

# AURORA'S TECHNOLOGICAL AND RESEARCH INSTITUTE

Parvathapur, uppal, Hyderabad.

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Year	Semester	Regulation	Course Code	Course Name	Course Outcomes
I	I	R16	MA101BS	Mathematics-I	<ul style="list-style-type: none"><li>•Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations</li><li>• Find the Eigen values and Eigen vectors which come across under linear transformations</li><li>• Find the extreme values of functions of two variables with/without constraints.</li><li>• Identify whether the given first order DE is exact or not</li></ul>
I	I	R16	CH102BS	Engineering Chemistry	<ul style="list-style-type: none"><li>•Students will gain the basic knowledge of electrochemical procedures related to corrosion &amp; its control. •They can understand the basic properties of water &amp; its usage in domestic &amp; industrial purposes.</li><li>•They learn the use of fundamental principles to make predictions about the general properties of material.</li></ul>
I	I	R16	PH103BS	Engineering Physics-I	<ul style="list-style-type: none"><li>•Realize the importance of light phenomenon in thin films and Resolution.</li><li>•Learn Principle, working of various Laser systems and light propagation through optical fibers.</li><li>•Distinguish various crystal systems and understand atomic packing factor.</li><li>•Know the various defects in crystals.</li></ul>
I	I	R16	EN104HS	Professional Communication in English	<ul style="list-style-type: none"><li>•Demonstrate effective use of teamwork skills to complete communication tasks.</li><li>•Demonstrate academic integrity.</li><li>•Use critical thinking to identify and analyze contemporary political, ethical, and social issues in engineering</li></ul>
I	I	R16	ME105ES	Engineering Mechanics	<ul style="list-style-type: none"><li>•On successful completion of the course students will be able to understand the laws and principles of mechanics.</li><li>•The ability to analyse and solve simple problems in mechanics.</li></ul>
I	I	R16	EE106ES	Basic Electrical & Electronics Engineering	<ul style="list-style-type: none"><li>•To analyze and solve problems of electrical circuits using network laws and theorems.</li><li>•To identify and characterize diodes and various types of transistors.</li></ul>

I	I	R16	EN107HS	English Language Communication Skills Lab	<ul style="list-style-type: none"> <li>•Students will be able to attain Better understanding of nuances of English language through audio- visual experience and group activities.</li> <li>•Neutralization of accent for intelligibility.</li> <li>•Speaking skills with clarity and confidence which in turn enhances their employability skills.</li> </ul>
I	I	R16	ME108ES	Engineering Workshop	<ul style="list-style-type: none"> <li>•Study and practice on machine tools and their operations.</li> <li>•Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.</li> <li>•Identify and apply suitable tools for different trades of engineering process including drilling, material removal, measuring, chiseling.</li> <li>•Apply basic electrical engineering knowledge for house wiring practice.</li> </ul>
I	I	R16	EA109MC	NSS	
I	II	R16	PH201BS	Engineering Physics-II	<ul style="list-style-type: none"> <li>•Realize the importance of behavior of a particle quantum mechanically.</li> <li>•Learn concentration estimation of charge carriers in semi conductors.</li> <li>•Learn various magnetic dielectric properties and apply them in engineering applications.</li> <li>•Know the basic principles and applications of super conductors.</li> </ul>
I	II	R16	MA202BS	Mathematics-II	<ul style="list-style-type: none"> <li>•use Laplace transform techniques for solving DE's.</li> <li>•evaluate integrals using Beta and Gamma functions.</li> <li>•evaluate the multiple integrals and can apply these concepts to find areas, volumes, moment of inertia etc of regions on a plane or in space.</li> <li>•evaluate the line, surface and volume integrals and converting them from one to another.</li> </ul>
I	II	R16	MA203BS	Mathematics-III	<ul style="list-style-type: none"> <li>•differentiate among random variables involved in the probability models which are useful for all branches of engineering.</li> <li>•calculate mean, proportions and variances of sampling distributions and to make important decisions for few samples which are taken from a large data.</li> <li>•solve the tests of ANOVA for classified data.</li> <li>•find the root of a given equation and solution of a system of equations.</li> <li>•fit a curve for a given data.</li> <li>•find the numerical solutions for a given first order initial value problem</li> </ul>

