JNTUH COLLEGE OF ENGINEERING JAGTIAL

Nachupally(V), Kondagattu,Jagtial, Telangana– 505 501

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B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING

R16 Course Outcomes:

I-Year I-Semester:

MA101BS: Mathematics-I

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Identify the types of differential equations and uses the right method to solve the differential equation.	Application
CO2	Write the matrix representation of a set of linear equations and to analyze solutions of system of linear equations.	Application
CO3	Solve the Eigen values and Eigen vectors which comes under the linear transformations.	Application
CO4	Solve the extreme values of functions of two variables with/ without constraints	Application
CO5	Form the partial differential equations and solving the first order equations.	Application
CO6	Identify the nature of the Quadratic forms of Matrices.	Application

CH102BS: Engineering Chemistry

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand the parameters that characterize the quality of water and able to formulate a preliminary design of water for waste water treatment processes.	Understanding
CO2	Acquire fundamental concepts of electrode potentials, electrochemical cells and basic principles underlying electro-analytical techniques. To acquire knowledge and concepts of different types of batteries, fuel cells and their methods of operation and applications	Applying
CO3	Understand and distinguish different polymerization techniques and their mechanisms and improve skills in understanding thermal, electrical and mechanical properties of polymers. Students will be able to understand and demonstrate the different moulding techniques and processing conditions of polymers.	Understanding
CO4	Gain knowledge about conducting polymers and bio degradable polymers and their applications.	Understanding
CO5	Have the knowledge of available energy sources, understand the latest technologies to conserve the energy sources and practice energy auditing techniques.	Applying
CO6	Learn the use of fundamental principles to make predictions about the general properties of materials and their application in different areas	Understanding

PH103BS: Engineering Physics-I

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Realize the importance of light interaction with matter by interference, diffraction and polarization	Evaluate
CO2	Know the basic principles involved in the lasers and their demonstration	Understand
CO3	Explain the light propagation through the optical fibers and apply them in engineering applications	Understand
CO4	Understand various crystal systems analyzing the crystal structures	Analyze
CO5	Learn various types of defects in the crystals and their importance	Evaluate
CO6	Study the crystal structures by various diffraction methods	Analyze

EN104HS: Professional Communication in English

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Use their communication skills.	Apply
CO2	Learn grammar and its appropriate applications.	Understand & Apply
CO3	Comprehend the text.	Understand & Analyze
CO4	Avoid common errors in spoken and written language.	Apply & Analyze
CO5	Learn good manners, discipline and ethical values.	Understand
CO6	Understand advantages and disadvantages of present day education system in India.	Understand

ME105ES: Engineering Mechanics

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand the resolving and composition of forces and moments for a given force system and able to apply equilibrium conditions to solve the problems on rigid body equilibrium	Understand
CO2	Analyze the types of friction for moving bodies and problems related to friction.	Analyze
CO3	Locate the centroid of areas and centre gravity of bodies	Apply
CO4	Understand the importance and to determine moment of inertia of area and bodies	Understand & Apply
CO5	Analyze and solve the problems on kinetics of particle and rigid bodies in translation, rotation	Analyze
CO6	Analyze dynamics problems using work energy principle	Analyze

EE106ES: Basic Electrical and Electronics Engineering

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Analyze** and solve various electrical circuits by using network reduction techniques, laws and theorems.	Analyze
CO2	**Examine** various single phase A.C. circuits with sinusoidal excitation.	Evaluate
CO3	**Describe** the working of diode, BJT and FET, their biasing methods, and **deduce** the expressions for device parameters/ current/ and current-voltage relationships.	Understand & Analyze
CO4	**Discuss** and **Compare** the various diode and transistor application circuits such as rectifiers, filters, and amplifiers.	Understand & Analyze
CO5	**Analyze** the various methods of biasing of transistor and small signal transistor (BJT) amplifier configurations using h-parameters.	Analyze
CO6	**Discuss** and **Compare** the various special purpose electronic devices such as Zener diode, Tunnel diode, Varactor diode and SCR, w.r.t. their of principle of operation and applications.	Understand & Analyze

EN107HS: English Language Communication Skills Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Attain language proficiency through audio- visual assistance.	Understand & Apply
CO2	Obtain good accent and intelligibility in pronunciation.	Apply
CO3	Gain neutralization of the influence of regional accent.	Understand & Apply
CO4	Command in group discussion, attain mastery in interviews.	Apply & Analyze
CO5	Gain prosperity in word power, proper usage of words and syntax.	Analyze & Evaluate
CO6	Acquire different types of effective writing skills.	Understand & Apply

