S.No	Subject Name			Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
				COURSE OUTCOMES and PO Mapping-R20 -B.Tech														
				I-I														
1	ALGEBRA AND CALCULUS	20MA1001	C111.1	Make use the concepts of Matrices to solve various Engineering problems .(BL-3)	3	3											1	
			C111.2	Solve the First order differential equations arising in various engineering fields .(BL-3)	3	3											1	
			C111.3	Identify different types of higher order differential equations and their applications in solving engineering problems . (BL-3)	3	3											1	
			C111.4	Apply Mean value theorems, Multi variable calculus to solve engineering problems.(BL-3)	3	3											1	
			C111.5	Identify solution methods for partial differential equations that model physical processes (BL-3)	3	3											1	
			C111.6	Apply multiple integrals techniques to solve engineering problems.(BL-3)	3	3											1	
				NO. OF COS MAPPED	6	6											6	
				AVERAGE CO MAPPING	3	3											1	
2	APPLIED PHYSICS	20PH1001	C112.1	Explain optical phenomenon i.e. interference, diffraction using Huygen's wave theory. (BL-2)	3	2												
			C112.2	Comprehend the concepts of matter waves, wave functions and its interpretation to understand the matter at atomic scale (BL-2)	3	2												
			C112.3	Outline Free electron theories on metals (BL-2)	3	1												
			C112.4	Demonstrate the physics of semiconductors. (BL-2)	3	1												
			C112.5	Illustrate the concepts of super conducting materials and nano-materials for scientific and engineering applications. (BL-2)	3	2				1							1	
			C112.6	Realize importance of LASERs and optical fibers in Engineering and Medical applications. (BL-2)	3	1				1							1	
				NO. OF COS MAPPED	6	6				2							2	
				AVERAGE CO MAPPING	3	1.5				1							1	
3	PROBLEM SOLVING AND PROGRAMMING	20ES1001	C113.1	Understand the peripherals, ports and connecting cables and able to assemble the system. [BL- 2]	3	3	2	1										
			C113.2	Apply algorithmic approach to solve computational problems. [BL -3]	3	3												
			C113.3	Apply modular approach for solving the problems by using the control structures. [BL-3]	3	3	3											
			C113.4	Select the individual data elements to simplify solutions and provide efficient memory utilization. [BL-3]	3	3	3											
			C113.5	Develop sorting algorithms for heterogeneous data. [BL-3]	3	3	2											
			C113.6	Explain User-Defined Data Types and Files. (BL - 2)	3	3	1											
				NO. OF COS MAPPED	6	6	5	1										
				AVERAGE CO MAPPING	3	3	2.2	1										
4	ENGLISH	20EN1001	C114.1	Practice the formulating appropriate sentences with Grammatical accuracy and also develop concept of word formation. .(BL3)										3				
			C114.2	Describe coherent and unified paragraphs with adequate support and detail and can write a topic sentence, support and concluding sentence. (BL2)									2	3				
			C114.3	Employ the writing and life skills in structural manner of real time scenarios. (BL-2)										3				
			C114.4	Explain the grammar rules for synthesis of sentences and use prewriting strategies to plan to write dialogues, reviews and edit the text effectively.(BL-3)									2	3				
			C114.5	Interpret the skills and sub skills of reading and use strategies for reading effectively and provide knowledge on the structure and format of technical writing (BL -3)									3	3				
			C114.6	Use the concepts of various real time scenarios to represent in an effective model. (BL - 3)									3	3				
				NO. OF COS MAPPED									5	5				
				AVERAGE CO MAPPING									2	3.6				
5	APPLIED PHYSICS LAB	20PH1501	C115.1	Understand the importance of optical phenomenon like Interference, diffraction and dispersion	3													
			C115.2	Comprehen the role of lasers in diffraction and the importance of optical fiber parameters	3					1								
			C115.3	Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.	3													
			C115.4	Identify the Importance of four probe method in determination of resistivity of a given semiconductor	3													
				NO. OF COS MAPPED	4					1								
				AVERAGE CO MAPPING	3					1								
			C116.1	Understand how speech sounds are used to create meaning. Apply their knowledge of English phonetics and phonology to improve their own pronunciation.									2	3				
			C116.2	Recognize and use pitch patterns to signal complete and incomplete thought groups and Speak confidently and intelligibly within groups and before an audience.									3	2				

