



**ELECTRICAL AND  
ELECTRONICS  
ENGINEERING**



Estd:1980

## **B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING**

### **Department Vision**

Transforming the individuals into globally competent Electrical Engineers to accomplish the technological needs of the society.

### **Department Mission:**

- Establishing world class infrastructure in Electrical Engineering.
- Adopting continuous improvement methods in content delivery and assessment.
- Facilitating industry institution interaction in teaching & learning, consultancy and research activities to fulfill the technological needs of the society.
- Encouraging the faculty and students to carry out innovative research and practicing ethical standards.
- Motivating the students for active participation in co-curricular and extracurricular activities.

### **Program Educational Objectives (PEOs) :**

<b>PEO1</b>	Graduates will be technically sound to have vibrant careers in core & IT sector.
<b>PEO2</b>	Graduates will compete, sustain, lead and enhance in competitive world.
<b>PEO3</b>	Graduates will serve the nation by solving technical problems with professional ethics and social responsibility

### **Program Specific Outcomes (PSO's):**

<b>PSO1</b>	The ability to analyse, design and implement power systems, power electronics, control systems using software systems.
<b>PSO2</b>	The ability to apply project management techniques to electrical & Electronics systems & to utilize applied differential equations, matrices, different transform methods, discrete mathematics in support to the program.



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**Program Outcomes (POs):**

**Engineering Graduates will be able to:**

1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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**Course outcomes (Cos) of all courses of all programs offered by the institution**

<b>Course Outcomes for First Year First Semester Course</b>	
<b>Course Code: B16 ENG 1101</b>	
<b>Course Title: ENGLISH</b>	
<b>CO-1</b>	The overall performance of the students will be enhanced after the course; they will be in a position to make presentations on topics of current interests – politics, famous personalities, science and technology, tourism, work and business environment, with increased public speaking skills.
<b>CO-2</b>	Students will be able to read, listen, speak and write effectively in both academic and non academic environment.
<b>CO-3</b>	The students will be updated with certain real life situations, which they can handle when, come face to face.
<b>Course Code: B16 ENG1102</b>	
<b>Course Title: MATHEMATICS-I</b>	
<b>CO-1</b>	Find partial derivatives, expand a function of more than one variable in a Taylor series and utilize them for errors and approximations, maxima and minima.
<b>CO-2</b>	Solve a first order ODE and also find orthogonal trajectories and solve problems related to simple applications.
<b>CO-3</b>	Solve a given higher order ODE, an equation with constant coefficients, a Cauchy's equation or a Legendre's equation.
<b>CO-4</b>	Utilize knowledge of Fourier series for solving partial differential equations and also in understanding courses like Signals & Systems
<b>Course Code: B16 ENG 1103</b>	
<b>Course Title: MATHEMATICS – II</b>	
<b>CO-1</b>	Utilizing the knowledge of matrices for solving linear simultaneous equations, find Eigen values and Eigen vectors and handle quadratic forms
<b>CO-2</b>	Utilizing the knowledge of Laplace Transforms to find transforms of important functions that arise in applications and also solve ODE
<b>CO-3</b>	Utilizing the knowledge of Laplace Transforms in courses like Net Works, Signals & Systems and Control Systems
<b>CO-4</b>	Utilizing the knowledge of difference equations and Z-transforms in understanding courses like Discrete Mathematical Structures and also Signals & Systems.
<b>Course Code: B16 ENG1105</b>	
<b>Course Title: PHYSICS</b>	
<b>CO-1</b>	Students learn in depth about the topics of Lasers, fiber optics, quantum mechanical theory and classical theories of thermodynamics and electromagnetism.
<b>CO-2</b>	Students understand the classical and modern concepts.
<b>Course Code: B16 ENG 1107</b>	
<b>Course Title: ENGINEERING GRAPHICS</b>	
<b>CO-1</b>	Apply principles of drawing to represent dimensions of an object.
<b>CO-2</b>	Construct polygons and engineering curves.
<b>CO-3</b>	Draw projections of points, lines, planes and solids.
<b>CO-4</b>	Represent sectional views of solids.
<b>CO-5</b>	Develop the surfaces of regular solids.
<b>CO-6</b>	Draw the isometric views of solids and combination of solids
<b>Course Code: B16 ENG 1109</b>	
<b>Course Title: PROFESSIONAL ETHICS AND MORAL VALUES</b>	
<b>CO-1</b>	By the end of the course student should be able to understand the importance of ethics and values in life and society.
<b>Course Code: B16 ENG 1111</b>	
<b>Course Title: PHYSICS LAB</b>	
<b>Course Code: B16 ENG 1113</b>	
<b>Course Title: WORKSHOP</b>	
<b>CO-1</b>	Use various tools to prepare basic carpentry and fitting joints.
<b>CO-2</b>	Fabricate simple components using tin smithy.



