



## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

(Established by H.P.State Legislative vide Act No. 14 of 2002)  
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<b>Criteria</b>	2 Teaching-learning and Evaluation
<b>Key Indicator</b>	2.6 Student Performance and Learning Outcomes
<b>Metric</b>	2.6.1 The institution has stated learning outcomes (generic and programme specific) / graduate attributes which are integrated into assessment process and widely publicized through the website and other documents

**COs of All Courses – Department Electronics & Communication Engineering**  
**(BTech-ECM)**



Semester:I

SNo	Course Codes	Course Name	Course Outcomes
1.	18B11HS111	English and Technical Communication	<p>CO-1 - Understand and learn the concepts of better and effective communication Familiarity CO2 Learn the basics of business etiquettes, values and personal goal setting.</p> <p>CO-3 - Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.</p> <p>CO-4 - Help make communication stronger by learning the nature and mechanics of effective writing.</p> <p>CO-5 - Learn the different formats of business writing with correct knowledge of grammar.</p>
2.	18B17HS171	English and Technical Communication Lab	<p>CO-1 - Understand and sharpen writing skills using correct grammar in Emails, Business letters and Report writing.</p> <p>CO-2 - Learn the basics of successful job applications.</p> <p>CO-3 - Help make communication stronger by learning Non verbal cues and correct Body Language.</p> <p>CO-4 - Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.</p> <p>CO-5 - Develop advanced vocabulary by learning to use different ways of word construction and strategies of learning new words.</p> <p>CO-6 - Learn to format different types of documents with command over language.</p>
3.	18B11MA111	Engineering Mathematics -1	<p>CO-1 - Evaluate partial derivatives with its physical significance and expand functions of several variables.</p> <p>CO-2 - Find maxima and minima of functions of several variables with / without constraints.</p> <p>CO-3 - Find areas and volumes of solids using multiple integration.</p> <p>CO-4 - Understand the calculus of vectors and vector valued functions with their physical significance.</p> <p>CO-5 - Use Laplace transforms and inverse Laplace transforms to solve IVP</p> <p>CO-6 - Solve linear systems of equations and perform diagonalization of matrices</p>
4.	18B11PH111	Engineering Physics-I	<p>CO-1 - To learn the fundamental of physical optics</p> <p>CO-2 - To implement the concepts and theory for solving the application related problems of physical optics.</p> <p>CO-3 - To learn the basic and mathematical methods for relativity and related fields.</p> <p>CO-4 - To learn the basic concepts of modern , laser and thermal physics</p> <p>CO-5 - To implement the concept of modern and thermal physics ; analyzing and solving the related</p>



			problems
5.	18B17PH171	Engineering Physics Lab-I	From PMS Dept.
6.	18B11CI111	Programming for Problem Solving	<p>CO-1- To formulate simple algorithms for arithmetic and logical problems.</p> <p>CO-2 - To translate the algorithms to programs (in C language).</p> <p>CO-3 - To test and execute the programs and correct syntax and logical errors.</p> <p>CO-4 - To implement conditional branching, iteration and recursion.</p> <p>CO-5 - To decompose a problem into functions and synthesize a complete program using divide and conquer approach.</p> <p>CO-6 - To use arrays, pointers and structures to formulate algorithms and programs.</p> <p>CO-7 - To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.</p> <p>CO-8 - To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration</p>
7.	18B17GE173	Engineering Graphics OR	<p>CO-1 - To impart and inculcate proper understanding of the theory of projection.</p> <p>CO-2 - To improve the visualization skills</p> <p>CO-3 - To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient</p> <p>CO-4 - To impart the knowledge on understanding and drawing of simple residential/office buildings.</p>
	18B17GE171	Workshop Practices	<p>CO-1 - Study of various carpentry processes and its applications in carpentry</p> <p>CO-2 - Study and practice the use of various carpentry tools for different carpentry processes</p> <p>CO-3 -Study and manufacturing of different wood working joints</p> <p>CO-4 - Study the principles, classification and application of different welding processes</p> <p>CO-5 - Study and Manufacturing of various welding joints using electric arc welding and gas welding</p>
8.	19B17CI171	Programming for Problem Solving Lab	<p>CO-1- Understand the Typical C Program Development Environment, compiling, debugging, Linking and executing.</p> <p>CO-2 - Introduction to C Programming using Control Statements and Repetition Statement</p> <p>CO-3 - Apply and practice logical formulations to solve some simple problems leading to specific applications.</p> <p>CO-4 - Design effectively the required programming</p>



			components that efficiently solve computing problems in real world.
9.	18B17GE172	Mandatory Induction Program	From other Dept.

**Semester: II**

SNo	Course Codes	Course Name	Course Outcomes
1.	18B11MA211	Engineering Mathematics-II	<p>CO-1 - Solve problems related to convergence of series</p> <p>CO-2 - Understand basics of Ordinary Differential equation</p> <p>CO-3 - Comprehend series solution with certain special functions e.g. Bessel, Legendre Eqn.</p> <p>CO-4 - understand partial differential Eqn and Solve Heat, wave &amp; Laplace equation</p> <p>CO-5 - Understand Functions of a complex variable, Analytic functions, Mobius Transformation</p> <p>CO-6 - Solve Contour integration and find Taylor's and Laurent's series</p> <p>CO-7 - Evaluate certain real definite and improper integrals.</p>
2.	18B11PH211	Engineering Physics-II	<p>CO-1 - To learn the fundamentals of vector calculus and its applications in electrostatics</p> <p>CO-2 - Knowledge of, physical interpretation, and ability to apply Maxwell's equations to determine field waves, potential waves, energy ,charge conservation conditions and other diverse engineering problems.</p> <p>CO-3 - Able to distinguish Step Index, Graded index fibers and compute mode volume and Implementation of numerical methods for calculating the design parameters of optical fiber.</p> <p>CO-4 - To understand the basics of statistical distributions and use Maxwell Boltzmann distribution, Fermi-Dirac and Bose-Einstein distributions to solve problems in some physical systems</p> <p>CO-5 - To analyze atomic structure, Crystal structure, Crystal axes and planes, X-ray diffraction data and effect of energy bands on electronic behavior of solids.</p> <p>CO-6 - To understand the concepts of modern solid state physics ,various properties of semiconductors and apply Hall effect to calculate allied parameters of semiconductors</p>
3.	18B11PH271	Engineering Physics Lab-II	<p>CO-1 - To Understand different aspects of magnetism and semi conductive properties of materials and their use in design of various devices.</p> <p>CO-2 - To helps the students to understand the</p>



