ELECTRONICS AND COMMUNICATION ENGINEERING			
R-15 Course Outcomes			
S.NO	**COURSE CODE**	**COURSE TITLE**	**COURSE OUTCOMES**
1	1521101	Mathematics-1	1.Apply the essential tool of matrices in a comprehensive manner
			2.Describe the convergence of series
			3.Classify the functions of several variables which is useful in optimization techniques
			4.Define Beta and gamma functions and solve definite integrals.
			5.Determine the Fourier series of the functions.
2	15021102	Mathematics 2	1.Solve the first order and higher order linear differential equations with constant coefficients.
			2.Apply Laplace Transforms in engineering problems.
			3.Evaluate multiple integrals.
			4.Understand Vector Calculus concepts and analyze their applications in engineering problems.
3	1503103	Engineering graphics	1.Use CAD drafting and editing tools along with page templates ,title block & print settings
			2.Describe the geometric details of Engineering objects&Become familiar with Auto Cad 2D 3D drawings
			3.Understand Engineering drawing basic theory of projectionsrelated to points lines, planes and solids in different orientations and drafting them in cad software
			4.Analyze various sectional views related to Engineering Drawings andCreate isometric drawings with 3d tools along with basic theory& procedures in engineering drawing
4	1504104	English	1.Describe the classification of words, sentences and their usages in sentences.
			2.Understand the difference between spoken and written English.
			3.Analyze the rules in language for changing the form of sentences.
			4.Illustrate the factors that influence grammar and vocabulary in speaking and writing
			5.Classify the parts of speech, tenses and sentence structures
5	1505105	Programming in c	1.Understand the basics of computer system and C programming.
			2.Analyze a given problem and develop an algorithm to solve the problem.

			3.Apply proper branching and loop constructs to solve a complex problem
			4.Understand the concepts of arrays and strings to solve real time applications
			5.Apply modular approaches for solving complex problems
			6.Illustrate memory optimization for solving real world problems using structures and Unions
6	1501106	Environmental science	1.Recall environmental concepts for the sustainable developmental activities towards the society.
			2.Summarize the interconnection of human dependence on this ecosystem.
			3.Solve environmental problems by gaining a higher level of knowledge and personal involvement.
			4.Outline the impact of developmental activities on environment and proper utilization of natural resources.
7	1505107	programming in C lab	1.Analyze given problem and develop an algorithm
			2.Implement Code and debug programs in C language using various constructs
			3.Choose proper C language constructs to solve complex problems.
			4.Organize and implement heterogeneous data in efficient memory utilization
8	1509108	Engineering workshop	1.Identify different manufacturing processes which are commonly employed in the industry
			2.Analyze the practical knowledge about fabricate components using different materials with their own hands
			3.Understand the knowledge of the dimensional accuracies and tolerances applicable for different manufacturing processes
			4.Experiment various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, Series wiring
9	1522201	Engineering physics	1. Apply the knowledge of Sciences to solve engineering problems by using Interference and Diffraction techniques.
			2. Understand the idea of Electronic materials & its applications in Engineering.
			3.Describe Origin of bands in solids
			4.Formulate the working elements of different lasers and estimate Laser operation parameters.

10	1521202	Mathematics-3	1. Solve Bessel and Legendre's equations in terms of polynomials.
			2. Describe analytic function, singularities, poles and residues
			3. Determine the differentiation of complex functions used in engineering problems and analyze images from z-plane to w-plan
			4. Compare the various special transformations.
			5. Analyze real definite integrals in definite regions.
11	1523203	Engineering chemistry	1.Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
			2.Describe periodic properties such as ionization potential, electro negativity and oxidation states .
			3.Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
			4.Understand the major chemical reactions that are used in the synthesis and streochemistry of molecules.
12	1524204	English-2	1. Express themselves fluently and appropriately in social and professional contexts.
			2. Understand academic subjects with greater facility through theoretical and practical components of the syllabus.
			3. Apply communication skills in formal and informal situations.
			4. Express themselves fluently and appropriately in social and professional contexts.
			5. Apply writing skills for the preparation of document.
13	152205	Electrical circuits	1.Understand basic electric circuits and network solving techniques.
			2.Analyze RL, RC and RLC circuits for AC excitations
			3.Describe working principle, operation and construction of DC machines, 3-Ø induction motors and 1-Ø transformers
			4.Solve the problems on EMF,Current ,Torque ,Regulation and Efficiency of DC machines ,3-Ø induction motor and 1-Ø transformer.
14	152506	Human values and professional ethics	1. Deal with professional ethics which includes moral issues and virtues.
			2. Describe social responsibilities of an engineer.
			3. Build right qualities of moral leadership.
15	1524207	English language and communications lab	1.Describe objects, places and persons.