No	Course	Code	CO	Statement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6	ENGLISH LANGUAGE LAB	20EN1501	C116.3	Discuss and respond to content of a lecture or listening passage orally and/or in writing and make inferences and predictions about spoken discourse									3	3					
			C116.4	Produce coherent and unified paragraphs with adequate support and detail and can write a paragraph with a topic sentence, support, and concluding sentence									3	2					
				NO. OF COS MAPPED									4	4					
				AVERAGE CO MAPPING									2.8	2.5					
7	ELECTRONICS & COMMUNICATION ENGINEERING WORKSHOP	20ES1502	C117.1	equipments. (BL-2)	3	2													
			C117.2	Apply basic electrical engineering knowledge to make simple house wiring circuitsand check their functionality.(BL-3)	3	2													
			C117.3	Understand to disassemble and assemble a Personal Computer and prepare the	3	2		1											
			C117.4	Apply knowledge to Interconnect two or more computers for information sharing (BL-3)	2	2													
				NO. OF COS MAPPED	4	4		1											
				AVERAGE CO MAPPING	2.8	2		1											
8	ENGINEERING & IT WORKSHOP		C118.1	Design and development of sheet metal objects by surface development and join the metals for obtaining desired shape.(BL-3)	1								2	2					
			C118.2	Build a Personal Computer and Install operating systems and prepare the computer ready to use.(BL-3)	2								2	2			2	2	
			C118.3	Develop presentation and documentation of a given tasks through Microsoft Windows and access the Internet & test Interconnect two or more computers for information sharing.(BL-3)	2								2	1			2		
				NO. OF COS MAPPED	3								3	3			2	1	
				AVERAGE CO MAPPING	1.7								2	1.67			2	2	
9	Problem Solving and Programming Lab	20ES1506	C119.1	Translate algorithms into programs (In C language) (BL - 2)	3	3	3												
			C119.2	Solve the problems and implement algorithms in C. (BL - 3)	3	3	3												
			C119.3	Make use of different data types to handle the real time data (BL - 3)	3	2	3	3											
				NO. OF COS MAPPED	3	3	3	1											
				AVERAGE CO MAPPING	3	2.7	3	3											

I-II

No	Course	Code	CO	Statement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10	Chemistry	20CH1001	C121.1	Illustrate the molecular orbital energy level diagram of different molecular species. (BL-3)	3														
			C121.2	Make use the knowledge about various kinds of electro chemical cells in engineering applications. (BL-2)	3	2				2	2								
			C121.3	Interpret the various energy storage devices and emerging technologies in engineering applications. (BL-2)	3					2	2								
			C121.4	Understand the mechanism and applications of different polymers in electronic devices. (BL-2)	3					2	2								
			C121.5	Familiarize the various sources of renewable energy and their harnessing. (BL-2)	3	2					2								
			C121.6	Apply the spectroscopy methods for the analysis of engineering materials. (BL-3)	3	2				2									
				NO. OF COS MAPPED	6	6				4	4								
				AVERAGE CO MAPPING	3	1				2	2								
11	VECTOR CALCULUS AND TRANSFORMS	20MA1004	C122.1	Illustrate the physical interpretation of Gradient, Divergence and Curl in various engineering applications.(BL-3)	3	3											1		
			C122.2	Apply Green's, Stokes and Divergence theorem in the evaluation of double and triple integrals. (BL-3)	3	3											1		
			C122.3	Make use the concepts of Laplace transform to solve various engineering problems. (BL-3)	3	3											1		
			C122.4	Apply the Inverse Laplace transform techniques to solve differential equations arising in engineering field. (BL-3)	3	3											1		
			C122.5	function and their applications in various fields of engineering .(BL-3)	3	3											1		
			C122.6	Apply the properties of Fourier transform to solve various engineering problems. (BL-3)	3	3											1		
				NO. OF COS MAPPED	6	6											6		
				AVERAGE CO MAPPING	3	3											1		
12	BASIC ELECTRICAL ENGINEERING	20ES1007	C123.1	Analyze DC and AC circuits with different sources and with different reduction techniques. (BL-4)	3	3	3										2	3	
			C123.2	Analyze the AC circuits or systems. (BL-4)	2	3											3	3	
			C123.3	Apply different concepts to analyze the Three Phase Circuits. (BL-3)	3	3	3	2									3	3	
			C123.4	Discuss the operation and construction of DC machine. (BL-2)	3	3	3	2									3	3	
			C123.5	Interpret the operation and construction of single phase and three phase transformers and machines. (BL-2)	3	3	3	2									3	3	
			C123.6	Illustrate the working of single phase and three phase induction motors. (BL-2)	3	3	3	2									3	1	
				NO. OF COS MAPPED	6	6	5	4									6	6	
				AVERAGE CO MAPPING	2.8	3	3	2									2.833	2.67	
			C124.1	Summarize the fundamental concepts of python programming. (BL - 2)	3	3													

