DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE OUTCOMES (COS) OF ALL COURSES FRAMED UNDER

JNTUA-R15 REGULATION

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S.No	Course Code	Course Name	Year & Sem
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I B. Tech, I Sem ECE COs (R15-JNTUA)

Year & Sem	Course Code	Course Name	CO's	
I-I	15A52101	FUNCTIONAL ENGLISH	2101.1	Acquire good listening skills to participate effectively in group discussions, debates, and interviews and writing skills for effective technical report writing. (L2)
			2101.2	Develop oral communication skills in English to speak fluently in various academic and social situations. (L3)
			2101.3	Identify deviant use of English both in spoken and written forms, and improve awareness of its in science and technology. (L2)
			2101.4	Understand the importance of reading for life, and career and thereby develop an interest for it. (L2)
			2101.5	Demonstrate fundamental skills required for critical thinking. (L2)

Year & Sem	Course Code	Course Name	CO's	
I-I	15A54101	MATHEMATICS – I	4101.1	Solve the First, Second and Higher order D.Es and Applications of First Order D.E (L3)
			4101.2	Attain the knowledge of Applications of L.D.Es like Mechanical & Electrical Oscillatory circuits and deflection of beams (L2)
			4101.3	Familiarize with functions of several variables which is useful in Optimizations. (L6)
			4101.4	Determine important tools of calculus in Higher Dimensions (Multiple Integrals) (L5)
			4101.5	Become familiar with the applications of vector calculus to Engineering Problems. (L6)

Year & Sem	Course Code	Course Name	CO's	
I-I	15A05101	Computer Programming	5101.1	Illustrate basics of computers, concepts of algorithm , flowchart, programming terminology and apply various C-tokens & Input and Output statements to solve simple problems. (L5)
			5101.2	Apply selection,loop,branch control statements and arrays to solve different applications. (L3)
			5101.3	Examine pointers for implementing direct access of memory locations and the necessity of modularity in programming. (L3)
			5101.4	Solve various data base related problems by using non-homogeneous data structures. (L3)
			5101.5	Utilize the concepts and need of files in programming and implement file operations. (L2)

Year & Sem	Course Code	Course Name	CO's	
I-I	15A51101	Engineering Chemistry	1101.1	Differentiate between hard and soft water.(L3)
			1101.2	Discuss BUNA-S and BUNA-N Elastromers (L2)
			1101.3	Understand the electrochemical sources of energy. (L3)
			1101.4	Discuss about solid, liquid, gaseous fuels (L2)
			1101.5	Understand the principles of lubricants and CNTs (L2)

Year & Sem	Course Code	Course Name	CO's	
I-I	**15A01101**	**Environmental Studies**	1101.1	Understand the various natural resources (L2)
			1101.2	Describe about the Biodiversity and Ecosystem (L2)
			1101.3	Discuss about the pollution aspects (L3)
			1101.4	To know about the social issues related to environment and their protection acts (L1)
			1101.5	Describe about the population explosion and welfare programme (L2)

Year & Sem	Course Code	Course Name	CO's	
I-I	**15A52102**	**English Language Communication Skills Lab**	2102.1	Pronounce words correctly using speech sounds, word stress, intonation and rhythm. (L2)
			2102.2	Acquire proficiency in spoken English. (L2)
			2102.3	Apply English language skills effectively for interviews, group discussions, public speaking and debates with sheer confidence. (L3)
			2102.4	Develop their employability skills. (L3)
			2102.5	Identify techniques for writing a speech on an occasion and furthermore, give reviews on a book orally or in written form. (L3)

Year & Sem	Course Code	Course Name	CO's	
I-I	15A51102	Engineering Chemistry Lab	1102.1	Determine the calorific value of fuel and viscosity of the oils. (L3)
			1102.2	Estimate the ferrous iron and copper iodometry. (L2)
			1102.3	Estimate the hardness of water and copper by EDTA method. (L3)
			1102.4	Measure the manganese in steel and iron in cement. (L3)
			1102.5	Illustrate the concentration values of different solutions by conductometry. (L2)