<b>Course Outcomes for First Year Second Semester Course</b>	
<b>Course Code: B16 ENG 1201</b>	
<b>Course Title: MATHEMATICS-III</b>	
<b>CO-1</b>	Utilize knowledge of line, sphere etc. in his engineering subjects
<b>CO-2</b>	Utilize the knowledge of Beta and Gamma functions and multiple integrals to evaluate the integrals they come across in their applications
<b>CO-3</b>	Utilize the knowledge of Fourier Transform in courses like Signals and Systems and in the solution of partial differential equations at a later stage
<b>Course Code: B16 ENG 1203</b>	
<b>Course Title: CHEMISTRY</b>	
<b>CO-1</b>	Students learn in-depth about the topics of desalination of sea water, CNG, LPG Biogas, Semiconductors, Liquid crystals, Conducting polymers, fiber reinforced plastics, building materials.
<b>CO-2</b>	Students understand the basic and advanced applied concepts.
<b>CO-3</b>	Students learn to interrelate the theory and with the relevant experiment.
<b>CO-4</b>	Students learn experimental techniques and understand the theory about experiments.
<b>Course Code: B16 ENG1205</b>	
<b>Course Title: COMPUTER PROGRAMMING USING C &amp; NUMERICAL METHODS</b>	
<b>CO-1</b>	Student can understand basic terminology used in C programming.
<b>CO-2</b>	Student can write programs by applying elementary algorithms to solve problems in C language.
<b>CO-3</b>	Student can write, compile and debug programs in C language.
<b>CO-4</b>	Student can Write programs to solve numerical methods
<b>CO-5</b>	Student can be familiar with finite precision computation.
<b>Course Code: B16 ENG 1207</b>	
<b>Course Title: HISTORY OF SCIENCE AND TECHNOLOGY</b>	
<b>CO-1</b>	By the end of this course the students should be able to understand the contribution of Scientific and Technological developments for the benefit of society at large.
<b>Course Code: B16 EC1208</b>	
<b>Course Title: CIRCUIT THEORY</b>	
<b>CO-1</b>	Able to develop an understanding of the basic fundamental electrical laws, elements of electric Networks and learn the techniques to measure voltage and current.
<b>CO-2</b>	Develops the ability to apply circuit theorems to DC and AC circuits.
<b>CO-3</b>	Able to analyze the coupled & three phase circuits.
<b>Course Code: B16 ENG 1210</b>	
<b>Course Title: CHEMISTRY LAB</b>	
<b>Course Code: B16 ENG 1212</b>	
<b>Course Title: COMPUTER PROGRAMMING USING C &amp; NUMERICAL METHODS LAB</b>	
<b>Course Code: B16 ENG 1213</b>	
<b>Course Title: ENGLISH LANGUAGE LAB</b>	
<b>CO-1</b>	Students will be sensitized towards recognition of English sound pattern.
<b>CO 2</b>	The fluency in speech will be enhanced.



<b>Course Outcomes for Second Year First Semester Course</b>	
<b>Course Code: B16 ENG 2101</b>	
<b>Course Title: MATHEMATICS – IV</b>	
<b>CO-1</b>	Apply the concepts of Gradient, Divergence, Curl, Directional derivative, solenoidal and Irrotational fields
<b>CO-2</b>	Determine scalar potential, circulation and work done
<b>CO-3</b>	Evaluate integrals using Green's, Stokes' and Divergence theorems
<b>CO-4</b>	Obtain the solution of 1-D wave equation and 1-D heat equation
<b>CO-5</b>	Determine the zeroes and poles of functions and residues at poles
<b>CO-6</b>	Evaluate certain real definite integrals that arise in applications by the use of Residue theorem
<b>Course Code: B16 EE 2101</b>	
<b>Course Title: NETWORK ANALYSIS &amp; SYNTHESIS</b>	
<b>CO-1</b>	Students will outline the significance of energy storing elements (Inductance & Capacitance) in circuits and study transient behavior of responses.
<b>CO-2</b>	Students will learn to apply Laplace transform technique for circuit analysis and know its advantages.
<b>CO-3</b>	Students will learn to apply two-port network analysis for devices like amplifiers, transmission lines and understand how magnetic coupling can be included in circuit.
<b>CO-4</b>	Students will learn the concept of network functions, poles and zeros and to determine the response of network from poles and zeros.
<b>CO-5</b>	Students will learn to apply the synthesis procedure for RC, LC & RL networks (Foster, Cauer methods).
<b>Course Code: B16 EE 2102</b>	
<b>Course Title: ELECTROMAGNETIC FIELD THEORY</b>	
<b>CO-1</b>	Find the electrostatic and magneto static fields for different configurations.
<b>CO-2</b>	Apply various principles and laws to estimate the effect of electric and magnetic fields.
<b>CO-3</b>	Distinguish between the effects of electrostatic and magneto static fields.
<b>CO-4</b>	Apply Maxwell's equations for static and time varying fields.
<b>CO-5</b>	Analyze the EM wave in different domains and compute average power density
<b>Course Code: : B16 EE 2103</b>	
<b>Course Title: ELECTRICAL MEASUREMENTS &amp; INSTRUMENTS</b>	
<b>CO-1</b>	Illustrate the characteristics of measuring instruments.
<b>CO-2</b>	Discriminate measuring instruments based on their principle & operation.
<b>CO-3</b>	Calculate power and energy in 1, 3 & poly phaser circuits.
<b>CO-4</b>	Measure electrical parameters using a bridge.
<b>CO-5</b>	Find magnetic measurements using Ballistic Galvanometers and Flux meters.
<b>CO-6</b>	Apply potentiometers & instrument transformers to measure electrical elements, calibration of the meters.
<b>Course Code: : B16 EE 2104</b>	
<b>Course Title: ELECTRONICS DEVICES AND CIRCUITS</b>	
<b>CO-1</b>	Understand the physical structure, principles of operation, electrical characteristics and circuit models of diodes, BJT's and FET's.
<b>CO-2</b>	Use this knowledge to analyze and design basic electronic application circuits.
<b>CO-3</b>	Extend the understanding of how electronic circuits and their functions fit into larger electronic systems.
<b>Course Code: : B16 ME 2106</b>	
<b>Course Title: ENGINEERING MECHANICS &amp; STRENGTH OF MATERIALS</b>	
<b>CO-1</b>	Evaluate the forces in concurrent and coplanar force systems, using various principles and also under different conditions of equilibrium. Analyze the forces in various applications and apply the concepts of friction to some basic applications of Electrical engineering.
<b>CO-2</b>	Understand and apply principles of parallel force systems to find centroid and moment of inertia of different objects.
<b>CO-3</b>	Apply the concepts of kinematics and kinetics to analyze force on particles under rectilinear.
<b>CO-4</b>	Distinguish between various mechanical properties like yield strength, ultimate strength etc., of a given material and also to determine various types of direct stresses. Analyze the effect of shear force & bending moment on various beams.
<b>CO-5</b>	Determine the bending stresses in different beams of various cross sections and to find torsional stresses in shafts
<b>Course Code: B16 EE 2106</b>	
<b>Course Title: NETWORKS &amp; MEASUREMENTS LAB</b>	
<b>CO-1</b>	Students will gain the skill to make and experiment with practical electric circuits. CO2: Students will be able to measure voltage, current, power in practical electric circuits. CO3: Students will know the significance of various theorems and their applications.
<b>CO-2</b>	Students will be able to assess the behavior of electric circuits.
<b>CO-3</b>	Students will be able to calibrate single phase energy meter, voltmeter & wattmeter CO6: Students will be able to measure resistance, inductance & capacitance.



