

## G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade |  
Accredited by NBA (CIV, CSE, ECE & EEE) | Affiliated to JNTUA)  
Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

### Program Outcomes (PO's):

Engineering Graduates will be able to

- ❖ **PO 1. Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering Fundamentals and an engineering specialization to the solution of complex engineering problems.
- ❖ **PO 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- ❖ **PO 3. Design / development of solutions:** 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.
- ❖ **PO 4. Conduct investigations of complex problems:** 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.
- ❖ **PO 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- ❖ **PO 6. The engineer and society:** 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.
- ❖ **PO 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
- ❖ **PO 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ❖ **PO 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ❖ **PO 10. Communications:** 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 receive clear instructions.
- ❖ **PO 11. Project management and finance:** 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 multidisciplinary environments.
- ❖ **PO 12. Life-long learning:** 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.

*E. Krishna*  
PRINCIPAL

G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

**G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY**  
**(Autonomous)**

(Approved by AICTE | NAAC Accreditation with 'A' Grade |  
Accredited by NBA (CIV, CSE, ECE & EEE) | Affiliated to JNTUA)  
Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

---

**R 18 REGULATIONS**

Course Name: **FUNCTIONAL ENGLISH**

	Course Outcomes
CO1	Understand and remember various aspects of English.
CO2	Analyze the different situations of speaking and writing skills.
CO3	Apply the LSRW skills to the societal communication.
CO4	Analyze the importance of English in Science and Technological context.
CO5	Able to demonstrate the acquired knowledge in executing the technical writing.
CO6	Apply the significance of team work in problem solving technique .

Course Name: **ENGLISH LANGUAGE COMMUNICIATION SKILLS LAB**

	Course Outcomes
CO1	Remember and understand better pronunciation.
CO2	Analyze the fluency and neutralize mother tongue influence.
CO3	Acquire proficiency and become active participant in communication like GDs, Debates.
CO4	Understand the difference among different accents.
CO5	Write effectively in different formats like letters, e-mails.
CO6	Enhancing the minimum employability.


  
**PRINCIPAL**  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **MATHEMATICS-I**

	Course Outcomes
CO1	Apply the mathematical principles to solve first and second order differential equations
CO2	Analyze the non homogeneous linear differential equations of second and higher order along with Euler – Cauchy’s equations and Legendre’s linear equation
CO3	Apply the differential equations of second and higher order in various streams ---like Electrical Circuits, Simple Harmonic motion, Deflection of beams
CO4	Estimate the Taylors and Maclaurin series involving Maxima and minima of functions consisting of 2 variables along with radius of curvature
CO5	Evaluate the multiple integrals involving double and triple integrals along with change of order of integration and apply the multiple integrals to areas and volumes in polar and Cartesian coordinates.
CO6	Analyze the concept of vector calculus involving divergence, curl, green’s theorem, and Stokes and Gauss theorems.

Course Name: **COMPUTER PROGRAMMING**

	Course Outcomes
CO1	Comprehend the fundamental concepts of computer hardware and problem solving abilities
CO2	Knowledge on the basic concepts of algorithms, flow charts and C programming
CO3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements
CO4	Interpret the importance of pointers and functions in programming
CO5	Analyze and Modularize the problem and its solution by using functions, structures and unions
CO6	Ability to relate the concepts of strings, files and preprocessors to the real world applications

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **COMPUTER PROGRAMMING LAB**

	Course Outcomes
CO1	Utilize problem solving techniques to find solutions to problems.
CO2	Able to use C language features effectively and implement solutions using C language.
CO3	Explore to identify the appropriate data structure for a given problem or application.
CO4	Improve logical and technical skills.
CO5	Apply programming skills to solve complex C problems.
CO6	Apply various analytical skills to implement solutions using C language.

Course Name: ENGINEERING CHEMISTRY

	Course Outcomes
CO1	Analyze the various procedures involved in the treatment of water from the industrial water and treatment of boiler feed water.
CO2	Understand/Apply the various preparations of polymers along with conducting polymers and inorganic polymers.
CO3	Illustrate a detailed review on the working of electrochemical cells, and the process of corrosion preventions.
CO4	Analyze the classification of fuels along with their characteristics and calorific value involving solid fuels.
CO5	Interpret various liquid and gaseous fuels along with their process of origin, properties, advantages and disadvantages
CO6	Summarize the underlying chemistry of engineering materials involving refractories, lubricants ,rocket propellants and carbon clusters

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: ENGINEERING CHEMISTRY LAB

	Course Outcomes
CO1	Analyze the volumetric analysis of hardness of water, copper by EDTA method and Winkler's method.
CO2	Analyze the ferrous ion using diphenylamine dichrometrically and acidity, alkalinity of water.
CO3	Understand and perform the preparation of phenol formaldehyde resin.
CO4	Demonstrate and calculate the viscosity of oil through viscometer - I
CO5	Demonstrate and calculate the viscosity of oil through viscometer - II
CO6	Interpret the conductance of acid base samples conductometrically.

Course Name: ENVIRONMENTAL STUDIES

	Course Outcomes
CO1	Remember the definition and need for environmental studies involving public awareness and natural resources.
CO2	Understand various eco systems involving forest, grassland, desert and aquatic type, their biodiversity and scientific methods to protect them
CO3	Analyze the various types of pollution in the environment relating to air, water, soil and their corresponding methods of control
CO4	Understand the various causes, effects and control measures of urban and industrial wastes along with disaster management
CO5	Discuss the various social issues related to environment and bring about public awareness regarding the pollution
CO6	Justify an insight into the human population along with women and child care and perform various case studies on role of information technology in environment

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **ENGLISH FOR PROFESSIONAL COMMUNICATION**

	Course Outcomes
CO1	Ability to understand and remember various aspects of English.
CO2	Critically analyze the wide range of techniques involved in speaking and writing skills.
CO3	Apply the LSRW skills for the professional communication.
CO4	Analyze the significance of English in Science and Technological context.
CO5	Able to demonstrate the acquired knowledge in executing the technical writing skills.
CO6	Apply the significance of team work in problem solving methods .

Course Name: **MATHEMATICS-II**

	Course Outcomes
CO1	Analyze the concept of Laplace transform of standard functions along with inverse transform, dirac's delta function and convolution theorem
CO2	Apply the Laplace transforms to ordinary differential equations of first order and second order
CO3	Carry out the determination of Fourier coefficients in terms of Fourier series involving Half range Fourier sine and cosine expansions
CO4	Interpret the Fourier integral theorem along with Fourier sine and cosine transformation and also the concept of inverse transformation
CO5	Formulate the partial differential equations through elimination of arbitrary constants and also understand the technique of separation of variables
CO6	Analyze the technique of Z-transformation for various conditions along with analysis of Fourier transforms

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **ENGINEERING PHYSICS LAB**

	Course Outcomes
CO1	<b>Understand</b> the concept of interference by finding thickness of paper and radius of curvature of plano-convex lens by forming Parallel fringes and Newton's rings.
CO2	<b>Interpret</b> the concept of diffraction by finding the wavelength of different colours of white light and LASER.
CO3	<b>Examine</b> the behavior of the ferromagnetic material by plotting B-H curve and verifies Biot-Savart's law by using Stewart-Gee's apparatus.
CO4	<b>Analyze</b> the propagation of a wave in a medium by determining the dispersive power of prism, acceptance angle, and numerical aperture of an optical fiber.
CO5	<b>Interpret</b> the nature of a semiconductor by determining its energy gap.
CO6	<b>Demonstrate</b> the concept of diffraction due to single slit by finding the width of the slit.

