B.Tech (Electronic and Communication Engineering)
1st SEMESTER

Course Name: Chemistry-1 (BTCH101-18)

At the end of the course, the student will be able to:

CO1	State the periodic functions, theories and solutions of Quantum mechanics.
CO2	Explain spectroscopic techniques and behavior of metallurgical systems.
CO3	Explain the principles of intermolecular interactions and geometrical features of stereochemistry.
CO4	State the organic reactions, basic principles and the processes of thermodynamic system.
CO5	Illustrate the properties of water corrosion and its remedial effects.

Course Name: Chemistry-1 Lab (BTCH102-18)

CO1	Synthesize a small drug molecule and analyse a salt sample
CO2	Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water
CO3	Analyze the acid content of different lubricating oils used in daily life.
CO4	Acquire some technical, theoretical as well as a practical knowledge for introduction to principles and techniques of chromatography
CO5	Study the arrangement of atoms in different structures.

Course Name: Maths -I (BTAM101-18)

CO1	To recall Rolle's theorem and discuss its applicability to different engineering problems and to extend the use of differentiation
CO2	Integration to calculate maxima, minima, improper integrals and its applications.
CO3	To gain the knowledge of different concepts of differentiation and integration and demonstrate its applications.
CO4	To discuss the convergence of sequence and series and to apply different tests of convergence.
CO5	To understand essential tool of matrices and linear algebra in a comprehensive manner.

Course Name: Programming for Problem Solving (BTPS 101-18)

CO1	Explain the basics of computer hardware and software, algorithm, pseudo codes and programming structures.
CO2	Illustrate the use syntax, semantics and constructs to solve mathematical and logical problems in 'C' language.
CO3	Identify the role of simple data structures, memory allocation and data handling for various applications in 'C'.
CO4	Identify the concept of functions.
CO5	Make use of structures, pointers and file handling to perform various file related operations.

	Course Name: Programming for Problem Solving Lab (BTPS 102-18)
CO1	Determine the algorithms for simple problems using arithmetic expressions.
CO2	Outline problems involving if-then-else structures.
CO3	Devise iterative as well as recursive programs.
CO4	Interpret data in arrays, strings and structures and manipulate them.
CO5	Review the pointers of different types and use them in defining self-referential structures.
	Course Name: Workshop/ Manufacturing Practices (BTMP 101-18)
CO1	Define different manufacturing processes employed in workshop.
CO2	Demonstrate the various process parameters.
CO3	Compare theoretical and practical aspects of the dimensional accuracies and tolerances of different manufacturing processes
CO4	Illustrate the knowledge of different job shops.
CO5	Define the advance manufacturing practices.
	Course Name: English (BTHU 101-18)
CO1	Construct sentences using different forms of a word and illustrate significance of using formal & in-formal words in different context.
CO2	Identify the importance of using formal grammar (such as rules, proper order of words and sequence of sentences) and spot grammatical errors.
CO3	Classify different types of sentence structures (such as simple, compound and complex sentences) and remember usage of it in different contexts.
CO4	Summarize factual information from a text and then paraphrase it using techniques of writing precisely.
CO5	Organize formal writings (business, report, proposal, E-mail, writings) and informal writings such as personal letter & e-mails etc. using a specified format.
	Course Name: English Lab (BTHU 102-18)
CO1	Comprehend spoken English (such as pronunciation of weak forms and contractions, via listening to audio-video aids) and summarize it.
CO2	Identify difference between formal & informal ways (use of body language, gestures, verbal and facial expressions) of holding discussions in a group.
CO3	Illustrate different functions of English Language and make use of them to handle daily routine conversation and dialogues.
CO4	Apply grammatically error free interrogative and affirmative statements while facing interviews.
CO5	Utilize formal & informal vocabulary (such as idioms and phrases) to give presentations.

2nd SEMESTER

Course Name: Semiconductor & Optoelectronic Physics (BTPH105-18)

CO1	Apply the fundamental principles to study the properties of electronic materials
CO2	Outline the free electron theory and periodic potential for electronic material
CO3	Identify the properties and Behaviors of semiconductor
CO4	Explain the Principle of optoelectronics devices and its applications
CO5	Apply the fundamental principles to study the properties of electronic materials

Course Name: Semiconductor & Optoelectronic Physics Lab (BTPH115-18)

CO1	Identify the physical principle involved in the various instruments.
CO2	Verify some of the theoretical concepts learnt in the theory courses.
CO3	Draw conclusions from data and develop skills in experimental design.
CO4	Summarize technical report which communicates scientific information in a clear and concise manner.
CO5	Demonstrate to the methods used for estimating and dealing with experimental uncertainties and systematic "errors."