ME108ES: Engineering Workshop

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Achieve the basic knowledge on various engineering materials.	Understand
CO2	Acquire the knowledge in various manufacturing process in the basic mechanical engineering workshop sections-smithy, carpentry, Fitting, welding etc.	Understand
CO3	Identify the various hand tools used in the basic mechanical engineering workshop sections-smithy, carpentry, Fitting, welding etc.	Understand
CO4	Achieve the basic knowledge on different operations/processes - measuring, marking, Cutting, finishing etc.,	Understand
CO5	Apply basic electrical engineering knowledge for house wiring practice.	Apply
CO6	Enhance team spirit and improve the ability to work together in engineering workshop practice.	Create

I-Year II-Semester:

PH201BS: Engineering Physics-II

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Realize the importance of behavior of particle quantum mechanically	Evaluate
CO2	Learn concentration estimation of charge carriers in semiconductors and demonstration of semiconductor devices	Understand
CO3	Learn various magnetic and dielectric properties and apply them in engineering applications	Understand
CO4	Know the basic principles and applications of superconductors	Remember
CO5	Fabrication of nano materials by top-down and bottom-up methods	Create
CO6	Understand the properties of nano materials and their applications	Understand

MA202BS: Mathematics-II

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Apply the concept of Laplace transform techniques for solving Differential Equations	Application
CO2	Evaluate the Integrations by using Beta and Gamma functions	Evaluation
CO3	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	Evaluation & Application
CO4	Understand the concept of the basic properties of vector valued functions and Vectors operators	Comprehension
CO5	Apply the Vector integration theorems (Gauss Divergent, Stokes & Greens theorems)	Application
CO6	Evaluate the line, surface and volume integrals and converting them from one to another.	Evaluation & Application

MA203BS: Mathematics-III

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Differentiate among random variables involved in the probability models which are useful for all branches of engineering	Analysis
CO2	Calculate mean, proportions and variances of sampling distributions and to make important decisions of a few samples which are taken from a sample data whose size is large and small.	Application
CO3	Solve the tests of ANOVA for one way classified data	Application
CO4	Find the roots of a given algebraic and transcendental equations and find the solution of a system of linear equations	Application
CO5	Solve the numerical solutions for a given first order initial value problem and evaluate the numerical Integrations by using various methods	Application
CO6	Fit curves for a given data by using the method of least square.	Evaluation & Application

CS204ES: Computer Programming in C

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Write algorithms, flowcharts and C programs for a given problem. Analyze day to day problems and able to represent them using algorithms, flow charts and C programs.	Apply
CO2	Decompose a problem into functions and to develop modular reusable code using arrays, storage classes and recursion etc.,	Apply
CO3	Compose programs using the concepts of pointers, parameter passing mechanism and string processing.	Create
CO4	Distinguish between homogeneous & heterogeneous data types and effective utilization of memory using structures and unions.	Apply
CO5	Appreciate the usage of file concept and able to write C programs using the file handling functions.	Understand & Apply
CO6	Formulate the 'C' code for a given problem, learn the required programming skills as per IT industry requirements and competitive examinations.	Apply

ME205ES: Engineering Graphics

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand the importance of codes from BIS and ISO Standards in Engineering Drafting.	Understand
CO2	Construct graphically and understand the importance of basic mathematical curves in Engineering applications	Create & Remember
CO3	Visualize and Demonstrate various geometrical structures (i.e. points, lines, planes and solids) through Orthographic Projections.	Apply
CO4	Prepare and interpret the orthographic and Isometric views of various solids.	Apply
CO5	Draw and develop the sectional views, surfaces of geometrical solids and projections of intersecting solids.	Apply
CO6	Confident in preparing 2D and 3D drawings using CAD.	Understand

CH206BS: Engineering Chemistry Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Determine the properties like hardness of water and chloride content in water.	Understanding
CO2	Understand the interaction of light with various solutions by calorimetry.	Understanding
CO3	Estimate the concentration of various unknown solutions using conductometric titrations.	Understanding
CO4	Estimate the concentration of various unknown solutions using Potentiometric titrations.	Understanding
CO5	Estimate the various metals like iron, copper by using volumetric analysis technique.	Understanding
CO6	Calculate the percentage of metals from present in it ore using back titration technique.	Understanding

PH207BS: Engineering Physics Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand the interaction of light with the matter by Newton's Rings- Diffraction grating and dispersive power of prism	Apply
CO2	Understand the mechanical behavior of materials by using Torsional pendulum and Melde's& experiment	Evaluate
CO3	Realize the importance of electrical response of various components by the experiments of LCR Circuit and CR Circuit.	Create
CO4	Know the basic principle of magnetic field along the axis of current carrying coil by using Stewart and Gees method	Analyze
CO5	Study the light propagation, amplification and light emission by optical fiber, Laser , LED respectively	Apply
CO6	Understand the knowledge of semiconductor behavior of PN Junction diode and solar cell.	Apply

CS208ES: Computer Programming in C Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Translate given algorithms into C programs without syntax and logical errors.	Apply
CO2	Write C programs with indenting.	Apply
CO3	Design and test programs to solve mathematical and scientific problems.	Apply
CO4	Write structured programs using control structures and functions.	Apply
CO5	Create, read and write from and to simple text and binary files.	Apply
CO6	Modularize the code for a given logic with functions so that they can be reused.	Apply

