ANURAG Engineering College

An Autonomous Institution, Accredited by NAAC with A+ Grade, ISO 9001: 2015 Institution
(Approved by AICTE, New Delhi, Affiliated to JNTUH, Hyderabad)
Ananthagiri (V&M), Suryapet (Dt). Pin: 508 206.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

S.NO.	COURSE CODE	COURSE NAME	DESCRIPTION OF THE COURSE OUTCOMES
		I YEAR I SEMESTER	
1	MA101BS	**MATRICES AND CALCULUS**	1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations 2. Find the Eigen values and Eigen vectors reduce the quadratic form to canonical form using orthogonal transformations. 3. Solve the applications on the mean value theorems. Evaluate the improper integrals using Beta and Gamma functions 4. Find the extreme values of functions of two variables with/ without constraints. 5. Evaluate the multiple integrals and apply the concept to find areas, volumes.
2	AP102BS	**APPLIED PHYSICS**	1. Understand various optical phenomena of light 2. Apply basic the principles of quantum mechanics to classify solids based on band theory. 3. Identify the role of semiconductor devices in science and engineering Applications. 4. Understand the features and applications of Nano materials in various fields.

			5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.
3	CP103ES	C PROGRAMMING FOR ENGINEERS	1. Design algorithm and flowcharts for solving problems. 2. Design programs by understanding concepts of operators and statements. 3. Develop code with functions and arrays. 4. Formulate programs using pointers and apply various file handling techniques for data management. 5. Analyze programs using searching and sorting techniques.
4	EN104HS	ENGLISH FOR SKILL ENHANCEMENT	1. Understand the importance of vocabulary and sentence structures. 2. Choose appropriate vocabulary and sentence structures for oral and written communication. 3. Demonstrate understanding of the rules of functional grammar. 4. Develop comprehension skills from known and unknown passages through effective reading strategies. 5. Construct paragraphs, letters, essays, abstracts, précis and reports in various contexts thereby improving proficiency in writing modules of English.
5	ME105ES	ENGINEERING WORKSHOP	1. Study and practice on machine tools and their operations. 2. Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, and foundry, house wiring and welding. 3. Identify and apply suitable tools for different trades of engineering processes including drilling, material removing, measuring, and chiseling. 4. Build right attitude, team working, precision and safety at work place. 5. Apply basic electrical engineering knowledge and various Manufacturing processes
6	EC106ES	ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING	1. Identify the different components used for electronics applications 2. Measure different parameters using various measuring instruments 3. Understand the Functionality of the CRO 4. Distinguish various signal used for analog and digital communications 5. Know various software's of Electronics and communication applications

7	AP107BS	APPLIED PHYSICS LAB	1. Know the determination of the Planck"s constant using Photo electric effect. 2. Appreciate quantum physics in semiconductor devices and optoelectronics. 3. Gain the knowledge of various semiconductor devices like .PN junction diode, Zener diode, BJT, LED, solar Cell. 4. Understand the properties and principles of laser and optical Fiber. 5. Carried out data analysis.
8	EN108HS	ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB	1. Reproduce speech sounds and improve language. 2. Develop accent and pronunciation in various situations. 3. Understand variants in pronunciation by differentiating between British and American accents. 4. Identify the diverse purposes of listening and speaking. 5. Exhibit critical thinking, problem-solving and decision-making skills through. Group Discussions and Interviews.
9	CP109ES	C PROGRAMMING FOR ENGINEERS LABORATORY	1. Ability to design programs using operators and control statements. 2. Develop code with functions and arrays 3. Ability to use Strings and Structures. 4. Formulate programs using various file handling techniques for data management. 5. Implement programs using searching and sorting techniques
10	ES110MC	ENVIRONMENTAL SCIENCE	1. The multidisciplinary nature of environment, essence of environment. 2. About the natural resources utilization and their conservation. 3. The importance of Biodiversity and its Conservation. 4. About the causes and effects of environmental pollution and its management as well as environmental issues. 5. About the environmental wastes management rules, regulations and EIA for the protection of environment and to achieve sustainable development.
I YEAR II SEMESTER
11	MA201BS	ORDINARY DIFFERENTIAL	1. Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real-world problems.