I	II	R16	CS204ES	Computer Programming in C	<ul style="list-style-type: none"> <li>•Demonstrate the basic knowledge of computer hardware and software.</li> <li>•Ability to write algorithms for solving problems.</li> <li>•Ability to draw flowcharts for solving problems.</li> <li>•Ability to code a given logic in C programming language.</li> <li>•Gain knowledge in using C language for solving problems.</li> </ul>
I	II	R16	ME205ES	Engineering Graphics	<ul style="list-style-type: none"> <li>•Ability to prepare working drawings to communicate the ideas and information.</li> <li>•Ability to read, understand and interpret engineering drawings.</li> </ul>
I	II	R16	CH206BS	Engineering Chemistry Lab	<ul style="list-style-type: none"> <li>•Students are able to estimate the impurities present in water.</li> <li>•Ability to select lubricants for various purposes.</li> <li>•Ability to prepare advanced polymer materials.</li> <li>•Ability to know the strength of an acid present in secondary batteries.</li> <li>•Ability to find the Fe+2, Ca&amp;Cl- present in unknown substances/ ores using titrimetric and instrumental methods.</li> </ul>
I	II	R16	PH207BS	Engineering Physics Lab	<ul style="list-style-type: none"> <li>•Students can effectively use vernier calipers, various rules, meters, scales and other measuring devices to acquire measurements within the stated precision.</li> <li>•Student will use oscilloscopes and multimeters to construct a wide variety of electrical circuits and measure the properties of those circuits.</li> </ul>
I	II	R16	CS208ES	Computer Programming in C Lab	<ul style="list-style-type: none"> <li>•Understand the fundamentals of C programming.</li> <li>•Choose the loops and decision making statements to solve the problem.</li> <li>•Implement different Operations on arrays.</li> <li>•Use functions to solve the given problem.</li> <li>•Understand pointers, structures and unions.</li> <li>•Implement file Operations in C programming for a given application</li> </ul>
I	II	R16	EA209MC	NCC/NSO	
II	I	R16	MA301BS	Mathematics-IV	<ul style="list-style-type: none"> <li>•analyze the complex functions with reference to their analyticity, integration using Cauchy's integral theorem.</li> <li>•find the Taylor's and Laurent's series expansion of complex functions.</li> <li>•express any periodic function in term of sines and cosines.</li> <li>•express a non-periodic function as integral representation.</li> <li>•analyze one dimensional wave and heat equation.</li> </ul>

II	I	R16	EC302ES	Analog Electronics	<ul style="list-style-type: none"> <li>•Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier.</li> <li>•Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.</li> <li>•Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.</li> </ul>
II	I	R16	EC303ES	Electrical Technology	<ul style="list-style-type: none"> <li>•To analyze the performance of dc generators and motors.</li> <li>•To analyze the performance of transformers.</li> <li>•To learn the in-depth knowledge on three phase induction motors.</li> <li>•To analyze the performance of special motors and electrical instruments in real time applications.</li> </ul>
II	I	R16	EC304ES	Signals & Stochastic Process	<ul style="list-style-type: none"> <li>•Represent any arbitrary analog or Digital time domain signal in frequency domain.</li> <li>•Understand the importance of sampling, sampling theorem and its effects.</li> <li>•Understand the characteristics of linear time invariant systems.</li> <li>•Determine the conditions for distortion less transmission through a system.</li> <li>•Understand the concepts of Random Process and its Characteristics.</li> <li>•Understand the response of linear time Invariant system for a Random Processes.</li> </ul>
II	I	R16	EC305ES	Network Analysis	<ul style="list-style-type: none"> <li>•Gains the knowledge on Basic network elements.</li> <li>•Learns and analyze the RLC circuits' behavior in detail.</li> <li>•Analyze the performance of periodic waveforms.</li> <li>•Learns and gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h &amp; g).</li> <li>•To analyze the filter design concepts in real world applications.</li> </ul>
II	I	R16	EC306ES	Electronic Devices & Circuit Lab	<ul style="list-style-type: none"> <li>•After Completion of the course the student is able to Apply various devices to real time problems.</li> <li>•Compute frequency response of various amplifiers.</li> </ul>

