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 :: R23 Regulation

B.Tech I Semester															
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**	
Communicative English - 23FE01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE01.1	Understand the context, topic, and pieces of specific information from social or Transactional dialogues.	-	-	-	1	-	-	-	-	3	3	-	2	-	-	-
23FE01.2	Apply grammatical structures to formulate sentences and correct word forms	-	-	-	1	-	-	-	-	3	3	-	2	-	-	-
23FE01.3	Use discourse markers to speak clearly on a specific topic in informal discussions.	-	-	-	1	-	-	-	-	3	3	-	2	-	-	-
23FE01.4	Read / Listen the texts and write summaries based on global comprehension of these texts.	-	-	-	1	-	-	-	-	3	3	-	2	-	-	-
23FE01.5	Prepare a coherent paragraph, essay, and resume	-	-	-	1	-	-	-	-	3	3	-	2	-	-	-
	Engineering Physics - 23FE04	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE04.1	Analyze the intensity variation of light due to interference, diffraction, and Polarization	3	3	3	1	1	1	1	-	-	-	-	1	-	-	-
23FE04. 2	Understand the basics of crystals and their structures	3	3	2	1	1	1	1	-	-	-	-	1	-	-	-
23FE04.3	Summarize various types of polarization of dielectrics and classify the magnetic materials	3	3	2	1	1	1		-	-	-	-	1	-	-	-
23FE04.4	Explain fundamentals of quantum mechanics and free electron theory of metals	3	3	2	1	1	1	1	-	-	-	-	1	-	-	-
23FE04.5	Identify the type of semiconductor using Hall Effect	3	3	2	1	1	1	1	-	-	-	-	1	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Linear Algebra & Calculus - 23FE03		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE03.1	Apply matrix algebra techniques to solve engineering problems	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
23FE03.2	Use Eigen values and Eigen vectors concept to find nature of quadratic form, inverse and powers of matrix.	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
23FE03.3	Expand various functions using Mean value theorems.	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-
23FE03.4	Understand the concepts of functions of several variables which are useful in optimization.	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
23FE03.5	Evaluate areas and volumes by using double and triple integrals.	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
Basic Electrical and Electronics Engineering - 23EE01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EE01.1	Extract electrical variables of AC & DC circuits using fundamental laws	3	2	3	-	-	-	-	-	-	-	-	1	-	-	-
23EE01.2	Understand the operation of electrical machines and measuring instruments	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
23EE01.3	Classify various energy resources, safety measures and interpret electricity bill generation in electrical systems.	2	2	-	-	-	3	-	-	-	-	2	2	-	-	-
23EE01.4	Interpret the characteristics of various semiconductor devices	3	2	-	-	-	-	-	-	-	-	-	1	-	2	-
23EE01.5	Infer the operation of rectifiers, amplifiers.	3	2	-	-	-	-	-	-	-	-	-	1	-	1	-
23EE01.6	Contrast various logic gates, sequential and combinational logic circuits	2	2	2	-	-	-	-	-	-	-	-	-	-	2	-
IT Workshop - 23IT51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23IT51.1	Identify the components of a PC and troubleshooting the malfunctioning of PC	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23IT51.2	Develop presentation /documentation using Office tools and LaTeX	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23IT51.3	Build dialogs and documents using ChatGPT	3	-	-	-	2	-	-	-	-	-	-	-	-	-	-
23IT51.4	Improve individual / teamwork skills, communication and report writing skills with ethical values	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Engineering Graphics -23ME01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23ME01.1	Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections	3	2	2	-	-	-	-	-	-	-	-	3	-	-	-
