

Department of Electronics & Communication Engineering, Integral University, Lucknow

CO-PO Mapping

B.Tech(ECE) First Semester

Proposed							Outcome													
Course Category	Code	Subject	Periods				Evaluation		PO											
			L	T	P	C	S	ESE	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
BS	PY101	Physics	3	1	-	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	To analyze the connection between daily life observations and science. To realize that apparently different ideas of Optics such as Interference and Diffraction have interrelationship between them. To realize the simplicity of ideas involved in explaining complex phenomenon.								0	3	2	1	3	3	1	3	2	2	1	3
CO2	To grow in ideas of different aspect of light and develop connection between daily life applications and science To analyze the process of development of a new theory while dealing with Polarization. To correlate that the conceptualization of an idea is far ahead than its practical realization while dealing with LASER. To grow in realization of totally different manifestation of light. To find the most recent applications of light in terms of communication and storage of data. To realize that how the design of complex systems is based on the simple ideas. To realize that the conceptualization of an idea is far ahead than its practical realization while dealing with Optical Fibers.								3	3	2	1	3	3	1	2	2	3	2	3
CO3	To grow in developing connection between philosophy and science. To find that seemingly different ideas such as Optics and Mechanics have interrelationship between them. To understand the process of development of a new theory and its application in day to day life. To realize the requirement of power of imagination.								3	3	3	3	1	3	1	3	2	2	1	3
CO4	To grow in developing the connection between philosophy and science To find that seemingly different ideas such as Compton Effect and Quantum Theory have interrelationship between them. To understand and analyze the process of development of a new theory and how the development of one idea leads to the development of a apparently different idea. To realize and appreciate the efforts made by the individuals to give a new understanding of science that led to the modern day applications.								3	3	3	2	2	3	1	2	2	1	1	3

CO5		To grow in developing connection between daily life utility and material science. To realize that apparently different materials with respect to Electric and Magnetic properties have inter relationship between them. To evaluate that how totally different manifestation of Modern Science leads to new technology. To do the evaluation that how an idea is far ahead than its practical realization while dealing with Nano Technology and Super Conductivity.								3	3	3	3	3	3	3	2	2	2	3	3	
										2	3	3	2	2	3	1	2	2	2	2	2	3
Course Category	Code	Subject	L	T	P	C	S	ESE	PO													
ESA	EC101	Basic Electronics	3	1	-	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12		
CO1		Understand the current voltage characteristics of semiconductor devices. Identify the unique vocabulary associated with electronics and explain the basic concepts of Semiconductor diodes such as p-n junction diode, characteristics and ammeters, DC loadline, Zener diode. To apply the basics of diode to describe the working of rectifier circuits such as Full and half wave rectifiers. To solve examples on rectifiers for parameters such as Capacitance, load and source effect, line and load regulations, and circuit current.							3	3	2	1	1	1	0	1	1	0	0	0	1	
CO2		Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation Draw and explain the structure of bipolar junction transistor. Explain the operation of each device in terms of junction bias voltage and charge carrier movement. Identify and explain the various current components in a transistor.							3	3	3	2	1	1			1				1	
CO3		Design and analyze of electronic circuits Describe the application of transistors for Current and voltage amplification. Also to describe the characteristics of different configurations of the transistor. Describe DC load line and bias point. List, explain, and design and analyze the different biasing circuits.							3	3	3	2	1	1			1					
CO4		Evaluate frequency response to understand behavior of Electronics circuits. Sketch, explain and design the amplifier circuit for given specification and analyze them discuss oscillator principles, oscillator types, and frequency stability as it relates to its operation. Analyze and Design the different types of Oscillators. Discuss ideal and practical operational amplifier (op amp) their electrical parameters, need for op amp. Explain and design different application circuits using op amp							3	3	3	2	1				2					
CO5		List and explain the different number system. Solve examples on converting one form of number system to another form. State Boolean laws and theorems. State and explain the different logic gates using truth table. Analyze and design different adder circuits.							3	3	2	2					1					
									3	3	3	2	1	1	0	1	1	0	0	0	1	

