		S. Y. B. Tech. (Electronics & Telecommunication Engineering)	
SEM-I		**Part-I**
	Sr. No	**ET211 – Engineering Mathematics - III**
	1	1. Solve higher order linear differential equation related to electrical circuit theory
	2	2. Express a function in terms of sines and cosines components so as to model simple periodic functions
	3	3. Find the relation between two variables for the given data using regression and can explain various probability distribution functions.
	4	4. Apply Laplace and inverse Laplace transforms for analysis of simple electrical circuits.
	5	5. Apply numerical methods for solving linear equations and for evaluating the definite integrals.
	6	6. Solve the problems of Fourier integral and Fourier transform
		ET212 – Electronic Circuit Analysis and Design
	1	1. Student can analyze and design electronic circuit using multistage amplifier for given specifications.
	2	2. Student can analyze and design feedback amplifier.
	3	3. Student can analyze and design oscillators.
	4	4. Student can analyze power amplifiers.
	5	5. Students will be able to analyze the working of JFET, MOSFET and applications of these devices.
		ET213 – Network Theory & Analysis
	1	1. Analyze linear circuit with use of different network theorems and analysis methods.
	2	2. Compute two port network parameters and draw equivalent network.
	3	3. Determine transient and steady state response of linear circuits.
	4	4. Design passive filter and attenuator circuits.
		ET215 – Analog Communication
	1	1. Understand and identify the fundamental concepts and various components of analog communication systems.
	2	2. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
	3	3. Describe analog pulse modulation techniques and digital modulation technique.
	4	4. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
		ET216 – Electronic Software Lab-I
	1	1. Implement functions using C++.
	2	2. Implement Inheritance and Polymorphism using C++.
	3	3. Use functions and modules using Python.
		ET214 – Digital Techniques
	1	1. Demonstrate the use of codes and k-map minimization, Quine-McClusky techniques in digital circuits.
	2	2. Design combinational logic circuits using logic gates.
	3	3. Illustrate the use and significance of logic IC families and flip-flops in digital circuits.
	4	4. Design asynchronous and synchronous sequential logic circuits.
	5	5. Apply concepts of synchronous state machines for designing digital applications.
		Part-II
		ET221 – Control Systems
	1	1. Analyze various control systems.
	2	2. Calculate transfer function and draw mathematical models for control systems.
	3	3. Obtain transfer function of systems using signal flow graph and block diagram reduction.
	4	4. Analyze control system in time domain.

5	5. Determine stability of systems.	
	6. Analyze control system in frequency domain and state space.	
	ET222 – Analog Integrated Circuits	
1	1. Describe fundamentals of op amp and compare characteristics of ideal and practical op amp	
2	2. Understand and analyze frequency response of op amp	
3	3. Develop various Linear and Nonlinear applications of op amp	
4	4. Design first order and second order filters	
5	5. Understand and describe the concept of special ICs and its applications	
	ET223 – Principles of Digital Communication	
1	1. Describe & calculate information measures and apply source coding techniques for the memoryless discrete sources.	
2	2. Apply binary block coding techniques for error detection & correction and estimate error detection & correction capabilities of block code.	
3	3. Explicate, demonstrate and analyze different pulse code modulation techniques.	
4	4. Explain, demonstrate and analyze binary and M-ary digital modulation techniques and compare them.	
5	5. Describe mathematical & analytical concepts of matched filter & correlation receivers and explain synchronization techniques.	
	ET224 – Signals & Systems	
1	1. Represent different signals and systems mathematically and characterize their behavior graphically.	
2	2. Solve numerical on convolution integral, Convolution sum and Sampling theorem	
3	3. Realize LTI system equations by using different forms	
4	4. Calculate Fourier transform and plot Amplitude and Phase spectrum	
5	5. Calculate ZT of a function and plot its ROC	
	ET225 – Data Structures	
1	1. Analyze the algorithms to determine the time and computation complexity and justify the correctness.	
2	2. Implement given Search problem (Linear Search and Binary Search).	
3	3. Implement given problem of Stacks, Queues and linked list. Also, analyze the same to determine the time and computation complexity.	
4	4. 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.	
5	5. Implement Graph search and traversal algorithms and determine the time and computation complexity.	
	ET226 – Electronic Software Lab-II	
1	1. Write Python scripts using procedure and object oriented approach of writing a computer program.	
2	2. Exhibit ability to use Python's standard library packages to provide solution to a given problem.	
3	3. Test and debug python script for a given problem.	