Course Name: **NETWORK ANALYSIS**

	Course Outcomes
CO1	Analyze the concept of electrical circuits and magnetic circuits and study different techniques to calculate voltage and current and also Interpret the technique of solving circuits employing various theorems
CO2	Perform the D.C and A.C transient analysis on combination of circuits along with source transformation
CO3	understand and analyze the fundamental concept of single phase circuits and also determine different powers for a given circuit
CO4	Depict the locus diagrams of various combinations of circuits along with the analysis of concept of resonance
CO5	understand and analyze the concept of two port parameters and apply it for different two port networks
CO6	Understand the concept of filters and able to design different filters


  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **NETWORK ANALYSIS LAB**

	Course Outcomes
CO1	Solve the electrical network using mesh and nodal analysis by applying network theorems
CO2	Estimate the impedance for maximum power transfer and will be in a position to design the systems for maximum power transformation.
CO3	Analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform.
CO4	Communicate clearly and use the appropriate medium, including written, oral, and electronic methods.
CO5	Analyze and design a filter to meet its specifications using PSPICE Software
CO6	Engage in independent and lifelong learning in the context of technological changes.

Course Name: **Engineering Drawing**

	Course Outcomes
	At the end of the course, the student will be able to
CO1	Drawing 2D and 3D diagrams of various object
CO2	Learning conventions of Drawing, which is an Universal Language of Engineers
CO3	Drafting projections of points, planes and solids
CO4	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
CO5	Apply orthographic projection concepts to draw projections of points, lines, planes and solids
CO6	Apply development concepts to draw development of surfaces of simple solids

  
PRINCIPAL  
G. Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)



Course Name: **ENGINEERING & I.T. WORKSHOP**

Course Outcomes	
	At the end of the course, the student will be able to
CO1	To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
CO2	To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
CO3	To learn about Networking of computers and use Internet facility for Browsing and Searching.
CO4	Apply wood working skills in real world applications. Build different parts with metal sheets in real world applications
CO5	Apply fitting operations in various applications
CO6	Apply different types of basic electric circuit connections

Course Name: **Electrical circuits -I**

Course Outcomes	
CO1	Analyze the concept of electrical circuits and magnetic circuits and study different techniques to calculate voltage and current.
CO2	Determining the response of circuits to single phase A.C excitation and evaluate the RMS value and Average Values
CO3	Depict the locus diagrams of various combinations of circuits along with the analysis of concept of resonance
CO4	Understand the concept of bandwidth and Q factor in various series and parallel circuits.
CO5	Interpret the technique of solving circuits employing theorems which involve Norton's, Thevenin's, Maximum Power transfer theorem etc.
CO6	Analyze the concept of two port parameters with respect to impedance, admittance, Transmission and Hybrid parameters

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **Electrical circuits Lab**

	Course Outcomes
CO1	Perform the verification of theorems like Norton's Theorem, Thevenin's theorem, super position theorem, maximum power transfer theorem experimentally and theoretically.
CO2	Evaluate the frequency at which series and parallel resonance occurs in a given circuit
CO3	Calculate the impedance and admittance parameters along with transmission parameter and hybrid parameters for a given circuit.
CO4	Measure the active and reactive power for star and delta connected balanced loads
CO5	Assess the value of 3 phase power for unbalanced loads employing two wattmeter method
CO6	Determine the self inductance, mutual inductance and coefficient of coupling of coupled circuits

Course Name: **MATERIALSCIENCEANDENGINEERING**

	Course Outcomes
CO1	Students will get knowledge on bonds of solids and knowing the crystallization of metals. By knowing the grain size and shape through the crystallization
CO2	Students will be able to construct the equilibrium diagrams by experimental methods and knowing all types of equilibrium diagrams
CO3	Students will be able to learn the structure and properties of all cast irons, steels and Non-ferrous metal alloys of copper, Al and Titanium.
CO4	Students will be able to learn the methods of different heat treatments i.e. annealing, normalizing and hardening.
CO5	This unit helps the students to understand the importance of advanced composite materials in application to sophisticated machine and structure of components

  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

Course Name: **MATERIALSCIENCEANDENGINEERING LAB**

	Course Outcomes
CO1	Make use of different material samples for investigating micro structures.
CO2	Interpret the microstructures of materials using metallurgical microscope
CO3	Measure the harden ability of mild steel samples.
CO4	Improve the properties of materials using various heat treatment processes.
CO5	Compare the properties of different materials with temperature variation.

Course Name: **ENGINEERING MECHANICS**

	Course Outcomes
CO1	To analyze the basic concepts of rigid bodies subjected to different types of loads and supports.
CO2	To analyze the motion of the bodies considering friction and external loads.
CO3	To determine Centroids and area moment of inertia and centre of gravity and mass moment of inertia of simple and composite figures.
CO4	To analyse the motion of particle without considering forces and considering forces
CO5	To analyze the perfect frames using method of joints, method of sections & tension coefficient method for vertical , horizontal and inclined loads and concepts of Mechanical vibrations. (Simple, compound and torsional pendulums)
CO6	To analyse the motion of particle with and without considering forces

*G. Prasad*  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **APPLIED MECHANICS LAB**

Course Outcomes	
	At the end of the course, the student will be able to
CO1	Acquire knowledge of static and dynamic behavior of the bodies.
CO2	Acquire the knowledge, so that they can understand physical phenomenon with the help of various theories.
CO3	Explain the physical phenomenon with help of diagrams.
CO4	with broad vision with the skills of visualizing and developing their own ideas, and to convert those ideas in to engineering problems and solving those problems with the acquired knowledge of the Engineering mechanics
CO5	Apply the principles of mechanics to analyze structural and machine elements.
CO6	Identify the different types of beams and the types of loading. Derive expressions to determine the bending stress, deflection and shear stress in beams subjected to various types loading.