23ME01.2	Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.	3	2	1	-	-	-	-	-	-	-	-	3	-	-	-
23ME01.3	Understand and draw projection of solids in various positions in first quadrant.	3	2	2	-	-	-	-	-	-	-	-	3	-	-	-
23ME01.4	Able to draw the development of surfaces of simple objects	3	2	2	-	-	-	-	-	-	-	-	3	-	-	-
23ME01.5	Prepare isometric and orthographic sections of simple solids	2	2	2	-	-	-	-	-	-	-	-	3	-	-	-
Communicative English Lab - 23FE51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE51.1	Understand the different aspect of the English language proficiency with emphasis on LSRW skills.	-	-	-	2	-	2	-	-	3	3	-	-	-	-	-
23FE51.2	Apply Communication Skills through various language learning activities	-	-	-	2	-	2	-	-	3	3	-	2	-	-	-
23FE51.3	identifying the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking, comprehension.	-	-	-	2	-	2	-	-	3	3	-	2	-	-	-
23FE51.4	Exhibit professionalism in participating in debates and group discussions	-	-	-	2	-	2	-	-	3	3	-	2	-	-	-
Engineering Physics Lab - 23FE53		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE53.1	Analyze the wave properties of light using optical instruments	3	3	2	1	-	-	-	1	1	-	-	1	-	-	-
23FE53.2	Estimate the elastic modulii of various materials and acceleration due to gravity	3	3	2	1	-	-	-	1	1	-	-	1	-	-	-
23FE53.3	Demonstrate the vibrations in stretched strings	3	3	2	1	-	-	-	1	1	-	-	1	-	-	-
23FE53.4	Evaluate dielectric constant and magnetic field of circular coil carrying current	3	3	2	1	-	-	-	1	1	-	-	1	-	-	-
23FE53.5	Examine the characteristics of semiconductor devices	3	3	2	1	-	-	-	1	1	-	-	1	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Electrical and Electronics Engineering Workshop - 23EE51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE51.1	Compute voltage, current and power in an electrical circuit	3	2	-	-	-	-	-	2	3	2	-	1	-	-	-
23FE51.2	Compute medium resistance using Wheat stone bridge	2	2	-	2	-	-	-	2	2	2	-	-	-	-	-
23FE51.3	Discover critical field resistance and critical speed of DC shunt generators	2	2	2	2	-	-	-	2	2	2	-	-	-	-	-
23FE51.4	Estimate reactive power and power factor in electrical loads	2	2	-	3	-	-	-	2	3	2	-	1	-	-	-
23FE51.5	Plot the characteristics of semiconductor devices.	3	2	-	-	2	-	-	2	2	2	1	1	-	-	-
23FE51.6	Demonstrate the working of various logic gates using ICs.	3	3	-	2	2	-	-	2	3	3	-	1	-	-	-
NSS/NCC/Scouts & Guides/Community Service - 23AU02		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23AU02.1	Understand the importance of discipline, character and service motto. (Understanding -L2)	-	-	-	-	-	2	3	2	2	2	-	1	-	-	-
23AU02.2	Solve some societal issues by applying acquired knowledge, facts, and techniques. (Applying- L3)	-	-	-	-	-	3	2	3	3	3	-	1	-	-	-
23AU02.3	Explore human relationships by analysing social problems. (Understanding-L2)	-	-	-	-	-	2	3	2	2	3	-	1	-	-	-
23AU02.4	Determine to extend their help for the fellow beings and downtrodden people (Applying -L3)	-	-	-	-	-	3	2	3	3	2	-	1	-	-	-
23AU02.5	Develop leadership skills and civic responsibilities. (Applying- L3)	-	-	-	-	-	3	2	3	2	3	-	1	-	-	-

B.Tech II Semester																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Chemistry - 23FE02		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE02.1	Understand the fundamentals of quantum mechanics and molecular orbital energy diagrams for molecules.	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
23FE02.2	Summarize the suitability of advanced materials like semiconductors, superconductors, super capacitors and nano materials, in advanced fields.	3	2	2	2	-	2	2	-	-	-	-	2	-	-	-
23FE02.3	Apply Nernst equation in calculating cell potentials and understand conductometric, potentiometric titrations, electrochemical sensors and compare batteries for different applications.	3	3	2	2	-	2	2	-	-	-	-	2	-	-	-