		EQUATIONS AND VECTOR CALCULUS	2. Solve higher order differential equations and apply the concepts of differential equations to the real-world problems. 3. Evaluate the multiple integrals. 4. Evaluate vector differentiation and identify the vector differential operators physically in engineering problems. 5. Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.
12	CH202BS	ENGINEERING CHEMISTRY	1. Understand the basic properties of water and its usage in domestic and industrial purposes. 2. Acquire the basic knowledge of electrochemical procedures related to corrosion and its control. 3. Learn the fundamentals and general properties of polymers and other engineering materials. 4. Apply the knowledge of atomic, molecular and electronic changes related to conductivity. 5. Apply the knowledge of engineering materials in daily life.
13	EG203ES	COMPUTER AIDED ENGINEERING GRAPHICS	1. Apply computer aided drafting tools to create 2D and 3D objects. 2. Visualize the different aspects of Points, Lines and Planes. 3. Acquire knowledge on projections of solids. 4. Draw the Sectional views of solids and plan the drawing for development of surfaces. 5. Understand the isometric views and projections. Exposure to computer-aided geometric design and creating working drawings.
14	EE204ES	BASIC ELECTRICAL ENGINEERING	1. Understand the importance of DC circuits and analyze theorems. 2. Understand the concept of AC circuits and resonance. 3. Concept of principle of operation of transformer and efficiency of single -phase transformer. 4. Analyze the performance of DC machines and Induction motors. 5. Demonstrate the importance of electrical installation and the concept of power, power factor and its improvement.

15	EC205ES	ELECTRONIC DEVICES AND CIRCUITS	1. Analyze the PN Junction diode operation and its characteristics 2. Know the applications of Diode such as clippers and clampers. 3. Analyze the characteristics of BJT. 4. Analyze the characteristics of FET. 5. Understand the concept of special purpose devices
16	CH206BS	ENGINEERING CHEMISTRY LABORATORY	1. Determination of rate of corrosion of mild steel in various conditions. 2. To perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases. 3. To prepare polymers like Thiokol rubber and Bakelite. 4. Estimation of Saponification value, Viscosity and surface tension of lubricant oils. 5. Estimation of hardness of water, Chloride content of water sample.
17	CA207ES	APPLIED PYTHON PROGRAMMING LABORATORY	1. Able to install python and its modules. 2. Able to build basic programs using fundamental programming constructs 3. Able to code programs using functions and files. 4. Write and execute python codes for different applications. 5. Capable to implement on hardware boards.
18	EE208ES	BASIC ELECTRICAL ENGINEERING LABORATORY	1. Verify the various electrical laws and theorems with DC Excitation. 2. Determine the losses, efficiency and regulation of single-phase transformer. 3. Obtain the performance of induction motors. 4. Evaluate the speed of DC shunt motor. 5. Analyze the transient response of R, L, C circuits for different input conditions.
19	EC209ES	ELECTRONIC DEVICES AND CIRCUITS LAB	1. Analyze the characteristics of different electronic devices such as Diodes, Rectifiers etc... 2. Operate simple circuits like clippers and clampers. 3. Understand the Input and output characteristics of the BJT and FET transistor configurations. 4. Understand switching characteristics of the transistor

			5. Understand the characteristics of the SCR and UJT.
20	HS210MC	**CONSTITUTION OF INDIA**	1. Knowledge of historical perspective and salient features of Indian constitution 2. Aware of the fundamental rights of Indian citizens. 3. Know the directive principles and fundamental duties of government and citizens 4. Knowledge of the Quasi-federal and parliamentary structure of Indian constitution 5. Knowledge of the constitution amendment powers and Emergency Provisions of Indian constitution.
		II YEAR I SEMESTER	
21	MA301BS	**NUMERICAL METHODS AND COMPLEX VARIABLES**	1. Express any periodic function in terms of sine and cosine 2. Find the root of a given polynomial and transcendental equations and estimate the value for the given data using interpolation 3. Find the numerical solutions for a given first order ODE's 4. Analyze the complex function with reference to their analyticity. 5. Complex integration using Cauchy's integral, residue theorems, Taylor's and Laurent's series expansions of complex function
22	EC302PC	**NETWORK ANALYSIS AND SYNTHESIS**	1. Gain the knowledge on basic RLC circuit's behavior. 2. Analyze the Steady state and transient analysis of RLC Circuits. 3. Characterization of two port network parameters. 4. Analyze the Design aspect of various filters and attenuators 5. Analysis and designing of transfer function.
23	EC303PC	**ANALOG CIRCUITS**	1. Design the amplifiers with various biasing techniques. 2. Design single stage amplifiers using BJT and FET 3. Design multistage amplifiers and understand the concepts of High Frequency 4. Analysis of BJT, Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to sustained oscillations.