Course Name: Maths -II (BTAM202-18)

CO1	Solve the ordinary differential equations by exactness, Bernoulli's and for variables p, y and x.
CO2	Solve second order linear differential equations with constants and variable coefficients.
CO3	Determine power series solution of linear differential equations.
CO4	Compute differential calculus of functions of complex variables.
CO5	To describe integral calculus of functions of complex variables.

Course Name: Basic Electrical engineering (BTEE 101-18)

CO1	Outline the basic concept of DC and AC Electrical circuits
CO2	Apply the fundamental principles of DC & AC electrical circuits to solve the problems related to electrical circuits
CO3	Interpret the physical components and working of transformer.
CO4	Demonstrate the working and constructional details of DC machines and Induction Motors.
CO5	Summarize the different electrical components ,wiring and earthing for electrical installations.

	Course Name: Basic Electrical engineering Lab (BTEE 102-18)
CO1	Identify the physical principle involved in the various instruments.
CO2	Verify some of the theoretical concepts learnt in the theory courses.
CO3	Draw conclusions from data and develop skills in experimental design.
CO4	Summarize technical report which communicates scientific information in a clear and concise manner.
CO5	Demonstrate to the methods used for estimating and dealing with experimental uncertainties and systematic "errors."
	Course Name: Engineering Graphics & Design (BTME 101-21)
CO1	Describe the principles of Engineering Graphics and its tools.
CO2	Draw orthographic projection and explain its concept.
CO3	To have the knowledge of generating the pictorial views.
CO4	Explain the solid projection techniques and surface development.
CO5	Use CAD Tools to draw 2d and 3D Models and generate printable drawing.

	3rd Semester
	Course Name: Electronic Devices BTEC-301-18
CO1	Understand physics of semiconductors and behavior of charge carriers within semiconductors
CO2	Understand the working of semiconductor diodes supported with mathematical explanation.
CO3	Understand the working of BJT and MOSFET with their equivalent small signal models.
CO4	Understand the chemical processes used in fabrication of integrated circuits.
	Course Name: Digital System Design BTEC-302-18
CO1	Apply concepts of Boolean algebra for handling logical expressions.
CO2	Understand working and realization of combinational circuits.
CO3	Understand working flip-flops and use them in designing of sequential circuits.
CO4	Understand fundamental concepts of logic families and architectural of programmable devices.
CO5	Use HDL programming tool for simulation of combinational & sequential circuits.
	Course Name: Electromagnetic Waves BTEC-303-18
CO1	Understand characteristics & wave propagation through transmission lines
CO2	Understand Maxwell's equations for electromagnetic waves
CO3	Characterize uniform plane wave
CO4	Calculate reflection and transmission of waves at media interface
	Course Name: BTEC-304-18(Network Theory)
CO1	Analyze linear networks using network theorems
CO2	Use Laplace transform to analyze transient & steady state response of linear networks.
CO3	Comprehend network parameters to analyze two port networks.
CO4	Realize one port networks using Foster's and Cauer's methods.
	Course Name: BTEC-303-18(Mathematics III)
CO1	The mathematical tools needed in evaluating multiple integrals and their usage.
CO2	The effective mathematical tools for the solutions of differential equations that model physical processes
CO3	The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.
CO4	To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering
CO5	To provide an overview of probability and statistics to engineers
	Course Name: BTEC-311-18(Electronic Devices Lab)
CO1	Realize use of diodes in circuits with proper understanding to their working.

CO2	Understand characteristics & working of BJT in different configurations.
CO3	Understand characteristics & working of MOSFET in circuits.
CO4	Think and design working circuits based on diodes, BJTs and MOSFETs.
	Course Name: BTEC-311-18(Digital System Design Lab
CO1	Realize combinational circuits using logic gates.
CO2	Realize sequential circuits using logic gates
CO3	Write & simulate VHDL programs for combinational & sequential circuits.
CO4	Think and design working projects using digital 74XX ICs.