23FE02.4	Outline the importance of polymers and conducting polymers in advanced technologies.	3	2	2	2	-	2	2	-	-	-	-	2	-	-	-
23FE02.5	Outline the importance of poUnderstand the fundamentals of UV-Visible, IR spectroscopic techniques and basic principles of chromatographic techniques.	3	2	1	1	-	-	-	-	-	-	-	1	-	-	-
Differential Equations & Vector Calculus - 23FE05		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE05.1	Solve the differential equations related to various engineering fields	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
23FE05.2	Apply knowledge of partial differentiation in modelling and solving of Partial differential equations	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
23FE05.3	Interpret the physical meaning of different operators such as gradient, curl and divergence.	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-
23FE05.4	Evaluate the work done against a field, circulation and flux using Vector Calculus.	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
Basic Civil & Mechanical Engineering - 23CM01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	-	-
23CM01.1	Describe various sub-divisions of Civil Engineering and to appreciate their role in societal development.	1	-	-	-	2	-	2	-	-	-	-	-	-	-	-
23CM01.2	Outline the concepts of surveying and obtain the theoretical measurement of distances, angles and levels through surveying.	-	-	-	-	2	-	2	-	-	-	-	-	-	-	-
23CM01.3	Classify the various materials used in construction and highway engineering and identify their appropriate usage as per the needs	1	-	-	-	2	-	2	-	-	-	-	-	-	-	-
23CM01.4	Illustrate the fundamental principles involved in transportation network system, their individual components and their engineering importance.	1	-	-	-	1	-	-	-	-	-	-	3	-	-	-
23CM01.5	Explain the quality parameters of various water sources and functions of selected water storage and conveyance structures	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Introduction to Programming - 23CS01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23CS01.1	Understand basics of computers, concept of algorithms and flowcharts	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
23CS01.2	Understand the features of C language	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
23CS01.3	Interpret the problem and develop an algorithm to solve it	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
23CS01.4	Implement various algorithms using the C programming language.	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
23CS01.5	Develop skills required for problem-solving and optimizing the code	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
Network Analysis - 23EC01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC01.1	Apply fundamental laws and theorems to compute electrical variables of DC circuits	3	3	-	-	-	-	-	-	-	-	-	-	-	1	-
23EC01.2	Analyze electrical networks during transients in the Laplace domain	3	3	2	-	-	-	-	-	-	-	-	-	-	1	-
23EC01.3	Apply fundamental laws and theorems to compute electrical variables of AC electrical circuits	3	3	-	-	-	-	-	-	-	-	-	-	-	2	-
23EC01.4	Analyse resonance circuits	3	2	1	-	-	-	-	-	-	-	-	-	-	2	-
23EC01.5	Evaluate variables associated with magnetic circuits	3	2	1	-	-	-	-	-	-	-	-	-	-	2	-
23EC01.6	Compute the parameters of a two-port network	3	3	1	1	-	-	-	-	-	-	-	-	-	1	-
Chemistry Lab - 23FE52		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE52.1	Analyze important parameters of water to check its suitability for drinking purposes and industrial applications.	3	2	-	-	-	1	2	3	2	-	-	-	-	-	-
23FE52.2	Acquire practical knowledge related to preparation of Bakelite and nanomaterials.	3	-	1	-	-	2	1	3	-	1	-	-	-	-	-