B.Tech(ECE) Third Semester

Course Category	Code		L	T	P	C	S	ESE	PO											
									PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
DC	EC 202	Electromagnetic Field Theory	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		Students are able to define and recognize the different coordinate systems and their relation in							3	3	2	1	1	1	0	1	1	0	0	2
CO2		Explain the fundamental laws governing the electromagnetic fields and calculate the associated physical							3	3	3	2	1	1			1		1	2
CO3		For the given system, the students are able to design the mathematical equations of electromagnetic field							3	3	3	2	1	1			1			2
CO4		Design the transmission line for the low-frequency communication with the help of wireline circuit elements.							3	3	3	2	1				2			2
CO5		Generalize the concept of high frequency guided structures like waveguides means of transporting information, commonly used in communication.							3	3	2	2					1			1
									3	3	3	2	1	1	0	1	1	0	1	2
Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC 203	Circuit Theory	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		Given a circuit, students shall be able to represent signals in mathematical form, identify type of system, apply Kirchhoff's laws, and formulate differential equation for LTI system and solve using Laplace transform							3	3	1	1	2	0	0	0	0	0	0	0
CO2		Given a circuit of passive elements with sources, student shall be able to analyze and evaluate the circuits using Kirchhoff's laws and AC-DC theorems							3	3	1	1	2							
CO3		For a given circuit of R, L, C, student shall be able to generate its transient/ frequency response and examine, analyze and evaluate the circuit characteristics							3	3	1	1	2							
CO4		For a given transfer function, students shall be able to identify its pole zeros and for stable circuits, select suitable design of implementation, develop series / parallel combination to synthesize the circuit.							3	3	1	1	2							
CO5		Given a two port network, student shall be able to define its parameters, solve, analyze, and modify its form							3	3	2	1	2							

Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC 204	Electronic Circuit Simulation Lab.	0	0	2	1	60	40	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		Students shall be able to Learn, understand, design and verify the truth tables of combinational circuit.							3	2	2	1	1	2	0	0	0	1	0	1
CO2		Students shall be able to Learn, understand the concepts of ALU.							3	2	2	1	1	2				1		1
CO3		Students shall be able to Learn, understand, design and verify the truth tables of Sequential circuit.							2	1	2			2				1		1
CO4		Students shall be able to Learn, understand the concepts of memory cell.							2	1	2			2				1		1
CO5		Students shall be able to write the Assembly language programming and shall be able to execute the program using 8085 kit.							2	1	2			2				1		1
									2	1	2	1	1	2	0	0	0	1	0	1
Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC 209	Digital Electronics	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1		Given a number, students shall be able to represent various conversion in mathematical form, identify type of complements, apply 1's and 2's complements and formulate conversion of any radix to decimal and decimal to any radix and solve 1's, 2's, 9's and 10's complements.							3	3	3	1	0	1	0	0	1	0	0	0
CO2		Given a Boolean Expression, student shall be able to analyze and evaluate various axioms and theorems also K-Map method. For a given Combinational circuit, student shall be able to understand its various building blocks and examine, analyze and evaluate various gates, adders, subtractor, multiplexer and encoders.							3	3	3	1		1			1			1
CO3		Given concept of sequential logic would be able to select suitable design of various flip flops, shift registers and counters.							3	2	3	2	1	1			2			
CO4		Given concept of asynchronous sequential logic would be able to understand and analyze transition table, flow table, reduction of states and circuit with latches.							3	3	2	2	1				1			
CO5		Given a AND and OR array, student shall be able to define various logic devices. Solve, analyze, and modify different PLD based design.							3	3	2	1					1			
									3	3	3	1	1	1	0	0	1	0	0	1

Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC 214	Digital Electronics Lab.	0	0	2	1	60	40	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	Given a digital trainer kit, students shall be able to Learn, understand and verify the truth tables of the basics of gates.								3	1	3	0	0	0	0	0	3	0	0	1
CO2	Given a digital trainer kit, students shall be able to Learn, understand the concepts of Combinational circuits.								3	2	3						3			1
CO3	Given a digital trainer kit, students shall be able to Design and test code converter.								3	3	3	2	1				3			1
CO4	Given a digital trainer kit, students shall be able to Learn, understand the concepts of Flip-Flops and Registers.								3	3	2						3			1
CO5	Given a digital trainer kit, students shall be able to Learn, understand the concepts of Counters.								3	2	2	1	1				3			1
B.Tech(ECE) Fifth Semester																				
Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC-301	Computer Organization & Architecture	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	<ol style="list-style-type: none"> 1. Classify and compute the performance of machines. 2. Understand how to implement memory chips, boards, modules and caches. 3. Relate to arithmetic for ALU implementation. 4. Understand the basics of hardwired and micro-programmed control of the CPU. 5. Learn about various I/O devices and the I/O interface 								3	3	2	1	1	1	0	1	1	0	0	1
CO2	<ol style="list-style-type: none"> 1. Detailed Study of Arithmetic and Logic Unit (ALU) 2. Operation on Integer Representation, Integer Arithmetic, 3. Learn the central Processing Unit: CPU organization, 4. Instruction set, Instruction format, Instruction type, Addressing mode, 5. Understand the H/W Micro programmed control unit. 								3	3	3	2	1	1			1			1

