – L3)	2	3	1	-	-	3	1	-	-	-	1	2	-	1	-
20EC01.2	Interpret the mathematical models of Currents and Voltages of Diodes, Bipolar Junction Transistors and Field Effect Transistors and biasing of BJT and FET using fundamental circuits.(Understand – L2)	2	1	2	1	-	3	1	-	-	-	-	1	-	1	-
20EC01.3	Apply the knowledge of diodes, transistors and filters for designing the rectifiers, Filters, Regulators and Amplifier circuits using Devices and components.(Apply – L3)	3	1	1	-	-	-	1	-	-	-	-	-	-	2	-
20EC01.4	Analyze the characteristics of Diodes, Bipolar Junction Transistors, Field Effect Transistors and their equivalent models using VI Characteristics and mathematical models.(Analyze – L4)	1	3	-	-	-	-	-	-	-	-	1	1	-	2	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Professional Communication Skills Lab - 20FE51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE51.1	Introduce oneself and others using appropriate language and details (Understand: L2).	-	-	-	-	3	-	-	-	-	3	3	-	-	1	-
20FE51.2	Comprehend short talks and speak clearly on a specific topic using error free English (Understand: L2).	-	-	-	-	3	-	-	-	-	3	3	-	-	1	-
20FE51.3	Report effectively after participating in informal discussions ethically (Remember: L1).	-	-	-	-	3	-	-	-	-	3	3	-	-	2	-
20FE51.4	Interpret data aptly, ethically & make oral presentations (Apply: L3).	-	-	-	-	3	-	-	-	-	3	3	-	-	2	-
20FE54 - Applied Physics Lab		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE54.1	Analyze the wave characteristics of light (Understand: L2).	3	3	1	1	-	1	-	-	1	-	-	1	-	-	-
20FE54.2	Estimate the magnetic field using Stewartâ€™s and Geeâ€™s apparatus (Understand: L2).	3	2	1	1	-	1	-	-	1	-	-	1	-	-	-
20FE54.3	Verify the characteristics of semiconductor diodes (Apply: L3).	3	2	1	1	-	-	-	-	1	-	-	1	-	-	-
20FE54.4	Determine the acceptance angle and numerical aperture of optical fiber (Apply: L3).	3	2	1	1	-	-	-	-	1	-	-	1	-	-	-
20FE54.5	Improve report writing skills and individual teamwork with ethical values. (Understand : L2)	3	2	1	1	-	-	-	2	2	2	-	1	-	-	-
Basic Electrical Engineering Lab - 20EE51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EE51.1	Interpret the behavior of passive components of electrical circuits, inductance of magnetic circuits, two port networks and principle of DC machines using fundamental electrical laws and mathematical models.(Understand – L2)	3	2	1	1	-	-	-	-	-	2	-	-	-	-	2
20EE51.2	Apply Kirchhoff's laws, Network theorems to verify the linear electrical circuits using fundamental electrical laws and mathematical equations.(Apply – L3) .	3	3	1	1	-	-	-	-	-	2	-	-	-	-	2
20EE51.3	Examine the active & reactive powers of single phase electrical circuits and resonant frequency, bandwidth & quality factor of electrical circuits.(Apply – L3)	3	2	1	1	-	-	-	-	-	2	-	-	-	-	3
20EE51.4	Adapt effective Communication, presentation and report writing skills.(Apply – L3)	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Electronic Devices and Circuits Lab - 20EC51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC51.1	Demonstrate the characteristics of Diodes, BJT, FET, Voltage regulators, Diode applications. (Understand – L2)	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
20EC51.2	Analyze the device parameters of Diodes, Bipolar Junction Transistors, and Field Effect Transistors for its electrical parameters using VI characteristics. (Analyze – L4)	3	1	-	-	-	-	-	-	-	-	1	1	-	2	-
20EC51.3	Apply the knowledge of diodes, Capacitors and transistors for the realization of rectifiers, regulators, Clippers and Clampers circuits. (Apply – L3)	3	1	1	-	-	-	-	-	-	-	-	-	-	2	-
20EC51.4	Adapt effective Communication, presentation and report writing skills.(Apply – L3)	-	-	-	-	-	-	-	-	3	2	-	-	-	-	-

B.Tech II Semester																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Professional Communication-II - 20FE02		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE02.1	Produce a coherent paragraph interpreting a figure / graph/ chart/ table (Understand:L2)	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
20FE02.2	Comprehend the given texts thoroughly by guessing the meanings of the words contextually. (Understand:L2)	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
20FE02.3	Use language appropriately for describing / comparing / contrasting / giving directions and suggestions (Remember:L1)	-	-	-	2	-	-	-	-	3	3	-	2	-	-	-
20FE02.4	Write formal /informal dialogues with an understanding of verbal / non verbal features of communication. guess meanings of the words from the context.(Understand:L2)	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
20FE02.5	Write well structured Essays, Reports and Resume (Apply - L3).	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
Linear Algebra and Transformation Techniques - 20FE04		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE04.1	Investigate the consistency of equations and solve them (Apply : L3).	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
20FE04.2	Determine the Eigen Values, Inverse and Powers of a matrix using Cayley – Hamilton Theorem (Apply : L3).	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
20FE04.3	Use the concepts of Laplace Transforms to various forms of functions (Understand : L2).	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
20FE04.4	Solve Ordinary Differential Equations by using Laplace Transforms (Apply : L3).	2	1	-	1	-	-	-	-	-	-	-	1	-	-	-
20FE04.5	Apply Z-Transforms to solve Difference Equations (Apply : L3).	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
Engineering Chemistry - 20FE06		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE06.1	Apply Nernst Equation for calculating electrode cell potentials and compare batteries for different applications. (Apply-L3)	3	3	2	1	-	2	2	-	-	-	-	2	-	-	-
20FE06.2	Apply principles of corrosion for design and effective maintenance of various equipment.(Apply-L3)	3	2	2	1	-	2	1	-	-	-	-	2	-	-	-
20FE06.3	Analyze the suitability of advanced materials like nonmaterial's in electronics and medicine. (Understand-L2)	3	2	2	1	-	1	1	-	-	-	-	2	-	-	-
20FE06.4	Identify the importance of liquid crystals, polymers in advanced technologies. (Understand-L2)	3	2	2	1	-	1	1	-	-	-	-	2	-	-	-
20FE06.5	Apply the principles of analytical techniques in chemical analysis. (Apply-L3)	3	2	1	1	-	1	1	-	-	-	-	2	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Programming for ProblemSolving Using C - 20CS01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20CS01.1	Familiar with syntax and semantics of the basic programming language constructs. (Understand : L2)	2	3	-	-	-	-	-	-	-	1	-	1	-	-	-
20CS01.2	Construct derived data types like arrays in solving problem. (Apply : L3)	2	3	2	1	-	-	-	-	-	1	-	1	-	-	-
20CS01.3	Decompose a problem into modules and reconstruct it using various ways of user-defined functions. (Apply : L3)	2	3	2	1	-	-	-	-	-	1	-	1	-	-	-
20CS01.4	Define user-defined data types like structures and unions and its applications to solve problems. (Apply : L3)	2	3	2	-	-	-	-	-	-	1	-	1	-	-	-
20CS01.5	Discuss various file I/O operations and its application. (Understand : L2)	2	3	2	-	-	-	-	-	-	1	-	1	-	-	-
Digital Logic Circuits - 20EC02		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC02.1	Summarize the key differences between number systems and their usage in Digital electronic circuits. (Understand– L2)	2	3	1	-	-	-	-	-	-	-	-	1	-	1	-
20EC02.2	Identify the minimization techniques of Boolean expressions to implement digital circuits using basic logic gates and logic circuits. (Apply–L3)	2	3	3	-	-	-	-	-	-	-	-	2	-	2	-
20EC02.3	Apply the minimization and realization methods for design of Combinational and Sequential logic circuits. (Apply–L3)	2	3	3	-	-	-	-	-	-	-	-	2	-	3	-
20EC02.4	Analyze the Combinational, Sequential, Finite state machines and Algorithmic state machines for implementation of digital logic circuits. (Analyze–L4)	2	3	3	-	-	-	-	-	-	-	-	3	-	3	-
Constitution of India - 20MC01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20MC01.1	Understand history and philosophy of constitution with reference to Preamble, Fundamental Rights and Duties. (Understand : L2)	-	-	-	-	-	3	3	3	-	2	-	3	-	-	-
20MC01.2	Understand the concept of Unitary and Federal Government along with therole of President, Prime Minister and Judicial System(Understand : L2)	-	-	-	-	-	3	2	3	-	2	-	3	-	-	-
20MC01.3	Understand the structure of the state government, Secretariat, Governor and Chief Minister and their functions(Understand : L2)	-	-	-	-	-	3	3	3	-	2	-	3	-	-	-
20MC01.4	Learn local administration viz. Panchayat, Block, Municipality and Corporation. (Understand : L2)	-	-	-	-	-	3	2	3	-	2	-	3	-	-	-
20MC01.5	Learn about Election Commission and the process and about SC, ST, OBC and women(Understand : L2)	-	-	-	-	-	3	3	3	-	2	-	3	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Engineering Chemistry Lab - 20FE53		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE53.1	Assess alkalinity of water based on the procedure given (Understand - L2).	3	3	-	1	-	2	2	-	-	-	-	-	-	-	-
20FE53.2	Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus (Understand - L2).	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
20FE53.3	Acquire practical knowledge related to preparation of polymers (Understand - L2).	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-
20FE53.4	Exhibit skills in performing experiments based on theoretical fundamentals (Understand - L2).	3	2	1	-	-	-	-	-	-	-	-		-	-	-
Programming for Problem Solving Using C Lab - 20CS51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20CS51.1	Apply control structures of C in solving computational problems. (Apply – L3)	2	3	1	-	-	-	-	-	1	1	-	2	-	-	-
20CS51.2	Implement derived data types & use modular programming in problem solving. (Apply – L3)	2	3	1	-	-	-	-	-	1	1	-	2	-	-	-
20CS51.3	Implement user defined data types and perform file operations. (Apply – L3)	2	3	1	-	-	-	-	-	1	1	-	2	-	-	-
20CS51.4	Improve individual / teamwork skills, communication & report writing skills with ethical values. (Apply – L3)	2	3	1	-	-	-	-	-	1	1	-	2	-	-	-
Digital Logic Circuits Lab - 20EC52		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC52.1	Demonstrate the Functionality of Logic gates, Flip-flops, Shift registers and Counters. (Understand– L2)	2	2	1	2	2	-	-	-	-	-	-	2	-	2	-
20EC52.2	Apply the Boolean minimization methods to implement Combinational and Sequential logic circuits using logic gates. (Apply –L3)	2	3	2	3	3	-	-	-	-	-	-	2	-	2	-
20EC52.3	Analyze the behaviour of Combinational and Sequential logic circuits. (Analyze–L4)	2	3	2	3	3	-	-	-	-	-	-	2	-	2	-
20EC52.4	Adapt effective communication, presentation and report writing skills. (Apply–L3)	-	-	-	-	-	-	-	2	2	3	-	1	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Engineering Workshop - 20ME51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20ME51.1	Develop different prototypes in the carpentry section.	1	2	1	2	-	2	-	-	3	1	-	3	-	-	-
20ME51.2	Fabricate various basic prototypes in fitting trade	1	2	1	2	-	2	-	-	3	1	-	3	-	-	-
20ME51.3	Demonstrate various operations related to plumbing, tin smithy and black smithy	1	2	1	1	-	2	-	-	3	1	-	3	-	-	-
20ME51.4	Perform various basic house wiring techniques	1	2	1	2	-	2	-	-	3	1	-	3	-	-	-