			5. Utilize the Concepts of positive feedback to improve the stability of Oscillators to sustained oscillations.
24	EC304PC	DIGITAL LOGIC DESIGN	1. Acquire the knowledge on numerical information in different forms and Boolean algebra theorems. 2. Define Postulates of Boolean algebra and to minimize combinational functions, and design the combinational circuits. 3. Design and analyze sequential circuits for various cyclic functions. 4. Characterize logic families and analyze them for the purpose of AC and DC Parameters. 5. Understand the concept of FSM and ASM charts.
25	EC305PC	SIGNALS AND SYSTEMS	1. Characterize various signals, systems and their time and frequency domain analysis, using transform techniques. 2. Apply the transform on standard and arbitrary signals. 3. Identify the conditions for transmission of signals through systems and conditions for physical realization of systems. 4. Interpret the concepts of Laplace and Z-transforms for analysis of signals and systems. 5. Use sampling theorem for baseband and band pass signals for various types of sampling and apply the correlation and PSD functions for various applications.
26	EC306PC	ANALOG CIRCUITS LABORATORY	1. Design amplifiers with required Q point and analyze amplifier characteristics 2. Examine the effect multistage amplification on frequency response 3. Understand the drain and transfer characteristics of CD, CS of JFET 4. Investigate negative feedback concept in amplifiers. 5. Investigate positive feedback concept in Oscillators.
27	EC307PC	DIGITAL LOGIC DESIGN LABORATORY	1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems.

			2. Define Postulates of Boolean algebra and to minimize combinational functions, and design the combinational circuits. 3. Design and analyze sequential circuits for various cyclic functions. 4. Characterize logic families and analyze them for the purpose of AC and DC parameters. 5. Design logic circuits using different logic families.
28	EC308PC	**BASIC SIMULATION LABORATORY**	1. Generate, analyze and perform various operations on Signals/Sequences both in time and Frequency domain 2. Analyze and Characterize Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling 3. Generate different Random Signals and capable to analyze their Characteristics 4. Apply Fourier transformations on standards signals and arbitrary signals. 5. Apply the Concepts of Deterministic and Random Signals for Noise removal Applications and on other Real Time Signals.
29	HS309MC	**GENDER SENSITIZATION**	1. Students will have developed a better understanding of important issues related to gender in contemporary India. 2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film. 3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it. 4. Students will acquire insight into the gendered division of labor and its relation to politics and economics. 5. Men and women students and professionals will be better equipped to work and live together as equals. 6. Students will develop a sense of appreciation of women in all walks of life.

			7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.
		II YEAR II SEMESTER	
30	EC401PC	**PROBABILITY THEORY AND STOCHASTIC PROCESSES**	1. Perform operations on single and multiple Random variables. 2. Perform operations on single and multiple Random variables 3. Determine the temporal characteristics of Random Signals and Characterize LTI systems. 4. Determine the Spectral characteristics of Random Signals and Characterize driven by stationary random process by using ACFs and PSDs. 5. Understand the concepts of Noise and Information theory in Communication Systems.
31	EC402PC	**ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES**	1. Acquire the knowledge of Basic Laws, Concept sand proofs related to Electrostatic Fields. 2. Acquire the knowledge of Basic Laws, Concept sand proofs related to Magneto static Fields. 3. Characterize the static and time-varying fields; establish the corresponding sets of Maxwell's Equations and Boundary Conditions. 4. Analyze the Wave Equations and classify conductors, dielectrics and evaluate the UPW Characteristics for several practical media of interest. 5. Analyze the Design aspect of transmission line parameters and configurations.
32	EC403PC	**ANALOG AND DIGITALCOMMUNICATIO NS**	1. Design and analyze various Analog Modulation and Demodulation techniques. 2. Model the noise present in continuous wave Modulation techniques. 3. Implement the Super heterodyne Receiver concept and Pulse Modulation Techniques in various applications 4. Design Various Pulse Modulation Techniques in Various Applications 5. Design and analyze various Digital Modulation and Demodulation techniques