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<b>CO-4</b>	Students will gain the skill to make and experiment with practical electric circuits. CO2: Students will be able to measure voltage, current, power in practical electric circuits. CO3: Students will know the significance of various theorems and their applications.
<b>CO-5</b>	Students will be able to assess the behavior of electric circuits.
<b>Course Code: B16EC2105</b>	
<b>Course Title: ELECTRONIC DEVICES &amp; CIRCUITS LAB</b>	
<b>CO-1</b>	To understand the role of basic electronic devices like ordinary Pn diodes, Zener diodes, LEDs, BJTS and JFETs in achieving various functionalities like rectification, voltage regulation, amplification, switching action etc. in various electronic circuits.
<b>CO-2</b>	To construct and simulate different electronic circuits using Multisim.
<b>CO-3</b>	To have the hardware skills and software skills required in the design of electronic systems for various applications.
<b>Course Code: B16 ENG 2104</b>	
<b>Course Title: ENGLISH PROFICIENCY</b>	
<b>CO-1</b>	Understand the importance of professional communication.
<b>CO-2</b>	Learn language skills and vocabulary in order to improve their language competency.
<b>CO-3</b>	Know and perform well in real life contexts.
<b>CO-4</b>	Identify and examine their self-attributes which require improvement and motivation.
<b>CO-5</b>	Build their confidence and overcome their inhibitions.
<b>CO-6</b>	Improve their strategies in reading skills.
<b>Course Code: B16 ENG 2106</b>	
<b>Course Title: INDUSTRY ORIENTED TRAINING</b>	
<b>CO-1</b>	Application using implementation of Data structures.
<b>CO-2</b>	Application using implementation of Linear and nonlinear Data structures in view of industry.
<b>CO-3</b>	Applications using Object Oriented Concepts in view of industry.