#	Course	Code	CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
13	Introduction to Python Programming	20ES1007	C124.2	Apply the basic elements and constructs the python to solve logical problems. (BL - 3)	3	2	1												
			C124.3	Organize data using different data structures of python. (BL - 3)	3	2													
			C124.4	Implement the files modules and packages in programming. (BL - 3)	3	1	1												
			C124.5	Apply object oriented & exception handling concepts to build simple applications.	3	2													
			C124.6	Implement the concepts of Regular expressions and Turtle Graphics. (BL - 3)	3	1		1											
				NO. OF COS MAPPED	6	6	2	1											
				AVERAGE CO MAPPING	3	1.8	1	1											
14	CHEMISTRY LAB	20CH1501	C125.1	(BL2)	3	2				2									
			C125.2	(BL2)	3	2				2									
			C125.3	Demonstrate advanced polymer materials are used in engineering applications (BL2)	3	2				2									
				NO. OF COS MAPPED	3	3				3									
				AVERAGE CO MAPPING	3	2				2									
15		20ES1504	C126.1																
			C126.2																
			C126.3																
				NO. OF COS MAPPED	3	3	3												
				AVERAGE CO MAPPING	0	0	0												
16	ENGINEERING GRAPHICS LAB	20ES1504	C127.1	Develop the orthographic projection of points and straight lines(BL-3)	2	2		1									2		
			C127.2	Construct the planes and simple solids.(BL-3).	2	2		2	1								2		
			C127.3	Understand and practice basic AUTOCAD commands (BL-2)	1	1	1	1									1		
			C127.4	Construct Isometric views using AUTOCAD (BL-3).	2	2	2	2									1		
				NO. OF COS MAPPED	4	4	2	4	1								4		
				AVERAGE CO MAPPING	1.8	1.8	1.5	1.5	1								1.5		
17	Introduction to PYTHON PROGRAMMING LAB	20ES1510	C128.1	Understanding and use of python- Basic Concepts (BL -2)	2	2	3												
			C128.2	Solve the concepts of python functions and data structures (BL -3)	2	2	3												
			C128.3	Understand the concepts of files, modules, multithreading and regular	2	2	3	3											
				NO. OF COS MAPPED	3	3	3	1											
				AVERAGE CO MAPPING	2	2	3	3											
18	ORAL COMMUNICATION SKILLS LAB	20EN1502	C129.1	communication that facilitates their ability to work collaboratively with others.										2	3				
			C129.2	confrontational, more productive professional & personal relationships and understand techniques required for excellent telephone										3	2				
			C129.3	Develop their public speaking abilities to speak both formally and informally.										2	3				
			C129.4	Learn the skills necessary to deliver effective presentation with clarity and impact.										3	3				
				NO. OF COS MAPPED										4	4				
				AVERAGE CO MAPPING										2.5	2.75				
II-I																			
19	Complex Analysis and Numerical Methods	20MA1005	C211.1	Apply the techniques of special functions in various engineering problems . (BL-3)	3	3											1		
			C211.2	Identify the analyticity of complex functions to find the derivatives of complex functions. (BL-2)	3	3											1		
			C211.3	Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours. (BL-3)	3	3											1		
			C211.4	Solve the Algebraic ,Transcendental Equations by using numerical methods & understand the concepts of Interpolation . (BL-3)	3	3													
			C211.5	Solve the ordinary differential equations by using various numerical methods. (BL-3)	3	3											1		
				NO. OF COS MAPPED	5	5											3		
				AVERAGE CO MAPPING	3	3											1		
20	DATA STRUCTURES	20ES1010	C212.1	Classify the Data Structures concepts in real time applications. (BL-2).	3	2	2										2		
			C212.2	Demonstrate the concepts of stacks and queues for organizing data. (BL-3).	1	3	3										2		
			C212.3	Demonstrate the concepts of Linked Lists in Linear Data Structures. (BL-3).	1	3	3	1									1		
			C212.4	Interpret different ways of handling Trees and Graphs as non-linear Data Structures (BL-3).	1	3	2	1									1		
			C212.5	Analyze different searching and sorting techniques for organizing data (BL-4).	2	3	3	1									2		
				NO. OF COS MAPPED	5	5	5	4	1								5	3	
				AVERAGE CO MAPPING	1.6	2.8	2.6	0.8	0								1.6	0	
21	Electronic Devices and Circuits	20ES1012	C213.1	Illustrate the V-I characteristics of P-N junction Diode and special semiconductor devices. (BL-2)	3	1											3		
			C213.2	Demonstrate the performance of rectifiers with and without filters. (BL-2)	3	2	3										3		
			C213.3	Compare the operating characteristics of BJT (BL-3)	3	2											3		

Electronic Devices and Circuits — 20ES1012

CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C213.4	Analyze the BJT biasing techniques. (BL-4)	3	3	2										2	
C213.5	Interpret the characteristics of MOSFET. (BL-2)	3	1	1										3	
	NO. OF COS MAPPED	5	5	5										5	4
	AVERAGE CO MAPPING	3	1.8	1.2										2.8	0