			<p>concepts of light propagation in optical fiber and introduce them to various losses in optical fiber communication.</p> <p>CO-3 - To demonstrate the scientific results based on observation.</p> <p>CO-4 - Scientific discussion for clear and concise conclusion on particular scientific results.</p> <p>CO-5 - To develop collaborative learning skills</p>
4.	18B11EC211	Electrical Science	<p>CO1 - Understand the basic parameters related to DC and AC circuit.</p> <p>CO2 - Understanding electrical principle, laws, and working of electrical machines.</p> <p>CO3 - Understanding different theorems to analyze DC and AC circuits.</p> <p>CO4 - Understanding sinusoidal steady state analysis of various AC circuits.</p> <p>CO5 - Demonstrate knowledge of and apply the theory of transformers and induction motors.</p>
5.	18B17EC271	Electrical Science Lab	<p>CO1 - Understanding basic electrical sources and measuring devices: Power supply, Multimeter, CRO/DSO and Function Generator.</p> <p>CO2 - Understand the basic working principle of a transformer and the operation of electrical machines.</p> <p>CO3 - Practical implementation of the fundamental electrical theorems and modeling of simple electrical systems.</p> <p>CO4 - Accurate measurement of voltage, current, power and impedance of any circuit.</p> <p>CO5 - DC analysis, Transient analysis and Frequency analysis of a given circuit depending on types of elements.</p> <p>CO6 -Teamwork skills for working effectively in groups and develop analytical skills to compare experimental results with theoretical concepts.</p>
6.	18B17GE171	Workshop Practices OR	<p>CO-1 - Study of various carpentry processes and its applications in carpentry</p> <p>CO-2 - Study and practice the use of various carpentry tools for different carpentry processes</p> <p>CO-3 -Study and manufacturing of different wood working joints</p> <p>CO-4 - Study the principles, classification and application of different welding processes</p> <p>CO-5 - Study and Manufacturing of various welding joints using electric arc welding and gas welding</p>
	18B17GE173	Engineering Graphics	<p>CO-1 - To impart and inculcate proper understanding of the theory of projection.</p> <p>CO-2 - To improve the visualization skills</p> <p>CO-3 - To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient</p>



			CO-4 - To impart the knowledge on understanding and drawing of simple residential/office buildings.
7.	18B17CI211	Data Structures and Algorithms	<p>CO-1 - To gain knowledge on the notions of data structure, Abstract Data Type.</p> <p>CO-2 - For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.</p> <p>CO-3 - For a given Search problem (Linear Search and Binary Search) student will able to implement it.</p> <p>CO-4 - For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.</p> <p>CO-5 - Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.</p> <p>CO-6 - Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.</p>
8.	18B17CI271	Data Structures and Algorithms Lab	<p>CO-1 - To gain knowledge on the notions of data structure, Abstract Data Type</p> <p>CO-2 - To have hands on skills to evaluate different kinds of linked lists and their applications in day to day problem solving.</p> <p>CO-3 - To have hands on skills to evaluate different kinds stacks and their applications and implementations in day to day problem solving</p> <p>CO-4 - To have hands on skills to evaluate different kinds queues and their applications and implementations in simulations.</p> <p>CO-5 - To acquire knowledge of various sorting algorithms</p> <p>CO-6 - To learn Searching: Balanced tree, red-black tree, lower bounds for searching</p> <p>CO-7 - To learn to code for operations on Tree or BST (Creation; Traversing like pre-order, post-order and in-order; Searching element; finding height etc.)</p> <p>CO-8 - Introduction to Heaps</p> <p>CO-9 - To learn to code for operations on Graphs (Creation; entering info, printing output and deleting; traversal of BFS and DFS algorithm )</p>



Semester: III

SNo	Course Codes	Course Name	Course Outcomes
1.	21B11HS312	Interpersonal Dynamics, Values and Ethics	From HSS Deptt.
2.	18B11MA311	Probability Theory and Random Processes	From Math's Dept.
3.	20B11EM311	Object Oriented Programming Concepts	CO-1- To learn the concepts of Objects, Classes, Methods, Constructors and Destructors, Friend Functions and Static member functions, Inline functions, constant functions. CO-2 -To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-level Inheritance, Hierarchical Inheritance and Hybrid Inheritance. CO-3 -To learn the concept of Abstract classes and interfaces, Operator overloading and conversion function CO-4 - To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file.CO-5 -To learn the Exception Handling: try-catch and finally block, making userdefined exceptions. CO-6 - To learn the Unified Modeling Language (UML): Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams.
4.	20B17EM371	Object Oriented Programming Concepts Lab	CO-1 - To learn the concepts of Objects, Classes, Methods, Constructors and Destructors, Friend Functions and Static member functions, Inline functions, constant functions.CO-2 -To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-level Inheritance, Hierarchical Inheritance and Hybrid Inheritance.CO-3 - To learn the concept of Abstract classes and interfaces, Operator overloading and conversion function CO-4 - To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file. CO-5 -To learn the Exception Handling: try-catch and finally block, making user defined exception
5.	20B11EM312	Digital Electronics	CO-1- Have a thorough understanding of the fundamental concepts and techniques Familiarity used in digital electronics. CO-2 - To understand and examine the structure of various number systems and its Familiarity application in digital design. CO-3 - The ability to understand, analyze and design various combinational and Usage sequential circuits. CO-4 -Ability to identify basic requirements for a