<b>Course Outcomes for Second Year Second Semester Course</b>	
<b>Course Code: B16 EE 2201</b>	
<b>Course Title: ELECTRICAL MACHINES-I</b>	
<b>CO-1</b>	Identify the concepts of electromechanical energy conversion. K2
<b>CO-2</b>	Describe the concepts of construction, operating principle, different types of DC machines and transformers, effects on DC machine and parallel operation of DC generators. K2
<b>CO-3</b>	Interpret the characteristics of DC machines. K3
<b>CO-4</b>	Discriminate different types of speed control methods of DC motors. K4
<b>CO-5</b>	Examine the performance of DC machines and transformers by different testing methods. K4
<b>CO-6</b>	Discriminate different types of transformer connections. K4
<b>Course Code: B16EE2202</b>	
<b>Course Title: SIGNALS &amp; SYSTEMS</b>	
<b>CO-1</b>	Characterize and analyze the properties of continuous and discrete time signals and systems. [K2]
<b>CO-2</b>	Apply the convolution for continuous time signals and discrete time signals. [K3]
<b>CO-3</b>	Evaluate the Fourier Series of periodic signals. [K1]
<b>CO-4</b>	Determine the Fourier Transform and Z-Transform of different types of signals and make use of their Properties. [K1]
<b>CO-5</b>	Convert a continuous time signal to the discrete time domain and reconstruct using the sampling theorem. [K2]
<b>Course Code: B16 EC 2206</b>	
<b>Course Title: ANALOG ELECTRONICS CIRCUITS</b>	
<b>CO-1</b>	Know the equivalent circuit of multistage amplifier and its analysis. [K3]
<b>CO-2</b>	Identify the different feedback topologies and analyze them. [K1]
<b>CO-3</b>	Explain the principle of oscillator and design different types of sinusoidal oscillators. [K3]
<b>CO-4</b>	Define the difference between voltage and power amplifiers and design different classes. [K1, K3]
<b>CO-5</b>	Know that Tuned amplifiers amplify a narrow band of frequencies and will also be able to analyze them. [K2, K3]
<b>CO-6</b>	Identify that Op-amp not amplifies but also perform different operations and analyze some applications. [K1, K2]
<b>Course Code: B16 ME 2204</b>	
<b>Course Title: PRIME MOVERS &amp; PUMPS</b>	
<b>CO-1</b>	Understand the concepts of hydrodynamic force of jet on stationary and moving flat inclined and curved vanes.
<b>CO-2</b>	Apply the concepts of momentum equation for finding the forces acting on the vanes of the turbines.
<b>CO-3</b>	Understand the Carnot, Otto, Diesel, Rankine, Joule Cycles.



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CO-4	Apply the otto, Diesel cycles for finding the performance of S.I and C.I engines.
CO-5	Understand the working principle of steam turbines and gas turbines..
CO-6	Evaluate the performance characteristics of steam and gas turbines.
CO-7	Understand the working principle of centrifugal and reciprocating pumps.
CO-8	Evaluate the performance characteristics of steam and gas turbines
<b>Course Code: B16 EE 2203</b>	
<b>Course Title: ELECTRICAL POWER GENERATION, TRANSMISSION &amp; DISTRIBUTION</b>	
CO-1	Explain the power generation from different energy sources.
CO-2	Evaluate different tariffs.
CO-3	Analyze the various transmission and distribution systems.
CO-4	Design overhead transmission systems under various conditions
CO-5	Calculate Inductance & Capacitance of transmission lines.
<b>Course Code: B16 ENG2201</b>	
<b>Course Title: ENVIRONMENTAL STUDIES</b>	
CO-1	Get awareness among the students about then a true and natural ecosystems.
CO-2	Learn sustainable utilization of natural resources like water, land, minerals, air.
CO-3	Learn resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radio active pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation.
CO-4	Safeguard against industrial accidents particularly nuclear accidents.
CO-5	Learn Constitutional provisions for the protection of natural resources.
<b>Course Code: B16 ME2207</b>	
<b>Course Title:THERMAL PRIME MOVERS LAB</b>	
CO-1	Explain the working principle of different types of IC Engines and illustrate the valve timing and port diagrams of an IC engines.
CO-2	Determine the viscosities of oil samples, Flash and Fire point values of fuels.
CO-3	Perform the load, Morse, Heat balance and economical speed test on IC Engines.
CO-4	Discuss the working principle of different types of hydraulic turbines
CO-5	Illustrate the working principle of centrifugal and reciprocating pumps
<b>Course Code: B16 EC2208</b>	
<b>Course Title: ANALOGELECTRONICCIRCUITS LAB WITH SIMULATION</b>	
CO-1	Acquire a basic knowledge on simple applications of operational amplifier.
CO-2	Observe the amplitude and frequency responses of negative feedback amplifier and two stage RC coupled amplifier.
CO-3	Design and test sinusoidal oscillators.
CO-4	Design and test a power amplifier.
CO-5	Design, construct, and take measurement of the analog electronic circuits to compare experimental results in the laboratory with theoretical analysis.
CO-6	Use Multisimto test their electronic design.
<b>Course Code: B16ENG2204</b>	
<b>Course Title: INDUSTRY ORIENTED TRAINING</b>	
CO-1	Application using implementation of core JAVA concepts.
CO-2	Application using implementation of AWT, Applets
CO-3	Applications using Networking concepts in view of industry.