22 — DIGITAL LOGIC DESIGN — 20EC2001

CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C214.1	Use number systems, binary codes and Boolean algebra to implement digital circuits. (BL-3)	3	2	1										1	
C214.2	Apply minimization techniques on Boolean expressions. (BL-3)	3	3	3	1									1	
C214.3	Design combinational circuits using logic gates. (BL-3)	3	3	3	1									1	1
C214.4	Analyze synchronous sequential circuits. (BL-4)	3	1	2	1									2	1
C214.5	Classify the memories & programmable logic devices. (BL-2)	2	2											1	1
	NO. OF COS MAPPED	5	5	5	3									2	
	AVERAGE CO MAPPING	2.8	2.2	1.8	1									3	

23 — NETWORK THEORY — 20EC2002

CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C215.1	Describe the Series resonance ,parallel resonance and analyze the locus diagramsof R,L,C(BL-2)	3	2	2	1									1	1
C215.2	Analyze the DC transients of R,L,C (BL-4)	3	2	2	2									1	1
C215.3	Analyze the AC transients of R,L,C (BL-4)	3	2	2	2									1	1
C215.4	Derive Two port network parameters of Electrical circuits(BL-3)	3	3	2	2									1	1
C215.5	Analyze the Filters and Network functions(BL-4)	3	3	2	2									1	1
	NO. OF COS MAPPED	5	5	4	1										5
	AVERAGE CO MAPPING	3	2.4	2.5	9										1

24 — ELECTRONIC DEVICES & CIRCUITS LAB — 20ES1515

CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C216.1	Demonstrate the basic characteristics and applications of basic electronic devices. (BL-02)	3	1	2				3	2		2			2	2
C216.2	Draw the characteristics of electronic devices by plotting graphs(BL-02)	3	1	2				3	2		2			2	2
C216.3	Analyze the Characteristics of UJT, BJT, FET, and SCR (BL-04).	3	1	1				3	2		2			2	2
C216.4	Design FET based amplifier circuits/BJT based amplifiers for the given specifications.(BL-03)	3	2	2				3	2		2			2	2
	NO. OF COS MAPPED	5	5											5	3
	AVERAGE CO MAPPING	2.4	1											1.6	2.67

25 — Digital Logic Design Lab — 20EC2501

CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C217.1	Demonstrate the truth table of various expressions and combinational circuits	3	2	3				2	2		2			2	3
C217.2	using logic gates. (BL-2)	2		3				3	2		2			2	2
C217.3	Develop various combinational circuits such as adders, sub-tractors, comparators, multiplexers and de-multiplexers. (BL-3)	3	3	3				2	2		2			2	3
C217.4	Construct flips-flops, counters and shift registers. (BL-3)	3	2	3				3	2		2			2	2
	NO. OF COS MAPPED	4	4	4				4	4		4			4	4
	AVERAGE CO MAPPING	2	1.3	2.25				2	1.5		1.5			1.5	1.75

26 — Network theory lab — 20EC2502

CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C218.1	Demonstrate the concept of resonance and locus diagrams of R,L,C.(BL-2)	3	3		2			2	2					1	1
C218.2	Analyze the transient response of AC and DC circuits.(BL-3)	3	3		2			1	2					1	1
C218.3	Determine experimentally the two port network parameters and filters and verify their result.(BL-2)	3	3	2	2	2		2	2					3	3
	NO. OF COS MAPPED	3	3	1	3	1		3	3					3	3
	AVERAGE CO MAPPING	3	3	2	2	2		1.7	2					1.667	1.67

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28 — ANALOG ELECTRONICS — 20EC2003

CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C221.1	Analyze the small signal amplifiers at low frequencies and high frequencies.(BL-4)	3	3	2										2	
C221.2	Illustrate the concepts of negative feedback amplifiers. (BL-2)	3	3	2										2	
C221.3	Illustrate the working principle of oscillators. (BL-2)	3	3	1										1	
C221.4	Analyze the parameters of multi stage amplifiers.(BL-4)	3	3	2	2									1	2
C221.5	Interpret the concepts of Power amplifiers and Tuned amplifiers.(BL-2)	3	2	1	2									2	3
	NO. OF COS MAPPED	5	5	5	2									5	2
	AVERAGE CO MAPPING	3	2.8	1.6	2									1.6	2.5

29 — CONTROL SYSTEMS — 20EC2004

CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C222.1	Analyze the differential equations for mechanical and electrical systems and obtain the transfer function from block diagrams, servo motors and signal flow graphs (BL - 3)	2	2	3											3
C222.2	Analyze the time domain specifications, steady state errors and to learn time response analysis of first and second order systems(BL - 3)	3	3	1											3
C222.3	Summarize the concepts Routh's stability and Root locus to find the stability of the system (BL - 2)	1	2	2										3	
C222.4	Summarize the frequency domain specifications from Bode, Polar, Nyquist plots and evaluate the frequency domain specifications(BL - 2)	1	1	3	1										3
C222.5	Summarize the concept of state space analysis, controllability and Observability and to obtain the transfer function. (BL - 2)	1	3	3											3
	NO. OF COS MAPPED	5	5	5	3									5	3
	AVERAGE CO MAPPING	1.6	2.2	2.4	0.3									0.6	4