SEM-II (label spans rows above)

T. Y. B. Tech. (Electronics & Telecommunication Engineering)		
Part-I		
Sr. No	**ET311: ELECTROMAGNETIC FIELD THEORY**	
1	1. Define and recognize different co-ordinate systems and apply divergence, gradient, curl to EM waves.	
2	2. Derive the laws of electrostatic, magneto static fields and electromagnetic wave equation.	
3	3. Apply boundary conditions to different media for wave propagation and Maxwell's equations for analysis of wave propagation.	
4	4. Derive transmission line equations, parameters.	
5	5. Apply knowledge of Smith chart to determine transmission line parameters.	
	EET312 : DIGITAL DESIGN & HDL	
1	1. Explain different syntax of HDL language.	
2	2. Design and analyze combinational logic circuits using VHDL and Verilog.	

3	3. Design and analyze sequential logic circuits using VHDL.
4	4. Describe architecture and internal components of CPLD, FPGA, ASIC and SOC and compare them.
5	5. Explain different testing methods for combinational Logic, sequential logic, IC and write test bench for simple combinational circuits.

ET313: DIGITAL SIGNAL PROCESSING	
1	1. Solve problems based on Correlation and DFT
2	2. Analyze response of the system using linear filtering
3	3. Calculate FFT of the Discrete signal
4	4. Calculate and analyze FIR & IIR filter coefficients using different techniques.
5	5. Realize transfer function of FIR & IIR filters using different methods
6	6. Apply concepts of DSP in various applications

ET314: MICROCONTROLLERS AND APPLICATIONS	
1	1. Expose the fundamental features and operation of contemporary microcontroller
2	2. Demonstrate and perform hardware interfacing.
3	3. Explore the students to the fundamentals of PIC Microcontroller 16F877 architecture
4	4. Introduce the various core and peripheral features in PIC Microcontroller 16F877.
5	5. Develop and practice assembly language and C language programming techniques

ET315.1: OPEN ELECETIVE-I **BUSINESS ETHICS**	
1	Elaborate concepts of ethics and related theories
2	Describe and apply tools for decision making and management in business ethics
3	Understand and form the ethical issues in corporation
4	Understand and identify the ethical issues from various stakeholders' point of context

ET315.2: OPEN ELECETIVE-I **MANAGERIAL ECONOMICS**	
1	Elaborate the concepts of managerial economics
2	2. Analyze the issues related to demand, supply and market
3	3. Use different tools for demand analysis and forecasting
4	4. Analyze the production and cost functions
5	5. Decide price on the basis of market, demand and supply

ET316: ELECTRONIC SOFTWARE LAB-III	
1	1. Write Python scripts using procedure and object oriented approach of writing a computer program.
2	2. Exhibit ability to use Python's standard library packages to provide solution to a given problem.
3	3. Test and debug python script for a given problem.

Part-II

ET322: EMBEDDED SYSTEMS	
1	1. Student can describe hardware and software architecture of embedded system.
2	2. Student can describe ARM7TDMI core architecture and Controller based on this architecture
3	3. Student can write C program for different applications for LPC2148microcontroller.
4	4. Student can interface different peripherals with LPC2148 microcontroller.
5	5. Student can describe microcontroller based real time systems for different applications.

ET323 : ELECTRONIC SYSTEM DESIGN	
1	1.Describe construction, working & analyze characteristics of thyristors.
2	2.Analyze AC and DC power control circuits using thyristors.

SEM-I

3	3. Design and implement timers, frequency counters, digital voltmeters and frequency synthesizers.	
4	4.Design and simulate Communication system components for system design.	
5	5.Design and analyze controllers for industrial applications.	

SEM-II

	ET324: ADVANCED MOBILE COMMUNICATION (Semester-I)
1	Students will be able to define cellular systems, working and hand off strategies implemented in mobile communication.
2	2. Students will be able to analyze various losses in mobile radio propagations and define multiple access schemes sharing radio spectrum.
3	3. Students will be able to define GSM - architecture, frame structure, system capacity and services provided.
4	4. Students will be able to describe mobile communication evolution of 2G to 5G technologies
5	5. Students will be able to analyze emerging technologies required for fourth generation mobile systems such as Long Term Evolution(LTE) & 5G next generation technology.

	ET325.1: OPEN ELECTIVE-II OPTICAL COMMUNICATION (Semester-I)
1	1. Represent different signals and systems mathematically and characterize their behavior graphically.
2	2. Solve numerical on convolution integral, Convolution sum and Sampling theorem
3	3. Realize LTI system equations by using different forms
4	4. Calculate Fourier transform and plot Amplitude and Phase spectrum
5	5. Calculate ZT of a function and plot its ROC

	ET325.2: OPEN ELECTIVE-II SENSORS & APPLICATIONS
1	1. Elaborate the concept of sensors and its characteristics.
2	2. Describe the working principle of analog and digital sensors.
3	3. Design sensor interface circuits for a given engineering problem.
4	4. Select an appropriate sensor for a given engineering application based on interface technique, material and technology of a sensor.
5	5. Describe the working principle of different types of actuators.