Year & Sem	Course Code	Course Name	CO's	
I-I	15A05102	Computer Programming Lab	5102.1	Demonstrate DOS and Linux Commands (L2)
			5102.2	Illustrate the syntax and semantics of C language for simple problem statements. (L2)
			5102.3	Develop the programs using arrays, strings operations (L4)
			5102.4	Write programs that perform operations using derived data types. (L2)
			5102.5	Develop C programming for a given application using file operations. (L4)

I B. Tech, II Sem ECE COs (R15-JNTUA)

Year & Sem	Course Code	Course Name	CO's	
I-II	15A54201	Mathematics – II	4201.1	Understand the usage of Laplace Transforms. (L2)
			4201.2	Evaluate the Fourier Series expansion of periodic functions. (L5)
			4201.3	Understand the usage of Fourier Transforms. (L2)
			4201.4	Formulate/Solve/Classify the solutions of P.D. Equations and also find the solutions of 1-Dimensional Wave equations and Heat equations. (L6)
			4201.5	Understand the usage of Z-Transforms. (L2)

Year & Sem	Course Code	Course Name	CO's	
I-II	15A52201	ENGLISH FOR PROFESSIONAL COMMUNICATION	2201.1	Participate effectively in debates on modern corporatism and listen, and speak well in English in group discussions. (L3)
			2202.2	Recall the alternative sources of energy by listening, summarizing and rewriting reports. (L1)
			2202.3	Develop report writing skills. (L3)
			2202.4	Interpret charts and tables. (L2)
			2202.5	Communicate effectively in interviews by developing required competence thereby enhancing improving job prospects. (L2)

Year & Sem	Course Code	Course Name		CO's
I-II	15A04201	NETWORK ANALYSIS	4201.1	Apply the various Circuit Analysis Techniques to the electrical circuits (L3)
			4201.2	Analyze the DC Transients in electrical networks (L4)
			4201.3	Analyze the Steady State sinusoidal quantities in electrical networks (L4)
			4201.4	Analyze series and parallel resonant circuits (L4)
			4201.5	Apply the various basics of filter techniques and two-port network principles(L3)

Year & Sem	Course Code	Course Name		CO's
I-II	15A56101	Engineering Physics	6101.1	Understand the usage of Laplace Transforms. (L2)
			6101.2	Evaluate the Fourier Series expansion of periodic functions. (L5)
			6101.13	Understand the usage of Fourier Transforms. (L2)
			6101.4	Formulate/Solve/Classify the solutions of P.D. Equations and also find the solutions of 1-Dimensional Wave equations and Heat equations. (L6)
			6101.5	Understand the usage of Z-Transforms. (L2)

Year & Sem	Course Code	Course Name	CO's	
I-II	15A03101	ENGINEERING DRAWING	3101.1	Apply the geometrical constructions and classify the engineering /mathematical curves used in engineering applications(L3)
			3101.2	Explain various kinds of scales and their practical usage and basics of orthographic projections. (L2)
			3101.3	Analyze the geometrical objects in two dimensional objects. (L4)
			3101.4	Analyze the visualization of geometrical solids in three dimensional through exercise in orthographic projections. (L4)
			3101.5	Analyze the detailed views of the isometric and orthographic views of different objects. (L4)

Year & Sem	Course Code	Course Name	CO's	
I-II	15A04202	Network Analysis Lab	4202.1	Analyze the various network theorems (L4)
			4202.2	Evaluate the frequency response of series and parallel resonance circuits (L5)
			4202.3	Analyze the Transient response of series DC Circuits (L4)
			4202.4	Design the frequency response of various filters (L6)

Year& Sem	Course Code	Course Name	CO's	
I-II	**15A56102**	**Engineering Physics Lab**	6102.1	Application of interference and diffraction(exp.no:1,2,8,10) (L3)
			6102.2	Determination of NA, AA, Energy gap(exp.no:3,4) (L5)
			61021.3	Calculations using laser (exp.no:11,12,13) (L3)
			6102.4	Evaluation of dispersive power (exp.no:9) (L5)
			6102.5	Analyzing variation of magnetic field (exp.no:14) (L4)