No	Course	Code	CO	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
30	ELECTROMAGNETIC WAVES AND TRANSMISSION LINES	20EC2005	C223.1	Apply the Coulomb's law and Gauss law to different charge	2	2	3											3
			C223.2	Make use of Biot-Savart Law, Ampere's Circuit law to static current distributions.(BL-3)	3	3	1											3
			C223.3	Analyze the electric and magnetic fields.(BL-4)	1	2	2										3	
			C223.4	Interpret the characteristics of EM Wave.(BL-2)	1	1	3	1										3
			C223.5	Illustrate the concepts of transmission lines.(BL-2)	1	3	3											3
				NO. OF COS MAPPED	5	5	5	1									1	4
				AVERAGE CO MAPPING	1.6	2.2	2.4	1									3	3
31	PROBABILITY THEORY AND RANDOM PROCESS	20EC2006	C224.1	Interpret the concepts of sample spaces and set theory to calculate probabilities (BL-2)	3	2	2											
			C224.2	Apply the concept of random variables with probability density and distribution functions to compute probabilities for complex problems. (BL-3)	2	2	2											
			C224.3	Compute the statistical averages for multiple random variables using joint probability density and distribution functions. (BL-2)	2	3	2	3										
			C224.4	Interpret the concept of Power Spectrum Density & Cross Power Spectrum density related to temporal characteristics and spectral characteristics (BL-4)	3	3	3	3									2	
			C224.5	Apply the principles of a random process for solving system related problems. (BL-3)	3	2	2	3									2	
				NO. OF COS MAPPED	5	5	5										2	
				AVERAGE CO MAPPING	2.6	2.4	2.2										2	
32	Signals and Systems	20EC2007	C225.1	Interpret the concept of various signals and linear Time invariant Systems. (BL-2)	3	2	2										1	
			C225.2	Interpret the concept of Fourier series for Continuous time signals.(BL-2)	3	3	3	2									3	2
			C225.3	Apply continuous time Fourier Transform for Continuous time signals .(BL-3)	3	3	2	2									2	1
			C225.4	Apply Sampling Theorem for Continuous time signals.(BL-3)	3	2	3										2	
			C225.5	Analyze Laplace and Z-transform for continuous and discrete time systems.(BL-4)	2	3	3	1									2	2
				NO. OF COS MAPPED	5	5	5	3									5	3
				AVERAGE CO MAPPING	2.8	2.6	2.6	1.7									2	1.67
33	Principles of Databases		C226.1	Demonstrate the fundamental elements and the applications of database management system (BL-2)	3	1											1	
			C226.2	Analyze the integrity constraints for relevant problems in database system. (BL-4)	3	2											1	
			C226.3	Construct the SQL queries to create, manipulate and extract the information in database system (BL - 3)	2	3	2										2	2
			C226.4	Illustrate the concept of Normalization to produce a good database design in database design process. (BL - 2)	3	3											2	
			C226.5	Demonstrate Transactions and concurrency control in maintaining the database's integrity in database Systems. (BL - 2)	3	1											1	
				NO. OF COS MAPPED	5	5	1										5	1
				AVERAGE CO MAPPING	2.8	2	2										1.4	2
34	MATLAB AND SIMULINK LAB	20EC2504	C227.1	signals and Sequences, Convolution and Correlation of signals	1	1							2				1	2
			C227.2	Analyze signals and sequences using MATLAB.	2	1							1				1	2
			C227.3	Apply different transforms on a given signal to draw magnitude and phase spectrum.	2	2	2	1					3				1	2
			C227.4	Identify whether the given system is linear or non-linear and time variant or invariant.	2	2	2	1					2				2	2
			C227.5	Verify sampling theorem using MATLAB.	2								1				1	2
				NO. OF COS MAPPED	5	4	2	2					5				5	5
				AVERAGE CO MAPPING	1.8	1.5	2	1					1.8				1.2	2
35	ANALOG ELECTRONICS LAB	20EC2503	C228.1	Measure various parameters of analog circuits and compare experimental results in the laboratory with theoretical analysis. (BL-3)				1					2	2				
			C228.2	Analyze negative feedback amplifier circuits, oscillators, Power amplifiers, Tuned amplifiers.(BL-4)	3	2			2				2	2				2
			C228.3	Design analog electronic circuits using discrete components (BL-3)	3	2	2	2	2				2	2			2	2
			C228.4	Design RC and LC oscillators, Feedback amplifier for specified gain and multistage amplifiers for Low, Mid and high frequencies. (BL-3)			2		2				2	2			2	2
				NO. OF COS MAPPED	2	2	2	2	3				4	4			2	3
				AVERAGE CO MAPPING	3	2	2		2				2	2			2	2