B.Tech III Semester																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Numerical Methods and IntegralCalculus - 20FE10		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20FE10.1	Estimate the best fit polynomial for the given tabulated data using Interpolation. (Understand – L2)	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
20FE10.2	Apply numerical techniques in solving of equations and evaluation of integrals. (Apply – L3)	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
20FE10.3	Discriminate among Cartesian, Polar and Spherical coordinates in multiple integrals and their respective applications to areas and volumes. (Apply – L3)	3	2	-	1	-	-	-	-	-	-	-	1	-	-	-
20FE10.4	Generate the single valued functions in the form of Fourier series and obtain Fourier series representation of periodic function. (Apply – L3)	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-
20FE10.5	Evaluate the directional derivative, divergence and angular velocity of a vector function. (Apply – L3)	3	1	-	1	-	-	-	-	-	-	-	1	-	-	-
Data Structures - 20CS03		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20CS03.1	Write the algorithms for various operations on list using arrays and linked list and analyze the time complexity of its operations. (Understand : L2)	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
20CS03.2	Apply linear data structures like stack and queue in problem solving.(Apply : L3)	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
20CS03.3	Demonstrate various sorting techniques and compare their computational complexities in terms of space and time. (Understand : L2)	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
20CS03.4	Write the algorithms for various operations on binary trees, binary search trees and AVL trees.(Understand : L2)	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
20CS03.5	Demonstrate graph traversal techniques and hashing techniques. (Understand : L2)	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Analog Circuit Design - 20EC03		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC03.1	Understand the concept of amplifier, Oscillator and linear wave shaping circuits. (Understand – L2)	2	3	1	-	-	3	1	-	-	-	1	2	-	2	-
20EC03.2	Apply h-parameter / suitable models of the transistor for estimating gain, input and output resistance and feedback concepts at amplifier and oscillator circuits.. (Apply – L3)	3	1	-	-	-	-	-	-	-	-	-	1	-	2	-
20EC03.3	Analyze feedback concepts in amplifier, oscillator circuits, and Multivibrators. (Analyze – L4)	3	1	1	-	-	-	-	-	-	-	-	2	-	3	-
20EC03.4	Apply knowledge of transistor for the design of amplifiers, oscillator circuits, linear wave shaping Circuits and Multivibrators. (Apply – L3)	3	-	-	-	-	-	-	-	-	-	1	1	-	2	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Signals & Systems - 20EC04		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC04.1	Summarize the basic concepts of signals, systems and sampling (Understand – L2)	2	1	1	-	-	-	-	-	-	-	-	-	-	-	1
20EC04.2	Examine the operations on signals and approximate using orthogonal functions.(Apply – L3)	2	1	1	-	-	-	-	-	-	-	-	-	1	-	2
20EC04.3	Apply the concept of impulse response to analyze the linear time invariant systems (Apply – L3)	3	1	1	1	-	-	-	-	-	-	-	1	-	-	2
20EC04.4	Analyze continuous time periodic and aperiodic signals using Fourier series, Fourier transform and Laplace transforms (Analyze – L4)	3	2	1	1	-	-	-	-	-	-	-	2	2	-	3
Random Variables & Stochastic Processes - 20EC05		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC05.1	Summarize the concepts of random variables, random processes and noise.(Understand – L2)	3	2	1	-	-	-	-	-	-	-	-	1	1	-	1
20EC05.2	Use the mathematical concepts of random variables and random processes for determining statistical parameters and spectral characteristics. (Apply – L3)	3	2	1	1	-	-	-	-	-	-	-	2	2	-	2
20EC05.3	Analyze the behavior of random variables and random processes using distribution and density functions. (Analyze – L4).	3	2	1	1	-	-	-	-	-	-	-	2	2	-	-
20EC05.4	Apply the knowledge of random variables and processes for analyzing the system behavior (Apply – L3).	3	3	1	1	-	-	-	-	-	-	-	2	3	-	2
Data Structures Lab - 20CS53		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20CS53.1	Implement Linear Data Structures using array and Linked list. (Apply : L3)	-	2	1	-	1	-	-	-	-	-	-	-	-	-	-
20CS53.2	Implement Various Sorting Techniques. (Apply : L3)	-	2	1	-	1	-	-	-	-	-	-	-	-	-	-
20CS53.3	Implement Non-Linear Data Structure such as Trees &Graphs. (Apply : L3)	-	2	1	-	1	-	-	-	-	-	-	-	-	-	-
20CS53.4	Improve individual / teamwork skills, communication & report writing skills with ethical values. (Apply : L3)	-	-	-	-	-	-	2	2	2	-	-	-	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Analog Circuit Design Lab - 20EC53		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC53.1	Demonstrate the characteristics of Amplifiers, Oscillators, feedback amplifiers, and Multivibrators. (Understand – L2)	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
20EC53.2	Apply the knowledge of devices for the design of Timer circuits, Oscillators and Multivibrators. (Apply – L3)	3	1	1	-	-	-	-	-	-	-	-	-	-	1	-
20EC53.3	Design of feedback amplifiers and waveform generators using Electronic devices and components. (Analyze – L4)	1	1	1	2	-	-	-	-	-	-	-	1	-	2	-
20EC53.4	Adapt effective Communication, presentation and report writing skills. (Apply – L3)	-	-	-		-	-	-	-	3	2	-	-	-	3	-
Digital System Design Lab - 20EC54		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC54.1	Demonstrate the functionality of logic gates using Verilog HDL simulator. (Understand–L2)	1	1	2	1	2	-	-	-	-	-	-	1	-	2	-
20EC54.2	Analyze the behavior of combinational and sequential circuits using Verilog HDL simulator. (Analyze– L4)	3	2	3	2	3	-	-	-	-	-	-	2	-	3	-
20EC54.3	Understand the functionality of memories using Verilog HDL simulator .(Understand – L2)	3	2	3	2	3	-	-	-	-	-	-	2	-	3	-
20EC54.4	Adapt effective Communication, presentation and report writing. (Apply–L3)	3	2	2	1	-	-	-	-	-	-	-	2	-	2	-
Signal Modeling And Analysis - 20ECS1 (Skill Oriented Course)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20ECS1.1	Understand the programming concept of plotting trigonometric function, linear equations solutions in MATLAB. (Understand – L2)	1	1	-	1	2	-	-	-	-	-	-	2	-	-	-
20ECS1.2	Analyze the time frequency relations of signals. (Analyze – L4))	2	2	1	-	-	-	-	-	-	-	-	2	-	-	2
20ECS1.3	Adapt effective communication, presentation and report writing. (Apply – L3)	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-