Course Category	Code		L	T	P	C	S	ESE	PO												
DC	EC-303	Communication Systems Engineering	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	
CO1		Understand different types of modulation and demodulation							3	3	2	1	2	1	1	0	0	0	0	0	1
CO2		Student learn the theory of probability, random variables, and understand the effect of noise in the communication systems							3	3	1	2	2	1							
CO3		Understand different pulse modulation and demodulation techniques							3	3	2	2	2	1							
CO4		Understand the basics of information theory, source coding techniques, calculate Entropy of source and efficiency of source coder							3	3	2	1	2								1
CO5		Understand the methods to mitigate inter symbol interference							3	3	2	2	2	1	1	1					1
									3	3	2	2	2	1	1	1	0	0	0	0	1
Course Category	Code		L	T	P	C	S	ESE	PO												
DC	EC-304	Automatic Control System	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	
CO1		Given a system, students shall be able to represent the system in mathematical form, identify type of the system, apply block reduction technique and Mason's Gain formula to obtain the transfer function of the given system, and formulate differential equation to represent the model of a mechanical system into equivalent electrical system and solve using Laplace transform.							3	3	2	1	1	1		1	1				1
CO2		For a given system, student shall be able to analyze and evaluate the system in time domain and predict the performance in time domain for different standard input signals. Evaluate the steady-state error.							3	3	3	2	1	1			1				1
CO3		For a given system, student shall be able to analyze the system in frequency domain and explain the nature of stability. Examine and analyze the stability by Nyquist criterion and Bode Plot							3	3	3	2	1	1	0	0	1	0	0		
CO4		For a given unstable system, students shall be able to identify and select the suitable compensator. To make the system stable select and design the suitable compensator for implementation. To develop the compensator by using Bode Plot and Root Locus.							3	3	3	2	1				2				

CO5		For a given a system, student shall be able to find the mathematical model called state-space representation and will be able to understand the conversion between transfer function and state-space model. Solve the system to find the time response from state-space representation. Analyze the system and obtained the transfer function from state-space model and vice versa									3	3	2	2					1			
											3	3	3	2	1	1	0	1	1	0	0	1
Course Category	Code		L	T	P	C	S	ESE	PO													
DC	EC-305	Antenna & Wave Propagation	2	1	0	3	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12		
CO1		Student will have the depth knowledge of principle of electromagnetic radiation , antenna characteristics, parameters and will be able to deduce the electric fields and magnetic fields radiated by a alternating current element /Hertzian dipole antenna							3	3	2	2		1	1	1	1	1			2	
CO2		Student will be able to understand and design the concept of antenna array and will be able to do the analyze /recognize the radiation pattern.							3	3	3	3									3	
CO3		Student will able to understand ,classify and design the different types of practical antennas							2	2	2	1	2	2								
CO4		Student will able to understand and analyze the different type of radio propagation and their effects in atmosphere.							3	2	1	1			1	1	2	2	2	2	1	
									3	3	2	2	2	2	1	1	2	2	2	2	2	
Course Category	Code		L	T	P	C	S	ESE	PO													
DE	EC-306	Departmental Elective-1 (MICROELECTRONICS TECHNOLOGY)	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12		
CO1		Students will be able to identify different type of integrated circuits and their applications. Students will know about different methods of silicon wafer manufacturing, cleaning and crystal orientation and defects. Students will able to compute resistivity of wafers.							3	3	3	2	1	1	0	1	2	0	0	1		
CO2		Students shall able to understand different types of oxidation techniques and different oxide furnaces. Students will able to compute the thickness of the oxide. Students will able to identify different ion implantation equipment and its process. Students will able to compute range and dopant distribution profiles.							3	3	3	3	2	1				2			1	