Year & Sem	Course Code	Course Name	CO's	
I-II	**15A99201**	**Engineering And IT workshop Lab**	9201.1	Design the sheet metal objects by surface development and join the metals for obtaining desired shape. (L6)
			9201.2	Identify the internal parts of computer and its peripheral. (L1)
			9201.3	Demonstrate Assemble and disassemble a Personal Computer and prepare the computer ready to use. (L2)
			9201.4	Develop skills in installation of Linux and Windows XP OS and to connect network for information sharing. (L5)
			9201.5	Illustrate how to Access the Internet and Browse it to obtain the required information. (L2)

II B. Tech, I Sem ECE COs (R15-JNTUA)

Year& Sem	Course Code	Course Name		CO's
II-I	15A54301	MATHEMATICS-III	54301.1	Solve engineering problems by applying the concept of matrices(L3)
			54301.2	Interpret and solve non- linear equations with a single variable. (L2)
			54301.3	Apply numerical methods for various mathematical operations such as Interpolation, Differentiation, Integration. (L3)
			54301.4	Apply curve-fitting techniques for data representations and computation in engineering analysis. (L3)
			54301.5	Compare numerical solutions of ordinary differential equations with the method of successive approximations. (L4)

Year& Sem	Course Code	Course Name		CO's
II-I	15A04301	ELECTRONIC DEVICES AND CIRCUITS	4301.1	Construct electronic circuits using various diodes. (L2)
			4301.2	Develop LMPS (Linear Mode Power Supply) units using rectifiers, filters & regulators. (L3)
			4301.3	Demonstrate the construction, working and characteristics of BJT, JFET and MOSFET in various modes(L2)
			4301.4	Analyse DC bias circuits for BJT and FET Amplifiers. (L4)
			4301.5	Analyse transistor amplifier circuits using BJT & FET(L4)

Year& Sem	Course Code	Course Name	CO's	
II-I	15A04302	SWITCHING THEORY AND LOGIC DESIGN	4302.1	Understand Boolean algebra, Number systems and logic gates in the development of logic circuits. (L2)
			4302.2	Apply K-Map & Tabular Methods to minimize logic functions. (L3)
			4302.3	Design different combinational Logic circuits. (L6)
			4302.4	Design different Sequential Logic circuits and their applications. (L6)
			4302.5	Design different combinational logic circuits using PLDs.(L6)

Year& Sem	Course Code	Course Name	CO's	
II-I	15A04303	SIGNALS AND SYSTEMS	4303.1	Apply Fourier series to analyse periodic signals and their spectra.(L3)
			4303.2	Analyse continuous time signals using Fourier transform. (L4)
			4303.3	Examine signal transmission through linear systems(L4)
			4303.4	Analyses discrete time signals using discrete time Fourier transform(L4)
			4303.5	Apply Laplace and z transform to analyse continuous & discrete time systems(L3)

Year& Sem	Course Code	Course Name	CO's	
II-I	15A04304	PROBABILITY THEORY AND STOCHASTIC PROCESSES	4304.1	Analyse various probability density functions of random variables. (L4)
			4304.2	Apply the concepts of Multiple random variables in communication systems. (L3)
			4304.3	Solve the engineering problems involving random processes. (L6)
			4304.4	Analyse the spectral characteristics of random process. (L4)
			4304.5	Analyse the response of Linear system with random inputs and also compare different spectral band random process. (L4)

Year& Sem	Course Code	Course Name	CO's	
II-I	15A02306	ELECTRICAL TECHNOLOGY	2306.1	Explain the operation and construction of DC generators using EMF equation. (L2)
			2306.2	Explain the operation and construction of DC motor using torque equation. (L2)
			2306.3	Analyse the Operating Principle and design aspects of Single-phase transformers. (L4)
			2306.4	Analyse the Operating Principle and design aspects of Three phase induction motors. (L4)
			2306.5	Interpret the principle, constructional features of different synchronous machines. (L4)

Year& Sem	Course Code	Course Name		CO's
II-I	15A04305	ELECTRONIC DEVICES AND CIRCUITS LABORATORY	4305.1	Understand the parameters of Diodes and transistors from the characteristics. (l2)
			4305.2	Demonstrate the rectifier and voltage regulator circuits using diodes. (L2)
			4305.3	Construct various amplifiers using BJTs and FETs. (L6)
			4305.4	analyze the characteristics of SCR and UJT. (L4)