<div align="center">III-I</div>

No	Course	Code	CO	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
38	Microprcessors & Microcontrllers	20EC2010	C311.1	Interpret the working principles of 8086 micro processor . (BL-2)	1		1										1	
			C311.2	Develop assembly language programs using instruction set in 80	2	2		1	2									1
			C311.3	Compare various versions of MSP430 based on applications. (BL-2)	1	1	1										1	2
			C311.4	organization of MSP430. (BL-2)	2	2	1	1	2									1
			C311.5	Implement serial communication protocols using MSp430. (BL-3)	1		1	1	1								1	
				NO. OF COS MAPPED	5	5	5		3									4
				AVERAGE CO MAPPING	1.4	1	0.8		1.7									1

No	Course	Code	CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
39	Java Programming		C312.1	Describe the basic Elements of Java for problem solving.(BL-2)	3	2											1	
			C312.2	Demonstrate the concepts of arrays and strings for organizing data. (BL-3)	1	2	2										1	
			C312.3	Describe the concepts of object oriented programming. (BL-2)	2	3	1										2	1
			C312.4	Design the web applications through java applets. .(BL-3)	1	3	3										1	2
			C312.5	Develop Multi-threaded programs to improve the system performance . (BL-6)	3	3	3										1	1
				NO. OF COS MAPPED	5	5	4										5	3
				AVERAGE CO MAPPING	2	2.6	2.25										1.2	1.33
40	Linear IC Applications	20EC2009	C313.1	Analyze the various characteristics of Differential amplifier. (BL: 4).	3	3	3											
			C313.2	Interpret the characteristics and configurations of Op-amp (BL: 2).	3	3	2											
			C313.3	Analyze the linear and nonlinear applications of an Op-amp (BL:2)	3	3	3		1								1	1
			C313.4	Design the Oscillators and active filters using Op-amp (BL: 4).	3	3	2		2								2	2
			C313.5	Study the applications of the special purpose integrated circuits and Data Convertors. (BL: 2).	3	3	2		2								2	1
				NO. OF COS MAPPED	5	5	5		3								3	3
				AVERAGE CO MAPPING	3	3	2.4		1.7								1.667	1.33
41	Analog and Digital Communications	20EC2008	C314.1	Analyze the Analog modulation and demodulation systems BL4	3	3	2										2	
			C314.2	Verify the effect of noise on the performance of communication system BL2	3	3	3										1	
			C314.3	Analyze the various Digital modulation techniques BL4	3	3	3										2	
			C314.4	Apply the Amplitude, frequency and phase shift keying techniques BL3	3	3	2										1	
			C314.5	Make use of the different error control codes for efficient transmission BL3	3	2	2										2	
				NO. OF COS MAPPED	5	5	3										5	
				AVERAGE CO MAPPING	3	2.8	4										1.6	
46	ANALOG AND DIGITAL COMMUNICATIONS LAB	20EC2505	C315.1	Demonstrate analog & pulse modulation and demodulation schemes. [BL:3]	3	3	2						2	2		2	3	3
			C315.2	Analyze the behaviour of digital modulation and demodulation techniques. [BL:4]	3	3							2	2		2	3	3
			C315.3	Execute programs in MATLAB to implement various digital carrier keying techniques.	3	3	2						2	2		2	3	3
			C315.4	Simulate channel coding and equalization techniques using MATLAB [BL:2]	3	3	2						2	2		2	2	2
				NO. OF COS MAPPED	4	4	3						4	4		4	4	4
				AVERAGE CO MAPPING	2.3	2.3	1.33						1.5	1.5		1.5	2.25	2.25
	MICROPROCESSORS & MICROCONTROLLERS LAB	20EC2506	C316.1	Understand the installation process of CC studio & launch pad. (BL-2)	1	1	1		1						1		1	1
			C316.2	Synthesize operations on MSP430 microcontroller using Code Composer Studio. (BL-3)		2	2		2						2			1
			C316.3	Examine power consumption of microcontroller using low power modes. (BL-3)				2	2									1
				NO. OF COS MAPPED	3	3												
				AVERAGE CO MAPPING	33	1	0.8		1.7									1
37	Environmental Science		C317.1	Know the importance of Public Awareness & Various Resources						2	2							
			C317.2	Illustrate various echo systems & their characteristics and biodiversity & its conventions.						2	2							
			C317.3	Interpret various sources & pollution and their preventive Measures.						2	3							
			C317.4	Create awareness on social issues related to environment & their preventive acts.						2	3							
			C317.5	Know about the population explosion & family welfare programs and identify the natural assets & related case studies.						2	2							
				NO. OF COS MAPPED						5	5							
				AVERAGE CO MAPPING						2	2.4							
			III-II															
49	DIGITAL SIGNAL PROCESSING	20EC2012	C321.1	(BL-02)	3	3	3	3	1									2
			C321.2	Analyze time and frequency domains description of discrete time signals using FFT Algorithms(BL-03)	3	3	3	3	2									3
			C321.3	Design of IIR filters using different methods(BL-04)	3	3	3	3										
			C321.4	Design of FIR filters using different methods (BL-04)	3	3	3	3	2									3
			C321.5	Summarize the architectural features of programmable DSP Processor. (BL-02)	3	3	2	2	2								2	2
				NO. OF COS MAPPED	5	5	4	1	3									1
				AVERAGE CO MAPPING	3	3	3.5	14	2.3									10
50	Digital Design using HDL	20EC2011	C322.1	Interpret digital design flow used in chip design Flow. (BL-2)	3	3	2		3								2	2
			C322.2	Model simple digital circuits using Verilog HDL. (BL-3)	3	3	1		3								2	1
			C322.3	Simulate digital circuits using Verilog HDL.(BL-3)	3	3	1		3								2	2
			C322.4	Analyze simulation techniques in behavioral and Switch level models of digital circuits. (BL-3)	3	3	1		3								3	1