Course Name: **DATA STRUCTURES**

Course Outcomes	
CO1	Familiarize the student with good programming design methods, particularly Top-Down design
CO2	To develop skills to design and analyze linear and non linear data structures.
CO3	Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
CO4	Develop recursive algorithms as they apply to trees and graphs.
CO5	To develop a base for advanced computer science study
CO6	Familiarize the student with the issues of Time complexity and examine various algorithms from this perspective

*G. Princy*  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

**COURSE NAME: DATA STRUCTURES LAB**

	Course Outcomes
CO1	Learn to choose appropriate data structure as applied to specified problem definition.
CO2	Design and analyze linear and non-linear data structures.
CO3	Design and implement algorithms for manipulating linked lists, stacks, queues, trees and graphs in python
CO4	Implement recursive algorithms as they apply to trees and graphs.
CO5	Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures
CO6	Implement operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

# G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade |

Accredited by NBA (CIV, CSE, ECE & EEE) | Affiliated to JNTUA)

Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

The following are the Course Outcomes of all the courses for the Academic Year 2019-20 for I-B. Tech

## R19 REGULATIONS

Course Name: **MATHEMATICS – I**

	Course Outcomes
CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications
CO2	CO2 Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem
CO3	CO3 Utilize mean value theorems to real life problems.
CO4	CO4 familiarize with functions of several variables which is useful in optimization
CO5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
CO6	Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

Course Name: **CHEMISTRY**

	Course Outcomes
CO1	To illustrate the molecular orbital energy levels for different molecular species and apply Schrödinger wave equation and particle in a box.
CO2	To differentiate between pH metry Potentio metry and conductometric titrations
CO3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.
CO4	Understand the principles of different analytical instruments and explain their
CO5	Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
CO6	Explain of different types of colloids, their preparations, properties and applications

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **PYTHON PROGRAMMING**

	Course Outcomes
CO1	Comprehend the fundamental concepts of computer hardware and problem-solving abilities
CO2	Knowledge on the basic concepts of algorithms, flow charts and python programming
CO3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements
CO4	Interpret the importance of pointers and functions in programming
CO5	Analyze and modularize the problem and its solution by using functions
CO6	Ability to relate the concepts of strings, files and preprocessors to the real-world applications

Course Name: **PYTHON PROGRAMMING LAB**

	Course Outcomes
CO1	Design solutions to mathematical problems & organize the data for solving the problem.
CO2	Understand and implement modular approach using python.
CO3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc
CO4	Understands about files and its applications.
CO5	Develop real-world applications, files and exception handling provided by python.
CO6	Select appropriate programming construct for solving the problem.

Course Name: **CHEMISTRY LAB**

	Course Outcomes
	At the end of the course, the student will be able to
CO1	Understand the determine the cell constant and conductance of solutions
CO2	Prepare advanced polymer materials.
CO3	Measure the strength of an acid present in secondary batteries
CO4	Understand and apply the pH metric titrations.
CO5	Verify Lambert-Beer's law
CO6	Potentiometry - determination of redox potentials and EMFs

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

**COURSE NAME: PRINCIPLES OF ELECTRICAL ENGINEERING**

	Course Outcomes
CO1	Apply concepts of KVL/KCL and network theorems in solving DC circuits
CO2	Analyze steady state behavior of single phase and three phase AC electrical circuits
CO3	Choose correct rating and characteristics of a transformer for a specific application
CO4	Illustrate working principles of induction motor, dc motor and synchronous generator.
CO5	Identify type of electrical machine based on their construction.
CO6	Describe working principles of protection devices used in electrical circuits

**COURSE NAME: PRINCIPLES OF ELECTRICAL ENGINEERING LAB**

	Course Outcomes
CO1	Get exposure to common electrical components and their ratings.
CO2	Make electrical connections by wires of appropriate ratings.
CO3	Understand usage of common electrical measuring instruments.
CO4	Determine performance characteristics of transformers and electrical machines.

**Course Name: MATHEMATICS – II**

	Course Outcomes
CO1	Apply the mathematical principles to solve second and higher order differential equations.
CO2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
CO3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
CO4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs.
CO5	Analyze the vector calculus involving divergence, curl and their properties alongwith vector identities.
CO6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.

*L. Princy*  
PRINCIPAL  
G. Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)



Course Name: **DATA STRUCTURES**

	Course Outcomes
CO1	Learn to choose appropriate data structure as applied to specified problem definition.
CO2	Design and analyze linear and non-linear data structures.
CO3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs
CO4	Demonstrate advantages and disadvantages of specific algorithms and data structures
CO5	Develop programs for efficient data organization with reduce time complexity
CO6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

Course Name: **COMMUNICATIVE ENGLISH**

	Course Outcomes
CO1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO2	Apply grammatical structures to formulate sentences and correct word forms
CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO5	Create a coherent paragraph interpreting a figure/graph/chart/table
CO6	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English

Course Name: **ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING**

	Course Outcomes
CO1	Learning conventions of Drawing, which is an Universal Language of Engineers. Also Interpret and Sketch the various curves which Including ellipse, parabola, hyperbola
CO2	Analyze and draft the orthographic projections of points and lines
CO3	Analyze and sketch the orthographic projections of planes and solids
CO4	Revise and Improve their visualization skills in the development of new products
CO5	Construct the isometric projection of an object employing orthographic projections
CO6	Drawing 2D and 3D diagrams of various objects

*G. Prasad*  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **APPLIED PHYSICS**

	Course Outcomes
CO1	Interpret the properties of light waves and its interaction of energy with the matter
CO2	Explain the principles of physics in dielectrics and magnetic materials.
CO3	Apply electromagnetic wave propagation in different guided media.
CO4	Calculate conductivity of semiconductors
CO5	Interpret the difference between normal conductor and super conductor
CO6	Elucidate the applications of nano materials

Course Name: **APPLIED PHYSICS LABORATORY**

	Course Outcomes
CO1	Operate optical instruments like microscope and spectrometer and understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
CO2	interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
CO3	demonstrate the importance of dielectric material in storage of electric field energy in the capacitors
CO4	plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
CO5	evaluate the acceptance angle of an optical fiber and numerical aperture
CO6	determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor and identify the type of semiconductor using Hall effect

Course Name: **DATA STRUCTURES LAB**

	Course Outcomes
CO1	Learn to choose appropriate data structure as applied to specified problem definition.
CO2	C Design and analyze linear and non-linear data structures.
CO3	Design and implement algorithms for manipulating linked lists, stacks, queues, trees and graphs in python
CO4	Implement recursive algorithms as they apply to trees and graphs.
CO5	Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures
CO6	Implement operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

**Course Name: COMMUNICATIVE ENGLISH LAB**

	Course Outcomes
CO1	Remember and understand the different aspects of the English Language proficiency with emphasis on LSRW skills
CO2	Apply communication skills through various language learning activities.
CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings.
CO5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO6	Improve upon speaking skills over telephone, role plays and public speaking.