Year& Sem	Course Code	Course Name		CO's
II-I	15A02307	ELECTRICAL TECHNOLOGY AND BASIC SIMULATION LABORATORY	2307.1	Explain the magnetization characteristics of DC generator & motor and find critical field resistance & efficiency. (L2)
			2307.2	Demonstrate the OC & SC test of single-phase transformer & find the efficiency. (L2)
			2307.3	Apply the various operations on Continuous and Discrete time signals. (L3)
			2307.4	analyze the LTI systems using transforms. (L4)

Year& Sem	Course Code	Course Name	CO's	
II-II	15A54402	MATHEMATICS-IV	4402.1	Apply the Frobenius method to obtain a series solution for the given linear second order Ordinary Differential equations. (L3)
			4402.2	Solve the engineering problems using Bessel functions and Legendre's polynomials. (L3)
			4402.3	Analyse the complex functions with reference to their analyticity. (L4)
			4402.4	Apply Taylor's & Laurent's series to solve complex functions.(L3)
			4402.5	Solve improper integrals by using residue method. (L3)

Year& Sem	Course Code	Course Name	CO's	
II-II	15A04401	ELECTRONIC CIRCUIT ANALYSIS	4401.1	Analyze the various feedback Amplifiers & Oscillators.(L4)
			4401.2	Analyze the Small signal high frequency transistor Amplifier model for CE Configuration.(L4)
			4401.3	Apply the concepts of h-parameter & analyze the Multi stage amplifiers and differential amplifiers.(L3)
			4401.4	Examine the design aspects of different power amplifiers.(L4)
			4401.5	Examine the design aspects of different tuned amplifiers.(L4)

Year& Sem	Course Code	Course Name	CO's	
II-II	**15A04402**	**ANALOG COMMUNICATION SYSTEMS**	4402.1	Analyze the Amplitude modulation & demodulation systems in time & frequency domains.(L4)
			4402.2	Analyze the Angle modulation & demodulation systems in time & frequency domains.(L4)
			4402.3	Analyze the performance of anaolg communication system in the presence of noise.(L4)
			4402.4	Analyze different discrete modulation & demodulation techniques.(L4)
			4402.5	Solve basic coomunication problems & calculate information rate and channel capacity of discrete communication channel.(L3)

Year& Sem	Course Code	Course Name	CO's	
II-II	**15A04403**	**ELECTROMAGNETIC THEOTY AND TRANSMISSION LINES**	4403.1	Analyze and solve the problems of electric and magnetic fields that vary with time and space.(L4)
			4403.2	Apply Maxwell's equations in solving electromagnetic field equations.(L3)
			4403.3	Analyze electromagnetic wave propagation in different media.(L4)
			4403.4	Explain the concept of transmission lines and their applications.(L2)
			4403.5	Analyze and design various impedance matching techniques.(L4)

Year& Sem	Course Code	Course Name	CO's	
II-II	**15A05201**	**DATA STRUCTURES**	5201.1	Apply the concept of arrays with asymptotic notations in building linear and non linear data structures. (L3)
			5201.2	Analyze stacks, queues and linked list using dynamic memory allocation.(L4)
			5201.3	Develope algorithms for trees and graphs.(L3)
			5201.4	Compare and implement different sorting techniques.(L5)
			5201.5	Build different searching techniques and hashing methods.(L3)

Year& Sem	Course Code	Course Name	CO's	
II-II	**15A02303**	**CONTROL SYSTEMS ENGINEERING**	2303.1	Apply mathematical models, signal flow graph & Block diagram representation to determine transfer function of control systems .(L3)
			2303.2	Analyse the time domain responses of first and second-order systems. (L4)
			2303.3	Analyse control systems by applying Routh-Hurwitz and root-locus techniques.(L4)
			2303.4	Apply Bode plot, Polar & Nyquist plot concepts to analyze the control systems in frequency domain.(L3)
			2303.5	Apply state space model for a given physical system and solve the state equations. (L3)