B.Tech IV Semester																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Universal Human Values 2: Understanding Harmony - 20HS01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20HS01.1	Apply the value inputs in life and profession	-	-	-	-	-	3	2	2	-	-	-	1	-	-	-
20HS01.2	Distinguish between values and skills, happiness and accumulation of physical facilities, the self and the Body	-	-	-	-	-	2	2	-	-	-	-	1	-	-	-
20HS01.3	Understand the role of a human being in ensuring harmony in society	-	-	-	-	-	3	2	-	-	-	-	1	-	-	-
20HS01.4	Understand the role of a human being in ensuring harmony in the nature and existence	-	-	-	-	-	3	3	2	-	-	-	1	-	-	-
20HS01.5	Distinguish between ethical and unethical practices	-	-	-	-	-	2	2	3	-	-	-	2	-	-	-
Control Systems - 20EE09		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EE09.1	Develop mathematical models of systems in terms of transfer function and state-space. (Apply-L3)	1	1	1	-	-	-	-	-	-	-	-	1	-	-	-
20EE09.2	Analyze control systems in time domain (Apply-L3)	3	1	1	1	-	-	-	-	-	-	-	2	-	-	1
20EE09.3	Analyze control systems in frequency domain (Apply-L3)	3	2	1	1	-	-	-	-	-	-	-	2	-	-	1
20EE09.4	Understand the concepts of controllers and compensators. (Understand-L2)	3	2	1	1	1	-	-	-	-	-	-	1	-	-	-
Digital Signal Processing - 20EC06		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC06.1	Interpret the basics of discrete time signal processing techniques.(Understand – L2)	2	2	1	-	-	-	-	-	-	-	-	2	-	-	1
20EC06.2	Examine Discrete Time Signals in time and frequency domain using DTFT, DFT, FFT and Z-transforms (Apply – L3)	2	1	1	-	-	-	-	-	-	-	-	2	-	-	2
20EC06.3	Apply DFT, FFT and Z-Transform techniques to solve and realize discrete Systems (Apply – L3)	3	3	1	1	-	-	-	-	-	-	-	2	-	-	2
20EC06.4	Construct the IIR Filters using Butterworth, Chebyshev Approximation techniques and FIR Filters using Fourier series method and windowing Techniques (Apply – L3)	3	3	2	1	-	-	-	-	-	-	-	3	-	-	2

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Analog Communications - 20EC07		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC07.1	Understand the fundamental concepts of various analog modulation schemes with relevant time and frequency domain representations.(Understand – L2)	2	2	1	-	-	-	-	-	-	-	-	2	1	-	-
20EC07.2	Interpret the generation, detection of continuous wave and pulse analog modulation techniques. (Understand – L2)	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
20EC07.3	Apply the concepts of analog modulation and demodulation techniques for calculating communication system related parameters.(Apply – L3)	2	2	1	1	-	-	-	-	-	-	-	2	3	-	-
20EC07.4	Analyze the performance of continuous wave modulation schemes in the presence of channel noise.(Analyze – L4)	2	3	1	1	-	-	-	-	-	-	-	3	3	-	-
Electromagnetic Waves & Transmission Lines - 20EC08		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC08.1	Define the basic laws that govern Electrostatic and Magnetostatic Fields. (Understand – L2)	3	2	1	1	-	-	-	-	-	-	-	1	3	-	-
20EC08.2	Understand the basic concepts of Electro Magnetic fields in static and time varying conditions. (Understand – L2)	3	2	1	1	-	-	-	-	-	-	-	1	3	-	-
20EC08.3	Apply the Electromagnetic concepts to different mediums (air, Dielectric media) (Apply – L3)	2	3	2	1	1	-	-	-	-	-	-	2	3	-	-
20EC08.4	Analyze the characteristics of EM wave propagation in different unbounded and bounded mediums. (Analyze – L4)	2	3	2	1	1	1	-	-	-	-	-	2	3	-	-
Environmental Science - 20MC02		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20MC02.1	Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.(Understand- L2)	3	3	-	-	-	3	3	3	-	-	-	3	-	-	-
20MC02.2	Evaluate local, regional and global environmental issues related to resources and their sustainable management (Understand- L2)	3	3	-	-	-	3	3	-	-	-	-	3	-	-	-
20MC02.3	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.(Understand- L2)	3	-	3	-	-	-	2	-	-	-	-	2	-	-	-
20MC02.4	Acknowledge and prevent the problems related to pollution of air, water and soil. (Understand- L2)	3	-	-	-	-	2	3	2	-	-	-	3	-	-	-
20MC02.5	Identify the significance of implementing environmental laws and abatement devices for environmental management.(Understand -L2)	3	3	3	3	-	3	3	3	-	-	-	3	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Programming Using Python Lab - 20AD53		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20AD53.1	Identify various programming constructs available in Python and apply them in solving computational problems (Understand -L2)	3	2	-	-	2	-	-	-	-	-	-	-	-	-	-
20AD53.2	Demonstrate data structures available in Python and apply them in solving computational problems (Understand -L2)	3	2	2	-	3	-	-	-	-	-	-	-	-	-	-
20AD53.3	Implement modular programming, string manipulations and Python Libraries (Apply – L3)	3	2	2	-	3	-	-	-	-	-	-	-	-	-	-
20AD53.4	Adapt effective communication, presentation skills and report writing.(Apply – L3)	-	-	-	-	-	-	-	-	3	2	-	-	-	-	-
Digital Signal Processing Lab - 20EC55		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC55.1	Understand the generation and operations of signals using MATLAB. (Understand – L2)	1	1	-	-	1	-	-	-	-	-	-	-	-	-	1
20EC55.2	Analyze the signals in time and frequency domains using MATLAB and Code Composer Studio. (Analyze – L4)	2	3	-	-	1	-	-	-	-	-	-	2	-	-	2
20EC55.3	Design IIR and FIR Filters and obtain their frequency response using MATLAB. (Apply – L3)	2	2	3	1	2	-	-	-	-	-	-	2	-	-	2
20EC55.4	Adapt effective communication, presentation skills and report writing. (Apply – L3)	-	-	-	2	-	-	-	1	2	3		1	-	-	-
Analog Communications Lab - 20EC56		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC56.1	Demonstrate the practical aspects of continuous wave modulation schemes.(Understand – L2)	3	3	1	-	1	-	-	-	-	-	-	-	2	-	-
20EC56.2	Construct the circuits for studying pulse modulation techniques. (Apply – L3)	2	3	1	-	1	-	-	-	-	-	-	2	2	-	-
20EC56.3	Apply the programming aspects of MATLAB in simulation of continuous wave and pulse modulation techniques (Apply – L3)	3	2	2	-	2	-	-	-	-	-	-	2	3	-	-
20EC56.4	Adapt effective communication, presentation and report writing skills. (Apply – L3)	-	-	-	-	-	-	-	1	2	3	-	1	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Modeling, Design And Prototyping - 20ECS2 (Skill Oriented Course)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20ECS2.1	Understand the programming concept of virtual instruments. (Understand – L2)	3	2	-	-	2	-	-	-	-	-	-	1	1	2	1
20ECS2.1	Develop real time applications using loops, formula nodes, array, clusters and DAQ. (Apply – L3)	3	2	2	-	2	-	-	-	2	-	-	1	1	2	1
20ECS2.1	Adopt Communication, Presentation and Report writing skills. (Apply – L3)	-	-	-	-	-	-	-	-	2	2	-	-	1	2	1

B.Tech V Semester															
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**	
Digital Communications - 20EC09		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC09.1	Understand the concepts of digital communication system (Understand – L2).	2	1	1	-	-	-	-	-	-	-	-	2	1	-	-
20EC09.2	Analyze the Baseband and Pass band digital modulation techniques (Analyze – L4)	3	2	1	-	-	-	-	-	-	-	-	2	3	-	-
20EC09.3	Examine the optimum reception and probability of error of digital modulation (Apply – L3).	3	3	2	2	-	-	-	-	-	-	-	2	3	-	-
20EC09.4	Apply source coding and error control coding techniques in digital communication process (Apply – L3).	3	2	2	2	-	-	-	-	-	-	-	2	3	-	-
Antennas and Wave Propagation - 20EC10		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC10.1	Understand basic antenna parameters, radiation mechanism, characteristics of radio wave propagations (Understand – L2)	3	2	1	1	-	-	-	-	-	-	-	1	3	-	-
20EC10.2	Analyze wire antenna, ground, space, and sky wave propagation mechanism for communication purpose and various Antenna Arrays (Analyze – L4)	3	2	1	1	-	-	-	-	-	-	-	1	3	-	-
20EC10.3	Design HF, VHF and UHF Antennas (Apply – L3)	2	3	2	1	-	-	-	-	-	-	-	2	3	-	-
20EC10.4	Apply antenna measurement methods to assess antenna's performance (Apply – L3)	1	2	3	2	-	-	-	-	-	-	-	2	3	-	-
Linear IC Applications - 20EC11		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC11.1	Identify the building blocks of linear integrated circuits, characteristics and application of Op-Amps (Understand – L2)	3	2	1	1	-	-	-	2	-	-	-	1	-	1	-
20EC11.2	Apply the concept of feedback to op-amps for linear and non-linear applications. (Apply – L3).	3	2	2	-	-	-	-	2	-	-	-	1	-	2	-
20EC11.3	Analyze Op-Amp, 555 timer applications, phase locked loops to perform addition and multiplication of signals and voltage regulators using Linear ICs (Analyze – L4)	3	3	1	-	-	-	-	2	-	-	-	1	-	2	-
20EC11.4	Design active filters, waveform generators and data converters using Op Amps (Apply – L3)	3	2	3	1	-	-	-	2	-	-	1	1	-	3	-