	SLH32.1: SELF LEARNING MODULE II COMPUTER ORGANIZATION (Semester-I)
1	1. Describe computer architectures.
2	2. Describe processor structure & its functions.
3	3. Design micro-programs of a control unit sub-system.
4	4. Analyze computer memory & IO sub-systems.

B. Tech. (Electronics & Telecommunication Engineering)

Part-I	
Sr. No	**ET411: Machine Learning**
1	1. Describe fundamental aspects of Machine Learning.
2	2. Distinguish between various characteristics of ML
3	3. Explore classification and regression algorithms
4	4. Design neural network for classification
5	5. Design and implement different Machine Learning models.
6	6. Apply Machine learning techniques that enable to solve real world problems.

	ET412: Data Communication
1	1. Explain Data Communications System and its components.
2	2. Develop building skills of subnetting and understand routing mechanisms.
3	3. Enumerate the layers of the OSI model and TCP/IP and explain the function(s) of each layer.
4	4. Identify the different types of network topologies and protocols.
5	5. Acquaintance with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

SEM-I

SEM-I		**ET414: Database Management System (Semester-I)**
	1	Design ER models to represent simple database application scenarios.
	2	Construct relational tables from ER model, populate relational databases and formulate SQL queries on data.
	3	3. Analyze & improve the database design by applying normalization.
	4	4. Describe database storage structures and access techniques.
	5	5. Elaborate the concept of transaction processing, concurrency control, recovery techniques, Bigdata and NoSQL.
		ET 415A: Elective II - Image & Video Processing (Semester-I)
	1	1. Describe and performs basic operations on image and video.
	2	2. Design and apply filter on images in spatial and frequency domain.
	3	3. Analyze and implement algorithm for image and video processing application using modern tools.
	4	4. Select and apply appropriate technique for preprocessing, segmentation and feature extraction of images and videos in real time applications.
		ET415B: Elective-II - Wireless Sensor Networks (Semester - I)
	1	Know Wireless Sensor scenario with its challenges, architecture and protocols.
	2	Apply their knowledge for the implementation of the Wireless Sensor Network in various applications.
SEM-II		**Part-II**
		ET 421: Microwave Engineering (Semester-II)
	1	1. Understand the importance of microwave Engineering
	2	2. Formulate the wave equation in wave guide for analysis.
	3	3. Understand the working principles of all the microwave tubes and solid state devices
	4	4. Identify the use of microwave components and devices in microwave applications.
	5	5. Carry out the microwave network analysis
	6	6. Choose a suitable microwave measurement instruments and carry out the required measurements
		ET422: CMOS VLSI Design (Semester-II)
	1	Describe MOS transistor theory and mathematical equations for behavior of E-MOSFET
	2	2. Design combinational logic circuits using E-MOSFETs.
	3	3. Design sequential logic circuits using E-MOSFETs.
	4	4. Analyze timing issues in digital circuits
		ET423A: Elective III- Industrial Internet Of Things (Semester-II)
	1	Comprehend different components and technical requirements of an IIoT System.
	2	2. Design reference IIoT architecture based solution for the development of IIoT application.
	3	3. Select appropriate communication technology and/or protocol for a given application.
	4	4. Analyze the security issues associated with identity access component of an IIoT system.
	5	5. Implement cloud industrial IoT solutions for a given application.
		ET423B: Elective III - Artificial Intelligence and Applications (Semester-II)
	1	Understand and able to use problem solving approach using Artificial Intelligence.
	2	2. Understand the need of NLP and Probabilistic language models.
	3	3. Understand basics of Robotics and apply AI in Robotics.
	4	4. Differentiate between Machine Learning and Deep learning as well as apply deep learning for various applications.
		ET 424A : Elective IV- Network Security (Semester-II)
	1	Describe classical encryption techniques and cyber laws within the context of cyber security.
	2	2. Identify working principles of secret key and public key cryptography.

3	3. Demonstrate Network and Transport layer communication standards/protocols for web security.
4	4. Apply network security principles, authentication mechanism for secure data transmission.
5	5. Select appropriate security services to prevent, detect and/or recover from a security attack.
ET424 B: Elective IV- Data Analytics (Semester-II)
1	Understand the key issues in big data management and its associated applications
2	in intelligent business and scientific computing.
3	2. Use the right method to solve real problem.
4	3 Selecting appropriate data visualizations to clearly communicate analytic insights.
ET413: Internet of Things (Semester-II)
1	1. Student can elaborate different components of an IoT System.
2	2. Student can describe the architecture Cortex M3 series ARM microcontroller/ Raspberry Pi.
3	3. Student can write interfacing program for different applications with ARM microcontroller.
4	4. Student can describe different communication technologies and application protocols used in IoT.
5	5. Student can elaborate different cloud platforms of IoT.