Year& Sem	Course Code	Course Name	CO's	
II-II	15A04404	ELECTRONIC CIRCUIT ANALYSIS LABORATORY	4404.1	Analyze the single and multistage amplifiers at low, mid and high frequencies using simulation software and Hardware.(L4)
			4404.2	Analyze the transistor oscillators using simulation software and Hardware.(L4)
			4404.3	Determine the efficiencies of power amplifiers using simulation software.(L5)
			4404.4	Analyze Frequency response of tuned amplifiers using hardware and multisim soft ware.(L4)

Year& Sem	Course Code	Course Name	CO's	
II-II	15A04405	ANALOG COMMUNICATION SYSTEMS LABORATORY	4405.1	Analyze behaviour of analog modulations systems in the time domain.(L4)
			4405.2	Analyze behaviour of pulse modulations systems in the time domain.(L4)
			4405.3	Illustrate the characteristics of radio receiver and antenna measurements(L2)

Year& Sem	Course Code	Course Name	CO's	
II-II	15A04406	Comprehensive Online Examination-I	4406.1	Acquire fundamental engineering knowledge(L1).
			4406.2	Demonstrate the ability to navigate skills and online learning(L2).
			4406.3	Apply the concept of problem-solving ability in competitive exams(L3).

III B. Tech, I Sem ECE COs (R15-JNTUA)

Year & Sem	Course Code	Course Name		CO's
III-I	15A05402	Computer Organization	5402.1	Analyze different functional units, bus structure and addressing modes in computer(L4).
			5402.2	Explain the functional units of the processor such as register file and ALU(L2).
			5402.3	Differentiate the use of main memory, cache memory and virtual memory in the computer system(L2).
			5402.4	Explain the input/output interfaces & memory organization(L2).
			5402.5	Apply the concepts of the pipelining and basic characteristics of multiprocessors(L3).

Year & Sem	Course Code	Course Name		CO's
III-I	15A04501	Antennas and Wave Propagation	4501.1	Explain the basics of antenna parameters & radiation pattern(L2).
			4501.2	Design VHF, UHF and Microwave antennas(L6).
			4501.3	Analyze the construction of micro strip, flat sheets, corner and parabolic reflector antennas(L4).
			4501.4	Design the antenna arrays & Make use of antenna measurements to assess antenna's performance(L6).
			4501.5	Explain different modes of wave propagation in free space & mechanism of the atmospheric effects on radio wave propagation(L2).

Year & Sem	Course Code	Course Name	CO's	
III-I	**15A04502**	**Digital Communication Systems**	4502.1	Apply the fundamentals concepts of sampling theorem along with different coding and modulation techniques in communication systems(L3).
			4502.2	Differentiate the basic principles of baseband and passband digital modulation schemes(L2)
			4502.3	Employ the Geometric Representation of Signals in Signal Space(L2).
			4502.4	Analyze the different modulation & demodulation for band pass data transmission and their probability of error(L4).
			4502.5	Apply different channel encoding techniques for error detection and correction(L3)

Year & Sem	Course Code	Course Name	CO's	
III-I	**15A04503**	**Linear Integrated Circuits and Applications**	4503.1	Explain the construction and characteristics of the operational-amplifiers(L2).
			4503.2	Analyze the feedback and its effect on the performance of op-amp(L4).
			4503.3	Develop knowledge on some linear applications of Op-amp and on the design of active filters using Op-amps(L6).
			4503.4	Design various waveform generators using Op-amp, 555 Timer and PLL(L6).
			4503.5	Analyze data converter (ADC and DAC) Circuits using Op amps(L4).

Year & Sem	Course Code	Course Name	CO's	
III-I	**15A04504**	**Digital System Design**	4504.1	Construct the logic circuits using different types of logic families(L6).
			4504.2	Develop VHDL programs for digital circuits(L6).
			4504.3	Design and implement various combinational circuits using basic IC structures and VHDL(L6).
			4504.4	Design and implement various sequential circuits using using basic IC structures and VHDL(L6).
			4504.5	Develop VHDL programs for various complex combinational and Sequential circuits using VHDL(L6).

Year & Sem	Course Code	Course Name	CO's	
III-I	**15A04505**	**Linux Programming & Scripting**	4505.1	Apply LINUX utilities to manage simple file processing operations & organize directory structures with appropriate security(L3).
			4505.2	Explain LINUX networking commands for establishing computer network communication(L2).
			4505.3	Develop robust scripts in Perl Scripting Language(L6).
			4505.4	Develop and run scripts using TCL(L6).
			4505.5	Develop and run scripts using Python(L6).