B.Tech V Semester																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Electronic Measurements and Instrumentation - 20EC12 (Program Elective - I)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC12.1	Understand the concepts of measurements and working principle of different voltmeters, ammeters, signal generators, Wave analyzers, Oscilloscopes and Transducers. (Understand-L2)	2	2	1	-	-	-	-	-	-	-	-	2	-	2	-
20EC12.2	Analyze the working of different measuring instruments and bridges using mathematical models.(Analyze-L4)	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-
20EC12.3	Apply appropriate passive or active transducers for measurement of physical parameters.(Apply-L3)	3	3	3	-	-	-	-	-	-	-	-	3	-	2	-
20EC12.4	Design ammeter, voltmeter, ohmmeters and bridges for the given specifications. (Apply-L3)	3	3	3	-	-	-	-	-	-	-	-	3	-	2	-
Digital IC Design - 20EC13 (Program Elective - I)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC13.1	Understand the parameters of MOS transistors. (Understand – L2)	3	2	1	1	1	-	-	-	-	-	-	1	-	3	-
20EC13.2	Design of Combinational and Sequential Circuits using MOS transistors. (Apply – L3)	3	3	3	1	1	-	-	-	-	-	-	2	-	3	-
20EC13.3	Examine the Dynamic logic circuits and their characteristics. (Apply – L3).	3	2	1	1	1	-	-	-	-	-	-	-	-	3	-
20EC13.4	Summarize Semiconductor memories and their organization. (Understand – L2)	1	3	1	1	-	-	-	-	-	-	-	2	-	3	-
Data Communication and Computer Networks - 20EC14 (Program Elective - I)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC14.1	Understand the functions of the OSI, TCP/IP reference models (Understand – L2)	2	3	1	-	-	-	-	-	-	-	-	3	3	-	-
20EC14.2	Summarize design issues for layer protocols (Understand – L2).	2	1	1	-	-	-	-	-	-	-	-	2	3	-	-
20EC14.3	Examine the routing algorithms to find shortest paths for packet delivery (Apply– L3)	3	3	-	2	2	-	-	-	-	-	-	2	3	-	-
20EC14.4	Interpret the operations of application layer protocols (Understand – L2)	2	2	-	-	-	-	-	-	-	-	-	3	3	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Digital Communications Lab - 20EC57		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC57.1	Interpret baseband and pass band modulation and demodulation techniques (Understand – L2)	3	2	-	2	-	-	-	-	-	-	-	2	3	-	-
20EC57.2	Apply coding techniques for error detection and correction in digital data transmission. (Apply – L3).	3	2	1	2	-	-	-	-	-	-	-	-	3	-	-
20EC57.3	Implement frequency and phase shift keying techniques using Software Defined Radio (Apply – L3).	3	2	-	2	3	-	-	-	-	-	-	-	3	-	-
20EC57.4	Adopt effective communication, presentation and report writing skills (Apply – L3).	-	-	-	2	-	-	-	1	2	3		1	-	-	-
Linear IC Applications Lab - 20EC58		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC58.1	Demonstrate the characteristics and applications of Op-Amps (Understand – L2)	2	3	1	2	-	-	-	2	1	2	-	1	-	2	-
20EC58.2	Apply the 555 Timer circuit concepts for the realization of waveform generators (Apply – L3).	2	3	1	1	-	-	-	2	1	2	-	1	-	2	-
20EC58.3	Design Active filters, arithmetic circuits, waveform generators and data converters using Op-Amp (Apply – L3)	2	3	1	2	-	-	-	2	1	2	-	1	-	3	-
20EC58.4	Adapt effective Communication, presentation and report writing skills (Apply – L3)	-	-	-	2	-	-	-	1	2	3	-	1	-	-	-
Design and Simulation of Antennas - 20ECS3 (Skill Oriented Course)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20ECS3.1	Understand the basic concepts of transmission lines and antennas according to Requirement and applications. (Understand – L2)	3	2	1	2	-	-	-	-	-	-	-	-	1	-	-
20ECS3.2	Apply software tools for different transmission lines and antennas. (Apply – L3)	3	2	1	1	-	-	-	-	-	-	-	-	1	-	-
20ECS3.3	Design the different parameters of transmission lines and antennas. (Design – L4)	3	1	2	2	-	-	-	-	-	-	-	-	3	-	-
20ECS3.4	Adapt effective Communication, presentation and report writing skills (Apply – L3)	-	-	-	2	-	-	-	1	2	3	-	1	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Summer Internship - 20PI01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20PI01.1	Identify engineering processes relevant to the industry (Understand – L2)	3	3	-	-	-	2	3	-	-	-	-	3	3	3	3
20PI01.2	Understand the usage of modern technologies & tools in the field of Electronics & Communication Engineering (Understand – L2)	3	3	3	3	3	3	3	3	3	-	3	3	3	3	3
20PI01.3	Adapt communication & Presentation skills(Apply – L3)	-	-	-	-	-	-	-	-	3	3	1	3	-	-	-
20PI01.4	Improve the report writing skills (Apply – L3)	-	-	-	-	-	-	-	3	1	3	1	3	-	-	2
OOP through JAVA - 20IT81 (Open Elective – I)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20IT81.1	Understand Object Oriented Programming Concepts through constructs of JAVA. (Understand - L2)	3	1	-	-		-	-	-	-	-	-	-	-	-	-
20IT81.2	Apply the concepts of Inheritance and Polymorphism on real-world applications. (Apply-L3)	3	2	-	-	1	-	-	-	-	-	-	3	-	-	-
20IT81.3	Implement reusability using interface and packages. (Understand - L2)	3	1	-	-	2	-	-	-	-	-	-	3	-	-	-
20IT81.4	Construct robust applications using exception handling. (Apply-L3)	3	1	-	-	2	-	3	-	-	-	-	3	-	-	-
20IT81.5	Understand multi-threading concepts. (Understand - L2)	3	2	-	-	2	-	-	-	-	-	-	3	-	-	-