23FE52.3	Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus	3	2	1	-	-	-	2	3	2	1	-	-	-	-	-
23FE52.4	To estimate the amount of calcium in cement and the strength of acid present in Pb-Acid battery	3	1	-	-	-	-	-	3	1	-	-	-	-	-	-
23FE52.5	Improve individual / teamwork skills, communication and report writing skills with ethical values	-	-	-	-	-	-	-	2	2	2	2	2	-	-	-
Computer Programming Lab - 23CS51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23CS51.1	Read, understand, and trace the execution of programs written in C language	3	2	-	-	3	-	-	-	-	-	-	-	-	-	-
23CS51.2	Apply the right control structure for solving the problem	3	2	2	-	3	-	-	-	-	-	-	-	-	-	-
23CS51.3	Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, pointers and files in C.	3	2	2	-	3	-	-	-	-	-	-	-	-	-	-
23CS51.4	Improve individual / teamwork skills, communication and report writing skills with ethical values.	-	-	-	-	-	-	-	2	2	2	2	2	-	-	-

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Engineering Workshop -23ME51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23ME51.1	Identify workshop tools and their operational capabilities	3	2	1	1	-	-	-	-	-	-	-	2	-	-	-
23ME51.2	Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, and welding	3	2	1	1	-	-	-	-	-	-	-	2	-	-	-
23ME51.3	Modal various basic prototypes in fitting trade	3	2	1	1	-	-	-	-	-	-	-	2	-	-	-
23ME51.4	Apply basic electrical engineering knowledge for House Wiring Practice	3	2	1	1	-	-	-	-	-	-	-	2	-	-	-
Network Analysis and Simulation Lab - 23EC51		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC51.1	Demonstrate fundamental circuit laws, network theorems, node and mesh analysis of electrical circuits	2	2	-	1	2	-	-	-	-	2	1	2	-	1	-
23EC51.2	Design resonance circuit for given specifications	2	2	-	1	2	-	-	-	-	2	2	2	-	1	-
23EC51.3	Measure time constants of RL & RC circuits	2	2	-	1	1	-	-	-	-	2	1	2	-	2	-
23EC51.4	Analyze the 1st and 2nd order circuits with respect to parameter variation	2	3	-	1	2	-	-	-	-	2	1	2	-	2	-
23EC51.5	Characterize and model the network in terms of all network parameters	2	2	-	1	2	-	-	-	-	2	2	2	-	2	-
Health and Wellness, Yoga and Sports - 23AU01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23AU01.1	Understand the importance of yoga and sports for Physical fitness and sound health. (Understand)	-	-	-	-	-	2	-	2	3	2	-	1	-	-	-
23AU01.2	Demonstrate an understanding of health-related fitness components. (Apply)	-	-	-	-	-	3	-	3	3	2	-	1	-	-	-
23AU01.3	Compare and contrast various activities that help enhance their health.(Understand)	-	-	-	-	-	2	-	2	3	3	-	1	-	-	-
23AU01.4	Assess current personal fitness levels. (Apply)	-	-	-	-	-	3	-	3	3	2	-	1	-	-	-
23AU01.5	Develop Positive Personality (Apply)	-	-	-	-	-	3	-	3	3	3	-	1	-	-	-

B.Tech III Semester																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Probability Theory and Stochastic Process - 23FE12		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23FE12.1	Summarize the concepts of Probability and random processes.	3	2	1	-	-	-	-	-	-	-	-	1	1	-	-
23FE12.2	Examine the Temporal and Spectral characteristics of Random Signals.	3	2	1	1	-	-	-	-	-	-	-	2	2	-	-
23FE12.3	Analyze Linear Time Invariant systems driven by stationary random process by using Auto correlation function and Power spectral Density.	3	2	1	1	-	-	-	-	-	-	-	2	1	-	-
23FE12.4	Interpret the concepts of Noise and Information theory in Communication systems.	3	3	1	1	-	-	-	-	-	-	-	2	3	-	-
UHV 2 – Understanding Harmony and Ethical Human Conduct - 23HS01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23HS01.1	Describe the terms like Natural Acceptance, Happiness and Prosperity (L2)	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
23HS01.2	Identify one’s self, and one’s surroundings (family, society nature) (L2)	-	-	2	-	-	-	-	3	-	-	-	-	-	-	-
23HS01.3	Relate human values with human relationship and human society. (L2)	-	-	-	-	-	2	-	3	2	-	-	-	-	-	-