Year & Sem	Course Code	Course Name	CO's	
III-I	15A04507	IC Applications Laboratory	4507.1	Design negative feedback amplifiers and analyze their characteristics using Op-amp(L6).
			4507.2	Design multivibrator, integrator, differentiator using Op-amp(L6).
			4507.3	Design active filters and function generators and using Op-amp(L6).
			4507.4	Design VCO, AGC, PLL, AVC and regulators using linear ICs(L6).

Year & Sem	Course Code	Course Name	CO's	
III-I	15A04508	Digital Communication Systems Laboratory	4508.1	analyze Time division multiplexing and demultiplexing techniques(L4).
			4508.2	Analyze the PCM, DPCM, DM, ADCM using hardware &software(L4).
			4508.3	Analyze the different shift keying techniques using hardware &software(L4).
			4508.4	Analyze the QAM using signal space analysis(L4)

Year & Sem	Course Code	Course Name	CO's	
III-I	15A99501	Audit course – Social Values & Ethics	9501.1	Develop the capability of shaping themselves in the society & develop the roles and responsibility of NSS activity(L6).
			9501.2	Explain the features of constitution of India(L2).
			9501.3	Explain the development of the society around them and organization they work.(L2)
			9501.4	Develop themselves into professionals & follow professional ethics(L6).

Year & Sem	Course Code	Course Name	CO's	
III-II	**15A52301**	**Managerial Economics and Financial Analysis**	2301.1	Analyze the consumer behavior with regard to their product or services and measure demand of a particular product or services by applying various methods in given situation(L4).
			2301.2	Compare concept of production & cost analysis(L4).
			2301.3	Determine the price of a product or services in given market condition(L5).
			2301.4	Interpret the financial accounting and the financial ratios(L2).
			2301.5	Summarize Capital and its types and budget techniques(L2).
CO's				
III-II	**15A04601**	**Microprocessors & Microcontrollers**	4601.1	Explain the concepts of Intel x86 series of processors(L2).
			4601.2	Apply the concept of addressing modes, instruction set and assembler directives for programming the 8086 microprocessors(L3).
			4601.3	Explain the concepts of MSP 430 low power microcontroller(L2)
			4601.4	Analyze the concepts of interrupts, low power modes and RTC of MSP 430(L4).
			4601.5	Apply the different interfacing protocols to implement real time applications using MSP430(L3).

Year & Sem	Course Code	Course Name	CO's	
III-II	**15A04602**	**Electronic Measurements and Instrumentation**	4602.1	Explain the performance characteristics of AC & Dc meters used in instrumentation(L2).
			4602.2	Explain the construction, principle and working of CRO and time period &voltage measurements(L2).
			4602.3	Explain function generators, wave analyzers, logic analyzers and spectrum analyzers(L2).
			4602.4	Analyze different DC & AC bridges for their application in measurement and also explain Q meter, EMI and EMC(L4).
			4602.5	Explain the principles involved in sensors & transducers(L2).
CO's				
III-II	**15A04603**	**Digital Signal Processing**	4603.1	Analyze discrete time signals and systems in time domain and frequency domain(L4).
			4603.2	Calculate Fourier transform for discrete time signals by using various transformation techniques(L3)
			4603.3	Develop structures for realization of discrete time FIR and IIR systems(L6).
			4603.4	Design of linear phase FIR and IIR filters by various techniques(L6).
			4603.5	Explain basic concepts of interpolation and decimation(L2).

Year & Sem	Course Code	Course Name	CO's	
III-II	15A04604	VLSI Design	4604.1	Explain about IC fabrication and relation between different parameters of MOSFET showing its characteristics(L2).
			4604.2	Apply lambda-based rules to develop layouts, stick diagrams of logic circuits and estimate sheet resistance, area capacitance and delays(L3).
			4604.3	Design digital system at gate level and physical level(L6).
			4604.4	Design different sub systems using various VLSI design styles(L6).
			4604.5	Explain about EDA tools & testing of logic circuits(L2).