B.Tech VI Semester																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Microprocessors and Microcontrollers - 20EC15		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC15.1	Understand the architecture of 8086, 8051 and ARM Controller (Understand – L2)	3	2	1	1	-	-	-	-	-	-	-	1	-	3	-
20EC15.2	Apply Assembly Language instructions for Processor and Controller based applications (Apply – L3)	3	2	1	1	-	-	-	-	-	-	-	1	-	3	-
20EC15.3	Analyze the operating modes and interrupt structures of processors and controllers (Analyze – L4)	2	3	2	1	-	-	-	-	-	-	-	2	-	3	-
20EC15.4	Develop the ARM based interfacing systems for Real time applications (Apply – L3)	1	2	3	2	-	-	-	-	-	-	-	2	-	3	-
VLSI Design - 20EC16		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC16.1	Understand semiconductor technology and MOS fabrication process (Understand- L2)	2	1	1	-	-	-	-	-	-	-	-	3	-	-	-
20EC16.2	Apply layout design rules for NMOS, CMOS logic circuit designs.(Apply – L3)	2	1	1	-	-	-	-	-	-	-	-	3	-	2	-
20EC16.3	Analyze the IC building blocks. (Analyze L4)	2	3	2	-	-	-	-	-	-	-	-	3	-	3	-
20EC16.4	Apply CMOS testing techniques to test different digital designs. (Apply-L3)	2	2	1	-	-	-	-	-	-	-	-	3	-	-	-
Microwave Engineering - 20EC17		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC17.1	Understand the microwave sources, components and measurements of microwave parameters (Understand – L2)	3	2	2	1	-	-	-	-	-	-	-	2	3	-	-
20EC17.2	Develop the TE, TM fields in waveguides and microwave signals using microwave tubes and solid state devices (Apply – L3)	3	2	2	1	-	-	-	-	-	-	-	2	3	-	-
20EC17.3	Apply the properties of S-parameters to model the S-matrix of waveguide components (Apply – L3)	3	2	1	1	1	-	-	-	-	-	-	1	3	-	-
20EC17.4	Analyze the flow of microwave fields in waveguides, components and efficiency of microwave tubes (Analyze – L4)	3	3	2	1	1	-	-	-	-	-	-	2	3	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Image Processing - 20EC18 (Program Elective - II)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC18.1	Interpret the fundamental concepts of digital Image Processing. (Understand- L2)	1	1	1	-	-	-	-	-	-	-	-	1	-	-	3
20EC18.2	Apply the concepts of masking and filtering for image enhancement. (Apply-L3)	2	3	2	1	-	-	-	-	-	-	-	1	-	-	3
20EC18.3	Summarize the image segmentation methodologies. (Understand-L2)	3	3	3	2	-	-	-	-	-	-	-	1	-	-	3
20EC18.4	Understand the underlying concepts of image restoration and compression techniques. (Understand-L2)	3	3	2	2	-	-	-	-	-	-	-	1	2	-	3
Satellite Communications - 20EC19 (Program Elective - II)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC19.1	Understand the orbital mechanics, concepts of satellite communication and its applications (Understand – L2)	1	-	-	-	-	3	3	-	-	-	-	1	1	-	-
20EC19.2	Summarize the concepts of satellite space segment, earth segment and satellite services (Understand – L2)	1	1	1	-	-	3	1	-	-	-	-	1	2	-	-
20EC19.3	Examine the satellite link budget calculations and orbital dynamics (Apply – L3)	1	-	1	2	-	-	-	-	-	-	-	-	2	-	-
20EC19.4	Apply the multiple-access techniques and mobile services for satellite Communications (Apply – L3)	1	1	1	-	-	3	1	-	-	-	-	-	2	-	-
Principles of Robotic Systems - 20EC20 (Program Elective - II)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC20.1	Understand the Robotic components and modules. (Understand – L2)	3	2	-	-	2	-	-	-	-	-	-	1	-	2	-
20EC20.2	Analyse the working of Modules and Control techniques. (Analyse – L4)	3	2	2	-	2	-	-	-	-	-	-	1	-	2	1
20EC20.3	Summarize the concepts of Robotic sensors for vision related applications (Understand – L2)	2	2	1	-	2	-	2	-	-	-	-	2	-	2	-
20EC20.4	Apply the concepts and algorithms to develop Robot designs (Apply – L3)	2	2	1	-	-	-	-	-	-	-	-	3	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Microprocessors and Microcontrollers Lab -20EC59		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC59.1	Demonstrate the MASM/TASM tool for developing Assembly Language Programs. (Understand – L2)	2	2	3	2	2	-	1	1	-	-	-	2	-	2	-
20EC59.2	Apply the Assembly Language instructions of Processor and Controller for logical operations. (Apply – L3)	3	3	3	2	2	-	1	1	-	-	-	3	-	3	-
20EC59.3	Develop the ARM based interfacing systems for Real time applications. (Apply – L3)	3	3	3	3	3	-	1	1	-	-	-	3	-	3	-
20EC59.4	Adapt effective communication, presentation and report writing skills. (Apply – L3)	-	-	-	2	-	-	-	1	2	3	-	1	-		-
VLSI Design Lab - 20EC60		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC60.1	Implement combinational and sequential circuits on FPGA/CPLD boards. (Apply – L3)	2	1	2	2	3	-	-	-	-	-	-	-	-	3	-
20EC60.2	Design the Combinational and Sequential logic using NMOS and CMOS Technology. (Apply – L3)	2	1	2	2	3	-	-	-	-	-	-	-	-	3	-
20EC60.3	Analyze combinational and sequential circuits using Static CMOS logic from schematic to layout. (Analyze – L4)	2	1	2	2	3	-	-	-	-	-	-	-	-	3	-
20EC60.4	Adapt effective communication, presentation and report writing skills. (Apply – L3)	-	-	-	2	-	-	-	1	2	3	-	1	-	-	-
Microwave Engineering Lab - 20EC61		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC61.1	Demonstrate the functions of microwave bench setup (Understand – L2)	1	-	-	1	1	-	-	-	-	-	-	-	1	-	-
20EC61.2	Examine the properties of microwave passive devices using HFSS (Apply – L3)	1	1	1	1	3	-	-	-	-	-	-	1	3	-	-
20EC61.3	Estimate the frequency, wave length, VSWR, impedance and scattering parameters of microwave devices (Apply – L3)	2	2	-	3	2	-	-	-	-	-	-	-	3	-	-
20EC61.4	Adapt effective communication, presentation and report writing skills. (Apply – L3)	-	-	-	2	-	-	-	1	2	3	-	1	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Soft Skills Course - 20HSS1		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20HSS1.1	To Develop self-awareness and personality traits for professional growth. (Understand-L3)	-	-	-	-	2	-	-	3	3	3	-	2	-	-	-
20HSS1.2	Work effectively in multi-disciplinary and heterogeneous teams through knowledge of teamwork, Inter-personal relationships, conflict management and leadership quality. (Understand-L3)	-	2	-	-	2	-	-	3	3	3	-	3	-	-	-
20HSS1.3	Communicate through verbal /oral communication with good listening skills and empathy. .(Apply-L3)	-	-	-	-	2	-	-	3	3	3	-	3	-	-	-
20HSS1.4	Apply skills required to qualify in recruitment tests, Interviews & other professional assignments.(Apply-L3)	-	-	-	-	2	-	-	3	3	3	-	-	-	-	-
Operations Research Techniques - 20ME83 (Open Elective - II)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20ME83.1	Apply linear programming approach for optimizing the objectives of industrial oriented problems. (Applying-L3)	1	-	-	-	-	-	-	-	2	-	-	-	-	-	-
20ME83.2	Formulate and solve transportation models and Assignment models. (Applying-L3)	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-
20ME83.3	Implement the strategies in competitive situations and able to sequence the jobs to be processed on machines. (Applying-L3)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
20ME83.4	Identify the replacement period of the equipment and analyze the waiting situations in the organization. (Applying-L3)	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-
20ME83.5	Determine the optimum inventory level and resolve the complex problem into simple problems by dynamic programming approach and apply optimum strategies. (Applying-L3)	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-