			2.Understand the listening process and answer the questions related to it.
			3.Analyze phonetics with examples
			4.Illustrate different modes of communication skills
			5.Classify LSRW skills
16	1599208	Physics and chemistry lab	1.Evaluate of the application of interference, diffraction phenomena along with laser
			2.Support the scientific process in the conduct and reporting of experimental investigations.
			3.Formulate the measurement technology, usage of new instruments and real time applications in engineering studies
			4.Justify the theoretical ideas and concepts covered in lecture by doing hands on in the experiments.
			5.Estimate rate constants of reactions from concentration of reactants/products as afunction of time.
			6.Measure molecular/system properties such as surface tension, viscosity,conductance of solutions, redox potentials, chloride content of water, etc.
17	1521301	Mathematics-IV	1. Understand the fundamentals of special functions
			2. Solve Bessel equations and Legendre's equations
			3. Solve functions of a complex variable and Complex integrals
			4. Evaluate residues by Cauchy's residue theorem
18	1504302	Electro magnetic fields	1. Use vector algebra, and vector calculus.
			2. Calculate the Electromagnetic fields due to various sourses
			3. Understand the various currents, dielectrics and capacitors
			4.Understand theorems relating electromagnetic fields and potentials
			5. Aplly Boundary condtions to obtain fields in various conditions
19	1504303	Electronic devices and circuits	1.Describe the operation of various Diodes, transistors and their applications
			2. Analyze rectifiers with and without filters
			3. Compare BJT and FET circuits under different configurations
			4.Illustrate the Biasing of BJT and FET.

			5. Use various special semiconductor devices in different applications
20	1504304	Signals & systems	1.Identify the various signals and operations on signals
			2.Describe the spectral characteristics of signals.
			3.Illustrate signal sampling and its reconstruction
			4.Apply convolution and correlation in signal processing.
			5.Analyze continuous and discrete time systems.
21	1504305	Network theory	1.Understand the basic concepts of magnetic circuits,resonance and network functions
			2.Solve DC and AC circuits by using various theorems.
			3.Analyze RL,RC and RLC for DC and AC transient response
			4.Analyze two port networks for Z,Y,ABCD,H parameters and its relationship between them
22	1504306	Electrical machines	1. Understand the concepts of Electrical Machines.
			2.Perform OC and SC tests on transformers
			3.Model the stator and rotor designing aspects of induction motors.
			4. Analyze the parameters of DC Machine
			5. classify the single phase motors
23	1504307	Electrical engineering lab	1. Verify the characteristics of Network Theorems and Two port Networks
			2. Perform various tests and learn about DC motors, generatorsan single phase transformers.
			3. Design single phase transformers.
24	1504308	Electronic devices and circuits lab	1.Verify the V-I Characteristics of various diodes.
			2.Examine the load characteristics of rectifiers.
			3.Verify the Input and Output characteristics of various transistors.
25	1504401	Analog communications	1. Understand different blocks in communication system and how noise affects communication.
			2. Distinguish between different amplitude modulation and angle modulation schemes.
			3. Construct AM, FM Transmitters and different radio receiver circuits for various applications.
			4.Compare various Pulse modulation and demodulation techniques.
			5. Verify sampling theorem
26	1504402	Switching theoryu& logic design	1. Use number systems and binary codes.
			2. Understand the postulates, theorems and properties of Boolean algebra.