II	I	R16	EC307ES	Basic Simulation Lab	<ul style="list-style-type: none"> <li>•Understand Basics of MATLAB syntax, functions and programming.</li> <li>•Analyze the generation Various Signals and Sequences in MATLAB, including the operations on Signals and Sequences.</li> <li>•Determine the Convolution and Correlation between Signals and sequences.</li> <li>•Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.</li> <li>•Analyze the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.</li> <li>•Understand the Waveform Synthesis using Laplace Transform.</li> <li>•Remember for Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.</li> <li>•Verification of Weiner-Khinchine Relations and Sampling Theorem.</li> </ul>
II	I	R16	EC308ES	Basic Electrical Engineering Lab	<ul style="list-style-type: none"> <li>•Identify the basic elements of the electrical engineering.</li> <li>•Understand the basic theorems in Electrical Engineering.</li> <li>•Understand the basic operation of transformers and various electrical machines.</li> </ul>
II	I	R16	MC300ES	Environmental Science & Technology	<ul style="list-style-type: none"> <li>•Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.</li> </ul>
II	II	R16	EC401ES	Switching Theory & Logic Design	<ul style="list-style-type: none"> <li>•Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray and BCD.</li> <li>•Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.</li> <li>•Be able to design and analyze small combinational circuits and to use standard combinational functions/ building blocks to build larger more complex circuits.</li> <li>•Be able to design and analyze small sequential circuits and devices and to use standard sequential functions/ building blocks to build larger more complex circuits.</li> </ul>

II	II	R16	EC402ES	Pulse and Digital Circuits	<ul style="list-style-type: none"> <li>•Understand the applications of diode as integrator, differentiator, clippers, clamper circuits.</li> <li>•Learn various switching devices such as diode, transistor, SCR. Difference between logic gates and sampling gates</li> <li>•Design multivibrators for various applications, synchronization techniques and sweep circuits.</li> <li>•Realizing logic gates using diodes and transistors.</li> <li>•Understanding of time and frequency domain aspects.</li> <li>•Importance of clock pulse and its generating techniques.</li> </ul>
II	II	R16	EE404ES	Control Systems	<ul style="list-style-type: none"> <li>•Improve the system performance by selecting a suitable controller and/or a compensator for a specific application.</li> <li>•Apply various time domain and frequency domain techniques to assess the system performance.</li> <li>•Apply various control strategies to different applications (example: Power systems, electrical drives etc...).</li> <li>•Test system Controllability and Observability using state space representation and applications of state space representation to various systems.</li> </ul>
II	II	R16	EC405ES	Analog Communication	<ul style="list-style-type: none"> <li>•Able to analyze and design various modulation and demodulation analog systems.</li> <li>•Understand the characteristics of noise present in analog systems.</li> <li>•Study of signal to Noise Ration (SNR) performance, of various Analog Communication systems.</li> <li>•Analyze and design the various Pulse Modulation Systems.</li> <li>•Understand the concepts of Multiplexing: Time Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM).</li> </ul>
II	II	R16	SN405MS	Business Economics & Financial Analysis	<ul style="list-style-type: none"> <li>•The students will understand the various Forms of Business and the impact of economic variables on the Business.</li> <li>•The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.</li> </ul>
II	II	R16	EC406ES	Analog Communication Lab	<ul style="list-style-type: none"> <li>•Design and simulate modulation and demodulation circuits such as AM,DSB-SC,FM.</li> <li>•Construct pre-emphasis and de-emphasis at the transmitter and receiver respectively.</li> <li>•Construct diode detector and AGC circuit that are necessary for good reception of the signal.</li> <li>•Design and simulate the PAM,PWM&amp;PPM circuits.</li> </ul>