II-Year I-Semester:

MA301BS: Mathematics – IV

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Analyze the complex functions with reference to their analyticity, using Cauchy Riemann equation	Analysis
CO2	Evaluate integration of complex functions using Cauchy's integral theorem and Cauchy's integral formula.	Evaluation
CO3	Formulate and solve the periodic function in terms of sine and Cosine	Application
CO4	Solve a non-periodic function as integral representation and learn the expansion of a given function by Fourier series	Application
CO5	Analyze one dimensional wave and heat Equation	Analysis
CO6	Find the Taylor's and Laurent's series expansion of complex functions.	Evaluation

EC302ES: Analog Electronics

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Design** and **analyze** small signal amplifier circuits applying the biasing techniques learnt earlier.	Create & Analyze
CO2	Cascade different amplifier configurations to **compute** the required overall specifications like gain, bandwidth, input and output impedances.	Apply
CO3	**Discuss** the operation of transistor at high frequency and its frequency response.	Understand
CO4	**Analyze** the various configuration of JFET amplifier and concept of MOSFETs.	Analyze
CO5	**Compare** and **Contrast** various types of Feedback amplifiers and Oscillator circuits.	Evaluate
CO6	**Classify** the Large Signal and Tuned Amplifiers and **Calculate** the efficiency of various Power amplifier circuits.	Understand & Analyze

EC303ES: Electrical Technology

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Explain the working principle of dc machines and identify speed control of dc motors	Understand
CO2	Understand the principle of transformers and its types	Understand
CO3	Analyze the performance of induction machine in order to implement in house hold and industrial applications	Analyze
CO4	Demonstrate knowledge on importance of Voltage regulation of Alternators	Evaluate
CO5	Understand the principle of operation of moving iron and moving coil instruments and special purpose motors	Understand
CO6	Analyze the efficiency of dc machines, transformers and induction motors	Analyze

EC304ES: Signals and Stochastic Process

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Represent** any arbitrary signals interms of complete sets of orthogonal functions and **define** the various standard signals like impulse functions, stepfunction and signum function etc.	Understand
CO2	**Express** periodic signals interms of Fourier series and **Analyze** the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis.	Understand & Analyze
CO3	**Apply** the Laplace transform and Z- transform for analyze of continuous-time and discrete-time signals and systems.	Apply
CO4	**Determine** the response of LTI system using convolution and **illustrate** the the concepts of correlation and **Describe** the process of sampling and the effects of under sampling.	Understand & Evaluate
CO5	**Describe** the temporal characteristics like mean, Auto Correlation Function, Cross Correlation Function etc. of random process.	Understand
CO6	**Analyze** random processes spectral characteristics like power spectral density etc.	Analyze

EC305ES: Network Analysis

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Discuss the knowledge on Basic network elements and Network topologies.	Understanding
CO2	Analyzing the knowledge on fundamentals of Magnetically coupled circuits..	Analyzing
CO3	Evaluate the RLC circuits' behavior in detail.	Evaluate
CO4	Justify the performance of periodic waveforms using Laplace transform techniques.	Evaluate
CO5	Illustrate and Analyze the knowledge of characteristics of the two port network parameters (Z, Y, ABCD, h, g, etc.).	Analyzing
CO6	Design the filter design concepts in real world applications.	Create

EC306ES: Electronic Devices and Circuits Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Identify** and discuss the specifications, and **Test** the various passive and active electronic components including R, L, C, switches, diodes, BJT, FET, SCR and UJT.	Apply & Analyze
CO2	**Demonstrate** the characteristics of PN junction diode, Zener diode, SCR and UJT.	Apply
CO3	**Design** and **compare** various rectifier circuits with and without filter.	Create & Analyze
CO4	**Examine** the input and output characteristics of BJT and FET in various configurations and **compute** the various performance parameters.	Analyze & Apply
CO5	**Design** the various transistor biasing circuits for building an amplifier.	Create
CO6	**Determine** the frequency response of BJT and FET amplifiers using Power supply, Function generator and CRO and **compute** the mid band gain and gain bandwidth product.	Evaluate & Apply

EC307ES: Basic Simulation Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Express** the various types of signals and systems and perform operations on signals and sequences	Apply
CO2	**Compute** the response of an LTI system to given different types of signals. And also **perform** Fourier analysis of signals	Apply & Evaluate
CO3	**Compute** the convolution and correlation operations on different signals.	Apply
CO4	**Apply** Laplace transform and able to locate poles and zeros of a system.	Apply
CO5	**Compute** various statistical properties of a random noise and verify whether it is stationary.	Apply
CO6	**Verify** the Sampling theorem and illustrate the concept of Gibbs phenomena.	Evaluate