<b>Course Outcomes for Third Year First Semester Course</b>	
<b>Course Code: B16EE3101</b>	
<b>Course Title: ELECTRICAL MACHINES – II</b>	
CO-1	Understand the concepts of continuous time and discrete time systems.
CO-2	Analyze systems in complex frequency domain.
CO-3	Understand sampling theorem and its implications.
<b>Course Code: B16EE3102</b>	
<b>Course Title: POWER SYSTEM ANALYSIS AND STABILITY</b>	
CO-1	Student able to understands and can draw single line diagram of the power system.
CO-2	Student understands different load flow techniques.
CO-3	Students are able to model any complex network into simple mathematical Modelling
CO-4	Student able to analyse different types of fault in a power system
CO-5	Student able to understand stability analysis of power system
<b>Course Code:B16EC3105</b>	





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<b>Course Title: LINEAR INTEGRATED AND PULSE CIRCUITS</b>	
<b>CO-1</b>	Discuss the op-amp's basic construction, characteristics, parameter limitations, various configurations and different applications of op-amp.
<b>CO-2</b>	Analyze and design basic op-amp circuits, particularly various linear and non-linear circuits, active filters, signal generators and 555 timers.
<b>CO-3</b>	Design and conduct experiments, on RC low pass and high pass circuits.
<b>CO-4</b>	Design and conduct experiments on different types of multivibrators.
<b>Course Code: B16EE3103</b>	
<b>Course Title: CONTROL SYSTEMS</b>	
<b>CO-1</b>	Students will be able to model electrical and mechanical physical systems by applying laws of physics
<b>CO-2</b>	Students will be able to represent mathematical models of systems using block diagrams & Signal Flow Graphs and derive their transfer functions
<b>CO-3</b>	Students will be able to analyze systems in time domain for transient and steady-state behavior
<b>CO-4</b>	Students will learn the concept of stability and use RH criterion and Root locus methods for stability analysis.
<b>CO-5</b>	Students will learn to obtain frequency response plots of systems and use them for system analysis and stability assessment.
<b>Course Code: B16EE3104</b>	
<b>Course Title: DIGITAL ELECTRONICS AND LOGIC DESIGN</b>	
<b>CO-1</b>	Students will be aware of theory of Boolean Algebra & the underlying features of various number systems.
<b>CO-2</b>	Students will be able to use the concepts of Boolean Algebra for the analysis and minimization of Boolean expressions.
<b>CO-3</b>	Students will be able to design of various combinational & sequential logic circuits.
<b>CO-4</b>	Students will be able to design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays.
<b>CO-5</b>	Students will be able to design various logic gates using diodes and transistors.
<b>Course Code: B16 EE 3105</b>	
<b>Course Title: COMPUTER ARCHITECTURE AND ORGANIZATION</b>	
<b>CO-1</b>	Explain register transfer, memory transfer language, computer registers, computer instructions and addressing modes.
<b>CO-2</b>	Differentiate general register organization & stack organization, Reduced instruction set & complex instruction set computer.
<b>CO-3</b>	Assess instruction cycle, instruction formats.
<b>CO-4</b>	Interpret different memory organization & different modes of transfer.
<b>CO-5</b>	Explain register transfer, memory transfer language, computer registers, computer instructions and addressing modes.
<b>Course Code: B16CS3109</b>	
<b>Course Title: DATABASE MANAGEMENT SYSTEMS</b>	
<b>CO-1</b>	Generalize the basic concepts of DBMS
<b>CO-2</b>	Explore the relational model
<b>CO-3</b>	Prepare SQL commands for defining, constructing and manipulating databases
<b>CO-4</b>	Apply conceptual and logical data base design
<b>CO-5</b>	Apply normalization on tables
<b>CO-6</b>	Schedule concurrent transactions using protocols that provide serializability.
<b>CO-7</b>	Explore techniques for Recovering database
<b>Course Code: B16 EE 3106</b>	
<b>Course Title: DIGITAL SIGNAL PROCESSING</b>	
<b>CO-1</b>	Identify properties of discrete-time systems such as time-invariance, stability, causality, and linearity.
<b>CO-2</b>	Compute the linear and circular convolutions of discrete-time sequences.
<b>CO-3</b>	Evaluate and plot the frequency (magnitude and phase) response of linear time-invariant systems.
<b>CO-4</b>	Evaluate the discrete Fourier transform (DFT) of a sequence, relate it to the DTFT,
<b>CO-5</b>	Evaluate the transfer function of linear time-invariant systems & Determine if reference equations from transfer function descriptions using Z transforms.
<b>CO-6</b>	Design & Compare IIR & FIR filters
<b>Course Code: B16EE3107</b>	
<b>Course Title: ELECTRICAL MACHINES-I LAB</b>	
<b>CO-1</b>	Analyze characteristics of various types of generators & motors which will help in understanding of machines under various conditions. (K4)
<b>CO-2</b>	Compare Speed control of dc motors which will be useful in various industries.(K4)
<b>CO-3</b>	Determine testing of machines will give an idea in testing side in various industries(K4).
<b>Course Code: B16EC3108</b>	
<b>Course Title: LINEAR INTEGRATED CIRCUITS &amp; PULSE DIGITAL CIRCUITS LAB WITH SIMULATION</b>	
<b>CO-1</b>	Design and conduct experiments on RC low pass and high pass circuits.