			<p>design application and propose a Usage cost effective solution.</p> <p>CO-5 - The ability to identify and prevent various hazards and timing problems in a Assessment digital design.</p> <p>CO-6 - To develop skill to build, and troubleshoot digital circuits.</p>
6.	20B17EM372	Digital Electronics Lab + Verilog	<p>CO-1 - Apply the techniques of design, simulation and synthesis of digital circuits to design FPGA based systems or/and ASICs using Xilinx Familiarity design tools.</p> <p>CO-2 - Explain and design the test benches for verification of the given IP Usage core or HDL based design.</p> <p>CO-3 - Able to explain the System Modeling with Tasks and Functions.</p> <p>CO-4 - Design digital circuits for implementing a signal processing algorithm Assessment using different Verilog modeling styles</p>
7.	18B11EC313	Electronic Devices & Circuits	<p>CO-1- Understand the construction and working of a diode and its application as an electronic switch. Its use in clipper and clamper circuits as a wave shaping electronic component.</p> <p>CO-2- Understand the construction and working of a BJT and the different biasing networks used to stabilize the operating point for it to work in the active region or saturation and cut off region.</p> <p>CO-3 - Small signal analysis of BJT using the transistor and hybrid equivalent models. Estimation of various parameters (gain, input/output impedance) of CE and CB configurations.</p> <p>CO-4 - Understand the construction and working of a JFET, Depletion type and enhancement type MOSFET. Applications of JFET, and CMOS in design of logic gates.</p> <p>CO-5- Understanding the various biasing schemes for FET amplifiers, and FET small signal analysis using Ac equivalent model.</p> <p>CO-6- Understanding the Low-frequency response of BJT amplifier, Low- frequency response of FET amplifier, High frequency transistor models, frequency response of single stage and multistage amplifiers.</p>
8.	18B17EC373	Electronic Devices & Circuits Lab	<p>CO-1- Understand the V-I characteristics of diodes and its application as a switch and in wave shaping circuits.</p> <p>CO-2- Design of voltage regulator circuits using zener diode and half wave / full wave rectifiers using PN junction diodes.</p> <p>CO-3 - Understand the V-I characteristics of BJTs and its use in design of voltage and current amplifiers</p>





			CO-4- Understand the Drain and transfer characteristics of FETs and its use in design of logic gates. CO-5 -Design of single stage RC coupled amplifiers using BJTs and verifying the AC equivalent model for them. CO-6 - Study the frequency response of BJTs and FETs
9.	20B17EM373	Network Simulation Lab (LabView and MATLAB)	CO-1- Familiar with OPNET and NS3 Software CO-2 - Able understand the application of ether net and token ring, and LAN CO-3 - Able to configure the routing information protocol, open shortest path first protocol, and BGP CO-4 - Able to understand and apply the RSVP to provide the quality of services. CO-5 - Able to understand applications of MAC in wireless LAN
10.	21B11HS311	Professional Communication Practice	From HSS Deptt.

#### Semester: IV

SNo	Course Codes	Course Name	Course Outcomes
1.	18B11HS411	Finance and Accounts	From HSS Dept.
2.	18B11MA413	Discrete Mathematics	From Math's Dept.
3.	18B17EC474	Python Lab	CO-1- To understand the python program development environment, debugging, and executing. CO-2 - To understand the usage of control statements in python program. CO-3 - To practice programming in python for solving some simple problems leading to specific applications. CO-4 - Able to design a project on python.
4.	18B11CI412	Design and Analysis of Algorithms	CO-1 - For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms. CO-2 - Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms. CO-3 - Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation CO-4 - Describe the dynamic-programming



			<p>paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.</p> <p>CO-5 - For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.</p> <p>CO-6 - Explain the ways to analyze randomized algorithms (expected running time, probability of error).</p> <p>CO-7 - Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).</p>
5.	20B11EM411	Microprocessor Microcontrollers and Interfacing Techniques	<p>CO-1 Understand Standard Architecture of Intel Microprocessors and 8051 Microcontroller.</p> <p>CO-2 - Learn the instruction set of Intel 80x86 processors and to gain proficiency in assembly language programming</p> <p>CO-3- Know the concepts associated with interfacing a microprocessor to memory and I/O devices and to learn the programming for peripheral I/O devices</p> <p>CO-4 - Learn the control components of a microprocessor based system through the use of interrupts.</p> <p>CO-5 - Acquaint with the background knowledge for understanding next-generation CPUs and interfacing of microcontrollers</p>
6.	20B11EM412	Signals and Systems	<p>CO-1 - Classify signals and systems based on their properties and determine the mathematical representations of signals and systems.</p> <p>CO-2 - Explain the role of convolution in the analysis of LTI systems and also able to formulate and solve differential /difference equations describing LTI systems.</p> <p>CO-3 - Analyze the spectral characteristics of signals using Fourier analysis and analyze system properties based on impulse response and Fourier analysis.</p> <p>CO-4 - Apply the Laplace transform and Z-transform for analysis of continuous-time and discrete-time signals and systems.</p> <p>CO-5 - Understand the process of sampling and the effects of under sampling.</p>
7.	18B17CI472	Design and Analysis of Algorithms Lab	<p>CO-1 - Student will understand the running time using time library functions. Learn to prepare table for input size vs. running time. Learn to measure best run and worst run of the experiments.</p> <p>CO-2 - Students will learn to implement various</p>



			<p>types of design for algorithms and compare the approaches</p> <p>CO-3 - Students will learn to implement network algorithms and their applications.</p> <p>CO-4 - Student will learn to implement classical NP problems</p> <p>CO-5 - Students will learn to implement approximate algorithms for real world problems.</p> <p>CO-6 - Students will learn to implement randomized solution for difficult real world problems.</p>
8.	20B17EM471	Microprocessor Microcontrollers and Interfacing Techniques Lab	<p>CO-1 - Gain proficiency with using assembly language to develop microprocessor and microcontroller based applications</p> <p>CO-2 - Learn control components of a microprocessor based system through the use of interrupts</p> <p>CO-3 Gain practical experience in programming memory and peripheral devices like timers/counters, parallel peripheral devices, serial communication interfaces and I/O devices</p> <p>CO-4 - Gain practical experience in programming with coprocessor and DMA controller</p> <p>CO-5 - Develop a microprocessor and microcontrollers based system, using assembly language programming concepts, for handling a real life task</p>
9.	20B17EM472	Signals and Systems Lab	<p>CO-1 - Understand basics of MATLAB syntax, functions and programming.</p> <p>CO-2 - Generate and characterize various continuous and discrete time signals.</p> <p>CO-3 - Perform the basic operations on the signals.</p> <p>CO-4 - Design and analyze linear time-invariant (LTI) systems and compute its response.</p> <p>CO-5 - Analyze the spectral characteristics of signals using Fourier analysis.</p> <p>CO-6 - Analyze the systems using Laplace transform and Z transform. A</p>
10.	18B11GE411	Environmental Studies	From Other Dept.