EC308ES: Basic Electrical Engineering Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Predict the performance of DC machines	Understand
CO2	Justify dc network theorems by setting up various networks	Evaluate
CO3	Compare and contrast types of resonance circuits	Analyze
CO4	Express given electrical circuits in terms of ABCD,Z AND Y parameters model and solve the circuits	Evaluate
CO5	Work in teams to conduct experiments, analyze results	Analyze
CO6	Predict performance of transformers using standard equivalent circuit models.	Understand

*MC300ES: Environmental Science and Technology

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Develop technologies considering ecosystem values	Create
CO2	Recognize immense importance of natural resources, and explore future optional possibilities for development	Remember
CO3	Acquaint the value and appreciation for biodiversity services we receive, in turn will mould development under the frame work of biodiversity management strategie	Remember
CO4	Identify the causes of pollution, will realize global impacts of pollution and move path forward with green development	Remember
CO5	Develop ethically, socially, legally towards sustainable development	Create
CO6	Understand the method to assess the environmental impact of developmental proposals prior to major decisions being taken and commitments made	Understand

II-Year II-Semester:

EC401ES: Switching Theory and Logic Design

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Define the different forms of number representation in digital electronic circuits and to be able to convert between different representations.	Remember
CO2	Apply the simplification methods such as Boolean algebra, k-map and Tabular method to simplify the given Boolean function.	Apply
CO3	Discuss basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.	Understand
CO4	Design various combinational circuits like multiplexers, arithmetic circuits etc	Create
CO5	Design various sequential circuits like flip-flops, registers, counters etc	Create
CO6	Analyze the finite state machines such as Mealy and Moore machine	Analyze

EC402ES: Pulse and Digital Circuits

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Demonstrate the linear wave shaping of RC, RL circuits.	Apply
CO2	Demonstrate the Non-linear wave shaping of clipper circuits and clamping circuits.	Apply
CO3	Analyze different types of Multi vibrators and their construction procedures.	Analyze
CO4	Explain the functions of time base generators.	Evaluate
CO5	Evaluate the synchronization and frequency division circuits.	Evaluate
CO6	Design the different logic gates circuits using diodes and transistors.	Create

EC404ES: Control Systems

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Enumerate** the different types of control systems and **develop** the mathematical model of the physical systems.	Remember & Create
CO2	**Interpret** different physical systems in terms of electrical and mechanical systems to construct equivalent electrical models for analysis.	Evaluate & Create
CO3	**Employ** time domain analysis to analyze transient and steady state response of the system for standard input functions.	Apply & Analyze
CO4	**Explain** the nature of stability of the system and **investigate** different types of stability analysis in frequency domain and time domain	Analyze
CO5	**Identify** the needs of different types of controllers and design of PID controllers,lag,lead,lag-leadcompensators.	Remember & Create
CO6	**Construct** state space model for continuous systems and **develop** the state space model for physical systems	Apply & Create

EC405ES: Analog Communications

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Discuss different amplitude modulation techniques	Understand
CO2	Analyse the time domain and frequency domain description of SSB and VSBSC	Analyse
CO3	Design generation and detection of FM signal and comparison between amplitude and angle modulation schemes.	Create
CO4	Discuss the different types of Noises and evaluate the performance of the communication system	Evaluate
CO5	Interpret different types of receivers	Remember
CO6	Differentiate between different pulse modulation and demodulation techniques and signal multiplexing for various applications	Evaluate

SM405MS: Business Economics and Financial Analysis

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand various forms of business, sources of capital for a company and GDP of economy and phases of business cycle	Understanding
CO2	Analyze demand and supply concepts and different types, and measurement of elasticity of demand and factors influencing on elasticity of demand.	Analysing
CO3	Identify production techniques, and different types of internal economies, external economies and law of returns with appropriate examples.	Understanding
CO4	Evaluate various kinds of market structures, pricing strategies and BEA analysis concepts.	Evaluating
CO5	Apply the concepts of accounts and preparation of financial statements.	Applying
CO6	Create cash and fund flow statements for business organization	Creating

EC406ES: Analog Communications Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Classify and explain Analog modulation techniques	Understand
CO2	Demonstrate understanding of frequency modulation and demodulation technique.	Apply
CO3	Demonstrate and perform the Sample theorem	Apply
CO4	Compare FDM and TDM characteristics	Evaluate
CO5	Examine the operation of pre-emphasis and de-emphasis practically	Analyse
CO6	Design various pulse modulation techniques like PAM, PPM and PWM.	Create

EC407ES: Pulse and Digital Circuits Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Describe the operation of linear wave shaping circuits such as high pass and low pass for various input signals	Understanding
CO2	Design the linear and non linear wave shaping circuits such as clippers and clampers	Create
CO3	Analyze the switching characteristics of devices	Analyze
CO4	Analyze the principles of synchronization and frequency division circuits operating at different frequencies.	Analyze
CO5	Determine the operation of various logic gates	Apply
CO6	Classify the various multivibrator circuits.	Analyze