**COURSE NAME: CO-ENGINEERING LABORATORY**

	Course Outcomes
CO1	To acquire the knowledge about the characteristics and working principles of semiconductor diodes, Bipolar Junction Transistor
CO2	Analysis of Single-Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits
CO3	Able to Measure the amplitude and frequency utilizing oscilloscope and analyze the fabrication processes of printed circuit boards
CO4	Apply wood working skills in real world applications. Build different parts with metal sheets in real world applications
CO5	Apply fitting operations in various applications
CO6	Apply different types of basic electric circuit connections

**CourseName:ENGINEERINGPHYSICS**

	CourseOutcomes
CO1	Applymechanicsforsolvingengineeringproblems.
CO2	Applytheprinciplesofacoustics fornoise cancellationandindesigningbuildings
CO3	Analyzetheapplicationsofultrasonicsinvariousengineeringfields
CO4	Explaintherelationshipbetweenelasticconstants
CO5	Interprettheconceptsoflasersandopticalfibersinvariousapplications
CO6	Identifythesensorsforvariousengineeringapplications

  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

CourseName:ENGINEERINGPHYSICS LAB

	CourseOutcomes
CO1	Estimatethemechanicalpropertiesofmaterials
CO2	Determinemomentofinertiao faflywheel
CO3	Measurethevelocityofultrasonicsinliquid byapplying thebasicconceptsofultrasonics
CO4	Determinethewavelengthoflaser,particlesize,numericalapertureandacceptanceanglebyapplyingtheprinciples oflasers andopticalfibres
CO5	Measurethespringconstants, Poisson'sratioofthematerialandverifyHooke'slaw
CO6	Comparepressureandtemperaturevariationinstraingaugesensorandopticalfibresensor

CourseName:ENGINEERINGCHEMISTRY

	CourseOutcomes
CO1	ComparethequalityofdrinkingwaterwithBISandWHOstandards.Illustrateproblemsassociatedwithhardwateranddemonstrate industrialwatertreatmentprocess.
CO2	DemonstratethecorrosionpreventionmethodandapplyNernstequationforcalculatingelectrodeandcellpotentials.
CO3	Analyzetheclassificationoffuelsalongwiththeircharacteristicsandcalorificvalueinvolving solidfuels,liquidandgaseousfuels.
CO4	Explainedifferenttypesofpolymersandtheirapplications,demonstratethemechanismo fconductionandconductingpolymers.
CO5	Summarizetheunderlyingchemistryofengineeringmaterials involvingCement, lubricants.
CO6	Summarizethe applicationsofSEM,TEMandX-Raydiffractioninsurfacecharacterization.

CourseName:ENGINEERINGCHEMISTRY LAB

	CourseOutcomes
CO1	Determinethecellconstantandconductanceofsolutions.
CO2	Prepareadvancedpolymer materials
CO3	Determinethephysicalproperties likesurfacetension, adsorptionandviscosity
CO4	EstimatetheIronand Calciumincement
CO5	Calculatethehardnessofwater and calculationofdissolved oxygenpercentages
CO6	DeterminationofpercentageofIroninCementsample bycolorimetry

  
**PRINCIPAL**  
**G.Pullaiah College of Engg & Tech.**  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

CourseName:ENGINEERINGMECHANICS


	CourseOutcomes
CO1	Toanalyzethebasicconceptsofrigidbodiessubjectedtodifferenttypesofloadsandsupports.
CO2	Toanalyzethemotionofthebodiesconsideringfrictionandexternalloads.
CO3	TodetermineCentroidsandareamomentofinertiaandcentreofgravityandmassmomentofinertiaofsimpleandcompositefigures.
CO4	Toanalysethemotionofparticlewithoutconsideringforcesandconsideringforces
CO5	Toanalyzetheperfectframesusingmethodofjoints,methodofsections&tensioncoefficientmethodforvertical,horizontalandinclinedloadsandconceptsofMechanicalvibrations.(Simple,compoundandtorsionalpendulums)
CO6	Toanalysethemotionofparticlewithandwithoutconsideringforces

CourseName:APPLIED MECHANICS LAB

	CourseOutcomes
CO1	Acquireknowledgeofstaticanddynamicbehaviorofthebodies.
CO2	Acquiretheknowledge,sothattheycanunderstandphysicalphenomenonwiththehelpofvarious theories.
CO3	Explainthephysicalphenomenonwithhelpofdiagrams.
CO4	with broad vision with the skills of visualizing and developing their own ideas, and to convertthoseideasintoengineeringproblemsandsolvingthoseproblemswiththeacquiredknowledg eoftheEngineeringmechanics.
CO5	Applytheprinciplesofmechanicstoanalyzestructuralandmachineelements.
CO6	Identify the different types of beams and the types of loading. Derive expressions todeterminethebendingstress,deflectionandshearstressinbeamssubjectedtovarioustypesloadi ng.

**COURSE NAME: ELECTRICAL CIRCUITS -I**

	Course Outcomes
CO1	Analyze the concept of electrical circuits and magnetic circuits and study different techniques to calculate voltage and current.
CO2	Determining the response of circuits to single phase A.C excitation and evaluate the RMS value and Average Values
CO3	Depict the locus diagrams of various combinations of circuits along with the analysis of concept of resonance
CO4	Understand the concept of bandwidth and Q factor in various series and parallel circuits.
CO5	Interpret the technique of solving circuits employing theorems which involve Norton's, Thevenin's, Maximum Power transfer theorem etc.
CO6	Analyze the concept of two port parameters with respect to impedance, admittance, Transmission and Hybrid parameters

  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

**COURSE NAME: ELECTRICAL CIRCUITS-I LAB**

	Course Outcomes
CO1	Perform the verification of theorems like Norton's Theorem, Thevenin's theorem, super position theorem, maximum power transfer theorem experimentally and theoretically.
CO2	Evaluate the frequency at which series and parallel resonance occurs in a given circuit
CO3	Calculate the impedance and admittance parameters along with transmission parameter and hybrid parameters for a given circuit.
CO4	Measure the active and reactive power for star and delta connected balanced loads
CO5	Assess the value of 3 phase power for unbalanced loads employing two wattmeter method
CO6	Determine the self inductance, mutual inductance and coefficient of coupling of coupled circuits

**Course Name: PROBABILITY & STATISTICS**

	Course Outcomes
CO1	Make use of the concepts of probability and their applications
CO2	Apply discrete and continuous probability distributions
CO3	Classify the concepts of data science and its importance
CO4	Interpret the association of characteristics and through correlation and regression tools
CO5	Design the components of a classical hypothesis test
CO6	Infer the statistical inferential methods based on small and large sampling tests

**Course Name: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

	Course Outcomes
CO1	State the basic laws and usage of components in electric circuits.
CO2	Investigate DC and AC circuits using different methods and laws.
CO3	Analyze the principle of operation of DC machines and AC machines along with the various tests to predetermine the efficiency and regulation.
CO4	Understand the theory, operation and applications of semiconductor devices.
CO5	Determine various parameters of rectifier circuits using with and without filters
CO6	Analyze and Design different oscillator circuits, op-amps and the characteristics of BJT, FET to meet the given specifications.