B.Tech VII Semester																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
ASIC Design - 20EC21 (Program Elective - III)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC21.1	Understand ASIC Design Styles, Design Issues, Design Techniques and Construction. (Understand – L2)	1	-	2	1	2	-	-	-	-	-	-	2	-	2	-
20EC21.2	Apply design techniques, resources and tools to develop ASIC modules. (Apply – L3)	2	2	2	2	2	-	-	-	-	-	-	2	-	2	-
20EC21.3	Analyze the characteristics and Performance of ASICs and judge independently the best suited device for fabrication of smart devices. (Analyze – L4)	2	3	2	2	2	-	-	-	-	-	-	3	-	3	-
20EC21.4	Evaluate Design issues, simulation and Testing of ASICs. (Apply – L3)	3	3	3	3	3	-	-	-	-	-	-	3	-	3	-
Advanced Digital Signal Processing - 20EC22 (Program Elective - III)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC22.1	Understand random signals, correlation functions and power spectrum. (Understand – L2)	3	1	-	-	-	-	-	-	-	-	-	2	-	-	1
20EC22.2	Interpret forward and backward linear prediction models. (Understand – L2)	2	2	-	-	-	-	-	-	-	-	-	2	-	-	3
20EC22.3	Apply concept of normal equation solution for analyzing Wiener Filter. (Apply-L3)	3	3	1	1	-	-	-	-	-	-	-	2	-	-	3
20EC22.4	Examine the Power Spectrum by making use of parametric methods and non-parametric methods.(Apply-L3)	3	2	1	1	-	-	-	-	-	-	-	3	-	-	3
Optical Communications - 20EC23 (Program Elective - III)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC23.1	Describe the fundamental concepts of optical communication systems, WDM systems and optical networks (Understand –L2).	2	1	1	1	-	-	-	-	-	-	-	2	2	-	-
20EC23.2	Apply knowledge of signal transmission characteristics of fibers, sources, and detectors in the optical communication system parameters calculations. (Apply –L3)	3	2	2	2	-	-	-	-	-	-	-	2	3	-	-
20EC23.3	Interpret the operation of optical sources, detectors in the presence of channel degradation mechanisms in analog and digital optical systems (Understand –L2).	2	1	1	1	-	-	-	-	-	-	-	2	2	-	-
20EC23.4	Examine the parameters of source to fiber launching, Power-Coupling Calculations, attenuation, and dispersion measurement. (Apply –L3)	3	3	2	2	-	-	-	-	-	-	-	1	3	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Micro-Electro-Mechanical Systems - 20EC24 (Program Elective - IV)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC24.1	Understand the micro systems, microelectronics & miniaturization technique. (Understand –L2)	3	3	2	-	-	-	-	-	-	-	-	2	-	3	-
20EC24.2	Illustrate the scaling laws necessary for micro systems including Bulk and Surface micromachining techniques used for MEMS fabrication. (Understand –L2)	3	3	2	-	-	-	-	-	-	-	-	2	-	2	-
20EC24.3	Classify and discuss the properties of materials suitable for Microsystems. (Understand –L2)	3	3	2	-	-	-	-	-	-	-	-	2	-	2	-
20EC24.4	Examine the design aspects, sensing mechanisms and limitations of MEMS based devices. (Apply –L3)	3	3	3	-	-	-	-	-	-	-	-	3	-	3	-
Radar Systems - 20EC25 (Program Elective - IV)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC25.1	Understand the basic concepts of Radar systems. (Understand – L2)	3	3	2	-	-	-	-	-	-	-	-	3	3	3	-
20EC25.2	Analyze the CW Radar and FMCW Radar system for the measurement of speed and distance. (Analyze – L4)	3	2	2	-	-	-	-	-	-	-	-	3	3	2	1
20EC25.3	Apply the techniques to remove the clutter using MTI Radar and Pulse Doppler Radar. (Apply – L3)	3	3	2	-	1	3	-	-	-	-	-	3	3	2	1
20EC25.4	Design the matched filter for radar echoes. (Apply – L3)	3	3	2	-	1	3	-	-	-	-	-	3	3	2	1
Wireless Sensor Networks - 20EC26 (Program Elective - IV)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC26.1	Interpret the operation of wireless sensor network elements. (Understand-L2).	3	2	1	-	-	-	-	-	-	-	-	3	3	-	-
20EC26.2	Examine different communication protocols of wireless sensor networks and its applications (Apply-L3).	-	3	2	-	3	-	-	-	-	-	-	3	3	-	-
20EC26.3	Outline sensor tasking and techniques used to establish infrastructure of wireless sensor networks (Understand-L2).	-	3	3	3	3	-	-	-	-	-	-	3	3	-	-
20EC26.4	Apply the knowledge of sensor network platforms and tools for sensor network application development (Apply-L3).	3	2	3	3	3	-	-	-	-	-	-	3	3	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Low Power VLSI Design - 20EC27 (Program Elective - V)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC27.1	Summarize the Fundamental concepts of Low Power VLSI Design. (Understand – L2)	1	1	-	-	-	-	-	-	-	-	-	1	-	1	-
20EC27.2	Apply Low Power Design Approaches for IC designs. (Apply – L3)	3	2	1	1	-	-	-	-	-	-	-	1	-	2	-
20EC27.3	Analyze low voltage low power memories using mathematical models. (Analyze – L4)	2	3	2	2	-	-	-	-	-	-	-	2	-	3	-
20EC27.4	Design low voltage low power adders and multipliers. (Apply – L3)	3	3	3	2	-	-	-	-	-	-	-	2	-	3	-
Biomedical Signal Processing - 20EC28 (Program Elective - V)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC28.1	Illustrate the characteristics of EEG and ECG signals. (Understand – L2)	1	1	1	1	-	-	-	-	-	-	-	1	-	-	-
20EC28.2	Describe the behavior of EEG signals with Linear prediction and Autoregressive methods and ECG signals with detection and estimation Techniques (Understand-L2)	3	2	1	1	-	-	-	-	-	-	-	2	-	-	3
20EC28.3	Apply adaptive filtering and data compression techniques on ECG data. (Apply-L3)	3	2	1	1	-	-	-	-	-	-	-	1	-	-	3
20EC28.4	Summarize the concepts of Prony's methods of clinical applications (Understand-L2)	3	2	1	1	-	-	-	-	-	-	-	2	-	-	3
Cellular & Mobile Communication - 20EC29 (Program Elective - V)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC29.1	Outline the concepts and operational principles of cellular systems (Understand-L2)	2	1	-	-	-	2	2	-	-	-	-	1	2	-	-
20EC29.2	Summarize the multiple access techniques and evolution of cellular technologies. (Understand-L2)	1	1	1	-	-	2	1	-	-	-	-	1	1	-	-
20EC29.3	Examine interferences, performance parameters, cell site & mobile antennas and methodologies to improve the cellular capacity. (Apply-L3)	3	1	1	-	-	2	1	-	-	-	-	1	1	-	-
20EC29.4	Analyze the effects of radio propagation models, Frequency Management, Channel Assignment, handoff, and call drops in cellular communications (Analyze-L4).	2	1	1	-	-	2	1	-	-	-	-	1	1	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Management Science for Engineers - 20HS02		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20HS02.1	Understand management principles to practical situations based on the organization structures. (Understand - L2)	3	3	3	2	3	-	-	-	3	-	-	3	-	-	-
20HS02.2	Design Effective plant Layouts by using work study methods. (Understand - L2)	3	3	1	2	1	-	-	-	3	-	-	3	-	-	-
20HS02.3	Apply quality control techniques for improvement of quality and materials management. (Apply - L3)	3	3	3	2	1	-	-	-	3	-	-	3	-	-	-
20HS02.4	Develop best practices of HRM in corporate Business to raise employee productivity. (Understand - L2)	3	2	3	2	3	-	-	-	1	-	-	3	-	-	-
20HS02.5	Identify critical path and project completion time by using CPM and PERT techniques. (Apply - L3)	2	3	3	2	1	-	-	-	1	-	-	3	-	-	-
Industrial / Research Internship - 20PI02		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20PI02.1	Identify engineering processes relevant to the industry (Understand – L2)	3	3	-	-	-	2	3	-	-	-	-	3	3	3	3
20PI02.2	Understand the usage of modern technologies & tools in the field of Electronics & Communication Engineering (Understand – L2)	3	3	3	3	3	3	3	3	3	-	3	3	3	3	3
20PI02.3	Adapt communication & Presentation skills (Apply – L3)	-	-	-	-	-	-	-	-	3	3	1	3	-	-	-
20PI02.4	Improve the report writing skills (Apply – L3)	-	-	-	-	-	-	-	3	1	3	1	3	-	-	2
Internet of Things - 20EC30		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC30.1	Understand the programming concepts of IOT .(Understand – L2)	3	2	-	-	2	-	-	-	-	-	-	1	1	2	1
20EC30.2	Develop real time applications using Internet of Things. (Apply – L3)	3	2	2	-	2	-	-	-	2	-	-	1	1	2	1
20EC30.3	Demonstrate the integration of sensors with IoT. (Understand – L2)	3	2	-	-	2	-	-	-	-	-	-	1	1	2	1
20EC30.4	Adopt effective Communication, Presentation and Report writing skills. (Apply – L3)	-	-	-	-	-	-	--	1	2	3	-	1	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Introduction to Artificial Intelligence - 20AD81 (Open Elective - III)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20AD81.1	Enumerate the history and foundations of Artificial Intelligence. (Understand-L2)	2	3	2	-	3	-	-	-	-	-	-	2	-	-	-
20AD81.2	Apply the basic principles of AI in problem solving. (Apply-L3).	2	3	3	3	3	-	-	-	-	-	-	2	-	-	-
20AD81.3	Illustrate the different searching algorithms to find and optimize the solution for the given problem. (Apply-L3)	2	3	3	-	3	-	-	-	-	-	-	2	-	-	-
20AD81.4	Illustrate the different gaming algorithms and identify the importance of knowledge representation in Artificial Intelligence. (Apply- L3)	2	3	3	2	3	-	-	-	-	-	-	2	-	-	-
20AD81.5	Describe the use of predicate logic to represent the knowledge in AI domain. (Understand - L2)	2	3	3	2	3	-	-	-	-	-	-	2	-	-	-
Cyber Security & Digital Forensics - 20IT84 (Open Elective - IV)		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20IT84.1	Understand the implementation of cybercrime. (Understand - L2)	1	1	-	-	1	1	-	1-	-	-	-	1	1	-	-
20IT84.2	Identify key Tools and Methods used in Cybercrime. (Remember- L1)	-	1	1	-	3	1	-	-	-	-	-	1	1	-	-
20IT84.3	Under the Concepts of Cyber Forensics. (Understand- L2)	1	-	-	-	3	1	-	-	-	-	-	1	1	-	-
20IT84.4	Apply Cyber Forensics in collection of digital evidence and sources of evidence (Apply- L3)	1	-	-	1	-	-	-	-	-	-	-	2	2	-	-
20IT84.5	Analyze the cyber forensics tools for present and future (Analyze- L4)	-	-	1	-	3	1	-	-	-	-	1	2	1	-	-

B.Tech VIII Semester

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Project Work - 20PI03		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20PI03.1	Identify the complex engineering problems relevant to the society and industry. (Understand – L2)	3	3	-	-	-	2	3	-	-	-	-	3	3	3	3
20PI03.2	Apply modern technologies, tools and systems in the field of Electronics & Communication Engineering to analyze the identified problem. (Apply – L3)	3	3	3	3	3	3	3	3	3	-	3	3	3	3	3
20PI03.3	Design and implement a viable solution to the problem. (Apply – L3)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
20PI03.4	Apply communication & Presentation skills (Apply – L3)	-	-	-	-	-	-	-	-	3	3	1	3	-	-	-
20PI03.5	Develop the team work and leadership skills with professional and ethical values. (Apply – L3)	-	-	-	-	-	-	-	3	3	1	2	3	-	-	-
20PI03.6	Develop the report writing skills. (Apply – L3)	-	-	-	-	-	-	-	3	1	3	1	3	-	-	2