EC408ES: Analog Electronics Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Design** and **test** the hardware of various Transistor Amplifier circuits without feedback.	Create
CO2	**Examine** the frequency response, input and output impedances of various feedback amplifier circuits.	Evaluate
CO3	**Demonstrate** the working of RC and LC oscillator circuits and **determine** frequency of oscillations practically.	Apply
CO4	**Simulate** various Amplifier and Oscillator circuits using Multisim software.	Create
CO5	**Examine** the efficiency of various power amplifier circuits.	Evaluate
CO6	**Demonstrate** the working of Tuned amplifiers practically.	Apply

*MC400HS: Gender Sensitization Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Develop a better understanding of important issues related to gender in contemporary India.	Understand
CO2	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.	Understand & Analyze
CO3	Attain a finer grasp of how gender discrimination works in our society and how to counter it.	Apply & Evaluate
CO4	Acquire insight into the gendered division of labour and its relation to politics and economics.	Understand
CO5	Men and women students and professionals will be better equipped to work and live together as equals.	Apply
CO6	Develop a sense of appreciation of women in all walks of life.	Apply

III-Year I-Semester:

EC501PC: Electromagnetic Theory and Transmission Lines

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Summarize the basic equations of electromagnetic vector fields.	Evaluating
CO2	Determine the Static and Time varying Maxwell's equations and their applications in electromagnetic problems	Evaluating
CO3	Discuss the boundary conditions of static electromagnetic fields at various interfaces.	Create
CO4	Illustrate the transmission line equations and various transmission parameters	Analysing
CO5	Describe the wave propagation equations in various medium.	Understanding
CO6	Analyze the reflection and refraction of plane waves and define total internal reflection.	Analysing

EC502PC: Linear and Digital IC Applications

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Discuss** the basics of op-amp & apply the knowledge of engineering fundamentals to explain the operation of inverting, non-inverting amplifier, differentiator, integrator etc. using IC741	Understand & Apply
CO2	**Explain** the operation of various types of filters, various types of multi-vibrators & **design** them.	Understand & Create
CO3	**Discuss** the operation of various types of analog to digital and digital to analog converters & **Design** them.	Understand & Create
CO4	**Explain** the operation of various combinational Digital ICs & design them	Understand & Create
CO5	**Compare** various types of flip-flops i.e. JK,SR,D,T Flip-flops and IC's related to it.	Analyze
CO6	**Compare** the operation of various memory circuits like RAM,ROM and IC's related to it.	Analyze

EC503PC: Digital Communications

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Discuss the basics of information theory and source coding techniques.	Understand
CO2	Describe and determine the performance of line codes and methods to mitigate inter symbol interference	Evaluate
CO3	Illustrate the generation and detection of base band system	Apply
CO4	Estimate probability of error analysis of different band pass modulation techniques	Evaluate
CO5	Compare various Digital Modulation techniques like ASK,FSK ,QPSK,8-PSK,QAM etc	Analyse
CO6	Describe spread spectrum modulation & design DSSS & FHSS System	Create

SM504MS: Fundamentals of Management

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Apply the management concepts and approaches by correlating with engineering aspects to acquire the managerial skills on real time situations	Applying
CO2	Efficiently plan, implement, solve problem and frame strategies to solve technical and managerial problem for decision making even at critical times	Applying
CO3	Understand and apply organizational principles by delegating and empowering the appropriate HR and practice talent management	Understanding & Applying
CO4	Understand various leadership styles to handle during adversity and crisis and to learn various motivational theories for implementation in industrial carrier	Understanding
CO5	Apply various controlling techniques in business environment and frame strategies for organizational effectiveness	Applying
CO6	Gather and analyze both qualitative and quantitative information required for planning, organizing, directing and controlling a team.	Analysing

CS511OE:Operating Systems(Open Elective – I)

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand objectives, functions and evolutions of operating systems.	Understand
CO2	Evaluation of various process scheduling algorithms and analyzing solutions to critical section problem.	Analyze
CO3	Apply memory management concepts and appreciate virtual memory concept.	Apply
CO4	Understand file system interfaces and disk storage in Operating Systems.	Understand
CO5	Analyzing deadlock situations and applying methods to handle deadlocks.	Analyze
CO6	Understand Comprehensive analysis of various operating systems.	Understand & Apply

EC505PC: Linear IC Applications Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Design and analyse** the inverting & non inverting amplifier, adder and subtractor using op-amp (IC 741)	Create & Analyse
CO2	**Design** comparator, integrator & differentiator circuits using op-amp (IC 741)	Create
CO3	**Design** first order active LPF, HPF using op-amp (IC 741)	Create
CO4	**Design** monostable & astable multi-vibrator using IC 555	Create
CO5	**Analyze** various voltage Regulators using IC78xx, IC 79xx, IC 723	Analyze
CO6	**Design** Wave for generators(sine, square and sawtooth) using IC 741	Create