  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

**COURSE NAME: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

	Course Outcomes
CO1	Practically verify Superposition ,Thevenin's theorems and Open and Short circuit parameters.
CO2	Predetermine the Efficiency of a given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator by using Swinburne's test.
CO3	Predetermine the Efficiency and Regulation at any given load and Power Factor of a transformer by using OC & SC tests.
CO4	Analyze the V-I characteristics of P -N Junction Diode and Zener Diode.
CO5	Analyze the input and output characteristics of BJT, Common Source Configuration Output and Transfer Characteristics of JFET.
CO6	Determination of efficiency of a Half-Wave Rectifier and Full-Wave Rectifier with and without filters.

*S. J. Prasad*  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

**G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY**  
**(Autonomous)**

(Approved by AICTE | NAAC Accreditation with 'A' Grade |  
Accredited by NBA (CIV, CSE, ECE & EEE) | Affiliated to JNTUA)  
Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

---

The following are the course outcomes of all the courses for the academic year 2020-21


R 20 Regulations:

Course Name: **MATHEMATICS – I**

	Course Outcomes
CO 1	Develop the use of matrix algebra techniques that is needed by engineers for practical Applications.
CO 2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.
CO 3	Utilize mean value theorems to real life problems.
CO 4	Familiarize with functions of several variables, which is useful in optimization.
CO 5	Apply important tools of calculus in higher dimension and will become familiar with 2dimensional coordinate systems.
CO 6	Analyze 3- dimensional coordinate systems and utilization of special functions.

• Course Name: **CHEMISTRY**

	Course Outcomes
CO 1	Illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box.
CO 2	Differentiate between pH metry, Potentiometric and conductometric titrations.
CO 3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.
CO 4	Understand the principles of different analytical instruments and explain their applications.
CO 5	Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
CO 6	Explain different types of colloids, their preparations, properties and Applications

  
**PRINCIPAL**  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)



Course Name: **PYTHON PROGRAMMING**

	Course Outcomes
CO 1	Comprehend the fundamental concepts of computer hardware and problem-solving abilities
CO 2	Knowledge on the basic concepts of algorithms, flow charts and python programming
CO 3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements
CO 4	Interpret the importance of pointers and functions in programming
CO 5	Analyze and modularize the problem and its solution by using functions
CO 6	Ability to relate the concepts of strings, files and preprocessors to the real-world applications

Course Name: **FUNDAMENTALS OF ELECTRONICS ENGINEERING**

	Course Outcomes
CO 1	Analyze brief history of electronic components and devices.
CO 2	Analyze the function of CRO used to measure frequency, amplitude and phase.
CO 3	Comprehend the operation and characteristics of various electronic devices.
CO 4	Analyze various applications of semiconductor diodes
CO 5	Make use of boolean algebra postulates to minimize boolean functions.
CO 6	Understand the basic principles of electronic communication.

Course Name: – **ENGINEERING WORKSHOP**

	Course Outcomes
CO 1	Apply wood working skills to make products.
CO 2	Perform metal cutting operations in the fitting section to make models
CO 3	Perform simple welding operations to join to metal pieces
CO 4	Apply sheet metal working skills to make required models.
CO 5	Evaluate the performance analysis of various pumps and turbines

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

CO 6	Perform general maintenance works on own at house/ work place.
------	--

Course Name: **PYTHON PROGRAMMING LAB**

Course Outcomes	
CO 1	Design solutions to mathematical problems & Organize the data for solving the problem.
CO 2	Understand and implement modular approach using python.
CO 3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc
CO 4	Understands about files and its applications.
CO 5	Develop real-world applications, files and exception handling provided by python
CO 6	Select appropriate programming construct for solving the problem.

Course Name: **CHEMISTRY LAB**

Course Outcomes	
CO 1	Understand the determine the cell constant and conductance of solutions
CO 2	Prepare advanced polymer materials.
CO 3	Measure the strength of an acid present in secondary batteries
CO 4	Understand and apply the pH metric titrations.
CO 5	Verify Lambert-Beer'slaw
CO 6	Potentiometry - determination of redox potentials and EMFs

Course Name: **FUNDAMENTALS OF ELECTRONICS ENGINEERING LABORATORY**

Course Outcomes	
CO 1	Analyze brief history of electronic components and devices
CO 2	Analyze the function of CRO used to measure frequency, amplitude and phase.
CO 3	Identify various electronic components and measuring equipment
CO 4	Assemble and test simple electronic circuits over a PCB
CO 5	Interpret specifications (ratings) of the components.

*E. Vinitha*  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

CO 6	Understand the working of various communication systems.
------	--

**Course Name: MATHEMATICS – II**

	Course Outcomes
CO 1	Apply the mathematical principles to solve second and higher order differential equations.
CO 2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
CO 3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
CO 4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs.
CO 5	Analyze the vector calculus involving divergence, curl and their properties alongwith vector identities.
CO 6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.

**Course Name: APPLIED PHYSICS**

	Course Outcomes
CO 1	Interpret the properties of light waves and its interaction of energy with the matter
CO 2	Explain the principles of physics in dielectrics and magnetic materials.
CO 3	Apply electromagnetic wave propagation in different guided media.
CO 4	Calculate conductivity of semiconductors
CO 5	Interpret the difference between normal conductor and super conductor
CO 6	Elucidate the applications of nano materials

  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

Course Name: **DATA STRUCTURES USING C**

	Course Outcomes
CO 1	Learn to choose appropriate data structure as applied to specified problem definition.
CO 2	Design and analyze linear and non-linear data structures.
CO 3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs
CO 4	Demonstrate advantages and disadvantages of specific algorithms and data structures
CO 5	Develop programs for efficient data organization with reduce time complexity
CO 6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

Course Name: **COMMUNICATIVE ENGLISH**

	Course Outcomes
CO 1	Remember the concepts which the students has learnt previously and identifying their connections
CO 2	Understand the content, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO 3	Apply grammatical structures to formulate sentences and correct word forms
CO 4	Analyze discourse markers to speak clearly on a specific topic in informal discussions.
CO 5	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO 6	Create a coherent paragraph interpreting a figure/graph/chart/table.

  
**PRINCIPAL**  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

**Course Name: ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING**

	Course Outcomes
CO 1	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
CO 2	Apply orthographic projection concepts to draw projections of points, lines, planes and solids.
CO 3	Apply development concepts to draw development of surfaces of simple solids.
CO 4	Apply isometric projection concepts to draw isometric projections of right regular solids
CO 5	Apply orthographic projection concepts to convert isometric view to orthographic views.
CO 6	Make use of AutoCAD Software to draw 2D

**Course Name: APPLIED PHYSICS LABORATORY**

	Course Outcomes
CO 1	Operate optical instruments like Travelling microscope and spectrometer
CO 2	Understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
CO 3	Interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
CO 4	Plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
CO 5	Evaluate the acceptance angle of an optical fiber and numerical aperture
CO 6	Determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor.