**Semester: V**

SNo	Course Codes	Course Name	Course Outcomes
1.	18B11HS511	Project Management and Entrepreneurship	From HSS Dept.
2.	10B11CI511	Operating Systems	CO-1 -An appreciation of the role of an operating system.



			<p>CO-2 - Create processes and threads.</p> <p>CO-3 - Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.</p> <p>CO-4 - For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time</p> <p>CO-5 - Design and implement file management system.</p> <p>CO-6 - For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers. .</p>
3.	20B11EC511	Theory of Computation	<p>CO-1- Understanding the Finite automata and languages.</p> <p>CO-2 - Understanding the Computability theory such Turing machine, decidability, and reducibility.</p> <p>CO-3 - Able to understand the time complexity, space complexity and Intractability.</p> <p>CO-4 - Able to apply the theory of computation concept in different applications</p>
4.	20B17EC571	Theory of Computation Lab	<p>CO-1 - Understanding and Usage of the JFLAP software</p> <p>CO-2 - Understanding of the deterministic finite automata (DFA), nondeterministic finite automata (NFA), conversion and minimization.</p> <p>CO-3 - Able to understand the mealy and Moore machine</p> <p>CO-4 - Able to understand the Turing machine and their conversion in to grammar</p> <p>CO-5 - Able to understand the regular pumping lemma and context free pumping lemma, and transformer grammar.</p>
5.	20B11EC512	Communication Systems	<p>CO-1 -The students will have the knowledge of components of analogue communication system.</p> <p>CO-2 The students will have the ability to analyze the concept of various methods used for baseband/band pass analogue transmission and detection.</p> <p>CO-3 - The students will have the knowledge how we can covert analog signal to digital signal with the help of sampling and PCM</p> <p>CO-4 - The students will have the knowledge of components of digital communication system</p> <p>CO-5 - The students will have the ability to analyze various modulation methods for transmission of digital information</p>
6.		Operating Systems Lab	<p>CO-1 - Understand basics of MATLAB syntax, functions and programming.</p> <p>CO-2 - Generate and characterize various continuous</p>



			and discrete time signals. CO-3 - Perform the basic operations on the signals. CO-4 - Design and analyze linear time-invariant (LTI) systems and compute its response. Technical skills CO-5 - Analyze the spectral characteristics of signals using Fourier analysis. CO-6 - Analyze the systems using Laplace transform and Ztransform. Technical skills List of Experiment
7.	20B17EC572	Communication Systems Lab	CO-1 - Understand basics of MATLAB syntax, functions and programming. CO-2 - Generate and characterize various continuous and discrete time signals. CO-3 - Perform the basic operations on the signals. CO-4 - Design and analyze linear time-invariant (LTI) systems and compute its response. CO-5 - Analyze the spectral characteristics of signals using Fourier analysis. CO-6 - Analyze the systems using Laplace transform and Ztransform.
8.		Science Elective	From other Dept.
9.	<b>Professional Elective I</b>		
	20B1WEC531	Telecommunication and Switching network	CO-1 - To identify different types of network topologies and to enumerate the layers of OSI model and TCP/IP model. CO-2 - To understand the basics of circuit switching and the multi-stage switching technologies and apply the same for the analysis and design of optimized switches. CO-3 - To learn the different protocols at various layers of TCP/IP model and apply the knowledge Usage of same to design a given network. CO-4 - To identify the key metrics required for the performance assessment of IP based networks and then to apply this knowledge to optimize a given network operation based on some specific metrics. CO-5 - To understand various routing algorithms and apply this knowledge to design a network
	20B1WEC571	Telecommunication and Switching network Lab	CO-1 - Familiarity To learn network simulator and building NS2 to conduct network simulation for familiarization with OSI, TCP& UDP. CO-2 - Set up and analyze wired and LAN networks and understand TCP/UDP agents with CBR/FTP traffic source respectively. CO-3 - To create and analyze the mobile ad-hoc network, heterogeneous network and routing algorithm. CO-4 - Assessment To label and explain data trace file (.tr) of Wired, Wireless and LAN networks and to evaluate throughput in Wired networks (with and without errors).



	18B1WCI534	Java Programming	<p>CO-1 - To learn the graphics and animation on the web pages, using Java Applets. To learn and design a full set of Event driven UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) &amp; Swings.</p> <p>CO-2 - To learn Java Data Base Connectivity (JDBC) so as to retrieve and manipulate the information on any relational database through Java programs.</p> <p>CO-3 - To learn the server side programming using Servlets and JSP.</p> <p>CO-4 - To learn the invocation of the remote methods in an application using RMI.</p>
	18B1WCI574	Java Programming lab	<p>CO-1 - To learn the graphics and animation on the web pages, using Java Applets. To learn and design a full set of Event driven UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) &amp; Swings.</p> <p>CO-2 - To learn Java Data Base Connectivity (JDBC) so as to retrieve and manipulate the information on any relational database through Java programs.</p> <p>CO-3 - To learn the server side programming using Servlets and JSP.</p> <p>CO-4 - To learn the invocation of the remote methods in an application using RMI.</p>
	18B1WCI531	Information Theory & Coding	<p>CO-1 The students will have the knowledge of components of Information Theory</p> <p>CO-2 - The students will have the ability to analyze the concept entropy random variables</p> <p>CO-3 - The students will have the knowledge of channel capacity and Coding</p> <p>CO-4 - The students will have the knowledge of Block Codes for Error Correction</p> <p>CO-5 - The students will have the ability to understand the application of Hamming codes, Cyclic Codes and convolutional codes</p>
	18B1WCI571	Information Theory & Coding lab	<p>CO-1 - Demonstrate various entropies and information</p> <p>CO-2 Apply source coding techniques.</p> <p>CO-3 Construct codes using different coding techniques.</p> <p>CO-4 Explain various coding schemes for text , speech and audio.</p>
		Network Analysis and Synthesis	<p>CO-1 - Understand the need and foundation of network analysis</p> <p>CO-2 - Analyze two port networks, filters and attenuators</p> <p>CO-3 - Infer and evaluate scattering matrix and synthesize the networks.</p> <p>CO-4 Study of application domains for network</p>



			analysis and synthesis.
		Network Analysis and Synthesis Lab	CO-1 - Analyze behavior of complex DC and AC circuit's response in time and frequency domain. CO-2 - Apply concepts of electrical circuits across engineering. CO-3 - Apply the knowledge of basic circuit law and learn conditions for stability and reliability of network functions. CO-4 Synthesize two port network functions.