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<b>CO-2</b>	Observe operation of UJT Sweep Generator.
<b>CO-3</b>	Design and test different types of Multivibrators
<b>CO-4</b>	Acquire a basic knowledge on simple applications of operational amplifier.
<b>CO-5</b>	Design, construct Schmitt trigger using operational amplifier.
<b>CO-6</b>	Use Multisim to test their electronic designs.
<b>CO-7</b>	Design and test different types of Multiplexers and counters.
<b>Course Code: B16ENG3102</b>	
<b>Course Title: VERBAL &amp; QUANTITATIVE APTITUDE -I</b>	
<b>CO-1</b>	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
<b>CO-2</b>	Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.
<b>CO-3</b>	Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.
<b>CO-4</b>	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/ paragraph coherent.
<b>CO-5</b>	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.
<b>Course Code: B16ENG3102</b>	
<b>Course Title: PART - B QUANTITATIVE APTITUDE -I</b>	
<b>CO-1</b>	The students will be able to perform well in calculating on number problems and various units of ratio concepts.
<b>CO-2</b>	Accurate solving problems on time and distance and units related solutions.
<b>CO-3</b>	The students will become adept in solving problems related to profit and loss, in specific, quantitative ability.
<b>CO-4</b>	The students will present themselves well in the recruitment process using analytical and logical skills which he or she developed during the course as they are very important for any person to be placed in the industry.
<b>CO-5</b>	The students will learn to apply Logical thinking to the problems of syllogisms and
<b>Course Code: B16 ENG3103</b>	
<b>Course Title: BASIC CODING</b>	
<b>CO-1</b>	Know about Control Structures, Loop Structures and branching in programming.
<b>CO-2</b>	Know about various searching and sorting methods.
<b>CO-3</b>	Know about Functions, Recursions and Storage Classes.
<b>CO-4</b>	Know about Structures and Unions.
<b>CO-5</b>	Know different Operating System concepts.
<b>CO-6</b>	Differentiate OSI Model Vs. TCP/IP suite.

<b>Course Outcomes for Third Year Second Semester Course</b>	
<b>Course Code: B16EE3201</b>	
<b>Course Title: ADVANCED CONTROL SYSTEMS</b>	
<b>CO-1</b>	Know the various components and usage of each component. (K2)
<b>CO-2</b>	Derive state space model for a given systems and Apply the concept of Observability and Controllability for LTI system. (K3).
<b>CO-3</b>	Apply Z-transform in Engineering application related to digital control systems (K3).
<b>CO-4</b>	Design classical controller based on bode plots and modern controllers based on the state space techniques. (K3)
<b>CO-5</b>	Test the digital system which is useful after designing a particular system with respect to the stability point of view. (K3)
<b>Course Code: B16 EE3202</b>	
<b>Course Title: POWER ELECTRONICS</b>	
<b>CO-1</b>	Explain the principle of operation of thyristor, modern power semiconductor devices and necessity of series and parallel connection of thyristors.
<b>CO-2</b>	Explain the operation of Firing and Commutation techniques.
<b>CO-3</b>	Evaluate the phase controlled rectifiers with different loads.
<b>CO-4</b>	Analyze different Choppers, Cyclo converter and AC voltage Controller configurations.
<b>CO-5</b>	Investigate harmonic reduction techniques for inverters based on PWM techniques.
<b>Course Code: B16ENG3201</b>	
<b>Course Title: PRINCIPLES OF ECONOMICS AND MANAGEMENT</b>	



# SAGIRAMAKRISHNAM RAJU ENGINEERING COLLEGE(AUTONOMOUS)

Chinna Amiram, Bhimavaram-534204.(AP)