23HS01.4	Illustrate the need for universal human values and harmonious existence (L2)	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-
23HS01.5	Develop as socially and ecologically responsible engineers (L3)	-	-	-	-	-		2	3	-	-	-	1	-	-	-
Signals and Systems - 23EC02		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC02.1	Summarize the basic concepts of signals, systems and sampling	2	1	1	-	-	-	-	-	-	-	-	-	-	-	1
23EC02.2	Examine the operations on signals and approximate using orthogonal functions	2	1	1	-	-	-	-	-	-	-	-	-	1	-	2
23EC02.3	Apply the concept of impulse response to analyze the LTI systems	3	1	1	1	-	-	-	-	-	-	-	1	-	-	2
23EC02.4	Analyze both continuous time and discrete time signals and systems using Fourier series, Fourier transform, Laplace transforms and Z-Transforms	3	2	1	1	-	-	-	-	-	-	-	2	2	-	3

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Electronic Devices and Circuits - 23EC03		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC03.1	Recall the fundamentals of semiconductor physics necessary for electronic devices and circuits (Remember)	2	3	1	-	-	3	1	-	-	-	1	2	1	1	-
23EC03.2	Illustrate the structure and operation of Diodes, Bipolar Junction Transistors, Field Effect Transistors and biasing of BJT & FET using fundamental circuits. (Understand)	2	1	2	1	-	3	1	-	-	-	-	1	1	1	-
23EC03.3	Apply the knowledge of Diodes, Transistors and Filters for designing the Rectifiers, Regulators and Amplifier circuits using basic components. (Apply)	3	1	1	-	-	-	1	-	-	-	-	-	2	2	-
23EC03.4	Analyze the characteristics of Diodes, Bipolar Junction Transistors, Field Effect Transistors and their equivalent models using V-I Characteristics. (Analyze)	1	3	-	-	-	-	-	-	-	-	1	1	2	2	-
Switching Theory and Logic Design - 23EC04		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC04.1	Summarize the key differences between number systems and their usage in Digital Circuits.	2	3	1	-	-	-	-	2	-	-	-	1	-	3	-
23EC04.2	Identify the minimization techniques of Boolean expressions to implement Digital Circuits using basic logic gates and logic circuits	2	3	3	-	-	-	-	2	-	-	-	1	-	3	-
23EC04.3	Apply the minimization and realization methods for designing the Combinational & Sequential logic circuits	2	3	3	1	-	-	-	2	-	-	-	1	-	3	-
23EC04.4	Analyze the Combinational, Sequential, Finite State Machines for implementation of digital logic circuits	2	3	3	2	-	-	-	2	-	-	-	3	-	3	-
Electronic Devices and Circuits Lab - 23EC52		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC52.1	Demonstrate the characteristics of BJT, FET, SCR, UJT and applications of diode. **(Apply-L3)**	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
23EC52.2	Model the Rectifiers, filters and Amplifiers used in electronic circuits**.(Apply-L3)**	3	1	-	-	-	-	-	-	-	-	1	1	-	2	-
23EC52.3	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	-	-	-	-	-	-	-	-	-	-	2	-
23EC52.4	Adapt effective Communication, presentation and report writing skills. **(Apply-L3)**	-	-	-	-	-	-	-	-	3	2	-	-	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Switching Theory and Logic Design Lab - 23EC53		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC53.1	Demonstrate the functionality of Logic gates, Flip-flops, Shift registers and Counters	2	3	3	1	2	3	-	2	-	-	-	1	-	3	-
23EC53.2	Apply the Boolean minimization methods to implement Combinational and Sequential logic circuits using logic gates	2	1	1	1	1	3	-	2	-	-	-	1	-	3	-
23EC53.3	Analyze the behavior of Combinational and Sequential logic circuits	2	1	1	-	1	3	-	2	-	-	-	1	-	3	-
23EC53.4	Adapt effective Communication, presentation and report writing skills	-	-	-	-	-	-	-	-	-	3	-	3	-	3	-
Data Structures using C - 23CSS3		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23CSS3.1	Implement Various Searching & Sorting Techniques.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