**Semester: VI**

SN o	Course Codes	Course Name	Course Outcomes
1.	18B11CI612	Compiler Design	CO-1 - To understand the basic concept of compilation particular, lexical analyzer, syntax and semantic analysis, code generation and optimization phases of compilation CO-2 - Ability to create lexical rules and grammars for a programming language CO-3 - Ability to use flex or similar tools to create a lexical analyzer and Yacc/Bison tools to create a parser CO-4 - Ability to implement a various parser such as a bottom-up SLR parser without using any compiler-generation tools CO-5 - Ability to implement a various intermediate code generation techniques without using any compiler generation tools
2.		Computer Organization and Architecture	CO-1 - To learn the basic concepts, terminology and evolution in computer organization and architecture CO-2 - Understanding the computer architecture and computer arithmetic. CO-3 - Understanding of the computer memory and the issues related to memory. CO-4 - Understanding the concept of memory I/O, interrupt handling and DMA. CO-5 - Learn the organization of Processor and the concept of pipelining. CO-6 - Learning concepts of Parallel processing and related issues.
3.	18B17CI672	Compiler Design Lab	CO-1 - Gain an in-depth understanding of the principles underlying the design CO-2 - Construction of compilers CO-3 - Functioning of Compiler writing tools CO-4 - Building various parsing techniques
4.	18B11EC671	Mini Project	CO-1 - Review and evaluate the available literature on the chosen problem. CO-2 - Formulate methodology to solve the identified problem. CO-3 - Plan/Design Software/Hardware for the proposed system. CO-4 - Apply the principles, tools and techniques to solve the problem. CO-5 - To act as catalyst in transferring the Electronics &



			Communication Engineering Knowledge to the benefit of the society. CO-6 - Prepare the project report and present the results.
5.	20B11EC611	Database Systems	CO-1 - Explain the characteristics, architecture of database approach, its components, different data models and the examples of their usage. CO-2 - For a given query write relational algebra expressions for that query and optimize the developed expressions. CO-3 For a given specification of the requirement, design the databases using E-R method and normalization. CO-4 - Determine the functional dependency between two or more attributes, compute the closure of a set of attributes, evaluate a proposed decomposition CO -5 - Give examples of the application of primary, secondary, and clustering indexes, explain the theory and application of internal and external hashing techniques. CO -6 - Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling. CO -7 - Familiarize with the security in databases and gaining familiarity with other popular databases used in the industry
6.	20B17EC671	Database Systems Lab	CO-1 - Design and implement a database schema. CO-2 -Design different views of tables for different users and to apply embedded and nested queries. CO-3 -Understand the use of structured query language and its syntax , transactions, database recovery and techniques for query optimization. CO-4 - Understand, analyze and apply common SQL statements including DDL, DML , DCL statements to perform different operations. CO-5 - Develop application programs using PL/SQL CO-6 - Design and implement a project using embedded SQL and GUI
7.		Open Elective I (HSS Elective)	From HSS Dept.
8.		Industrial Training	
9.	<b>Professional Elective II</b>		
		Control Systems	CO-1 - Fundamental knowledge of control system, mathematical modelling of various physical systems. CO-2 - Determine the response of first and second order systems for various inputs. CO-3 - Analyze the transient and steady-state response open-loop and closed-loop systems. CO-4 - Analyze the stability of the in time-domain as well as in frequency-domain. CO-5 - Design and implementation of P, PD, PI, PID controllers and lead, lag and lag-lead compensators.
		Control Systems	CO-1 - Understand basics of control systems.





		Lab	CO-2 - Realize the different components of control system and their operations. CO-3 - The skill to analyze the response of any LTI system using software tools. CO-4 - Design of different types of controller and tuning their parameters,
		Artificial Intelligence	CO-1 - Analyze the need and foundation of Artificial Intelligence CO-2 - Study the Intelligent agents that receive percepts from the environment and perform actions CO-3 - Analysis of problem solving, knowledge and reasoning CO-4 - Study of application domains.
		Artificial Intelligence Lab	CO-1 - Understanding the software implementation of Artificial Intelligence Techniques CO-2 - Construct problem solving agent using various Informed and uninformed search strategies CO-3 - Utilize evolutionary search algorithms to solve the real world complex problems CO-4 - Analyze and apply algorithms to solve problems requiring constraint satisfaction and game theory
	20B1WEC631	Multimedia Communication	CO-1 - Characterize the types of multimedia contents. CO-2 - Identify different standards for multimedia communication. CO-3 - Choose required networks for multimedia communication. CO-4 - Understand different animation techniques.
	20B1WEC671	Multimedia Communication lab	CO-1 - Characterize the types of multimedia contents. CO-2 - Identify different standards for multimedia communication. CO-3 - Choose required networks for multimedia communication. CO-4 - Understand different animation techniques.
	20B1WEC632	Digital Signal Processing	CO-1 - Able to understand the theoretical concept of discrete Fourier transform, digital filters. CO-2 - Able to understand and apply parametric and nonparametric techniques of spectral analysis. CO-3 - Able to understand and concept of advance digital signal processing tools like short-time Fourier Transform, Wavelet transform. CO-4 - Able to process the non-stationary signals CO-5 - Able to implement and apply these skills for different applications
	20B1WEC672	Digital Signal Processing lab	CO-1 - Familiar with LabVIEW and MATLAB Programming CO-2 - Able perform and understand the convolution & correlation operation CO-3 - Able to perform and analyze discrete Fourier transform, window functions, and filter design CO-4 - Able to perform the de-noising of the signals CO-5 - Able to design the digital signal processing algorithms process the natural signals.