Estd:1980

CO-1	Students will be able to gain empirical knowledge and understand the complete frame work of business.
CO-2	To analyse the concepts pertaining to economic decision making.
CO-3	To analyse the concepts of Managerial decision making.
CO-4	To inculcate the spirit of Entrepreneurship and gain knowledge for setting up an enterprise.
<b>Course Code: B16 EE3203</b>	
<b>Course Title: POWERSYSTEMPROTECTION</b>	
CO-1	Identify the need for protection and know various devices for protection and terminology used in protection.
CO-2	Discriminate the constructional details with operation principle of various types of fuses, circuit breakers, relays, lightning arresters and their applications.
CO-3	Apply the arc quenching methods to various types of circuit breakers.
CO-4	Apply various relays to various types of power system equipment like alternator, transformer and feeders and distinguish between an electromagnetic relay and a static relay.
CO-5	Identify the different causes for over voltages and choose various protection devices against over voltages.
<b>Course Code: B16EE3204</b>	
<b>Course Title: MICROPROCESSOR&amp;MICROCONTROLLER</b>	
CO-1	Understand the fundamentals of 8085 Microprocessor and micro controller based systems.
CO-2	Familiarize with the instruction set and assembly level programming.
CO-3	Illustrate how the different peripherals (8255,8253etc.) are interfaced with Microprocessor.
CO-4	Distinguish and analyze the properties of Microprocessors & Microcontrollers.
CO-5	Apply knowledge on interfacing micro controllers for some real time applications.
<b>Course Code: B16 EE3205</b>	
<b>Course Title: ELECTRICALMACHINES-IILAB</b>	
CO-1	Calculate the regulation of an alternator by EMF, MMF and ZPF methods.
CO-2	Verify Alternator synchronism and draw the performance characteristics, finding out different reactances.
CO-3	Find the efficiency and machine performances by conducting various tests on 3- $\Phi$ and 1- $\Phi$ induction motor.
CO-4	Verify the speed variation of induction machine.
<b>Course Code: B16EE3206</b>	
<b>Course Title: CONTROL SYSTEMS LAB</b>	
CO-1	Will be able to do various engineering projects.
CO-2	Ability to formulate transfer function for given control system problems.
CO-3	Ability to find time response of given control system model.
CO-4	Plot Root Locus and Bode plots for given control system model
CO-5	Ability to design Lead, Lag, Lead-Lag systems in control systems
CO-6	Ability to design PID controllers for given control system model
<b>Course Code: B16ENG3202</b>	
<b>Course Title: VERBAL &amp; QUANTITATIVE APTITUDE-II</b>	
CO-1	Construct coherent, cohesive and unambiguous verbal expressions in both oral and written discourses.
CO-2	Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences.
CO-3	Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, reports, make notes, statement of purpose(for admission into foreign universities), letters of recommendation (for professional and educational purposes).
CO-4	Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner.
CO-5	Participate in group discussions/ group activities, exhibit team spirit, use language effectively according to the situation, respond to their interviewer/ employer with a positive mind, tailor make answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR)that they would face during the course of their recruitment process.
<b>PART-B QUANTITATIVE APTITUDE-II</b>	
CO-1	The students will be able to perform well in calculating different types of data interpretation problems.
CO-2	The students will perform efficaciously on analytical and logical problems using various methods.
CO-3	Students will find the angle measurements of clock problems with the knowledge of calendars and clock.
CO-4	The students will skillfully solve the puzzle problems like arrangement of different positions.
CO-5	The students will become good at solving the problems of lines, triangles, volume of cone, cylinder and so on.
<b>Course Code: B16EE3207</b>	
<b>Course Title: MINI PROJECT</b>	
CO-1	Identify the area of project work through the literature survey.
CO-2	Plan the project activity with constraints required to implement it.
CO-3	Develop communication and presentation skills.



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Chinna Amiram, Bhimavaram-534204.(AP)

**Estd:1980**

<b>CO-4</b>	Work a steam member for core/multi disciplinary projects.
<b>Course Code: B16 EE3208A</b>	
<b>Course Title: ADVANCED CODING</b>	
<b>CO-1</b>	Acquire coding knowledge on essential of modular programming.
<b>CO-2</b>	Acquire Programming knowledge on linked lists.
<b>CO-3</b>	Acquire coding knowledge on ADT.
<b>CO-4</b>	Acquire knowledge on time complexities of different methods
<b>CO-5</b>	Acquire Programming skill on Java libraries and Collections

<b>Course Outcomes for Fourth Year First Semester Course</b>	
<b>Course Code: B16EE4101</b>	
<b>Course Title: ELECTRIC DRIVES</b>	
<b>CO-1</b>	Identify different electric drive system.
<b>CO-2</b>	Understand the operation of rectifier fed DC drives, chopper fed DC drives and closed loop control of DC motor.
<b>CO-3</b>	Analyse the slip power recovery schemes of Induction motor and speed control of converter fed induction motor & synchronous motor.
<b>CO-4</b>	Evaluate the performance of speed control of synchronous motor by CSI and VSI.
<b>Course Code: B16EE4102</b>	
<b>Course Title: NON-CONVENTIONAL ENERGY RESOURCES</b>	
<b>CO-1</b>	Identify the need for Renewable energy
<b>CO-2</b>	Recognise the ways of collection of solar energy.
<b>CO-3</b>	Apply the knowledge of wind energy to estimate the energy potential.
<b>CO-4</b>	Apply the knowledge of ocean, waves and tides to estimate their energy potential.
<b>CO-5</b>	Understand the concepts behind geo-thermal energy and bio energy.
<b>Course Code: B16EE4103</b>	
<b>Course Title: ENERGY MANAGEMENT AND AUDITING</b>	
<b>CO-1</b>	Analyze and understand energy consumption patterns and environmental impacts and mitigation method.
<b>CO-2</b>	Listing various energy conservation measures for various processes.
<b>CO-3</b>	Students can carryout preliminary audits.
<b>CO-4</b>	Can work out economic feasibility of encon option.
<b>Course Code: B16EE4104</b>	
<b>Course Title: ELECTRICAL MACHINE DESIGN</b>	
<b>CO-1</b>	Understand the fundamental concepts of electrical machine design.
<b>CO-2</b>	Design the armature, field winding and main dimensions of DC Machine.
<b>CO-3</b>	Design of the single phase and three phase transformer dimensions and windings.
<b>CO-4</b>	Design number of turns, phase, airgap length and conductor size etc. for given synchronous machine.
<b>CO-5</b>	Find number of slots /pole and develop various winding diagrams for a given AC Machines.
<b>Course Code: B16EE4105</b>	
<b>Course Title: OPERATIONS RESEARCH</b>	
<b>CO-1</b>	Understand about the techniques of planning and monitoring the progress of a software project.
<b>CO-2</b>	Solve problems related to Project management.
<b>CO-3</b>	Analyse about the basic structure, characteristics, Functions and relationships of an organization so that the may acquire sound, scientific and Quantitative knowledge for decision making.
<b>CO-4</b>	Knowledge to solve problems related to planning, transportation etc.
<b>CO-5</b>	Realization of different techniques of engineering and other problems.
<b>Course Code: B16EE4106</b>	
<b>Course Title: FLEXIBLE AC TRANSMISSION SYSTEMS</b>	
<b>CO-1</b>	Understand the needs of power systems and utility networks where installation of FACTS Controllers/ Devices becomes essential.
<b>CO-2</b>	Evaluate the operating principles, control systems and modeling of different FACTS Controllers.
<b>CO-3</b>	Apply different FACTS controller for enhancing power transfer, enhancement of system damping, enhancing power stability and prevention of voltage instability.
<b>CO-4</b>	Understand the need s of power systems and utility networks where installation of FACTS Controllers/ Devices becomes essential.
<b>Course Code: B16EE4107</b>	
<b>Course Title: INTRODUCTION TO SOFT COMPUTING</b>	
<b>CO-1</b>	Apply various soft computing frame works like neural network, fuzzy logic and genetic algorithm.
<b>CO-2</b>	Design of various neural networks and fuzzy logic modeling depending upon the required application.
<b>CO-3</b>	Discuss hybrid soft computing.
<b>Course Code: B16EE4108</b>	