	4th Semester
	Course Name: Analog Circuits (BTEC-401-18)
CO1	Understand the different techniques for stabilizing analog circuits against parameter variations
CO2	Understand the concept of feedback amplifier and their characteristics
CO3	Design the different oscillator circuits for various frequencies
CO4	Demostrate the different power amplifier circuits, their design and use in electronics and communication circuits.
	Course Name: Microprocessor & Microcontroller (BTEC-402-18)
CO1	Summarize the architecture, functionalities and operation of 8085 microprocessor
CO2	Illustrate the internal architecture, memory concept, various ports and different operations of 8051microcontroller
CO3	Use of 8051 microcontroller instructions to develop assembly language programs and various addressing modes
CO4	Make use of interfacing of different peripherals and devices with 8051
	Course Name: Signals And Systems (BTEC-403-18)
CO1	Illustrate signals and systems mathematically in continuous and discrete time
CO2	Understand the behavior of linear-shift invariant systems
CO3	Apply concepts of Fourier and Laplace Transforms to analyze continuous-time signals and Systems
CO4	Demonstrate discrete-time signals and systems using Discrete-Time Fourier and Z-Transforms and simple Probability concepts.
	Course Name: Data Structures and Algorithms (BTCS-301-18)
CO1	Explain the performance of data structure operations.
CO2	Apply the concept of stack and queues using arrays and linked list.
CO3	Explain the operations on linked list data structure.
CO4	Develop algorithms for different operations on non-linear data structures.
CO5	Identify the searching & sorting techniques for good algorithms.
	Course Name: Universal Human Values-2 (HSMC-122-18)
CO1	Illustrate the various basis of value education
CO2	Explain the harmony of "I" in relation with the "body"
CO3	Develop harmony in human to human relationship
CO4	Demonstrate harmony in the nature & all levels of existence.
CO5	Show the awareness of professional ethics in society.
	Course Name: Environmental Sciences (EVS-101-18)
CO1	Students will enable to understand environmental problems at local and national level through literature and general awareness.

CO2	Explain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues.
CO3	The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these problems.
CO4	Explain and Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world

	5th Semester
	Course Name: BTEC-501-18(ADC)
CO1	Analyze and compare different analog modulation schemes for their efficiency and bandwidth.
CO2	Analyze the behavior of a communication system in presence of noise.
CO3	Illustrate pulsed modulation system and analyze their system performance
CO4	Analyze different digital modulation schemes and can compute the bit error performance.
	Course Name: BTEC-502-18 (DSP)
CO1	Illustrate signals mathematically in continuous and discrete time and frequency domain
CO2	Demonstrate the response of an LSI system to different signals
CO3	Apply different types of digital filters for various applications
CO4	Identify various DSP Processors on the basis of their architecture.
	Course Name: BTEC-503-18 (LIC)
CO1	Understand Differential and Cascade Amplifiers.
CO2	Know the basics, working and characteristics of Op-Amps.
CO3	Investigate various applications of Op-Amps.
CO4	Understand some specialized Op-Amps.
	Course Name: BTEC-504-18 (CS)
CO1	Infer the mathematical model of the complicated system.
CO2	Explain the stability of open and close loop system
CO3	Demonstrate ability to use Bode plots in the design and analysis of feedback control system
CO4	Develop and analyze state space models
	Course Name: Routing and Switching (BTEC-905A-18)
CO1	Demonstrate a basic understanding of small and medium-sized networks, including various network architectures.
CO2	Explain the basic functions of different protocols used in various layers of network architectures.
CO3	Apply the basic networking connections using different protocols.
CO4	Summarize the knowledge to construct simple networks and integrate voice, wireless, cloud, security, and storage technologies into their networks in order to support a variety of applications.
CO5	Demonstrate a basic understanding of access and authorization controls, VPN and how to implement them in general network security.
	Course Name: Java Programming (BTEC-901F-19)
CO1	Define various Java concepts and definitions.

CO2	Explain operators and control statements used in Java
CO3	Illustrate various concepts used in programming.
CO4	Make use of applets in Java.
CO5	Utilize concepts and java database connectivity skills in programming.
Course Name: PM (BTEC-505-18)	
CO1	Understand Project Characteristics and various stages of a project.
CO2	Understand the conceptual clarity about project organization and feasibility analyses – Market, Technical, Financial, Economic.
CO3	Develop the learning and understand techniques for Project Planning, Scheduling and Execution control.
CO4	Apply the risk management plan and analyses the role of stakeholders.