EC506PC: Digital IC Applications Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Describe the operation of logic gates and working of digital logic circuits.	Understand
CO2	Design the various combinational logics circuits by using logic gates, like logic gates, priority encoder, multiplexers and comparator.	Create
CO3	Evaluate the results of combinational circuits using different IC's.	Evaluate
CO4	Describe the operation of flip-flops and working of sequential circuits.	Understand
CO5	Design the sequential circuits by using flip-flops like counters and decade counters and registers.	Create
CO6	Evaluate the results of sequential circuits using different IC's.	Evaluate

EC507PC: Digital Communications Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Design PCM, DPCM Generation & Detection models	Create
CO2	Generate the output waveforms of the DM and ADM	Analyze
CO3	Construct & Compare TDM, FDM systems & observe the output waveforms practically	Create & Analyze
CO4	Calculate the bandwidth of various Digital modulation techniques like ASK, PSK, FSK using spectrum analyser	Analyse
CO5	Compare QPSK and QAM generation and detection methods	Evaluate
CO6	Demonstrate spread spectrum modulation & design DSSS & FHSS System	Apply

*MC500HS: Professional Ethics

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Deal effectively with moral complexity in the engineering practice	Apply
CO2	Basic theories act as moral guides to the engineers.	Remember & Apply
CO3	Professional practices resolve moral issues in the profession	Evaluate
CO4	Rights and responsibilities help to justify moral judgment concerning the profession	Evaluate
CO5	Global issues help the students to develop a set of beliefs, attitudes and habits	Create
CO6	Learn the rights and responsibilities as an employee, team member and a global citizen.	Understand & Analyze

III-Year II-Semester:

CS621OE: Java Programming(Open Elective-II)

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand the oop Concepts like Inheritance, polymorphism, Encapsulation etc.	Understand
CO2	Use Various Complex Techniques like Multithreading and Exception Handling in Solving Problems.	Apply
CO3	Establish Database Connectivity to java Programs.	Create
CO4	Handle Files and mouse Events using Adapter Classes	Understand
CO5	Develop Applets for Web-Based Programming Applications	Create
CO6	Use Awt Components in java Programs for GUI Applications and Applets for Internet Applications	Apply

ME622OE: Fundamentals of Robotics(Open Elective – II)

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand the basic components of robots.	Understand
CO2	Differentiate types of robots drive systems and grippers.	Analyze
CO3	Model forward and inverse kinematics for robots manipulators.	Create
CO4	Analyze forces in links and joints of robot manipulators.	Analyze
CO5	Program a robot to perform tasks in industrial applications and analyze robot economics.	Create
CO6	Design intelligent robots using various sensors and image processing & data reduction method for the control of robots	Create

EC612PE: Digital Image Processing(Professional Elective-I)

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Interpret and analyse 2D signals in frequency domain through image transforms.	Apply
CO2	Explain different techniques employed for the spatial enhancement of images.	Understand
CO3	Analyze image enhancement in the frequency domain	Analyse
CO4	Design Least mean Square filters & constrained least square restoration for image restoration purposes	Create
CO5	Explain image segmentation and representation techniques.	Analyse
CO6	Discriminate the redundancies elimination techniques for an image	Evaluate

EC601PC: Antennas and Wave Propagation

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Explain the fundamentals, basic parameters in the design of an antenna and apply for various designed antennas	Understand Apply
CO2	Analyze the designed thin linear wire antennas	Analyze
CO3	Analyze antenna array systems of different antennas and field analysis under application of different currents to the individual antenna elements	Analyze
CO4	Analyze Yagi-Uda, helical structure , reflector antennas, horn antennas and micro strip antennas	Analyze
CO5	Evaluate the basic antenna parameters and also the bench setup for antenna parameter measurement of testing for their effectiveness.	Evaluating
CO6	Classify and study the behavior of nature on EM wave propagation.	Understand

EC602PC: Microprocessors and Microcontrollers

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Discuss** and **compare** the internal architecture and organization of 8086, 8051 and ARM processors/controllers.	Understand & Analyze
CO2	**Demonstrate** programming proficiency using various addressing modes and instructions set of target microprocessor and microcontroller and validate on microprocessor and microcontrollers kits / MASM.	Apply
CO3	**Illustrate** the use of interrupts, serial communication, timers for real time control in 8051 with programming.	Apply
CO4	**Illustrate** the interfacing of I/O and memory devices with 8051.	Apply
CO5	**Use** various serial communication and bus interface units.	Apply
CO6	**Outline** the architecture of ARM Cortex and OMAP processor	Analyze