**Estd:1980**

<b>Course Title: MICROPROCESSOR AND MICRO CONTROLLER LAB</b>	
<b>CO-1</b>	Evaluate the programs using basic fundamentals of 8085 Microprocessor & 8051 Microcontroller.
<b>CO-2</b>	Develop different programs on extended version like 8086 microprocessor.
<b>CO-3</b>	Design programs for interfacing circuits like traffic controller, LED display board, Motor controller setc.
<b>Course Code: B16EE4109</b>	
<b>Course Title: POWER ELECTRONICS LAB</b>	
<b>CO-1</b>	Analyze the Thyristor and Transistor characteristics.
<b>CO-2</b>	Evaluate the characteristics of converter and inverter with R and RL Loads.
<b>CO-3</b>	Apply different controllers for controlling the DC drives
<b>Course Code: B16EE4110</b>	
<b>Course Title: PROJECT PHASE-I</b>	
<b>CO-1</b>	Identify a current problem through literature /field /case studies and define the back ground objectives and methodology for solving the same.
<b>CO-2</b>	Write report and present it effectively.

<b>Course Outcomes for Fourth Year Second Semester Course</b>	
<b>Course Code: B16EE4201</b>	
<b>Course Title: POWER SYSTEM OPERATION &amp; CONTROL</b>	
<b>CO-1</b>	Understand in solving economic load scheduling and unit commitment problems using various computational methods for optimal operation of generators.
<b>CO-2</b>	Solve the optimal scheduling of Thermal and Hydro-thermal system and Optimal power flow.
<b>CO-3</b>	Analyze the concepts like Load Frequency Control, Power system and stability issues.
<b>Course Code: B16EE4202</b>	
<b>Course Title: ADVANCED POWER ELECTRONICS (Elective-IV)</b>	
<b>CO-1</b>	Choose appropriate device for a particular converter topology.
<b>CO-2</b>	Understand the operating principles and models of different types of power electronic converters including dc-dc converters, AC to AC converters and inverters
<b>CO-3</b>	Analyze various converter topologies and can identify the corresponding T.H.D.
<b>CO-4</b>	Apply the knowledge of various devices and converter topologies for different industrial applications.
<b>Course Code: B16EE4203</b>	
<b>Course Title: ELECTRICAL DISTRIBUTION SYSTEMS (Elective-IV)</b>	
<b>CO-1</b>	Understand various concepts of distribution system, protection and its coordination.
<b>CO-2</b>	Apply the best methods for power factor improvement and voltage control.
<b>CO-3</b>	Differentiate the types of loads and their characteristics .
<b>Course Code: B16EE4204</b>	
<b>Course Title: HIGH VOLTAGE DIRECT CURRENT TRANSMISSION (Elective-IV)</b>	
<b>CO-1</b>	Understand about the importance of HVDC transmission over HVAC transmission.
<b>CO-2</b>	Analyze different types of Harmonics produced by converters in HVDC systems
<b>CO-3</b>	Apply different types of controlling techniques for converters used in HVDC systems
<b>CO-4</b>	Describe interaction between HVAC and HVDC transmission systems
<b>Course Code: B16EE4205</b>	
<b>Course Title: SIMULATION LAB</b>	
<b>CO-1</b>	Analyze matlab program for the Ybus
<b>CO-2</b>	Design the Simulink models for the simulation of transient and steady state stabilities in power systems
<b>Course Code: B16EE4206</b>	
<b>Course Title: PROJECT PHASE-II</b>	
<b>CO-1</b>	Identify a current problem through literature/field/ case studies and define the background objectives and methodology for solving the same.
<b>CO-2</b>	Analyze, design and develop a technology/process.
<b>CO-3</b>	Implement and evaluate the technology at the laboratory level.
<b>CO-4</b>	Write report and present it effectively.