CO's				
III-II	15A04605	MATLAB Programming	4605.1	Understand the mathematical concepts using MATLAB(L2).
			4605.2	Write the MATLAB programming for arrays and functions and files(L2).
			4605.3	Design the engineering problems using MATLAB(L6)
			4605.4	Implement real time examples using MATLAB(L6).

Year & Sem	Course Code	Course Name	CO's	
III-II	15A04607	Microprocessors & Microcontrollers Laboratory	4607.1	Write 8086 assembly language programs(L2).
			4607.2	Make use of programmable peripheral devices and their interfacing in assembly programming(L3).
			4607.3	Make use of MSP 430 and their Interfacing devices in CC Studio and simulate programs using embedded C for MSP 430(L3).

Year & Sem	Course Code	Course Name	CO's	
III-II	**15A04608**	**Digital Signal Processing Laboratory**	4608.1	Analyze discrete time signals & systems using MATLAB(L4).
			4608.2	Design & implement IIR & FIR filters for different specifications using MATLAB(L6)
			4608.3	Analyze discrete time signals & systems using floating point DSP processor kit with code composer studio (CCS)(L4).
			4608.4	Design & implement IIR & FIR filters using DSP processor kit with code composer studio (CCS)(L6).

Year & Sem	Course Code	Course Name	CO's	
III-II	**15A52602**	**Advanced English Language Communication Skills (AELCS) Laboratory**	2602.1	Develop communication skills through comprehensive and vocabulary(L6).
			2602.2	Apply writing skills in preparing resume, email and technical reports(L3)
			2602.3	Build presentation skills through poster and oral(L2).
			2602.4	Analyze the students for job skills and professional development activities(L4).
			2602.5	Develop management skills and analyze problem solving techniques(L6).
			CO's	
III-II	**15A04609**	**Comprehensive Online Examination-II**	4609.1	
				Acquire fundamental engineering knowledge(L1).
			4609.2	
				Demonstrate the ability to navigate skills and online learning(L2).
			4609.3	
				Apply the concept of problem-solving ability in competitive exams(L3).

Year & Sem	Course Code	Course Name	CO's	
IV-I	**15A04701**	**Optical Fiber Communication**	4701.1	Analyze the performance of digital and analog optical fiber systems (L4)
			4701.2	Evaluate the system bandwidth, noise bit rate of digital fiber system (L5)
			4701.3	Evaluate the system link loss, distortion (L5)
			4701.4	Understand the characteristics of fiber sources and detectors (L2)
			4701.5	Design and conduct experiment and analyses the results (L6)

Year & Sem	Course Code	Course Name	CO's	
IV-I	**15A04702**	**EMBEDDED SYSTEM**	4702.1	Design of embedded systems leading to 32-bit application development. (L6)
			4702.2	Understand hardware-interfacing concepts to connect digital as well as analog sensors while ensuring low power considerations. (L2)
			4702.3	Implement the protocols used by microcontroller to communicate with external sensors and actuators in real world. (L6)
			4702.4	Understand Embedded Networking (L2)
			4702.5	Understand Embedded Networking and IoT concepts based upon connected MCUs (L2)

Year & Sem	Course Code	Course Name	CO's	
IV-I	15A04703	Microwave engineering	4703.1	Analyze the waveguides using wave equations. (L4)
			4703.2	Describe the characteristics of microwave circuits through S- Parameters. (L2)
			4703.3	Analyze various microwave Oscillators & Amplifiers. (L4)
			4703.4	Analyze various microwave components. (L4)
			4703.5	Explain various methods of microwave measurements. (L2)

Year & Sem	Course Code	Course Name	CO's	
IV-I	15A04704	DATA COMMUNICATIONS & NETWORKING	4704.1	Understand the fundamental concepts of computer networking, protocols, architectures and applications of OSI & TCP/IP models (L1)
			4704.2	Discuss the process of multiplexing, switching and transmission media in networks, protocols in the data link layer (L3)
			4704.3	Demonstrate the multiple access methods, IEEE standards, Ethernet (L5)
			4704.4	Design issues related to network layer routing algorithms, Internet protocols (L4)
			4704.5	Analyze the various types of cryptography and network security techniques (L4)