		Embedded Systems Design	<p>CO-1 - Understand various components of embedded system, design challenges and design metrics</p> <p>CO-2 - Comprehend RISC architecture of ARM and PIC microcontrollers</p> <p>CO-3 - Learn about embedded system programming through ARM and PIC microcontroller, programming and I/O interfacing</p> <p>CO-4 - Know about embedded system design and development methodology, tools and languages used for embedded system design</p> <p>CO-5 - Learn about integration and testing of embedded systems</p>
		Embedded Systems Design Lab	<p>CO-1 - Gain experience about tools and languages used for embedded system design and development</p> <p>CO-2 - Gain experience in configuring and programming of system on module embedded system architecture</p> <p>CO-3 - Gain experience in embedded system programming of ARM based microcontroller system</p> <p>CO-4 - Gain experience in embedded system programming of PIC based microcontroller systems</p> <p>CO-5 - Gain experience in interfacing the microcontrollers with input devices, output devices, sensors and actuators</p>
	20B1WEC633	Wireless Communication and Computing	<p>CO-1 - Understand fundamentals of wireless communications.</p> <p>CO-2 - Understand basic skills for cellular networks design</p> <p>CO-3 - Analyze different characteristics (security, energy efficiency, mobility, scalability) in wireless networks.</p> <p>CO-4 - Apply knowledge of TCP/IP extensions for mobile and wireless networking Usa</p>
	20B1WEC673	Wireless Communication and Computing Lab	<p>CO-1 – Understand the basics of LabView, MATLAB and WiCOMM-Tkit</p> <p>CO-2 Understand basics of various analog and digital modulation techniques.</p> <p>CO-3 – Gain practical experience of the functioning of wireless systems.</p> <p>CO-4 Analyze the performance of practical wireless communication systems.</p>

#### Semester: VII

SNo	Course Codes	Course Name	Course Outcomes
1.	18B19EC791	Project Part-I	<p>CO-1 - Review and evaluate the available literature on the chosen problem.</p> <p>CO-2 - Formulate methodology to solve the identified problem</p> <p>CO-3 - Plan/Design Software/Hardware for the proposed system.</p> <p>CO-4 - Apply the principles, tools and techniques to solve the problem.</p>



			CO-5 - To act as catalyst in transferring the Electronics & Communication Engineering Knowledge to the benefit of the society. CO-6 - Prepare the project report and present the results.
2.	18B11HS711	Indian Constitution	From HSS Dept.
3.		Open Elective II	From other Dept.
4.		Open Elective III	From other Dept.
5.	<b>Professional Elective DE III</b>		
		Machine Learning	CO-1 - Understand the basic theory underlying machine learning. CO-2 - Understand a range of machine learning algorithms along with their strengths and weaknesses. CO-3 - Apply machine learning algorithms to solve problems of moderate complexity. CO-4 - Formulate machine learning problems corresponding to different applications. CO-5 - Read current research papers and understand the issues raised by current research.
		Machine Learning Lab	CO-1 - Identify the characteristics of real world datasets. CO-2 - Understand the implementation procedures and complexity of machine learning algorithms and their limitations. CO-3 - Implement machine learning algorithms on any given datasets using Python. CO-4 - Apply common machine learning algorithms in practice and implementing their own. CO-5 - Identify and apply machine learning algorithms to solve real world problems.
	20B1WEC737	Next Generation Telecom Networks	CO-1 - Identify, describe and give examples of the networking applications used in everyday tasks such as reading email or surfing the web CO-2 - Investigate the solutions to improve wireless network (from physical layer level to transport layer level) and discuss pros and cons. CO-3 - Student will develop an understanding of the underlying structure of networks and how they operate. CO-4 Analyze the network and issues associated with it.
	20B1WEC777	Next Generation Telecom Networks Lab	CO-1 - Understanding of LAN trainer kit CO-2 -Analysis of the network throughput for various different multiple access protocols like ALOHA, CSMA, CSMA/CD etc CO-3 -Understanding the basic concepts of token bus, token ring LAN CO-4 -Analysis of theoretical and practical results.
	20B1WEC738	Wireless Sensor Networks	CO-1 - Understand the basics of wireless sensor and network. CO-2 - To identify communication protocols



			<p>employed in wireless sensor.</p> <p>CO-3 - To select the appropriate technology to implement a WSN.</p> <p>CO-4 - To assess different communication protocols and their usefulness in different applications.</p>
	20B1WEC778	Data Mining and Predictive Analysis	<p>CO-1 - To get a detailed Overview of Data Mining.</p> <p>CO-2 - To learn about Data Preprocessing.</p> <p>CO-3 - To Understand data Visualization Techniques</p> <p>CO-4 - To understand Dimensionality Reduction.</p> <p>CO-5 - Mining Frequent Patterns, Associations, and Correlations, Classification, Cluster Analysis, Outlier detection.</p> <p>CO-6 - The Data Effect: A Glut at the End of the Rainbow (data), The Machine That Learns: A Look inside Chase's Prediction of Mortgage Risk (modeling).</p>
	20B1WEC779	Data Mining and Predictive Analysis Lab	<p>CO-1 - Students will be able to understand the various kinds of tools</p> <p>CO-2 - Students will be able to Analyze the mining techniques for realistic data, and also to conceptualize Data Mining and the need for pre-processing</p> <p>CO-3 - To develop the algorithms used for various types of Data Mining Problem</p> <p>CO-4 - Students will be able to construct algorithms to solve data mining problems using weka tool</p> <p>CO-5 - Students will be able to demonstrate the classification and clusters Techniques in large datasets</p>
6.	<b>Professional Elective DE-IV</b>		
	20B1WEC740	Neural Networks and Fuzzy Logic	<p>CO-1 - Analyze the need and foundation of fuzzy logic as a soft computing tool</p> <p>CO-2 - Study the fuzzy inference system for solving real world problems.</p> <p>CO-3 - Understanding of artificial neural network in machine learning algorithms.</p> <p>CO-4 - Analysis and study of neural network in various application domains.</p>
	20B1WEC780	Neural Networks and Fuzzy Logic Lab	<p>CO-1 - To learn the basic concepts of fuzzy logic and neural network through simulation.</p> <p>CO-2 - To develop and demonstrate the logic given in problem statement using algorithms in neural network and basics of toolbox studied.</p> <p>CO-3 - To develop and demonstrate the logic given in problem statement using operations in fuzzy logic and basics of toolbox studied</p> <p>CO-4 - To develop the real life applications using fuzzy logic and neural network.</p>
	20B1WEC741	Software Defined Networking	<p>CO-1 - Analyze the evolution of software defined networks</p> <p>CO-2 - Express the various components of SDN and their uses</p> <p>CO-3 - Explain the use of SDN in the current</p>