23CSS3.2	Implement Linked List, Stack & Queue data structures.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
23CSS3.3	Design and implement algorithms for operations on binary trees and binary search trees.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
23CSS3.4	Improve individual / teamwork skills, communication & report writing skills with ethical values.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Environmental Science - 23MC01		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23MC01.1	The necessity of resources, their exploitation and sustainable management (Understand – L2)	3	3	-	-	-	3	3	3	-	-	-	3	-	-	-
23MC01.2	The interactions of human and ecosystems and their role in the food web in the natural world and the global biodiversity, threats to biodiversity and its conservation. (Understand – L2)	3	3	-	-	-	3	3	-	-	-	-	3	-	-	-
23MC01.3	Environmental problems like pollution, disasters and possible solutions. (Remember – L1)	3	-	3	-	-	-	2	-	-	-	-	2	-	-	-
23MC01.4	The importance of environmental decision making in organizations through understanding the environmental law and environmental audits. (Remember – L1)	3	-	-	-	-	2	3	2	-	-	-	3	-	-	-
23MC01.5	Environmental issues like over population, human health etc related to local, regional and global levels. (Understand – L2)	3	3	3	3	-	3	3	3	-	-	-	3	-	-	-

B.Tech IV Semester																
COs	**CO Statements**	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**		
Managerial Economics and Financial Analysis - 23HS02		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23HS02.1	Define the concepts related to Managerial Economics, Financial Accounting and Management. (Understand-L2)	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23HS02.2	Understand the fundament also Economics viz., Demand, Production, cost, revenue and markets. (Understand-L2)	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23HS02.3	Apply the Concept of Production cost and revenues for effective Business decision (Apply-L3)	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
23HS02.4	Evaluate the capital budgeting techniques (Analyze-L4)	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-
23HS02.5	Develop accounting statements and evaluate the financial performance of business entity. (Analyze-L4)	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Control Systems - 23EE09		**PO1**	**PO2**	**PO3**	**PO4**	-	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EE09.1	Derive the transfer function of physical systems using block diagram algebra and signal flow graphs. (Apply-L3)	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
23EE09.2	Obtain the time response of first order and specifications of second order systems. (Apply-L3).	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
23EE09.3	Analyze the stability of LTI systems using Routh's stability criterion and root locus method (Apply-L3).	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
23EE09.4	Analyze the stability of LTI systems using frequency response methods and understand the classical control design techniques using Bode Diagrams. (Apply-L3)	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
23EE09.5	Apply state space analysis concepts for deriving state models and also understand the concepts of controllability and observability. (Apply-L3)	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
Electromagnetic Waves and Transmission Lines - 23EC05		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC05.1	Describe the concepts of electromagnetic field intensities using coulomb's law, Gauss law, Biot-Savart's Law and Ampere's Circuital Law. (Understand – L2)	3	1	2	-	-	-	-	-	-	-	-	1	2	-	-