Year & Sem	Course Code	Course Name	CO's	
IV-I	15A04705	RADAR SYSTEMS	4705.1	Explain Radar fundamentals and analysis of radar signals. (L2)
			4705.2	To understand the difference between CW radar and FM CW radar. (L2)
			4705.3	Able to calculate the blind speed and MTI radar parameters. (L3)
			4705.4	Able to identify the tracking of the target using various tracking radars. (L4)
			4705.5	Identify the difference types of radar receivers. (L1)

Year & Sem	Course Code	Course Name	CO's	
IV-I	15A04708	Digital Image Processing	4708.1	Understand the basic fundamentals of Image Processing (L2)
			4708.2	Apply various Image Transformations with their properties(L3)
			4708.3	Explain about various techniques of image enhancement in different domains (L4)
			4708.4	Analyze the Image for segmentation and Algebraic approaches for restoration of an image (L4)
			4708.5	Classify the Redundancies in Images and determine various Image Formats and compression standards. (L4,L5)

Year & Sem	Course Code	Course Name	CO's	
IV-I	15A04711	Microwave and Optical Communication Laboratory	4711.1	Understand the characteristics of Reflex klystron and GUN diode(L2)
			4711.2	Calculate the frequency, attenuation, VSWR using microwave bench set-up. (L4)
			4711.3	Determine the parameters of Magic-Tee and Directional coupler using bench set-up. (L5)
			4711.4	Understand the characteristics of optical devices like LASER and LED(L2)
			4711.5	Design and analyze an optical fiber link. (L4)
CO's				
IV-I	15A04712	VLSI & EMBEDDED SYSTEM Laboratory	4712.1	Design and draw the internal structure of the various digital integrated circuits(L6)
			4712.2	Develop VHDL/Verilog HDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer. (L5)
			4712.3	Design and analyze the different configurations of interfacing modules of TM4C microcontroller (L6)

Year & Sem	Course Code	Course Name	CO's	
IV-II	**15A04802**	**Low Power VLSI Circuits & Systems**	4802.1	Describe the need for low power design and recall the fundamentals of MOS transistor (L1, L2)
			4802.2	Describe and Derive the MOS inverter characteristics and Design the combinational circuits. (L2,L6)
			4802.3	Describe the sources of power dissipation and classify various supply voltage scaling(L2,L4)
			4802.4	Determine various methods of Minimizing Switched Capacitance(L5)
			4802.5	Evaluate the methods of Minimizing Leakage Power (L5)
			CO's	
IV-II	**15A04804**	**RF INTEGRATED CIRCIUTS**	4804.1	Understand the structure of radio frequency system. (L2)
			4804.2	Analyze the bandwidth estimation techniques and rise time and delay time (L4)
			4804.3	Identify the low noise amplifier and subsampling mixers L2)
			4804.4	Explain various types of RF power amplifiers. (L4)
			4804.5	Distinguish various frequency synthesis techniques (L2)

Year & Sem	Course Code	Course Name	CO's	
IV-II	15A04805	Comprehensive Viva Voce	4805.1	Recall the fundamentals of mathematics, science and Engineering(L1)
			4805.2	Relate comprehensive understanding of techniques applicable to their own area of professional practice(L2)
			4805.3	Develop their Communication skills and Build confidence to face the interviews(L6)
		CO's		
IV-II	15A04806	Technical Seminar	4806.1	Develop interest towards research-oriented field with ability to search the literature and brief report preparation. (L4)
			4806.2	Develop the skills, competencies and points of view needed by professionals in the field most closely related to the course(L5)
			4806.3	Develop the discussion and critical thinking about topics of current intellectual importance. (L5)
			4806.4	Develop the interpersonal & communication skills and awareness. (L6)
			4806.5	Develop presentation skills. (L6)

Year & Sem	Course Code	Course Name	CO's	
IV-II	15A04807	Project Work n	4807.1	Identify problems, formulate literature survey and analyze engineering problems. (L1, L4)
			4807.2	Apply the theoretical concepts to solve industrial problems with teamwork and multidisciplinary approach(L3)
			4807.3	Design system component that acquires the need for public health and environment consideration. (L6)
			4807.4	Form a team for carrying the project and perform documentation effectively. (L6)