			networking scenario CO-4 - Design and develop various applications of SDN
	20B1WEC781	Software Defined Networking Lab	CO-1 - Analyze the evolution of software defined networks CO-2 - Analyze the installation of Mininet. Assessment CO-3 - Understanding of various components of SDN CO-4 - Design and develop various applications of SDN using Mininet
		Digital Image processing	CO-1 - To learn the basic concepts and terminology in digital Image Processing. CO-2 - To learn about image transformation techniques and issues related to image transformation. CO-3 - To learn the basic techniques for Image Compression CO-4 - To learn about enhancing images through techniques like filtering and equalization CO-5 - To learn about image restoration, segmentation and denoising. CO-6 - To implement graph theory in vector space models and colouring methodologies for images in MATLAB CO-7 - To understand image processing techniques' case studies
		Digital Image processing Lab	CO-1 - To learn the basic concepts and terminology in digital Image Processing. CO-2 - To learn about image transformation techniques and issues related to image transformation. CO-3 - To learn the basic techniques for Image Compression CO-4 - To learn about enhancing images through techniques like filtering and equalization CO-5 - To learn about image restoration, segmentation and denoising. CO-6 - To implement graph theory in vector space models and colouring methodologies for images in MATLAB CO-7 - To understand image processing techniques' case studies
	20B1WEC742	Adaptive Systems and Signal Processing	CO-1 - Familiarization with iterative techniques to solve parameter estimation problems. CO-2 - To become enable for the choice of appropriate method for signal processing systems. CO-3 - To understand the concepts of adaptive systems. CO-4 - Having understood the concepts of Least-Mean-Square (LMS) algorithm, Recursive Least-Squares algorithm and Kalman filter, to become enable for the extension of this knowledge to machine learning paradigms.



	20B1WEC782	Adaptive Systems and Signal Processing Lab	CO-1 - Understanding the working of Parametric methods for power spectrum estimation. CO-2 - Understanding the working of Parametric methods for power spectrum estimation. CO-3 - To be able to apply adaptive filters like Wiener filter in practical application. CO-4 - Assessment To assess the functionality of Least Mean Square (LMS), Recursive
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**Semester: VIII**

SNo	Course Codes	Course Name	Course Outcomes
1.		Open Elective IV	From other Dept.
2.	<b>Professional Elective DE-V</b>		
		Pattern Recognition	CO -1 - Understand the concept and representation of patterns in different data. CO -2 - Able to understand the methodology of different classifiers. CO -3 - Able to estimate the density of the parametric and non patterns. CO -4 - Understand the concept of artificial neural network. CO -5 - Understand and able to visualize the concept and methodology of different feature extraction and feature selection methods.
		Pattern Recognition Lab	CO -1 - Able to use Numpy toolbox CO -2 - Able to use Panda toolbox CO -3 - Able to use a seaborn toolbox. CO -4 -Able to analyze the texture using scikit toolbox
		Computer Vision	CO-1 - Understanding the basics of image processing and computer vision CO-2 - Understanding image formation models CO-3 - Understanding the process of feature extraction CO-4 - Understanding the motion estimation CO-5 - Understand current applications in the field of Image Processing.
		Computer Vision Lab	CO-1 - Gain an in-depth understanding of the principles underlying the image processing CO-2 - Understanding image formation models CO-3 - Understanding the motion estimation CO-4 - Understanding the image segmentation and morphology CO-5 - Analyze imaging geometry, and scene understanding
	20B1WEC832	Network & Cyber Security	CO-1 - Develop Concept of Security needed in Communication of data through computers and networks along with Various Possible Attacks CO-2 - Understand Various Encryption mechanisms



			for secure transmission of data and management of key required for required for encryption CO-3 - Understand authentication requirements and study various authentication mechanisms CO-4 - Understand network security concepts and study different Web security mechanisms
	20B1WEC872	Network & Cyber Security Lab	CO-1 - Understanding the basic mathematical foundations of cryptography and hence its applications in network and cyber security CO-2 - To gain insightful experience by working with fundamental cryptographic applications CO-3 - To train in the art of design and analysis of information security protocols CO-4 - Practice implementing various security protocols and modifications
		Wavelets and Application	CO- 1 - understand about windowed Fourier transform and difference between windowed Fourier transform and wavelet transform. CO-2 - understand wavelet basis and characterize continuous and discrete wavelet transforms CO-3 - understand multi resolution analysis and identify various wavelets and evaluate their time-frequency resolution properties CO - 4 - Implement discrete wavelet transforms with multirate digital filters Assessment CO 5 Design certain classes of wavelets to specification and justify the basis of the application of wavelet transforms to different
		Wavelets and Application Lab	CO- 1 - Student will be able to understand various wavelet families and different wavelet filter banks. CO- 2 - Student will be able to understand composition and decomposition of continuous and discrete wavelet transform. CO- 3 - Student will learn how to implement code for different signal/ image processing techniques using wavelet transform.
3.	<b>Professional Elective DE-VI</b>		
	20B1WEC833	Game Theory with Computer Applications	CO-1 - To understand the games, Strategies, Nash Equilibrium CO-2 - To understand Zero sum games, Brass Paradox nad Mixed strategies. CO-3 - To study utility, utility function, Sealed Bid auctions, VCG. CO-4 - To study bargaining Game with alternating offers, Nash bargaining solution. CO-5 - To study cooperative game theory, stable sets, shapely value.
	20B1WEC834	Soft Computing Paradigms	CO-1- Comprehend the fuzzy logic and the concept of fuzziness and concepts of neural networks CO-2 - Demonstrate knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference



		<p>systems, and fuzzy logic</p> <p>CO-3 - Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications</p> <p>CO-4 - Able to understand and apply the GA , evolutionary programming, and swarm intelligence in different applications</p>
20B1WEC874	Soft Computing Paradigms Lab	<p>CO-1 - Able to understand the concept of fuzzy logic.</p> <p>CO-2 Able to understand the different neural networks and different training rule.</p> <p>CO-3 - Able to apply the fuzzy logic for different applications</p> <p>CO-4 - Able to apply the neural networks for different applications</p> <p>CO-5 - Able to understand and apply the Genetic algorithm for different applications</p>
	Computer Graphics	<p>CO-1 - Student will learn Overview of Computer Graphics Application and graphics devices, Display Technologies, Raster Refresh (Raster-Scan), CRT and LCD displays.</p> <p>CO-2 - Student will learn Scan conversion – lines, circles and Ellipses, filling, clipping and alising.</p> <p>CO-3 - Student will learn Two-Dimensional Transformations and Matrix Representation of 2D Transformations</p> <p>CO-4 - Student will learn Three-Dimensional Transformations and Viewing in 3D.</p> <p>CO-5 - Student will learn Solid Modeling Like Representing Solids, Regularized Boolean Set Operations, Primitive Instancing, Sweep Representations, and Comparison of Representations.</p> <p>CO-6 - Student will learn Plane Curves and Surfaces. The General Conic Equation; Representation of Space Curves</p>
	Computer Graphics Lab	<p>CO-1 - Using OpenGL for Graphics</p> <p>CO-2 - Programming User-interface issues</p> <p>CO-3 - Concepts of 2D &amp; 3D object representation</p> <p>CO-4 - Implementation of various scan &amp; clipping algorithms</p> <p>CO-5- Implementation of illumination model for rendering 3D objects</p>
	Cloud Computing	<p>CO-1 - To learn the basic concepts, applications and terminology of cloud computing.</p> <p>CO-2 - To learn basic concepts of data intensive applications and Map-Reduce</p> <p>CO-3 - To learn basic concepts of Virtualization and compare different Virtualization Techniques</p> <p>CO-4 - To understand Mobile Cloud Computing and its role in cloud computing implementation.</p> <p>CO-5 - Study various Cloud technologies and advance topic of cloud computing.</p>





		Cloud Computing Lab	CO-1 - Adapt different types of virtualization and increase resource utilization Familiarity CO-2 - Build a private cloud using open source technologies. CO-3 - Analyze security issues on cloud CO-4 - Develop real world web applications and deploy on commercial cloud.
4.	<b>Professional Elective DEVII</b>		
	20B1WEC835	Computer Graphics and Animation	CO -1 - Student will learn about the overview of computer graphic applications and graphics devices (Display Technologies, Raster Refresh (Raster Scan), CRT, LCD displays, etc.) CO-2 - Student will learn about the scan conversion - lines, circles and Ellipses, filling, clipping and aliasing CO- 3 - Student will learn about the Two-Dimensional transformations and matrix representation of 2D & 3D Transformations CO- 4 - student will learn about the different computer graphics algorithms CO-5 - Students will learn about the basics of computer animation, basic principles and different tools.
	20B1WEC875	Computer Graphics and Animation Lab	CO -1 - Using OpenGL for Graphics CO- 2 - Programming User-Interface Issues CO- 3 - Concepts of 2D & 3D object representation CO -4 - Implementation of various scan and clipping algorithms
		Deep Learning	CO-1 - The students will have the ability to understand the relationship between Machine Learning and Deep Learning. CO-2 - The students will have the ability to analyze the fundamentals of the neural network: principles of its operation, architecture, and learning rules. CO-3 - The students will have the knowledge of the back-propagation algorithm, cost functions and how learning rules are related and which cost functions are widely employed in Deep Learning. CO-4 - The students will learn how to apply the neural network to classification Problems like image recognition, one of the primary applications of Deep Learning. CO-5 - The students will have the ability to understand drivers that enable Deep Learning to yield excellent performance, basic concept and architecture of the convolution neural network.
		Deep Learning Lab	CO-1 - To classify images in real time using the pretrained deep convolutional neural network and to use transfer learning to retrain a convolutional neural network to classify a new set of images. CO-2 - To forecast time series data using a long short-



			<p>term memory (LSTM) network</p> <p>CO-3 - To use Deep Network Designer in MATLAB to adapt a pre-trained GoogLeNet network to classify a new collection of images.</p> <p>CO-4 - To create and train a simple convolutional neural network for deep learning classification using Deep Network Designer.</p> <p>CO-5 - To create a simple long short-term memory (LSTM) classification network using Deep Network Designer.</p>
		Automation and Robotics	<p>CO-1 - Able to explain the fundamentals of robotics and its components.</p> <p>CO-2 - Able to illustrate the Kinematics and Dynamics of robotics</p> <p>CO-3 - Understand the need and implementation of related Instrumentation &amp; control in robotics</p> <p>CO-4 - Able to illustrate the movement of robotic joints with computers/microcontrollers.</p>
		Automation and Robotics Lab	<p>CO-1 - Understand the components of robot programming.</p> <p>CO-2 - To illustrate the practical concepts of Kinematics and Dynamics of robotics</p> <p>CO-3 - Implementation of related Instrumentation &amp; control in robotics</p> <p>CO-4 - Apply artificial intelligence algorithms to the robotic systems</p>
20B1WEC836	IoT		<p>CO-1 - Understand general concepts of Internet of Things.</p> <p>CO-2 - Recognize various devices, sensors and applications.</p> <p>CO-3 - Analyze the communication protocols for IoT.</p> <p>CO-4 - Analyze potential applications of IoT and the cloud.</p> <p>CO-5 - Design, build and integrate IoT platforms, incorporating different types of sensors and actuators.</p>
20B1WEC876	IoT and Computing Lab		<p>CO-1 - Understand internet of Things and its hardware and software components.</p> <p>CO-2 - Interface I/O devices, sensors &amp; communication modules.</p> <p>CO-3 - Remotely monitor data and control devices.</p> <p>CO-4 Develop real life IoT based projects.</p>
20B1WEC837	System Simulation and Modelling		<p>CO-1 - Explain the system concept and apply functional modelling method to model the activities of a static system.</p> <p>CO-2 - Describe the behavior of a dynamic system and create an analogous model for a dynamic system.</p> <p>CO-3 - Simulate the operation of a dynamic system and make improvement according to the simulation results.</p>
5.		Project Part II	<p>CO-1 - Review and evaluate the available literature on the chosen problem.</p>



			<p>CO-2 - Formulate methodology to solve the identified problem</p> <p>CO-3 - Plan/Design Software/Hardware for the proposed system.</p> <p>CO-4 - Apply the principles, tools and techniques to solve the problem.</p> <p>CO-5 - To act as catalyst in transferring the Electronics &amp; Communication Engineering Knowledge to the benefit of the society.</p> <p>CO-6 - Prepare the project report and present the results.</p>
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