EC603PC: Digital Signal Processing

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Define** the fundamental concepts of DSP theory such as sampling theory, discrete frequency and Z –transform.	Remember
CO2	**Compute** the DTFT, DFT, and FFT of the discrete systems and relationships between DFT and various transforms.	Apply
CO3	**Design** and implement digital infinite impulse response (IIR) filters using digital techniques.	Create
CO4	**Design** and implement digital finite impulse response (FIR) filters. And **compare** FIR and IIR filters	Create & Evaluate
CO5	**Construct** the various structures for the digital filters.	Apply
CO6	**Analyze** the tradeoff sbetween normal and multirate DSP techniques and **discuss** the varous finite length word effects.	Analyze & Understand

EC604PC: Digital Signal Processing Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Write** the program of digital signal processing algorithms in MATLAB	Remember
CO2	**Compute** the DFT and FFT using MATLAB	Apply
CO3	**Design** IIR and FIR filters for low pass and high pass filters.	Create
CO4	**Apply** Multi-Rate signal processing concepts like decimation, interpolation and sampling rate conversion.	Apply
CO5	**Demonstrate** their abilities towards DSP processor based implementation of DSP systems.	Apply
CO6	**Apply** the DSP applications for audio signal and DTMF generation	Apply

EC605PC: Microprocessors and Microcontrollers Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Demonstrate** the assembler (Masm software) and 8086 /8051 kit for execution of the different programs.	Apply
CO2	**Develop** the programs of 8086 and 8051 using the respective instruction set.	Create
CO3	**Discuss** the usage of various debugging tools available to program for different microcontrollers.	Understand
CO4	**Test** the programs written using Arithmetic, Logical, Conditional and String Manipulated instructions using 8086 microprocessor and 8051 microcontroller kits.	Evaluate
CO5	**Demonstrate** serial and parallel communication, interfacing of ADC and DAC, stepper motor, LCD and matrix keyboard for various applications.	Apply
CO6	**Design** and **formulate** the programs of various interrupts timer and counter circuits for real time control applications.	Create

EN606HS: Advanced English Communication Skills Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Write forms of Letters, Reports, Resumes and Portfolios.	Understand & Apply
CO2	Develop proficiency in oral and written communication.	Remember & Create
CO3	Understand different kinds of verbal and non-verbal texts	Understand
CO4	Improve listening skills and reading comprehension.	Analyze & Create
CO5	Acquire the knowledge of presenting PPTs.	Apply
CO6	Participate effectively Group Discussion and face Interviews.	Understand & Apply

IV-Year I-Semester:

EC701PC: Microwave Engineering

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Explain and analyze the significance of microwave and microwave transmission lines.	Understand & Analyze
CO2	Analyze the characteristics of the various Cavity Resonators and wave guide components	Analyze
CO3	Study the characteristics of microwave tubes and compare them.	Evaluating
CO4	Classify the various microwave solid state devices.	Analyze
CO5	Evaluate the Scattering coefficients for various microwave components.	Evaluating
CO6	Appraise microwave parameters using a microwave test bench at microwave frequencies	Evaluating

EC721PE: Computer Networks (Professional Elective – II)

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand and explore the basics of computer networks and layered approach used for simulating the networking environment.	Understand
CO2	Identify the protocols used in the different layers of OSI model and TCP/IP protocol suite.	Understand & Apply
CO3	Understand the basic knowledge about various connecting devices used in building a networking environment.	Understand
CO4	Identify and administrate the flow of information in the various types of networks.	Apply
CO5	Understand and analyze the routing algorithms finding the shortest path.	Understand
CO6	Understand different protocols using in Transport layer and Application layer	Understand

EC731PE: Wireless Communications and Networks(Professional Elective – III)

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Discuss the fundamentals of cellular systems and wireless networking concepts.	Understand
CO2	Describe the mobile radio propagation-I, large scale path loss, diffraction, outdoor propagation and indoor propagation.	Understand
CO3	Distinguish between flat fading and frequency selective fading, Distinguish between fading affect due to multipath time delay spread, fading affect due to Doppler spread fast fading.	Understand
CO4	Describe small scale fading, Model of multipath channel and algorithm for adaptive equalization.	Understand
CO5	Describe the diversity techniques and derivation of the maximal ratio combining improvement and RAKE receiver.	Understand
CO6	Summarize the principles of wireless networks, WLAN topologies and WLAN standards.	Evaluate

EC743PE: Electronic Measurements and Instrumentation(Professional Elective – IV)

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Describe the fundamentals concepts and the principle of operation of various instruments.	Understand
CO2	Demonstrate the use of signal generators, analyzers, ADC, DAC, CRO and DSO for appropriate measurement.	Apply
CO3	Analyze different static and dynamic characteristics of instrument & based on this will be able to select particular instrument for measurement.	Analyze
CO4	Select transducers for particular application.	Evaluate
CO5	Design AC and DC bridges for relevant parameter measurement.	Create
CO6	Define units and standards, their conversions and characteristics and error analysis of measurement system.	Remember