33	EC404PC	**LINEAR AND DIGITAL IC APPLICATIONS**	1. A thorough understanding of operational amplifiers with linear integrated circuits. 2. Attain the knowledge of functional diagrams and design applications of IC555 and IC565. 3. Acquire the knowledge and design the Data converters. 4. Choose the proper digital integrated circuits by knowing their characteristics. 5. Acquire the knowledge of sequential logic ICs and memories
34	EC405PC	**ELECTRONIC CIRCUIT ANALYSIS**	1. Design the power amplifiers 2. Design the tuned amplifiers and analyze is frequency response 3. Design Multivibrators for various applications. 4. Design Time Base Generators for various applications. 5. Utilize the concepts of synchronization, frequency division and sampling gates.
35	EC406PC	**ANALOG AND DIGITAL COMMUNICATIONS LABARATORY**	1. Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics 2. Design and implement various multiplexing and de multiplexing techniques in various applications 3. Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics 4. Apply different types of Sampling with various Sampling rates and duty Cycles 5. Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically.
36	EC407PC	**LINEAR AND DIGITAL IC APPLICATIONS LABORATORY**	1. Design and implementation of various analog circuits using 741 ICs. 2. Design and implementation of various Multivibrators using 555 timers. 3. Design and implement various circuits using digital ICs. 4. Design and implement ADC, DAC and voltage regulators. 5. Design and implement the MUX, counters, and encoders.

37	EC408PC	ELECTRONIC CIRCUIT ANALYSIS LABARATORY	1. Design power amplifiers and find its efficiency 2. Design tuned amplifiers and find its Q-factor 3. Design various multivibrators and sweep circuits. Understand the necessity of linearity 4. Design sampling gates and understanding the concepts of frequency division. 5. Design various sweep circuits. Understand the necessity of linearity
38	HS410MC	HUMAN VALUES AND PROFESSIONAL ETHICS	1. Learns about dilemmas and moral issues and be able to apply these concepts to solve various professional problems 2. Acquires and understanding of the basic concepts of Professional ethics and human values & also gain the practical implication of ethical theories. 3. Knows the duties and responsibilities towards the society being in engineering profession. 4. Students gain the practical implication of evacuation from risk and maintaining confidentiality. 5. Meets the global challenges and develop the skills to sustaining in competitive environment.
III YEAR I SEMESTER			
39	EC501PC	MICROCONTROLLERS	1. Known the internal architecture, organization and assembly language programming of 8086 processors. 2. Known the internal architecture, organization and assembly language programming of 8051/controllers 3. Learntheinterfacingtechniquesto8086and8051basedsystems. 4. Known the internal architecture of ARM processor 5. Basic concepts of advanced ARM processors.
40	EC502PC	IOT ARCHITECTURES AND PROTOCOLS	1. Explore the Evolution of IoT, its Growth and Applications. 2. Know the components of IoT and Compare the various architectures of IoT. 3. Acquire the knowledge on data management of IoT. 4. Establish the knowledge on various IoT protocols like Data link,

			Network, Transport, Session, Service layers.
41	EC503PC	CONTROL SYSTEMS	1. Classify control systems and represents in various models. 2. Apply standard test signals to a system to determine their characteristics. 3. Make use of stability concepts to obtain the desired characteristics. 4. Determine the characteristics of a Linear control system using various time and frequency domain tools. 5. Examine the system behavior using various stability analysis techniques.
42	EC504PC	ANTENNAS AND WAVE PROPAGATION	1. Explain the mechanism of radiation, definitions of different antenna characteristic parameters and establish their mathematical relations. 2. Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF, UHF and Microwave antennas and also antenna arrays. 3. Specifytherequirementsformicrowavemeasurementsandarrangeasetuptocarryouttheantennafarzonepatternandgainmeasurementsinthelaboratory. 4. Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved. 5. Interpret the various concepts of ground wave propagation, space wave propagation, various factors affecting radio wave propagation
43	EC511PE	COMPUTER ORGANIZATION & OPERATING SYSTEMS	1. Visualize the organization of different blocks in a computer. 2. Utilizethemicro-leveloperationstocontroldifferentunitsinacomputer. 3. Implement Operating systems in a computer. 4. Understanding about the page-replacement algorithm 5. Implementation of File system structures
44	IT502PC/EC 512PE	DATA COMMUNICATIONS AND COMPUTER NETWORKS	1. Understand and explore the basics of communication and computer networks 2. Understand datalink, concepts of a computer network.