	6th Semester
	Course Name: Wireless Communication System (BTEC-601-18)
CO1	Understand the basic elements of Cellular Radio Systems and its design
CO2	Learn about the concepts Digital communication through fading multipath channels
CO3	Apply the various Multiple Access Techniques in communication systems
CO4	Explain available standards of wireless communication and its trends.
CO5	Explain the evolutions of wireless communication generation
	Course Name: Computer Networks (BTCS-504-18)
CO1	Demonstrate the basic understanding of communication network and its components, including network architecture of OSI Model.
CO2	Illustrate the protocols and methods of data link layer.
CO3	Extend the protocols and functions of Network Layer.
CO4	Explain various routing algorithms and protocols of Transport Layer.
CO5	Explain about DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.
	Course Name: Optical Fibres and Communication (BTEC-602-18)
CO1	Understand Basics of Optical Communication System.
CO2	Demonstrate the different Optical Fibers and dispersion in that fibers.
CO3	Explain various types of Optical Transmitters.
CO4	Explain various types of Optical Receivers.
CO5	Understand Light Wave Systems.
	Course Name: MWA (BTEC-604-18)
CO1	Understand the working and operation of various Microwave Tubes and Microwave Solid state devices.
CO2	Understand various important Microwave Components and the Microwave measurements that can be carried out.
CO3	Explain the basic concepts and types of Antennas and its regions.
CO4	Explain the important concepts of Antenna Arrays and Antenna Aperture.
	Course Name: WLAN and Security (BTEC-906A-18)
CO1	Understand WLAN and its architecture
CO2	Summarize WLAN Media Access Control and WLAN framing techniques
CO3	Apply the knowledge of security building blocks to solve the problems of designing security solutions in wireless networks
CO4	Understand wireless LAN authentication protocols in detail, and enhance the skills of configuring a secure wireless network.
	Course Name: Operating Systems (BTCS-402-18)

CO1	Explain basic operating system concepts such as overall architecture, system calls, user mode and kernel mode;
CO2	Distinguish Concepts of Process,Threads, process Scheduling, race conditions and critical sections
CO3	Analyze and apply CPU scheduling algorithms, deadlock detection and prevention algorithms;
CO4	Examine and categorize various memory management techniques like caching, paging, segmentation, virtual memory, and thrashing;
CO5	Design and implement file management system;
CO6	Appraise high-level operating systems concepts such as file systems, disk-scheduling algorithms and various file systems.

	7th Semester
Course Name: Python Programing (BTEC-907D-18)
CO1	Read and write simple Python Programmes
CO2	Develop Python programs with conditionals and loops.
CO3	Define Python functions and to use Python data structures–lists, tuples, dictionaries.
CO4	Perform input/output operations with files in Python.
CO5	Execute Searching, sorting and merging in Python.
	Course Name: Artificial Intelligence (BTEC-908A-18)
CO1	Understand the basics of Artificial Intelligent system and Fuzzy logic systems
CO2	Illustrate various types of Artificial Neural Networks & their models
CO3	Describe Artificial Neural networks methods, operation and parameters
CO4	Apply Neural Network using MATLAB Toolbox and its implementation
	Course Name: Soft Computing (BTCS908D-18)
CO1	Demonstrate the concepts of Soft Computing and Algorithms involved there - in.
CO2	Illustrate the Genetic Algorithms with its operators and applications.
CO3	Analyze the Neural Network models along with applications
CO4	Analyze Fuzzy systems and Swarm Intelligence.
	Course Name: Big data fundamentals (BTEC909A-18)
CO1	Understand the Evolution and basics of Big Data.
CO2	Understand the Architecture of Hadoop with its file system and its Programming.
CO3	Explain the Advanced analytical theory and methods.
CO4	Illustrate the challenges in handling streaming data from the real world.
	Course Name: Object Oriented Programming (BTCS302-18)
CO1	Identify classes, objects, members of a class and the relationships among them needed to solve a specific problem.
CO2	Demonstrate the concept of constructors and destructors. And create new definitions for some of the operators.
CO3	Utilize the concept of inheritance and its types.
CO4	Explain data encapsulation, polymorphism with virtual functions.
CO5	Demonstrate the concept of file operations, streams in C++ and various I/O manipulators.
	Course Name: Indian Constitution (BTMC-101)-18
CO1	Understand concepts of Constitution law and Constitutionalism
CO2	Know the basics, working and characteristics of Constitutional law and its components
CO3	Critically evaluate the organs of State
CO4	Understand Fundament Rights and DPSP
	Course Name: Essence of Indian Traditional Knowledge (BTMC-102-18)

CO1	Explain the connect up and basics of Indian traditional Knowledge in Modern scientific perspective
CO2	Show the history of Yoga, principal of Yoga and holistic health care system
CO3	Explain basics of Indian philosophical traditions.
CO4	Outline the basics of Indian Linguistic Tradition and Indian Artistic Tradition.