			3. Correlate the Boolean expression and their corresponding logic diagram.
			4. Design Combinational & sequential logic circuits.
			5. Solve Switching functions using Programmable Logic Devices.
27	1504403	Electronic circuit analysis	1. Apply the h – parameter model to amplifiers circuit design.
			2. Describe the various multistage amplifiers using BJT and FET.
			3. Design negative feedback amplifier circuits and oscillators.
			4. Analyze and design power amplifier circuits.
			5. Interpret the tuned amplifiers and tuned cascaded networks functionality.
28	1504404	Pulse and digital circuits	1. Demonstrate knowledge in constructing and analyzing linear and non-linear wave shaping circuits
			2. Use Logic gates and Sampling gates to develop digital systems
			3. Design and Develop Switching Circuits and Multivibrator Circuits
			4. Apply synchronization and frequency division concepts in advanced applications
			5. Distinguish among various logic families and Select the appropriate one for an application
29	1504405	Electromagnetic waves & transmission lines	1. Understand Wave propagation in loss less and conducting media
			2. Analyze Polarization ,Reflection and Refraction of plane waves
			3. Calculate different constants of Transmission line
			4. Design single and double stub matchig
			5. Understand the propagation of EM waves in waveguides
30	1504406	Probability theory & stochastic process	1. Describe various distributions of random variable
			2. Perform Operations on Single random variables
			3. Understand operations and theorems on multiple random Variables
			4. Compute PSD of Random process
			5. Analyze Linear Systems with Random Inputs

31	1504407	Electronic circuit analysis lab	1. Design and analyze the basic operations of amplifier using BJT and FET
			2. Evaluate two stage amplifiers
			3. Realize the given performance using negative feedback amplifiers
			4. Design and test oscillator circuits using BJT
			5. Design the different power amplifier circuits
32	1504408	Pulse and digital circuits lab	1. Design and analyze linear wave shaping and non-linear wave shaping circuits.
			2. Design sequential and combinational circuits using logic gates and flip-flops.
			3. Understand the switching characteristics of transistors.
			4. Design multivibrators and time base generators.
33	1504501	Micro processors and interfacing	1. Define various components and list out various features of microprocessors and peripherals.
			2. Describe the internal block diagram of microprocessors and peripherals, addressing modes, instruction set and data transfer schemes.
			3. Develop algorithm and assembly language programs to solve problems
			4. Apply an appropriate algorithm, program and peripheral for the application.
			5. Design the microprocessor based system to solve real time problems. (Prepare a case study model to get a first prototype)
34	1504502	Linear IC applications	1. Describe the DC and AC characteristics of Operational Amplifier and their compensation techniques.
			2. Understand the applications of Operational Amplifier.
			3. Analyze different analog active filters.
			4. Generate various waveforms using OP-Amp / 555 timers.
			5. Understand the principles of data converters.
35	1504503	Digital communication systems	1. Describe the functioning of digital modulation techniques.
			2. Understand the requirements for various baseband digital transmission systems.
			3. Illustrate the functioning of Digital Communication system and concepts of information theory.
			4.Apply various methods of error control coding techniques

			5.Illustrate various Digital carrier modulation schemes
36	1504504	Antenna & wave propogation	1. Define various antenna parameters
			2. Understand the radiation mechanisms of various antennas.
			3. Analyze characteristics of antenna arrays.
			4. Examine the antenna measurements.
			5.Analyze the effects of atmosphere on wave propagation.
37	1504505	Computer organization	1. Recognize the basic concepts of various units of computer
			2. Classify the instruction cycle and microprogram examples.
			3. Understand the organization of Central Processing Unit.
			4. Describe the different hardware components associated with the input-output organization of a computer.
			5. Differentiate the memory organization of a computer.
38	1504506	Digital IC applications	1. Understand CMOS, Bipolar logic families and fundamentals of VHDL Programming.
			2.Apply the concepts of VHDL for modeling and simulation of digital logic circuits.
			3.Analyze various Combinational and Sequential logic circuits.
			4.Model digital logic circuits using CMOS, BJT and ECL technologies.
39	1504507	IC application lab	1. Demonstrate the circuits with analog IC‟s (741, 555, 78XX/79XX, 723).
			2. Apply IC‟s (741, 555, 78XX/79XX, 723) in electronic applications.
			3. Design a digital system to meet required specifications.
			4. Test the functionality of system design with Test Benches.
			5. Test the results of designed digital system using FPGA.
40	1504508	Communication engineering lab	1. Use the knowledge of Amplitude, Frequency and Pulse Modulation Systems in developing analog Communication systems
			2. Use the knowledge of TDM, PCM, Delta Modulation, FSK, PSK, DPSK,QPSK in developing Digital Communication systems