*G. Prasad*  
PRINCIPAL  
G. Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **DATA STRUCTURES LAB**

	Course Outcomes
CO 1	Learn to choose appropriate data structure as applied to specified problem definition.
CO 2	Design and analyze linear and non-linear data structures.
CO 3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.
CO 4	Demonstrate advantages and disadvantages of specific algorithms and data structures.
CO 5	Develop programs for efficient data organization with reduce time complexity
CO 6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

Course Name: **COMMUNICATIVE ENGLISH LAB**

	Course Outcomes
CO 1	Remember and understand the different aspects of the English Language proficiency with emphasis on LSRW skills
CO 2	Apply communication skills through various language learning activities.
CO 3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO 4	Evaluate and exhibit acceptable etiquette essential in social and professional settings.
CO 5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO 6	Improve upon speaking skills over telephone, role plays and public speaking.

  
**PRINCIPAL**  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

**Course Name: ENVIRONMENTAL SCIENCE**

	Course Outcomes
CO 1	Solve environmental problems through higher level of personal involvement and interest.
CO 2	Apply ecological morals to keep up amicable connection among nature and human beings.
CO 3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
CO 4	Apply environmental laws for the protection of environment and wildlife.
CO 5	Influence society in proper utilization of goods and services.

**CourseName:ENGINEERINGPHYSICS**

#	COURSEOUTCOMES
CO1	Applymechanicsforsolvingengineeringproblems.
CO2	Applytheprinciplesofacousticsfor noisecancellationandindesigning buildings
CO3	Analysetheapplicationsofultrasonics invariousengineeringfields
CO4	Explaintheprinciplesofphysicsindielectricsandmagneticmaterials.
CO5	Interprettheconceptsoflasersand opticalfibersinvarious applications
CO6	Elucidatetheapplications ofsuperconductors andnano-materials

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

CourseName:ENGINEERINGPHYSICSLABORATORY

#	COURSEOUTCOMES
CO1	Estimatethe mechanical properties of materials
CO2	Determinemomentof inertia of a flywheel
CO3	Measurethe velocity of ultrasonics in liquid by applying the basic concepts of ultrasonics
CO4	Determinethewavelength of laser, particle size, numerical aperture and acceptance angle by applying the principles of lasers and optical fibres
CO5	Measurethe elastic constants, Poisson's ratio of the material
CO6	Measurethe strain of the metal bar by using strain gauge.

CourseName:ENGINEERINGCHEMISTRY

#	COURSEOUTCOMES
CO1	To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box
CO2	To differentiate between pHmetry, Potentiometric and conductometric titrations
CO3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers..
CO4	Understand the principles of different analytical instruments and explain their applications.
CO5	Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
CO6	Explain of different types of colloids, their preparations, properties and applications

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)



CourseName:C&ATASTRUCTURES

#	COURSEOUTCOMES
CO1	Learntochooseappropriatedatastructureasappliedtospecifiedproblem definition.
CO2	Designandanalyzelinear andnon-linear data structures.
CO3	Designalgorithmsformanipulatinglinkedlists,stacks,queues,treesandgraphs in python
CO4	Demonstrateadvantagesanddisadvantagesofspecificalgorithmsanddata structures
CO5	Developa baseforadvancedcomputersciencestudy.
CO6	Evaluatealgorithmsanddatastructuresinterms oftimeand memorycomplexityof basic operations.

CourseName:ENGINEERINGMECHANICS

#	COURSEOUTCOMES
CO1	Analyzethebasicconceptsofrigidbodiessubjectedtodifferenttypesofloadsandsupports.
CO2	Analyzethemotionofthebodiesconsideringfrictionandexternalloads.
CO3	Determinecentroids,centerofgravity,momento finertiaofsimpleandcomposite figures.
CO4	Analyzethemotionofparticlewithoutconsideringforcesandconsideringforces, develop equations for different motions.
CO5	ApplyNewton's lawsandconservationlawstoelasticcollisionsandmotionofrigidbodies.
CO6	AnalyzetheperfectframesusingdifferentmethodsandconceptsofMechanical vibrations.

  
**PRINCIPAL**  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

CourseName:ENGINEERINGCHEMISTRYLABORATORY

#	COURSEOUTCOMES
CO1	Determinethecellconstantandconductanceofsolutions
CO2	Preparedadvancedpolymermaterials.
CO3	Determinethephysicalproperties likesurfacetension, adsorptionandviscosity
CO4	EstimatetheIronand Calciumin cement
CO5	Calculatethehardnessofwater andcalculationofdissolvedoxygenpercentages
CO6	DeterminationofpercentageofIroninCementsample bycolorimetry

CourseName:C&DATASTRUCTURES LABORATORY

#	COURSEOUTCOMES
CO1	Learntochooseappropriatedatastructureasappliedtospecifiedproblemdefinition.
CO2	Designandanalyzelinear andnon-linear data structures.
CO3	Designandimplementalgorithmsformanipulatinglinkedlists,stacks,queues,trees and graphs in python
CO4	Implementrecursivealgorithmsastheyapplytotreesand graphs.
CO5	Formulatenewsolutionsforprogrammingproblemsorimproveexistingcodeusing learned algorithms and data structures
O6	Implementoperationslikerearching, insertion,deletion,traversingmechanismetc.on various data structures.

CourseName:APPLIEDMECHANICSLABORATORY

#	COURSEOUTCOMES
CO1	Acquireknowledgeofstaticanddynamicbehaviorofthebodies
CO2	VerifythePrincipleofmomentsusingthebellcranklever apparatus.
CO3	Determinevelocityratio,mechanicaladvantageandefficiencyofsingleanddoublegearcrab
CO4	Determinethevelocityratioofthemachineand tointerpret thelawofmachine
CO5	Analyzethecoefficientofstaticfrictionbetweentwosurfaces
CO6	Applylawsofmechanicsto determineefficiencyofsimple machineswithconsiderationof friction

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

CourseName:**UNIVERSALHUMAN VALUES**

#	COURSEOUTCOMES
CO1	Understandthesignificanceofvalue inputsinaclassroomandstartapplyingtheminthelife and profession
CO2	Distinguishbetweenvaluesandskills, happinessand accumulationofphysicalfacilities,the Self and the Body, Intention and Competence of an individual, etc
CO3	Understandthe valueofharmoniousrelationshipbasedontrustandrespect intheir lifeand profession
CO4	Understandtheroleofahumanbeingin ensuringharmonyinsocietyand nature
CO5	Distinguishbetweenethicalandunethicalpractices, andstart workingoutthestrategyto actualize a harmonious environment wherever they work.

CourseName:**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

#	COURSEOUTCOMES
CO1	State the basic laws and usage of components in electric circuits.
CO2	Investigate DC and AC circuits using different methods and laws.
CO3	Analyze the principle of operation of DC machines and AC machines along with the various tests to predetermine the efficiency and regulation.
CO4	Understand the theory, operation and applications of semiconductor devices.
CO5	Determine various parameters of rectifier circuits using with and without filters
CO6	Analyze and Design different oscillator circuits, op-amps and the characteristics of BJT, FET to meet the given specifications.