II	II	R16	EC407ES	Pulse & Digital Circuits Lab	
II	II	R16	EC408ES	Analog Electronics Lab	
II	II	R16	MC400HS	Gender Sensitization	<ul style="list-style-type: none"> <li>•Students will have developed a better understanding of important issues related to gender in contemporary India.</li> <li>•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.</li> <li>•students will attain a finer grasp of how gender discrimination works in our society and how to counter it.</li> <li>•Students will acquire insight into the gendered division of labour and its relation to politics and economics.</li> </ul>
III	I	R15	A50217	Control Systems Engineering	<ul style="list-style-type: none"> <li>•Students gets a thorough knoweledge on open loop and closed loop control systems, concept of feedback in control systems, mathematical modeling and transfer function derivations of sychronous AC &amp; DC motors.</li> <li>•Transfer function representation through block diagram algebra and signal flow graphs.</li> <li>•Time response analysis of different ordered systems.</li> <li>•he/she can be able to apply the above conceptual things to real-world electrical and electronics problems and applications.</li> </ul>
III	I	R15	A50516	Computer Organization & Operating Systems	<ul style="list-style-type: none"> <li>•Students will have thorough knowledge about basic structer of a digital computer.</li> <li>•Arithmetic operations of binary number system.</li> <li>•The organisation of Contol Unit, Arithmetic and Logic Unit, Memory Unit and I/O unit.</li> <li>•Operating System functions, types and system calls.</li> </ul>
III	I	R15	A50418	Antennas & Wave Propagation	<ul style="list-style-type: none"> <li>•Students will be aware of the parameter consideration of antenna efficiency, beam efficiency, radiation resistance.</li> <li>•Capable to analyze to design antenna and field evaluation under various conditions and formulate the electric as well as magnetic fields.</li> <li>•Understand the design issues of Yagi-Uda, Horn antennas and also their operation methodology.</li> <li>•Knowledge about the means of propagation of electromagnetic wave</li> </ul>

III	I	R15	A50422	Electronic Measurement & Instrumentation	<ul style="list-style-type: none"> <li>•Students will be able to describe the fundamental concepts and principles of instrumentation.</li> <li>•Explain the operations of the various instruments required in measurement.</li> <li>•Apply the measurement techniques for different types of tests.</li> <li>•Understand the principle of operation, working of different electronic instruments like digital multi meter etc</li> </ul>
III	I	R15	A50408	Analog Communication	<ul style="list-style-type: none"> <li>•Conceptually understand the baseband signal and system.</li> <li>•Identify various elements, processes and parameters in telecommunication system.</li> <li>•Design procedure of AM transmission and reception.</li> <li>•Understand basic knowledge of FM transmissio and reception.</li> <li>•Design typical telecommunication system.</li> </ul>
III	I	R15	A50425	Linear & Digital IC Applications	<ul style="list-style-type: none"> <li>•A thorough understanding of operational amplifier with linear integrated circuits.</li> <li>•Understanding of different families of digital integrated circuits and their charecterestics.</li> <li>•Also students will be able to design circuits using operational amplifier.</li> </ul>
III	I	R15	A50482	Analog Communication Lab	
III	I	R15	A50488	IC Applications & HDL Simulation Lab	
III	II	R15	A60010	Managerial Economics & Financial Analysi	<ul style="list-style-type: none"> <li>•Understand the market dyanmics namely: demand and supply, demand forecasting and pricing methods.</li> <li>•Gain an insight of how production function is carried out to achieve least cost.</li> <li>•Know how to analyse and interpret the financial statements through ratio analysis.</li> </ul>
III	II	R15	A60018	Human Values & Professional Ethics (open elective)	