#	Course	Code	CO	Description	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
			C322.5	Model digital circuits using Verilog tasks and directives.(BL-3)	3	3	3		3								3	3
				NO. OF COS MAPPED	5	5	5		5								5	5
				AVERAGE CO MAPPING	3	3	1.6		3								2.4	1.8
58	VLSI DESIGN	20EC2013	C323.1	Analyze the MOS Device Equations & CMOS basic inverter characteristics. (BL-4).	3	3	3		2								2	1
			C323.2	Apply the concepts of stick diagrams and layout design rules for CMOS Circuits. (BL-3).	3	3	3										3	3
			C323.3	Design the digital complex logic gate design of various types using CMOS and other forms of logic. (BL-3).	3	3	3	3	1									3
			C323.4	Develop various Data Path subsystems, parity generators, and array of memories to compensate trade-off area, speed and power requirements. (BL-3).	3	3	3	1	1								3	1
			C323.5	Implement digital logic circuits using PLAs, FPGAs and CPLDs. (BL-4).	3	2	2	1	3								3	2
				NO. OF COS MAPPED	5	5	5	3	4								4	5
				AVERAGE CO MAPPING	3	2.8	2.8	1.7	1.8								2.75	2
54	DIGITAL SIGNAL PROCESSING LAB	20EC2507	C324.1	Analyze discrete time signals & systems using MATLAB	2	3							2	2		2	2	3
			C324.2	Design & implement IIR & FIR filters for different specifications	2	2	2		2				2	2		2	2	2
			C324.3	Design DSP based real time processing systems to meet desired needs of the society	2	3							2	2		2	2	3
				NO. OF COS MAPPED	3	3	1		1				3	3		3	3	3
				AVERAGE CO MAPPING	2	2.7	2		2				2	2		2	2	2.67
44	Linear IC Applications Laboratory	20EC2508	C325.1	Illustrate the working of Op amp ICs & Application specific analog ICs.	2	2							3	3		2	3	
			C325.2	Analyze operational amplifier based circuits for linear and non-linear applications.	2	2	2						3	3		2	3	
			C325.3	Design Operational amplifiers for linear and nonlinear application, Multivibrator circuits using 555 & application specific ICs.	2	2	2						3	3		2	3	2
			C325.4	Simulate all linear and nonlinear application based Op amp Circuits and circuits based on application specific ICs.	2	2	2						3	3		2	3	2
				NO. OF COS MAPPED	4	4	3						4	4		4	4	2
				AVERAGE CO MAPPING	2	2	2						3	3		2	3	2
63	VLSI DESIGN LAB	20EC2509	C326.1	Develop Verilog HDL source code for the given problem/experiment, and simulate the given circuit with	3	3	2						2	3		2	2	3
			C326.2	Analyze the obtained results of the given experiment/problem.	3	2	2						2	3		2	2	3
			C326.3	Implement the experiments using FPGA/CPLD hardware tools.	3	3	2						2	3		2	2	3
				NO. OF COS MAPPED	3	3	3						3	3		3	3	3
				AVERAGE CO MAPPING	3	0	0						0	0		0	0	0
	IV-I																	
57	MICROWAVE ENGINEERING AND OPTICAL COMMUNICATIONS	20EC2014	C411.1	Interpret the importance of waveguides	3	3	1										1	
			C411.2	Illustrate the working of passive devices	3	3	1	1									1	
			C411.3	Differentiate Linear bean tubes and crossed field tubes in terms of operation and performance	3	3	1	1									3	
			C411.4	Analyze the signal propagation in optical fibers	3	3	1	1									1	
			C411.5	Describe appropriate optical sources and detectors for specific applications	3	3	1	1		1							3	
				NO. OF COS MAPPED	5	5	5	4		1							5	
				AVERAGE CO MAPPING	3	3	1	1		1							1.8	
59	IMAGE PROCESSING		C413.1	Analyze various types of images mathematically	3	2	2		2								2	
			C413.2	Compare image enhancement methods in spatial and frequency domains.	3	3	3		1								3	2
			C413.3	Demonstrate various segmentation algorithms for given image.	3	2	2		2								3	3
			C413.4	Compare DCT and wavelet transform techniques for image compression.	3	3	2	3	1								2	3
			C413.5	Apply various techniques for color image smoothing, sharpening and segmentation	3	3	3		2								3	2
				NO. OF COS MAPPED	5	5	5	1	5								5	4
				AVERAGE CO MAPPING	3	2.6	2.4	3	1.6								2.6	2.5
60	RENEWABLE ENERGY SYSTEMS		C414.1	Distinguish between flat plate and concentrated solar	3	1				1	1						1	
			C414.2	Describe electrical characteristics of PV cells & modules	3		1				3						1	
			C414.3	Explain about site selection considerations of WECS	3	1	1										1	1
			C414.4	Analyze the concept of producing Geothermal energies	3						2						2	1
			C414.5	Analyze the operation of tidal energy, wave energy & bio mass energy	2	2					2							2
				NO. OF COS MAPPED	5	3	2			1	4						4	3
				AVERAGE CO MAPPING	2.8	1.3	1			1	2						1.25	1.33
			C415.1	Apply the concepts & principles of management in real life industry.									2					
			C415.2	Apply the knowledge of Quality Control, Work-study principles in real life industry.					3									