B.Tech ECE :: Honor Courses																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
CPLD And FPGA Architectures – 20ECH1		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20ECH1.1	Understand different types of Complex Programmable Logic Devices (CPLD) and Field Programmable Gate Arrays (FPGA) chips. (Understand – L2)	1	1	2	2	2	-	-	-	-	-	-	-	-	-	2
20ECH1.2	Analyze the device Architecture of Anti-Fuse Programmed FPGAs. (Analyze- L4)	2	3	3	3	3	-	-	-	-	-	-	-	-	-	2
20ECH1.3	Apply Programming Technology for SRAM and FPGAs. (Apply – L3)	2	3	3	2	3	-	--	-	-	-	-	-	-	-	2
20ECH1.4	Design the Combinational and Sequential Circuits using CPLD & amp; FPGAs for real time Applications (Analyze- L4)	2	3	3	3	3	-	-	-	3	2	-	-	-	-	2
Real Time Operating Systems – 20ECH2		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20ECH2.1	Understand the commands and utilities in Linux/UNIX and RTO systems. (Understand – L2)	1	-	-	-	-	-	-	-	--	-	-	1	-	1	-
20ECH2.2	Analyze real-time operating systems objects, services and I/O concepts. (Analyze- L4)	2	1	2	1	2	-	-	-	-	-	-	1	-	2	-
20ECH2.3	Evaluate various Interrupts and Timers. (Analyze- L4)	2	2	2	2	2	-	--	-	-	-	-	2	-	3	-
20ECH2.4	Design real time embedded systems using the concepts of RTOS. (Analyze- L4)	3	3	3	3	3	-	-	-	-	-	-	2	-	3	-
VLSI Design Automation – 20ECH3		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20ECH3.1	Understand need for VLSI physical design automation. (Understand – L2)	1	1	1	-	-	-	-	-	--	-	-	1	-	2	-
20ECH3.2	Analyze VLSI automation algorithms for partitioning. (Apply – L3)	1	2	2	1	2	-	-	-	-	-	-	1	-	2	-
20ECH3.3	Formulate placement, floor planning and pin assignment problems and simulate. (Apply – L3)	1	2	3	1	2	-	-	-	-	-	-	2	-	3	-
20ECH3.4	Resolve routing issues using various algorithms. (Analyze- L4)	1	2	3	2	3	-	-	-	-	-	-	2	-	3	-
20ECH3.5	Illustrate physical design cycle for FPGAs. (Analyze- L4)	3	2	3	2	3	-	-	-	-	-	-	2	-	3	-
VLSI Testing and Verification – 20ECH4		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20ECH4.1	Identify the significance of testable design. (Understand – L2)	1	2	2	1	2	-	-	-	-	-	-	1	-	2	-
20ECH4.2	Implement combinational and sequential circuit test generation algorithms (Apply – L3)	1	2	3	1	2	-	-	-	-	-	-	2	-	3	-
20ECH4.3	Understand the importance of Design verification. (Understand – L2)	1	2	3	2	3	-	-	-	-	-	-	2	-	3	-
20ECH4.4	Analyze the static timing verification and physical design verification. (Analyze- L4)	3	3	3	3	3	-	-	-	-	-	-	2	-	3	-

B.Tech ECE :: Open Elective Courses offered																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Satellite Technology - 20EC81		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC81.1	List out the operational bands, Space craft control mechanisms, sensors and navigational aids for satellite applications (Remember-L1)	1	-	-	-	-	3	2	-	-	-	-	1	1	-	-
20EC81.2	Summarize the functions of satellite space segment, earth segment, Multiple access techniques and satellite services. (Understand-L2)	1	1	1	-	-	2	1	-	-	-	-	1	2	-	-
20EC81.3	Illustrate the operational principles of satellite power system and space craft Control mechanism. (Understand-L2)	1	1	1	-	-	2	1	-	-	-	-	1	2	-	-
20EC81.4	Outline the concepts of orbital mechanics & satellite communication and its application (Understand-L2)	1	1	1	-	-	2	1	-	-	-	-	1	2	-	-
Elements of Communication Systems - 20EC82		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC82.1	Summarize the properties of systems and concepts of noise in communication systems. (Understand-L2).	3	-	1	-	-	-	-	-	-	-	-	2	3	-	-
20EC82.2	Outline the concepts of communication system, transmission lines, antennas, and response of linear systems (Understand-L2).	2	1	-	-	-	-	-	-	-	-	-	2	3	-	-
20EC82.3	Apply the knowledge of systems, transmission and reception concepts for communication systems in the presence of noise. (Apply-L3).	3	2	2	-	-	--	-	-	-	-	-	2	3	-	-
20EC82.4	Interpret the response of linear systems and performance of RF transmitters, receivers, transmission lines and antennas (Understand L2).	3	1	-	2	-	-	-	-	-	-	-	2	3	-	-
Microprocessors and Interfacing - 20EC83		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC83.1	Outline the architecture of 8086 and peripheral devices. (Understand – L2)	1	-	2	1	1	-	-	-	-	-	-	1	-	1	-
20EC83.2	Apply 8086 instructions for microprocessor based applications. (Apply – L3)	2	3	2	2	2	-	-	-	-	-	-	3	-	3	-
20EC83.3	Analyze the operation and programming of peripheral devices. (Analyze – L4)	2	3	2	2	2	-	-	-	-	-	-	3	-	3	-
20EC83.4	Design of 8086 based system by interfacing memory, peripherals and I/O devices. (Apply – L3)	2	3	3	3	3	-	-	-	-	-	-	3	-	3	-

B.Tech ECE :: Open Elective Courses offered																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Analog and Digital Communications - 20EC84		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC84.1	Describe the concepts of analog and digital modulation (Understand-L2)	2	1	-	-	-	-	-	-	-	-	-	1	1	-	-
20EC84.2	Understand the waveform coding techniques, modulation techniques used in communication systems (Understand-L2)	1	3	2	1	-	-	-	-	-	-	-	1	3	-	-
20EC84.3	Examine the performance of analog and digital modulation techniques. (Apply-L3).	2	3	1	1	-	-	-	-	-	-	-	3	3	-	-
20EC84.4	Apply the transmission and detection techniques for communication system applications (Apply-L3)	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
Systems and Signal Processing - 20EC85		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC85.1	Discuss the classification of signals and systems along with their properties and the concepts of sampling. (L2)	2	1	1	-	-	-	-	-	-	-	-	1	-	-	1
20EC85.2	Apply the concepts of Fourier series, Continuous time and Discrete Fourier Transform and Z Transform on signals. (L3)	2	2	1	1	-	-	-	-	-	-	-	2	-	-	2
20EC85.3	Describe the systems and observe the response of Linear Systems. (Understand – L2)	3	1	1	1	-	-	-	-	-	-	-	1	-	-	3
20EC85.4	Design IIR Digital Filters by applying Approximation Procedures and FIR Digital Filters through Window Techniques. (Apply – L3)	3	2	1	1	-	-	-	-	-	-	-	2	-	-	3
Cellular Technology - 20EC86		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
20EC86.1	Understand the concepts of cellular system and wireless standards (Understand- L2).	1	-	1	-	-	3	-	-	-	-	-	1	-	-	-
20EC86.2	Summarize the evolution of cellular technologies from 1G to 5G systems and interference in cellular systems (Understand-L2).	1	-	1	-	-	2	1	-	-	-	-	1	1	-	-
20EC86.3	Examine the multiple access techniques and architectures of 2G/3G/4G/5G systems (Apply-L3).	2	1	1	-	-	2	1	-	-	-	-	1	1	-	-
20EC86.4	Characterize the advanced cellular technologies LTE, OFDMA, mm Wave, MIMO, NOMA. (Understand-L2)	1	1	1	-	-	2	1	-	-	-	-	1	1	-	-

Head of the Department
(ECE)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Mapping of Courses to POs and PSOs:: Program Articulation Matrix :: R20 Regulation

B.Tech I Semester															
Courses / POs and PSOs		**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	Professional Communication-I - 20FE01	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
2	Differential Equations - 20FE03	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
3	Applied Physics - 20FE07	3	3	2	1	-	-	-	-	-	-	-	1	-	-	-
4	Basic Electrical Engineering - 20EE01	3	2	1	1	-	-	1	-	-	1	-	-	-	-	3
5	Electronic Devices and Circuits - 20EC01	2	2	2	1	-	3	1	-	-	-	1	2	-	2	-
6	Professional Communication Skills Lab - 20FE51	-	-	-	-	3	-	-	-	-	3	3	-	-	2	-
7	20FE54 - Applied Physics Lab	3	3	1	1	-	1	-	2	2	2	-	1	-	-	-
8	Basic Electrical Engineering Lab - 20EE51	3	3	1	1	-	-	-	-	2	3	-	-	-	-	3
9	Electronic Devices and Circuits Lab - 20EC51	3	1	1	-	-	-	-	-	3	2	1	1	-	2	-