23EC05.2	Analyze the electromagnetic wave propagation in dielectric and conducting media. (Apply – L3)	3	2	2	3	1	-	-	-	-	-	-	2	3	-	-
23EC05.3	Summarize the primary and secondary constants of different types of transmission lines. (Understand – L2)	3	2	2	-	-	-	-	-	-	-	-	2	3	-	-
23EC05.4	Examine the parameters input impedance, reflection coefficient, and VSWR of transmission lines and calculate these parameters using Smith chart.(Apply – l3)	3	3	1	-	-	-	-	-	-	-	-	1	2	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Electronic Circuit Analysis - 23EC06		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC06.1	Illustrate the concepts of cascading of single stage amplifiers, feedback amplifier and oscillator circuits	3	1	-	-	-	-	-	-	-	-	1	2	-	2	-
23EC06.2	Analyze the effect of negative feedback on amplifier characteristics, Power amplifiers-Class A, B, C, AB and tuned amplifier circuits.	3	3	1	-	-	-	-	-	-	-	-	3	-	2	-
23EC06.3	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept	3	3	1	-	-	-	-	-	-	-	-	3	-	3	-
23EC06.4	Design and analysis of small signal high frequency transistor amplifiers, multistage amplifiers and Differential amplifier using BJT.	3	3	2	-	-	-	-	-	-	2	1	2	-	3	-
Analog Communications - 23EC07		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC07.1	Describe the Modulation and Demodulation techniques of Amplitude Modulation.	2	2	1	-	-	-	-	-	-	-	-	2	1	-	-
23EC07.2	Interpret the generation and detection of Angle Modulation techniques.	2	2	1	-	-	-	-	-	-	-	-	2	2	-	-
23EC07.3	Summarize the concepts of Radio Transmitters and Receivers	2	2	1	1	-	-	-	-	-	-	-	2	3	-	-
23EC07.4	Illustrate the noise performance in Analog Modulation techniques and also the concepts of Pulse Analog Modulation and Demodulation techniques	2	3	1	1	-	-	-	-	-	-	-	3	3	-	-
Signals and Systems Lab - 23EC54		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC54.1	Understand the basics of MATLAB Programming.	1	3	1	2	2	-	-	-	-	-	-	2	-	-	1
23EC54.2	Perform basic operations on Signals	3	3	1	2	3	-	-	-	-	-	-	2	-	-	2
23EC54.3	Obtain the spectral representation of given signal	3	3	1	2	3	-	-	-	-	-	-	2	-	-	2
23EC54.4	Adapt effective Communication, presentation and report writing skills.	-	-	-	-	-	-	-	2	2	3	-	1	-	-	-

COs	CO Statements	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Electronic Circuit Analysis Lab - 23EC55		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23EC55.1	Demonstrate the characteristics of amplifiers, oscillators and its applications.	2	3	1	2	-	-	-	2	1	2	-	1	-	2	-
23EC55.2	Apply the knowledge of Resistance and capacitance effects on frequency response and gain of amplifiers and oscillator circuits.	2	3	1	1	-	-	-	2	1	2	-	1	-	2	-
23EC55.3	Design different types of feedback amplifiers, Power amplifier, Tuned amplifiers, Oscillators with different characteristics	2	3	1	2	-	-	-	2	1	2	-	1	-	3	-
23EC55.4	Adapt effective Communication, presentation and report writing skills.	-	-	-	-	-	-	-	2	2	3	-	1	-	-	-
Python Programming - 23CSS1		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23CSS1.1	Implement the core programming concepts of Python programming language. (Apply-L3)	3	2	-	-	-	-	-	-	-	-	-	-	-	-	
23CSS1.2	Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries (Apply-L3)	3	2	-	-	-	-	-	-	-	-	-	-	-	-	
23CSS1.3	Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications. (Apply-L3)	3	2	-	-	-	-	-	-	-	-	-	-	-	-	
23CSS1.4	Improve individual / teamwork skills, communication & report writing skills with ethical values. (Apply-L3)	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-
Design Thinking & Innovation - 23ME57		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
23ME57.1	Apply fundamental design components, principles, and new materials to create and improve design projects. (Applying-L3)	2	1	-	-	3	-	-	-	-	-	-	2	-	3	-