			3. Understand the working of Network layer protocols such as ICMP, IGMP. 4. Understand the working of Transport layer protocols. 5. Understand the working of application layer protocols.
45	EC513PE	**ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**	1. Measure electrical parameters with different meters and understand the basic definition of measuring parameters. 2. Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals. 3. Operate an Oscilloscope to measure various signals. 4. Measure various physical parameters by appropriately selecting the transducers. 5. Understanding the concepts of various measuring bridges and their balancing conditions.
46	EC505PC	**MICROCONTROLLERS LABORATORY**	1. Write assembly language programs and implement on 8086. 2. Writeassemblylanguageprogramsandimplementon8051 3. Interface the I/Odeviceswith8051microcontrollers 4. Perform experiments on Cortex M3 development boards using GNU tool-chain 5. 8051interfacing with different peripheral devices
47	EC506PC	**IOT ARCHITECTURES AND PROTOCOLS LABORATORY**	1. Utilize the different sensors like room temperature, DHT, Humidity etc., 2. Interface the sensors and processor for transmission of data. 3. Capture the images and process it on Arduino/Node MCU/Raspberry Pi. 4. know the utilization of various protocols like I2c, UART communication etc., 5. Know the utilization of Communication protocols.
48	EC507PC	**ADVANCED COMMUNICATION LABORATORY**	1. Simulate and Analyze Dipole Antenna. 2. Simulate and Analyze QAM using MATLAB. 3. Generate eye diagram baseband Using MATLAB. 4. Analyse Performance of Digital modulation Techniques. 5. Generation of different types of signals using Vector Signal generator.

49	HS509MC	**INTELLECTUAL PROPERTY RIGHTS**	1. Distinguish and explain various forms of IPRs. 2. Identify criteria to fit one's own intellectual work in particular form of IPRs. 3. Apply statutory provisions to protect particular form of IPRs. 4. Appraise new developments in IPR laws at national and international level
III YEAR II SEMESTER			
50	EC601PC	**DIGITAL SIGNAL PROCESSING**	1. Explore the LTI System characteristics and Multirate signal processing 2. Establish the inter-relationship between DFT and various transforms 3. Understand the significance of various filter structures 4. Design a digital filter for a given specification. 5. Understand finite word length effects.
51	EC602PC	**MICROWAVE AND OPTICAL COMMUNICATIONS**	1. Known power generation at microwave frequencies and derive the performance characteristics. 2. Realize the need for solid state microwave sources and understand the principles of solid-state devices. 3. Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications 4. Measure the S-parameters in microwave component design. 5. Demonstrate the mechanism of light propagation through Optical Fibres
52	BF603HS	**BUSINESS ECONOMICS & FINANCIAL ANALYSIS**	1. The various Forms of Business and the impact to economic variables on the Business. 2. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. 3. The firm's financial position by analyzing 4. The Financial Statements of a Company. 5. How to analyze and interpret the financial statements through ratio analysis

53	EC621PE	**DIGITAL IMAGE PROCESSING**	1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization. 2. Demonstrate the knowledge of 2D transformation techniques. 3. Demonstrate the knowledge of Image Restoration Degradation Model and noise Filtering 4. Demonstrate the knowledge of image segmentation and Detection technique's 5. Demonstrate the knowledge Image Compression Models and Source Encoder
54	EC622PE	**MOBILE COMMUNICATIONS AND NETWORKS**	1. Known the evolution of cellular and mobile communication system. 2. Explore the Co-Channel and Non-Co-Channel interferences. 3. Known how to overcome the different fading effects? 4. Familiar with cell coverage for signal and traffic, diversity, techniques, frequency management, Channel assignment and types of handoffs. 5. Demonstrate the difference between cellular and Ad hoc Networks and design goals of MAC Layer protocol.
55	EC623PE	**EMBEDDED SYSTEM DESIGN**	1. Familiarize the selection procedure of Processors in the embedded domain. 2. Design Procedure for Embedded Firmware. 3. Visualize the role of Real time Operating Systems in Embedded Systems. 4. Evaluate the Correlation between task synchronization and latency issues 5. Expected to Understanding the Task Communication RTOS.
56	EC604PC	**DIGITAL SIGNAL PROCESSING LABORATORY**	1. Understand the fundamentals of signals and systems to generate elementary signals. 2. Interpret discrete-time signals using DFT, IDFT, and FFT of a given sequence and determine the power spectrum. 3. Design IIR and FIR digital filters for real time DSP applications.

			4. Compute multi-rate Digital signal processing (decimation, Interpolation, sampling rate conversion) of a given sequence. 5. Demonstrate their abilities towards DSP processor-based implementation of first and second order systems.
57	EC605PC	**MICROWAVE AND OPTICAL COMMUNICATIONS LABORATORY**	1. Verify characteristics of Reflex Klystron and Gunn diode. 2. Analyze various parameters of Waveguide Components. 3. Estimate the power measurements of RF Components such as directional Couplers. 4. Demonstrate characteristics of various optical sources. 5. Measure data Rate, Numerical Aperture and Losses in Optical Link.
58	AE606HS	**ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY**	1. Apply reading and listening strategies to enhance comprehension skills 2. Develop different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing 3. Enhance presentation skills to apply in professional life 4. Use strategies and techniques to clear group discussions 5. Practice mock interviews to improve employability skills