#	Course	Code	CO	CO Description														
61	MANAGEMENT SCIENCE		C415.3	Analyze the concepts of HRM in Recruitment, Selection and Training & Development.										2	3			
			C415.4	Evaluate PERT/CPM Techniques for projects of an enterprise		3											2	
			C415.5	Create Modern technology in management science.													3	
				NO. OF COS MAPPED		1			1					1	2		2	
				AVERAGE CO MAPPING		3			3					2	2.5		2.5	
62	MICROWAVE AND OPTICAL COMMUNICATIONS LAB	20EC2511	C416.1	Analyze the waveguides in different modes of operation. (BL-4)	2	3	2							2	3	2	2	2
			C416.2	Intepret the limitations of conventional tubes at microwave frequencies and different microwave oscillators & amplifiers. (BL-3)	2	2	2							2	3	2	2	2
			C416.3	Analyse the optical fiber communications link. (BL-4)	2	3	2							2	3	2	2	2
				NO. OF COS MAPPED	3	3	3							3	3	3	3	3
				AVERAGE CO MAPPING	2	2.7	2							2	3	2	2	2
				IV-II														
64	INTRODUCTION TO INTERNET OF THINGS		C421.1	Categorize different levels of IoT	3	2	1		1							1	2	1
			C421.2	Illustrate revolution of Internet in Mobile Devices, Cloud & Sensor Networks (L2)	3	2	1		2							2	2	2
			C421.3	Explaincommunication protocols used in IoT (L4)	3	2	2	1	2							2	2	2
			C421.4	Make use of python programming to implement Internet of Things (L3)	3	2	2	1	2							2	2	2
			C421.5	Design IoT applications using Raspberry Pi (L6)	3	2	3		3							2	2	3
				NO. OF COS MAPPED	3	3	3	3	2	3	2	1	3	3	3	2	2	2
				AVERAGE CO MAPPING	3	2	2.33	0.7	3.5	0	0	0	0	0	0	3	3	3.5
65	BLOCKCHAIN TECHNOLOGY		C422.1	Explain customized block chain solutions	2											1		
			C422.2	Describeuse of the specific mechanics of Ethereum	2											2		1
			C422.3	Distinguish setting up and interacting with a contract using Geth client and Mist Wallet.			2											1
			C422.4	Illustrate the Smart contract examples and patterns	2													
			C422.5	Design Blockchain network	2													
				NO. OF COS MAPPED	3	3	3	3	2	3	2	1	3	3	3	2	2	2
				AVERAGE CO MAPPING	1.3	0	0.67	0	0	0	0	0	0	0	0	0	0	0.5
66	Project Work		C425.1	Identify the problem by using the fundamental knowledge and skills.	3	3	2	2		2		2	3	3	3			
			C425.2	Design a solution.to complex problems in a systematic approach.	2	3	2	3	2		2		3	3	3	2	2	2
			C425.3	Demonstrate a strong working knowledge and interact with team manner in a professional manner.	2	3	2	3	3	3	2		3	3	3	2	2	2
				NO. OF COS MAPPED	3	3	3	3	2	3	2	1	3	3	3	2	2	2
				AVERAGE CO MAPPING	2.3	3	2	2.7	2.5	1.7	2	2	3	3	3	2	2	2