EC702PC: VLSI Design

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Discuss CMOS fabrication flow and technology scaling.	Understand
CO2	Design MOSFET based logic circuits	Create
CO3	Sketch layout of a inverter logic circuit	Apply
CO4	Construct logic circuits with different design styles	Create
CO5	Distinguish between different types of CMOS memories	Analyse
CO6	Compare the different types of faults occur in digital circuits	Evaluate

EC703PC: VLSI and E-CAD Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Discuss ECAD tools for VLSI design	Understand
CO2	Use different types of style modelling for digital circuits	Apply
CO3	Analyze the performance of CMOS circuits in terms of Power, delay and Area	Analyze
CO4	Apply test bench for combinational circuits for verification	Apply
CO5	Develop the hardware design after execution the software HDL code	Create
CO6	Identify faults in systems and adding extra hardware to improve testability of system	Analyze

EC704PC: Microwave Engineering Lab

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understanding various components of microwave test bench setup and in analyzing various types of microwave measurements.	Understand & Analyze
CO2	Evaluate the Frequency, attenuation using microwave test bench setup.	Evaluating
CO3	Evaluate the voltage standing wave ratio and unknown impedance for microwave components.	Evaluating
CO4	Estimate the scattering coefficients at various ports of microwave components.	Creating
CO5	Illustrate the Reflex klystron and Gunn diode Characteristics using Microwave test bench setup.	Understand
CO6	Evaluate the performance characteristics of directional Coupler	Evaluating

EC705PC: Industry Oriented Mini Project

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Survey** the literature to identify and **formulate** the engineering problem.	Analyze
CO2	List the various approaches to the selected problem. **Interpret** the advantages and disadvantages of various approaches.	Apply
CO3	Apply the selected approach for simulation / modelling / designing the problem.	Design
CO4	**Analyse** and write a project report based on the results of the simulation / modelling of the problem selected.	Analyze
CO5	**Justify** and present the results of the simulation / model / design before the departmental review committee.	Evaluate
CO6	**Plan** and work in a team with other peers and achieve the results within the stipulated time.	Create

EC706PC: Seminar

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Express interesting technical seminar topics.	Understand
CO2	Collect the information about emerging technologies from the literature.	Create
CO3	**Exhibit** effective communication skills, stage courage, and confidence.	Apply
CO4	Demonstrate interpersonal skills.	Apply
CO5	Design the existing product and new innovations.	Create

IV-Year II-Semester:

CS833OE: PHP Programming

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Develop a form containing several fields and be able to process the data provided on the form by a user in a PHP based script	Creating
CO2	Understand basic PHP syntax for variable use and standard language constructs such as conditionals and loops.	Understanding & Applying
CO3	Understand the syntax and functions available to deal with file processing for files on the server as well as processor web URLs.	Understanding
CO4	Understand the paradigms for dealing with form based data, both from the syntax of html forms and how they are accessed inside a PHP based script.	Understanding
CO5	Understand the different kinds of errors and create PHP pages with images.	Understanding & Creating
CO6	Create PHP forms and connect to the database and fetch the results from database.	Creating

EC853PE: Optical Communications

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Classify the structures of optical fibres and types	Understanding
CO2	Design optical fibre communication links using appropriate optical fibres light sources and detectors such as LASER and APD	Create
CO3	Discuss signal distortion in fibres	Understanding
CO4	Apply the fundamental principles of optics and light wave to design optical fibre communications	Applying
CO5	Explore the optical system design considerations and power launching	Analysing
CO6	Evaluate Laser diode equations, power coupling parameters	Evaluate

EC853PE: Global Positioning System

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	Understand the architecture of various satellite navigation systems such as GPS and GLONASS and compare them.	Understand and Evaluate
CO2	Understand the construction/architecture of GPS/ Galileo satellite and the GPS receiver, satellite phased development (modernization), GPS satellite signal structure, and compute the satellite position using appropriate algorithms.	Understand and Apply
CO3	Interpret the effect of various error sources and satellite geometry on the performance of GNSS.	Apply
CO4	Compare the local and wide area differential GPS schemes and understand the architecture of the GAGAN system.	Analyze
CO5	Estimate the GPS user position using the observation and navigation data parameters.	Evaluate
CO6	Understand the use and applications of GPS in various systems.	Understand

EC801PC: Major Project

After completion of this course, the students will be able to:

Course Outcome No.	Course Outcome (CO)	Cognitive level
CO1	**Survey** the literature to identify and **formulate** the engineering problem.	Analyze
CO2	**Select** appropriate modern engineering tools and components for solving the identified problem.	Evaluate
CO3	**Design** and **develop** engineering solutions to complex problems with systems approach and acquire analysis, synthesis, creative and evaluation skills.	Create
CO4	**Illustrate** written and oral communication skills through project report documentation and presentation.	Apply
CO5	**Justify** and present the results of the simulation / model / design before the departmental committee.	Evaluate
CO6	**Plan** and work in a team with other peers and achieve the results within the stipulated time.	Create