  
PRINCIPAL  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

CourseName:**BASIC ELECTRICAL AND ELECTRONICS ENGINEERINGLABORATORY**

#	COURSEOUTCOMES
CO1	Practically verify Superposition, Thevenin's, Norton's theorems and Open and Short circuit parameters
CO2	Predetermine the Efficiency of a given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator by using Swinburne's test.
CO3	Predetermine the Efficiency and Regulation at any given load and Power Factor of a transformer by using OC & SC tests.
CO4	Analyze the V-I characteristics of P -N Junction Diode and Zener Diode.
CO5	Analyze the input and output characteristics of BJT, Common Source Configuration Output and Transfer Characteristics of JFET.
CO6	Determine the ripple content present in half-wave and full-wave rectifiers using with and without filters.

Course Name: **FOUNDATION FOR IOT**

	Course Outcomes
CO 1	Utilize logic gate operations and Boolean theorems for circuit output evaluation and expression minimization
CO 2	Apply different arithmetic operations in CPU instruction sets.
CO 3	Apply addressing modes and instruction set to write simple programs.
CO 4	Distinguish sensors and actuators in terms of their functions and applications
CO 5	Apply Raspberry Pi to implement IoT projects.
CO 6	Develop simple Arduino-based by employing Arduino Uno boards along with sensors and actuators.

1

  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

Course Name: **FOUNDATION FOR IOT LAB**

	Course Outcomes
CO 1	Analyze the basic laws and usage of components in electric circuits
CO 2	Analyze the principle of operation of DC machines and AC machines along with the various tests to predetermine the efficiency and regulation
CO 3	Analyze building blocks of Internet of Things and characteristics.
CO 4	Understand the theory, operation and applications of semiconductor devices
CO 5	Determine various parameters of rectifier circuits using with and without filters
CO 6	Analyze and Design different oscillator circuits, op-amps and the characteristics of BJT, FET to meet the given specifications

Course Name: **FUNDAMENTALS OF ELECTRICAL ENGINEERING**

	Course Outcomes
CO 1	Understand the basic concepts of magnetic circuits, electro magnetism and Electrostatics.
CO 2	Understand and analyse DC circuits and their transformations.
CO 3	Understand and analyse the concepts of AC fundamental circuits.
CO 4	Apply KCL and KVL for mesh and nodal analysis
CO 5	Understand the Knowledge of electromagnetism and its principles.
CO 6	Understand the basic types of wires, cables, Batteries and wiring systems

  
**PRINCIPAL**  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

Course Name: **FUNDAMENTALS OF ELECTRICAL ENGINEERING LABORATORY**

Course Outcomes	
CO 1	Understand the basic concepts of electrical elements.
CO 2	Understand and analyses the basic laws.
CO 3	Understand and apply the connections of series and parallel circuits.
CO 4	Understand and apply the KCL and KVL.
CO 5	Understand and apply the basic wiring systems.
CO 6	Demonstration of parts of DC and AC Machines.

CourseName:**FUNDAMENTALS OF ARTIFICIAL ENGINEERING**

#	COURSEOUTCOMES
CO1	An ability to analyze a problem, identify and define the computing requirements appropriate to its solution.
CO2	An ability to design, implement and evaluate a system / computer based system process, component or program to meet desired needs
CO3	An ability to identify, formulate and solve engineering problems using the concepts of Artificial Intelligence.
CO4	Design and conduct experiments as well as analyze and interpret data using Machine Learning Algorithms.
CO5	An ability to use current techniques and skills necessary for computing and engineering practice
CO6	Get familiarized with the tools mandatory for handling problem solving techniques

*C. Vinay*  
**PRINCIPAL**  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

CourseName: **BASIC ARTIFICIAL INTELLIGENCE LABORATORY**

#	COURSEOUTCOMES
CO1	Execute statistical problems to produce appropriate solutions
CO2	Categorize the problem for selection of an appropriate algorithm
CO3	Compare computational complexity of AI problems for better efficiency
CO4	Demonstrate various AI algorithms based on empirical and theoretical proofs for performance statistics
CO5	An ability to use current techniques and skills necessary for computing and engineering practice.
CO6	Get familiarized with the tools mandatory for handling problem solving techniques

*S. Vinitha*  
**PRINCIPAL**  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

## G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade |  
Accredited by NBA (CIV, CSE, ECE & EEE) | Affiliated to JNTUA)  
Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

---

### Program Outcomes (PO's):

Engineering Graduates will be able to

- ❖ **PO 1. Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering Fundamentals and an engineering specialization to the solution of complex engineering problems.
- ❖ **PO 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- ❖ **PO 3. Design / development of solutions:** 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.
- ❖ **PO 4. Conduct investigations of complex problems:** 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.
- ❖ **PO 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- ❖ **PO 6. The engineer and society:** 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.
- ❖ **PO 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
- ❖ **PO 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ❖ **PO 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ❖ **PO 10. Communications:** 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 receive clear instructions.
- ❖ **PO 11. Project management and finance:** 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 multidisciplinary environments.
- ❖ **PO 12. Life-long learning:** 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.

  
PRINCIPAL

G. Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)



**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY::KURNOOL**  
**(AUTONOMOUS)**  
**ACCREDITED BY NAAC 'A' GRADE OF UGC AND NBA OF AICTE**  
**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE OUTCOMES-R18 REGULATION**

**III**

S.NO	Course Outcomes (COs)
1.	<p><b>A1014 Linear Algebra and Complex Variables</b></p> <p>CO1 Demonstrate knowledge of matrix calculation as an elegant and powerful mathematical language in connection with rank of a matrix, linear system of equations, linear dependence and independence</p> <p>CO2 Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.</p> <p>CO3 Define a quadratic form and determine its nature using Eigen values. Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.</p> <p>CO4 Analyze the functions of complex variable which include continuity, differentiability and analyticity along with evaluation of Cauchy-Riemann equations in Cartesian and polar coordinates.</p> <p>CO5 Employ the Cauchy's integral theorem along with integral formula along with expansion in Taylor's series, Maclaurin's series and Laurent series.</p> <p>CO6 Evaluate the residual formula through Laurent series and residue theorem along with evaluation of improper real integrals.</p>
2.	<p><b>A1401 Electronic Devices and Circuits</b></p> <p>CO1 Understand the operation and characteristics of PN diode with diode's applications in electronic circuits.</p> <p>CO2 Formulate the electrical models for special semiconductor diodes like Tunnel diode, LED and Photodiode.</p> <p>CO3 Analyze various rectifiers and filter circuits used in regulated power supplies.</p> <p>CO4 Compare and contrast the construction, working principles, characteristics and applications of major electronic devices like BJT, FET and MOSFET.</p> <p>CO5 Design and analyze the DC bias circuitry of BJT.</p> <p>CO6 Design and analyze the small signal models of BJT &amp; FET Amplifiers at low frequencies.</p>
3.	<p><b>A1402 Digital Logic Design</b></p> <p>CO1 Understand common forms of number representation in logic circuits.</p> <p>CO2 Make use of Boolean algebra postulates-map and tabulation methods to minimize boolean functions and to implement with logic gates.</p> <p>CO3 Construct and analyze various combinational circuits used in digital systems such as adders, subtractors and code-convertors.</p> <p>CO4 Construct and analyze various combinational circuits used in digital systems such as decoders, encoders, and data selectors.</p> <p>CO5 Construct and analyze various sequential circuits used in digital systems such as flip-flops, registers and counters.</p> <p>CO6 Design various PLDs such as ROMs, PALs, PLAs and PROMs.</p>
4.	<p><b>A1403 Signals and Systems</b></p> <p>CO1 Understand the concepts of different signals and systems in continuous &amp; discrete time domains.</p> <p>CO2 Find the Fourier series representation of different Periodic signals.</p> <p>CO3 Plot the spectrum of continuous time signals and verify the sampling theorem for low pass signals.</p> <p>CO4 Evaluate the Fourier transform of Discrete-time signals and prove the properties of DTFT.</p> <p>CO5 Find the response of LTI &amp; LTV systems and distinguish between signal &amp; system bandwidths.</p> <p>CO6 Understand the stability of systems through the ROC concept of Laplace and Z-transforms.</p>
5.	<p><b>A1404 Probability Theory and Stochastic Processes</b></p>