CO3	Student shall be able to explain about epitaxial and process and its reactors, different vapor phase epitaxial process and redistribution of impurities during epitaxy. Develop an understanding about chemical vapor deposition (CVD) and CVD process in IC fabrication.							3	3	2	3	2	1				1			
CO4	Student shall be able to select the suitable photolithography. To make mask making learn about pattern transfer process.							3	3	3	3	2	1				1			
CO5	Student shall be able to explain about bipolar and MOS based IC technology. To know about fault modeling, die bonding and wire Bonding, dicing, IC packaging techniques.							3	3	2	2	1	1				1		1	
								3	3	3	3	2	1	0	1	1	0	0	1	
Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC-308	Computer Organization & Architecture Lab	0	0	2	1	60	40	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	Students shall be able to Learn, understand, design and verify the truth tables of combinational circuit.							3	3	3	3	1	0	0	0	3	0	0	1	
CO2	Students shall be able to Learn, understand the concepts of ALU.							3	2	3	1	1				3		1	1	
CO3	Students shall be able to Learn, understand, design and verify the truth tables of Sequential circuit.							3	3	3	3	1				3			1	
CO4	Students shall be able to Learn, understand the concepts of memory cell.							3	3	2	1	1				3			1	
CO5	Students shall be able to write the Assembly language programming and shall be able to execute the program using 8085 kit.							3	2	2	2	1				3		1	2	
									3	3	3	2	1	0	0	0	3	0	1	1
Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC-309	Integrated Circuits Lab.	0	0	2	1	60	40	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	Students shall be able to Learn, understand, design and verify the truth tables of combinational circuit.							3	3	3	3	1	0	0	0	3	0	0	1	
CO2	Students shall be able to Learn, understand the concepts of ALU.							3	2	3	1	1				3		1	1	
CO3	Students shall be able to Learn, understand, design and verify the truth tables of Sequential circuit.							3	3	3	3	1				3			1	
CO4	Students shall be able to Learn, understand the concepts of memory cell.							3	3	2	1	1				3			1	
CO5	Students shall be able to write the Assembly language programming and shall be able to execute the program using 8085 kit.							3	2	2	2	1				3		1	2	
									3	3	3	2	1	0	0	0	3	0	1	1

Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC-310	Communication-I Lab.	0	0	2	1	60	40	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	To develop practical knowledge about theories of analog communication								3	1	3	0	0	1	0	0	3	0	0	1
CO2	To develop practical knowledge about simulation software.								3	2	3						3			1
CO3	To provide hands-on experience to the students, so that they are able to apply theoretical concepts in practice.								3	3	3	2	1				3			1
CO4	Demonstrate various pulse modulation techniques.								3	3	2				1		3			1
CO5	Evaluate analog modulated waveform in time /frequency domain and also find modulation index								3	2	2	1	1				3			1
CO6	Develop understanding about performance of analog communication systems.								3	3	1			3	1			1		3
									3	2	2	1	1	2	1	0	3	1	0	1
Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC-311	System Simulation Lab.	0	0	2	1	60	40	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	Will have a strong knowledge of MATLAB software								3	1	3		2				3			1
CO2	Will be able to do various engineering projects.									2	3						3			1
CO3	Ability to formulate transfer function for given control system problems.								3	3	3	2	1				3			1
CO4	Ability to find time response of given control system model.								3	3	2						3			1
CO5	Plot Root Locus and Bode plots for given control system model								3	2	2	1	1				3			1
CO6	Ability to design Lead, Lag, Lead-Lag systems in control systems								2	1	3	2		2	2		3	2		1
CO7	Ability to design PID controllers for given control system model								2	3			3			1			2	3
									3	2	3	2	2	2	2	1	3	2	2	1
B.Tech(ECE) Seventh Semester																				
Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC-401	Optical Communication	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	Identify and characterize different components of an Optical Fiber Communication link								3	0	1	0	1	0	0	0	0	0	0	2
CO2	Analyze Attenuation, Intermodal and intermodal dispersion, Polarizations maintaining fibers								3				1							2