			3. Perform measurements like Sensitivity, Selectivity and Fidelity of Communication subsystems and systems
			4. Use test equipment to test various communication systems they develop
41	1525601	Managerial economics & financial analysis	1. Understand principles and concepts of Managerial Economics and Accountancy.
			2. Understand the Economic theories i.e., Demand, Production, Cost, Markets and Price.
			3. Describe different types of Markets and competition, forms of organization and Methods of Pricing.
			4. Examine the profitability of various Projects.
			5. Utilize tools and techniques to analyze and interpret the key parameters of financial performance.
42	1504602	Digital signal processing	1. Apply Z-Transforms in digital system design
			2. Write algorithms for Fast Fourier Transforms
			3. Realize Digital Filters
			4. Design IIR and FIR filters for the desired characteristics.
43	1504603	Microwave engineering	1. Use Wave guide and Microwave components for various applications.
			2. Analyze various micro Wave Oscillators and Amplifiers
			3. Describe fabrication of striplines and MICs & microwave bench setup for various microwave measurements.
			4. Determine S – parameters of various microwave devices .
			5. Compute microwave signal parameters, power output and efficiency of microwave active devices.
44	1512604	Control systems	1. Demonstrate knowledge on modelling physical systems.
			2. Analyze the stability of the system in time and frequency domains
			3. Design lag, lead, lag-lead compensators in frequency domain
			4. Evaluate steady state error and static error constants
45	1504605	Micro controller& applications	1. Define various components and list out various features of microcontrollers.
			2 Describe the internal block diagram of microcontrollers, addressing modes,instruction set,physical design ,logical designof IOT,IOT levels.

			3. Develop algorithm and assembly language programs to solve problems.
			4. Apply an appropriate algorithm, program and peripheral for the application.
			5. Design the microcontroller based system to solve real time problems.
46	1515606	Data structures	1. Describe Data Types, primitive & non-primitive, and linear and non-linear data structures.
			2. Understand Arrays and Linked lists.
			3. Analyze Trees and Graphs
			4. Select appropriate searching technique and sorting technique
47	1515607	Computer networks	1. Describe OSI and TCP/IP reference models and various types of networks.
			2. Understand the functionality of various layers of reference models.
			3. Classify the routing protocols and analyze how to assign the IP addresses for the given network.
			4. Identify types of transmission media with real time applications.
			5. Analyze the functionality of various protocols.
48	1515608	Data base management systems	1. Understand the E-R model.
			2. Describe the Relational Model and SQL for the most widely used relational databases.
			3. Analyze the Normalization Techniques for Database Administration.
			4. Illustrate the Query Processing and Transaction Management.
49	1504609	Microprocessor& Micro controller lab	1. Develop algorithm and assembly language programs to solve problems.
			2. Analyze abstract problems and apply a combination of hardware and software to address the problem.
			3. Choosing an appropriate algorithm, program and peripheral for the application.
			4. Design the microprocessor based system to solve real time problems.
50	1504610	Digital signal processing lab	1. Analyze discrete/digital signals using mat lab and the basic operations of signal processing.
			2. Obtain the spectral parameters of windowing functions.
			3. Design FIR and IIR filters for desired specifications

			4. Design and implement DSP algorithms in software using a computer language such as C with TMS320C6748 floating point processor.
51	1525701	Management science	1.Know the principles and functions of management.
			2.Understand the various concepts, approaches and theories of management in the real situation.
			3.Compare and contrast organization structure designs and charts diligently with theoretical learning concepts
			4.Identify the elements of Operations management.
			5.Analyze the concept of strategic planning and implementation and apply on the decisions in strategic management.
52	1504702	Vlsi design	1. Describe the design rules and scaling concepts.
			2. Understand the various IC technologies and fabrication steps.
			3. Apply the basic functional modules for sub system design
			4. Analyze the basic electrical properties of MOS and BICMOS logic circuits
			5. Understand the models of integrated circuit design and testing techniques
53	1504703	Electronic measurements & instrumentation	1. Define the performance characteristics of an instrument.
			2. Understand the principle of analog, digital voltmeters and wave analyzers
			3. Explain different types of oscilloscopes
			4.Use AC and DC bridges for relevant parameter measurement.
			5. Apply the complete knowledge of various electronic transducers to measure the physical Quantities in the field of science and technology
54	1504704	Optical communications	1. Analyze the different kind of losses in fibers and optical fiber link design parameters.
			2. Categorize the types of optical sources and optical detectors on the basis of physical construction
			3.Identify the structures of Optical fibers based on modes, refractive index and fiber optics.