23ME57.2	Apply the design thinking process to develop and present innovative product solutions. (Applying-L3)	1	2	2	-	3	-	-	-	-	-	-	2	-	3	-
23ME57.3	Analyze the relationship between creativity and innovation, evaluate their roles in organizations, and develop strategic plans for transforming creative ideas into innovative solutions. (Analyzing-L4)	3	3	-	2	3	-	-	-	-	-	-	3	-	-	3
23ME57.4	Analyze to work in a multidisciplinary environment. (Analyzing-L4)	1	1	-	-	3	-	-	-	-	-	-	2	-	-	3
23ME57.5	Apply design thinking principles to address business challenges, develop and test business models and prototypes, and evaluate the value of creativity. (Evaluating-L5)	3	3	-	2	3	-	-	-	-	-	-	3	-	-	3

Head of the Department

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Mapping of Courses to POs and PSOs:: Program Articulation Matrix :: R23 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	Communicative English - 23FE01	-	-	-	1	-	-	-	-	3	3	-	2	-	-	-
2	Engineering Physics - 23FE04	3	3	3	1	1	1	1	-	-	-	-	1	-	-	-
3	Linear Algebra & Calculus - 23FE03	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
4	Basic Electrical and Electronics Engineering - 23EE01	3	2	3	-	-	3	-	-	-	-	2	2	-	2	-
5	IT Workshop - 23IT51	3	-	-	-	2	-	-	2	2	2	-	-	-	-	-
6	Engineering Graphics -23ME01	3	2	2	-	-	-	-	-	-	-	-	3	-	-	-
7	Communicative English Lab - 23FE51	-	-	-	2	-	2	-	-	3	3	-	2	-	-	-
8	Engineering Physics Lab - 23FE53	3	3	2	1	-	-	-	1	1	-	-	1	-	-	-
9	Electrical and Electronics Engineering Workshop - 23EE51	3	3	2	3	2	-	-	2	3	3	1	1	-	-	-
10	NSS/NCC/Scouts & Guides/Community Service - 23AU02	-	-	-	-	-	3	3	3	3	3	-	1	-	-	-

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	Chemistry - 23FE02	3	3	2	2	-	2	2	-	-	-	-	2	-	-	-
2	Differential Equations & Vector Calculus - 23FE05	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
3	Basic Civil & Mechanical Engineering - 23CM01	1	-	-	-	2	-	2	-	-	1	-	3	-	-	-
4	Introduction to Programming - 23CS01	3	2	2												
5	Network Analysis - 23EC01	3	3	2	1	-	-	-	-	-	-	-	-	-	2	-
6	Chemistry Lab - 23FE52	3	2	1	-	-	2	2	3	2	2	2	2	-	-	-
7	Computer Programming Lab - 23CS51	3	2	2	-	3	-	-	2	2	2	2	2	-	-	-
8	Engineering Workshop -23ME51	3	2	1	1	-	-	-	-	-	-	-	2	-	-	-
9	Network Analysis and Simulation Lab - 23EC51	2	3	-	1	2	-	-	-	-	2	2	2	-	2	-
10	Health and Wellness, Yoga and Sports - 23AU01	-	-	-	-	-	3	-	3	3	3	-	1	-	-	-

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	Probability Theory and Stochastic Process - 23FE12	3	3	1	1	-	-	-	-	-	-	-	2	2	-	-
2	UHV 2 – Understanding Harmony and Ethical Human Conduct - 23HS01	-	-	2	-	-	2	2	3	2	-	-	1	-	-	-
3	Signals and Systems - 23EC02	3	2	1	1	-	-	2	3	-	-	-	2	2	-	2
4	Electronic Devices and Circuits - 23EC03	2	2	2	1	-	3	1	-	-	-	1	2	2	2	-
5	Switching Theory and Logic Design - 23EC04	2	3	3	2	-	-	-	2	-	-	-	2	-	3	-
6	Electronic Devices and Circuits Lab - 23EC52	3	1	1	-	-	-	-	-	3	2	1	1	-	2	-
7	Switching Theory and Logic Design Lab - 23EC53	2	2	2	1	2	3	-	2	-	3	-	2	-	3	-
8	Data Structures using C - 23CSS3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Environmental Science - 23MC01	3	3	3	3	-	3	3	3	-	-	-	3	-	-	-

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	Managerial Economics and Financial Analysis - 23HS02	3	-	2	2	2	2	-	-	-	-	-	-	-	-	-
2	Control Systems - 23EE09	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
3	Electromagnetic Waves and Transmission Lines - 23EC05	3	2	2	3	1	-	-	-	-	-	-	2	3	-	-
4	Electronic Circuit Analysis - 23EC06	3	3	2	-	-	-	-	-	-	2	1	3	-	3	-
5	Analog Communications - 23EC07	2	3	1	1	-	-	-	-	-	-	-	3	3	-	-
6	Signals and Systems Lab - 23EC54	3	3	1	2	3	-	-	2	2	3	-	2	-	-	2
7	Electronic Circuit Analysis Lab - 23EC55	2	3	1	2	-	-	-	2	2	3	-	1	-	3	-
8	Python Programming - 23CSS1	3	2	-	-	-	-	-	2	2	2	-	-	-	-	-
9	Design Thinking & Innovation - 23ME57	2	2	2	2	3	-	-	-	-	-	-	3	-	3	3

Head of the Department
(ECE)