CO3	Analyze Fabrication & characteristics of semiconductors, lasers and LEDs, Fiber Splicer, Fiber connector, Fiber couplers, Multiplexers.	3				2									1					
CO4	Analyze optical source, Fiber and Detector operational parameters	3				1				1					1					
CO5	Compute optical fiber link design parameters	3			2							2								
		3	0	1	1	1	0	0	0	1	0	0	0	2						
Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC-402	VLSI Design	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	Design MOS/CMOS circuits and systems.	3	3	2	1	1	1	1	1	1	1	3	2	2						
CO2	Evaluate the system performance.	3	3	3	2	1	1	1	1	1	3	3	2							
CO3	Use PSPICE simulation programme to simulate the CMOS designs.	3	3	3	2	1	1	2	1	1	3	3	2							
CO4	Test existing systems and their own designs for simple fabrication faults.	3	3	3	3	2	2	2	1	2	3	3	2							
CO5	Integrate systems and sub-systems.	3	3	2	2	3	2	1	1	3	3	2	2							
		3	3	3	2	2	1	1	1	2	3	3	2							
Course Category	Code		L	T	P	C	S	ESE	PO											
DC	EC-403	Wireless Communication	3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	Students shall be able to Define Wireless and Radio. Determine and compare the techniques of various 1G,2G,3G, 4G systems with their characteristics and limitations. Learn different types of fading, indoor and outdoor propagation models and calculate losses.	3	3	3	1	0	1	0	0	1	0	0	0							
CO2	Students shall be able to understand the concept of frequency reuse. Given a Multiple access techniques, student shall be able to know multiple access schemes used and channel assignment strategies and calculate spectrum efficiency and differentiate basic parameters of FDMA, TDMA, CDMA. Apply cellular concepts to evaluate the signal reception performance in a cellular network and traffic analysis to design cellular network with given quality of service constraints.	3	3	3	1		1						1							1

CO3	Understand GSM, CDMA concepts, architecture, frame structure, system capacity and services. Understand and compare personal area network (PAN) technologies such as Zigbee, Bluetooth etc plan a wireless communications system for a given environment in which it is to be deployed.							3	2	3	2	1	1					2							
CO4	Students shall be able to define orbital mechanics and launch methodologies. Compare competitive satellite services and apply Kepler's First second & Third Law. Students shall be able to calculate basic parameters and angles in a satellite communication system.							3	3	2	2	1					1								
CO5	Students shall be able to design link power budget for satellites and Explain satellite access techniques. Students shall be able to describe satellite subsystems.							3	3	2	1						1								
								3	3	3	1	1	1	0	0	1	0	0	1						
Course Category	Code						L	T	P	C	S	ESE	PO												
DE	EC-407	Departmental Elective-5 (DIGITAL IMAGE PROCESSING)					3	1	0	4	40	60	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	
CO1	Students shall be able to understand the actual view in 2D image form and represent 2D image into mathematical form, able to understand the basic difference between gray image, color image and binary image.																								
												3	2	0	0	0	0	0	0	0	0	0	0	2	
CO2	For a given image, student shall be able to analyze it by applying using enhancement, restoration and segmentation techniques.																								
												3	2												
CO3	For a given image, student shall be able to understand the difference between lossless and lossy compression. Further they will be Examine and analyze the compression techniques like Huffman Coding, Arithmetic coding, Transform Coding: JPEG, JPEG2000, Zero tree, Zero block coders.																								
												3	2	3											
CO4	Students shall be able to understand the Feature Extraction Representation of an image in order to object recognition.																								
												3	3	3	3										
CO5	Student shall be able understand and how to apply it in various field like medical imaging, CAT, Biometrics: Barcodes and Image Forensics.																								
												3					3		1					2	
												3	2	2	2	0	2	0	1	0	0	0	0	2	

Course Category	Code		L	T	P	C	S	ESE	PO													
									PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12		
DE	EC-411	Departmental Elective-6(BIOMEDICAL INSTRUMENTATION)	3	1	0	4	40	60														
CO1		Given a biomedical signal sources, students shall be able to differentiate and analyse the signal, identify type of Biomedical sensors and transducers, and Analyze where and how sensors are used in healthcare.	3	2	3	1	2	3	0	0	1	0	0	1	0	0	1					
CO2		Given a Boolean Expression, student shall be able to analyze and evaluate various axioms and theorems also K-Map method. For a given Combinational circuit, student shall be able to understand its various building blocks and examine,analyze and evaluate various gates, adders, subtractor, multiplexer and encoders.	3	3	3	1	2	3						1								1
CO3		Given concept of Nervous system explain the respiratory and nervous systems and related measurements. Study design parameter of ECG, EEG	3	2	3	2	1	3						2								1
CO4		Given concept of Ophthalmology Instruments students shall be able to understand and analyze Electroretinogram, Electrooculogram, Ophthalmoscope, Tonometer for eye pressure measurement.	3	3	2	2	2	3						1								1
CO5		Given a Therapeutic Instruments students shall be able to understand and analyze Diathermy, Defibrillator, cardiac pacemaker, stimulators. design electrocardiographs. Compare pacemakers and defibrilators, understand principles of operation of electrosurgery and laser operating modes. Compare medical imaging methodes and equipment in radiology, nuclear medicine and medical ultrasound and MRI.	3	3	2	1	2	3						1								1
			3	3	3	1	2	3	0	0	1	0	0	1	0	0	1					1