III	II	R15	A60420	Digital Communication	<ul style="list-style-type: none"> <li>•Understand basic components of digital communication systems.</li> <li>•Design optimum receivers for digital modulation techniques.</li> <li>•Analyze the error performance of digital modulation techniques.</li> <li>•Know about different error detection and error correction codes</li> </ul>
III	II	R15	A60432	VLSI Design	<ul style="list-style-type: none"> <li>•Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistor.</li> <li>•Choose an appropriate inverter depending on specifications required for a circuit.</li> <li>•Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit.</li> <li>•Design simple memories using MOS transistor and can understand design of large memories.</li> <li>•design simple logic circuit using PLA, PAL, FPGA and CPLD.</li> </ul>
III	II	R15	A60430	Microprocessors & Microcontrollers	<ul style="list-style-type: none"> <li>•The students will learn the internal organisation of popular 8086/8051 microprocessor/ microcontroller.</li> <li>•The students will learn hardware and software interaction and integration.</li> <li>•The students will learn the design of microprocessors/microcontrollers- based systems.</li> </ul>
III	II	R15	A60421	Digital Signal Processing	<ul style="list-style-type: none"> <li>•Perform time, frequency and Z-transform analysis on signal and system.</li> <li>•Understand the inter-relationship between DFT and various transforms.</li> <li>•Understand the significance of various filter structures and effects of roundoff errors.</li> <li>•Design a digital filter for a given specification.</li> <li>•Understand the fast computation of DFT and appreciate the FFT processing.</li> <li>•Understanding the tradeoff between normal and multi rate DSP techniques and finite length word effects.</li> </ul>
III	II	R15	A60494	Microprocessors & Microcontrollers Lab	
III	II	R15	A60493	Digital Signal Processing Lab	

IV	I	R13	A70014	Management Science	<ul style="list-style-type: none"> <li>•Plan an organisation structure for a given context in the organisation.</li> <li>•Carry out production operations through work study.</li> <li>•Understand the markets, customers and competition better and price the given products appropriately.</li> <li>•Plan and control the HR functions better.</li> <li>•Plan, Schedule and control projects through PERT and CPM.</li> <li>•Evolve a strategy for a business or service organisation.</li> </ul>
IV	I	R13	A70442	Microwave Engineering	<ul style="list-style-type: none"> <li>•Understand the significance of microwaves and microwave transmission lines.</li> <li>•Analyze the characteristics of microwave tubes and compare them.</li> <li>•Be able to list and explain the various microwave solid state devices.</li> <li>•Can setup a microwave bench for measuring microwave parameters.</li> </ul>
IV	I	R13	A70515	Computer Networks	<ul style="list-style-type: none"> <li>•Students should understand and explore the basics of computer networks and various protocols.</li> <li>•He/she will be in a position to understand the world wide web concepts.</li> <li>•Students will be in a position to administer a network and flow of information further he/she can understand easily the concepts of network security, Mobile and ad hoc networks.</li> </ul>
IV	I	R13	A70434	Cellular & Mobile Communication	<ul style="list-style-type: none"> <li>•The student will be able to understand impairments due to multipath fading channel.</li> <li>•The student will be able to understand the fundamental techniques to overcome the different fading effects.</li> <li>•The students will be able to understand co-channel and non co-channel interference.</li> <li>•The students will be able to be familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.</li> </ul>
IV	I	R13	A70436	Digital Image Processing (e-1)	<ul style="list-style-type: none"> <li>•Have an appreciation of the fundamentals of Digital Image processing including the topics of filtering, transforms and morphology, and image analysis and compression.</li> <li>•Be able to implement basic image processing algorithms in MATLAB.</li> <li>•Have a skill base necessary to further explore advanced topics of digital image processing.</li> </ul>
IV	I	R13	A70440	Embedded System Design (e-2)	<ul style="list-style-type: none"> <li>•Understand and design embedded systems.</li> <li>•Learn basic of OS and RTOS.</li> <li>•Understand types of memory and interfacing to external world.</li> <li>•Understand embedded firmware design approaches.</li> </ul>