B.Tech II Semester

Courses / POs and PSOs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	Professional Communication-II - 20FE02	-	1	-	2	-	1	-	-	3	3	-	2	-	-	-
2	Linear Algebra and Transformation Techniques - 20FE04	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
3	Engineering Chemistry - 20FE06	3	3	2	1	-	2	2	-	-	-	-	2	-	-	-
4	Programming for ProblemSolving Using C - 20CS01	2	3	2	1	-	-	-	-	-	1	-	1	-	-	-
5	Digital Logic Circuits - 20EC02	2	3	3	-	-	-	-	-	-	-	-	2	-	3	-
6	Constitution of India - 20MC01	-	-	-	-	-	3	3	3	-	2	-	3	-	-	-
7	Engineering Chemistry Lab - 20FE53	3	2	1	1	-	2	2	-	-	-	-	-	-	-	-
8	Programming for Problem Solving Using C Lab - 20CS51	2	3	1	-	-	-	-	-	1	1	-	2	-	-	-
9	Digital Logic Circuits Lab - 20EC52	2	3	2	3	3	-	-	2	2	3	-	2	-	2	-
10	Engineering Workshop - 20ME51	1	2	1	2	-	2	-	-	3	1	-	3	-	-	-

B.Tech III Semester

Courses / POs and PSOs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	Numerical Methods and Integral Calculus - 20FE10	3	2	-	2	-	-	-	-	-	-	-	1	-	-	-
2	Data Structures - 20CS03	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Analog Circuit Design - 20EC03	3	2	1	-	-	3	1	-	-	-	1	2	-	3	-
4	Signals & Systems - 20EC04	3	2	1	1	-	-	-	-	-	-	-	2	2	-	2
5	Random Variables & Stochastic Processes - 20EC05	3	3	1	1	-	-	-	-	-	-	-	2	2	-	2
6	Data Structures Lab - 20CS53	-	2	1	-	1	-	2	2	2	-	-	-	-	-	-
7	Analog Circuit Design Lab - 20EC53	2	1	1	2	-	-	-	-	3	2	-	1	-	2	-
8	Digital System Design Lab - 20EC54	3	2	3	2	3	-	-	-	-	-	-	2	-	3	-
9	Signal Modeling And Analysis - 20ECS1 (Skill Oriented Course)	2	2	1	1	2	-	-	-	1	3	-	2	-	-	2

B.Tech IV Semester

Courses / POs and PSOs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	Universal Human Values 2: Understanding Harmony - 20HS01	-	-	-	-	-	3	3	3	-	-	-	2	-	-	-
2	Control Systems - 20EE09	3	2	1	1	1	-	-	-	-	-	-	2	-	-	1
3	Digital Signal Processing - 20EC06	3	3	2	1	-	-	-	-	-	-	-	3	-	-	2
4	Analog Communications - 20EC07	2	3	1	1	-	-	-	-	-	-	-	3	3	-	-
5	Electromagnetic Waves & Transmission Lines - 20EC08	3	3	2	1	1	1	-	-	-	-	-	2	3	-	-
6	Environmental Science - 20MC02	3	3	3	3	-	3	3	3	-	-	-	3	-	-	-
7	Programming Using Python Lab - 20AD53	3	2	2	-	3	-	-	-	3	2	-	-	-	-	-
8	Digital Signal Processing Lab - 20EC55	2	2	3	2	2	-	-	1	2	3	-	2	-	-	2
9	Analog Communications Lab - 20EC56	3	3	2	-	2	-	-	1	2	3	-	2	3	-	-
10	Modeling, Design And Prototyping - 20ECS2 (Skill Oriented Course)	3	2	2	-	2	-	-	-	2	2	-	1	1	2	1

B.Tech V Semester

Courses / POs and PSOs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	Digital Communications - 20EC09	3	2	2	2	-	-	-	-	-	-	-	2	3	-	-
2	Antennas and Wave Propagation - 20EC10	3	3	2	2	-	-	-	-	-	-	-	2	3	-	-
3	Linear IC Applications - 20EC11	3	3	2	1	-	-	-	2	-	-	1	1	-	2	-
4	Electronic Measurements and Instrumentation - 20EC12	3	3	3	-	-	-	-	-	-	-	-	3	-	2	-
5	Digital IC Design - 20EC13	3	3	2	1	1	-	-	-	-	-	-	2	-	3	-
6	Data Communication and Computer Networks - 20EC14	3	3	1	2	2	-	-	-	-	-	-	3	3	-	-
7	Digital Communications Lab - 20EC57	3	2	1	2	3	-	-	1	2	3	-	2	3	-	-
8	Linear IC Applications Lab - 20EC58	2	3	1	2	-	-	-	2	2	3	-	1	-	3	-
9	Design and Simulation of Antennas - 20ECS3 (Skill Oriented Course)	3	2	2	2	-	-	-	1	2	3	-	1	2	-	-
10	Summer Internship - 20PI01	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3
11	OOP through JAVA - 20IT81 (Open Elective – I)	3	2	-	-	2	-	3	-	-	-	-	3	-	-	-

B.Tech VI Semester

Courses / POs and PSOs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	Microprocessors and Microcontrollers - 20EC15	3	3	2	2	-	-	-	-	-	-	-	2	-	3	-
2	VLSI Design - 20EC16	2	2	2	-	-	-	-	-	-	-	-	3	-	3	-
3	Microwave Engineering - 20EC17	3	3	2	1	1	-	-	-	-	-	-	2	3	-	-
4	Image Processing - 20EC18	3	3	2	2	-	-	-	-	-	-	-	1	2	-	3
5	Satellite Communications - 20EC19	1	1	1	2	-	3	2	-	-	-	-	1	2	-	-
6	Principles of Robotic Systems - 20EC20	3	2	2	-	2	-	2	-	-	-	-	2	-	2	1
7	Microprocessors and Microcontrollers Lab -20EC59	3	3	3	3	3	-	1	1	2	3	-	3	-	3	-
8	VLSI Design Lab - 20EC60	2	1	2	2	3	-	-	1	2	3	-	1	-	3	-
9	Microwave Engineering Lab - 20EC61	2	2	1	2	2	-	-	1	2	3	-	1	3	-	-
10	Soft Skills Course - 20HSS1	-	2	-	-	2	-	-	3	3	3	-	3	-	-	-
11	Operations Research Techniques - 20ME83 (Open Elective - II)	1	1	2	2	1	-	1	1	2	-	1	-	-	-	-

B.Tech VII Semester

Courses / POs and PSOs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	ASIC Design - 20EC21	2	3	3	2	3	-	-	-	-	-	-	3	-	3	-
2	Advanced Digital Signal Processing - 20EC22	3	2	1	1	-	-	-	-	-	-	-	3	-	-	3
3	Optical Communications - 20EC23	3	2	2	2	-	-	-	-	-	-	-	2	3	-	-
4	Micro-Electro-Mechanical Systems - 20EC24	3	3	3	-	-	-	-	-	-	-	-	3	-	3	-
5	Radar Systems - 20EC25	3	3	2	-	1	3	-	-	-	-	-	3	3	3	1
6	Wireless Sensor Networks - 20EC26	3	3	3	3	3	-	-	-	-	-	-	3	3	-	-
7	Low Power VLSI Design - 20EC27	3	3	2	2	-	-	-	-	-	-	-	2	-	3	-
8	Biomedical Signal Processing - 20EC28	3	2	1	1	-	-	-	-	-	-	-	2	-	-	3
9	Cellular & Mobile Communication - 20EC29	2	1	1	-	-	2	2	-	-	-	-	1	2	-	-
10	Management Science for Engineers - 20HS02	3	3	3	2	2	-	-	-	3	-	-	3	-	-	-
11	Industrial / Research Internship - 20PI02	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3
12	Internet of Things - 20EC30	3	2	2	-	2	-	-	1	2	3	-	1	1	2	1
13	Introduction to Artificial Intelligence - 20AD81 (Open Elective - III)	2	3	3	3	3	-	-	-	-	-	-	2	-	-	-
14	Cyber Security & Digital Forensics - 20IT84 (Open Elective - IV)	1	1	1	1	3	1	-	-	-	-	1	2	2	-	-

B.Tech VIII Semester

S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	Project Work - 20PI03	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3

B.Tech ECE :: Open Elective Courses offered															
Courses / POs and PSOs		**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**	
S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	Satellite Technology - 20EC81	1	1	1	-	-	3	2	-	-	-	-	1	2	-	-
2	Elements of Communication Systems - 20EC82	3	2	2	2	-	-	-	-	-	-	-	2	3	-	-
3	Microprocessors and Interfacing - 20EC83	2	3	3	2	2	-	-	-	-	-	-	3	-	3	-
4	Analog and Digital Communications - 20EC84	2	3	2	1	-	-	-	-	-	-	-	2	3	-	-
5	Systems and Signal Processing - 20EC85	3	2	1	1	-	-	-	-	-	-	-	2	-	-	3
6	Cellular Technology - 20EC86	2	1	1	-	-	3	1	-	-	-	-	1	1	-	-

B.Tech ECE :: Honor Courses															
Courses / POs and PSOs		**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**	
S. No.	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	CPLD And FPGA Architectures – 20ECH1	2	3	3	3	3	-	-	-	3	2	-	-	-	-	2
2	Real Time Operating Systems – 20ECH2	2	2	3	2	3	-	-	-	-	-	-	2	-	3	-
3	VLSI Design Automation – 20ECH3	2	2	3	2	3	-	-	-	-	-	-	2	-	3	-
4	VLSI Testing and Verification – 20ECH4	2	3	3	2	3	-	-	-	-	-	-	2	-	3	-

Head of the Department
(ECE)