			4.Explain the necessity for using splices, couplers and connectors in energy transmission.
			5.Discuss WDM concepts, Optical Amplifiers, Optical System design and Measurements.
55	1504705	Digital image processing	1.Define various image processing parameters.
			2. Explain image filtering, segmentation and compression
			3. Compare different 2D transforms Color models and image restoration techniques
			4.Apply the concepts of image processing techniques in various applications.
			5. Analyze mathematical operations, coding and filtering methods in image processing
56	1504706	Embedded real time operating systems	1. Describe the fundamentals of Embedded System.
			2. Illustrate the basic programming models
			3. Contrast the different interfaces and protocols
			4. Use of RTOS and its Tasks
			5. Demonstrate different case studies of ERTOS
57	1504707	Neural networks and fuzzy logic	1. Understand the working of biological and artificial neural networks.
			2. Analyze different training methods.
			3. Illustrate the basic concepts of Fuzzy systems and relations.
			4. Describe the concepts of adaptive fuzzy systems and fuzzy associative memories.
58	1504708	Data communications	1. Describe the network layer model.
			2. Apply various error correction and detection methods in communication.
			3. Understand various multiplexing techniques and operation of Wireless networks
			4. Illustrate different telephone circuits and modems
59	1504709	Microwave& optical communications lab	1. Analyze the characteristics of different microwave sources.
			2. Measure the parameters of wave guide and microwave junctions.
			3. Examine the characteristics of optical fiber and sources.
			4. Verify the characteristics of microwave antennas
60	1504710	VLSIlab	1. Apply switching theory in the design of logic circuits.

			2. Analyze the combinational logic circuits and sequential logic circuits.
			3. Model various digital circuits using Verilog HDL.
			4. Synthesize different logic circuits and debug using FPGA/CPLD.
61	1504801	cellular and mobile communications	1. Describe the Elements of Cellular Radio System Design
			2. Analyze radio propagation losses at different cell site and mobile antennas.
			3. Distinguish the CO-Channel and adjacent channel interference.
			4 .Describe various handoffs and different channel assignment.
			5. Under stand the different digital cellular systems and multiple access techniques.
62	1504802	Satellite communications	1. Describe the concepts of Satellite Communication in space research.
			2. Understand the orbital aspects involved in space communication applications.
			3. Design various satellite links
			4. Analyze the concepts of multiple access techniques
			5. Design large Antennas, Tracking and Small Earth Station Antennas
63	1504803	Radar systems	1. Understand the essential principles of operation of radar systems.
			2. Describe the various Radar components
			3. Analyze different Radar systems
			4. Analyze differentradio navigation systems .
64	1504804	Speech processing	1. Apply the Fundamental concepts of speech production and speech perception in speech signal processing.
			2. Describe the mechanisms of human speech production.
			3. Choose appropriate features of speech for speech recognition.
			4. Design speech recognition system using statistical models.
65	1504805	OOPS through java programming	1. Understandsimple abstract data types and design implementations
			2. Describe the features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity
			3. Apply some common object-oriented design patterns and give examples of their use.

			4. Design applications with an event-driven graphical user interface
66	1504806	Data acquistion systems	1. Choose the elements of data acquisition techniques.
			2. Design and simulate signal conditioning circuits.
			3. Describe various data transfer techniques.
			4. Understand the components of data acquisition system.
67	1504807	Spread spectrum communications	1. Understand Fundamentals of Spread Spectrum
			2. Analysis of Direct Sequence and Avoidance – Type Spread Spectrum Systems
			3. Detect the spread spectrum signals.
			4. Describe the applications of Spread Spectrum to Communications
			5. Understand Code Division Multiple Access Digital Cellular Systems
68	1504808	Bio medical instrumentation	1. Understand the functioning of Human Cell and its electrical characteristics
			2. Describe Organization of cell and various potentuals
			3. Describe various bioelectrodes
			4. understand the functioning of cardiovascular measurement and circulatory System of heart
			5. Analyze the electrical hazards that may occur during the usage of medical instruments.