IV	I	R13	A70086	Advanced Communication Skills Lab (e-2)	
IV	I	R13	A70499	Microwave Engineering & Digital Communication Lab	
IV	II	R13	A80452	Satellite Communications (e-3)	<ul style="list-style-type: none"> <li>•Students will understand the historical background, basic concepts and frequency allocation for satellite communication.</li> <li>•Students will demonstrate orbital mechanics, launch vehicles and launcher.</li> <li>•Students will be able to visualize satellite sub system like Telemetry, tracking, command and monitoring power system.</li> </ul>
IV	II	R13	A80450	Radar Systems (e-4)	<ul style="list-style-type: none"> <li>•Understand radar fundamentals and analysis of the radar signals.</li> <li>•Understand various radar transmitter and receiver.</li> <li>•Understand various radars like MTI, Doppler and tracking radars and their comparison.</li> </ul>
IV	II	R13	A80454	Wireless Communications & Networks (e-5)	<ul style="list-style-type: none"> <li>•Understand the principles of wireless communication.</li> <li>•Understand fundamentals of wireless networking.</li> <li>•Understand cellular system design concepts.</li> <li>•Analyze various multiple access schemes used in wireless communication.</li> <li>•Understand wireless wide area networks and their specifications.</li> <li>•Familiar with some of the existing of orthogonal frequency division multiplexing.</li> </ul>
IV	II	R13	A80087	Industry Oriented Mini Project	<ul style="list-style-type: none"> <li>•Formulate a real world problem and develop its requirements.</li> <li>•develop a design solution for a set of requirements.</li> <li>•Test and validate the conformance of the developed prototype against the original requirements of the problem</li> <li>•Work as a responsible member and possibly a leader of a team in developing software solutions.</li> <li>•Express technical and behavioural ideas and thought in oral settings.</li> <li>•Participate in and possibly moderate, discussions that lead to making decisions.</li> <li>•Express technical ideas, strategies and methodologies in written form.</li> <li>•Prepare and conduct oral presentations.</li> <li>•Self learn new tools, algorithms, and/or techniques</li> </ul>

					that contribute to the software solution of the project 10. Generate alternative solutions, compare them and select the optimum one.
IV	II	R13	A80089	Seminar	
IV	II	R13	A80088	Major Project	<ul style="list-style-type: none"> <li>•Formulate a real world problem and develop its requirements.</li> <li>•Develop a design solution for a set of requirements.</li> <li>•Test and validate the conformance of the developed prototype against the original requirements of the problem. •Work as a responsible member and possibly a leader of a team in developing software solutions .</li> <li>•Express technical and behavioural ideas and thought in oral settings.</li> <li>•Participate in and possibly moderate, discussions that lead to making decisions.</li> <li>•Express technical ideas, strategies and methodologies in written form.</li> <li>•Prepare and conduct oral presentations.</li> <li>•Self learn new tools, algorithms, and/or techniques that contribute to the software solution of the project.</li> <li>•Generate alternative solutions, compare them and select the optimum one.</li> </ul>
IV	II	R13	A80090	Comprehensive Viva	<ul style="list-style-type: none"> <li>• Exhibit the strength and grip on the fundamentals of the subjects studied in the previous semesters.</li> <li>• Comprehend for all the courses studied in the entire programme</li> <li>• Viva voce will be conducted towards the end of the semester which will be covering the complete syllabus.</li> <li>• This will test the student’s learning and understanding during the course of their post graduate programme.</li> <li>• In doing so, the main objective of this course is to prepare the students to face interview both at the academic and the industrial sector.</li> </ul>