  
**PRINCIPAL**  
**G.Pullaiah College of Engg & Tech.**  
**Nandikotkur Road, VENKAYAPALLI**  
**KURNOOL-518 452 (A.P)**

	<p>CO1 Recall the basic parameters like probability concepts, principles of random variables</p> <p>CO2 Apply probability distribution and density functions to evaluate the performance of</p> <p>CO3 Describe the characteristics of real, physical world random phenomenon.</p> <p>CO4 Evaluate practical probabilistic problems involving random input signals.</p> <p>CO5 Illustrate about processes by means of autocorrelation, cross correlation and covariance functions.</p> <p>CO6 Describe the performance of systems with random signals &amp; understand the concept of Noise as applicable to linear Systems.</p>
6.	<p><b>A1405 Electronic Devices and Circuits Laboratory</b></p> <p>CO1 Analyze the description of CRO and Function generator panels.</p> <p>CO2 Find the cut-in voltage, static and dynamic resistances from V-I characteristics of PN junction diode.</p> <p>CO3 Find the breakdown voltage and Regulation characteristics of Zener diode.</p> <p>CO4 Compute the ripple content present in half wave and full wave rectifiers with and without filters.</p> <p>CO5 Plot the characteristics of BJT and FET.</p> <p>CO6 Draw the frequency response of single stage amplifiers at low, mid and high frequencies.</p>
7.	<p><b>A1406 Digital Logic Design Laboratory</b></p> <p>CO1 Design digital logic circuits using NI Lab VIEW software.</p> <p>CO2 Verify the logical operations of the digital ICs in the laboratory.</p> <p>CO3 Analyze the functionality of Combinational circuits using NI Lab VIEW.</p> <p>CO4 Analyze the functionality of Sequential Circuits using NI Lab VIEW.</p> <p>CO5 Design and analyze the code converters using NI Lab VIEW.</p> <p>CO6 Analyze the functionality of Combinational circuits and Sequential Circuits using Virtual lab.</p>
8.	<p><b>A1407 Basic Simulation Laboratory</b></p> <p>CO1 Generate different signals and sequences using MATLAB</p> <p>CO2 Perform correlation and convolution of signals and sequences</p> <p>CO3 Find the Fourier and Laplace transform of the given functions</p> <p>CO4 Plot the pole-zero map of the given transfer function in S &amp; Z planes</p> <p>CO5 Find mean and variance &amp; check the wide sense stationary of the Stochastic process</p> <p>CO6 Remove the noise by auto correlation / cross correlation in a given signal corrupted by noise.</p>
9.	<p><b>A1013 Verbal Ability &amp; Logical Reasoning</b></p>

**COURSE OUTCOMES-R18 REGULATION**

IV

S.NO	Course Outcomes (COs)
1.	A1408 – Electronic Circuit Analysis

  
**PRINCIPAL**  
**G.Pullaiah College of Engg & Tech.**  
**Nandikotkur Road, VENKAYAPALLI**  
**KURNOOL-518 452 (A.P)**

	<p>CO1 Design and analyze the small signal models of BJT&amp; FET Amplifiers at highfrequencies.</p> <p>CO2 Analyze the frequency response of single &amp; multi-stage amplifiers with compoundconnections.</p> <p>CO3 Understand and analyze the basic analog building blocks of Feedback Amplifiers.</p> <p>CO4 Design basic analog building blocks for LC and RC oscillator Circuits.</p> <p>CO5 Evaluate the efficiency of Large signal or Power amplifiers.</p> <p>CO6 Explain the concept of tuned amplifiers &amp; evaluate the resonant frequency for tunedamplifiers.</p>
2.	<p><b>A1409– Analog Communication Systems</b></p> <p>CO1 To Understand the basic concepts of the analog communication systems.</p> <p>CO2 To Analyze various analog continuous wave modulation and demodulationtechniques including AM, FM and PM.</p> <p>CO3 Evaluate the performance of the communication system in the presence of noise.</p> <p>CO4 Analyze various analog pulse modulation and demodulation techniques including AM, FM and PM.</p> <p>CO5 To calculate information rate and channel capacity of a discrete communicationchannel .</p> <p>CO6 To Acquire life long experience in doing projects related to communicationsystems.</p>
3.	<p><b>A1410 – Electromagnetic Theory andTransmission Lines</b></p> <p>CO1 State Coulomb’s law and Gauss’s law based on electrostatic fields and write theMaxwell’s equations.</p> <p>CO2 ExplainAmpere’s law in magneto static fields and write the Maxwell’s equations.</p> <p>CO3 Explain the Faraday’s law and understand the four Maxwell’s equations for time- varying fields</p> <p>CO4 Apply the Maxwell’s equations and analyze the reflection and refraction ofelectromagnetic waves propagated in normal and oblique incidences</p> <p>CO5 Understand the properties of different types of transmission lines</p> <p>CO6 Understand how to treat the transmission lines as circuit elements possessing complex impedances that are functions of line length and frequency</p>
4.	<p><b>A1211– Control Systems</b></p> <p>CO1 Differentiate the open loop and closed loop control system along with understandingof fundamental concepts like signal flow graph and Masons gain formula and also representing the transfer function of AC and DC servomotor.</p> <p>CO2 Analyze the time response of both first order and second order systems along with thedesigning of various controllers</p> <p>CO3 Apply the concepts of stability through Root locus technique, R-H Criterion in s-domain</p> <p>CO4 Plot the phase and magnitude of various systems employing Bode plot, Nyquist plotand polar plot</p> <p>CO5 Design compensation techniques which involve lag, lead and lead-lag type.</p> <p>CO6 Derive the State models from schematic models along with diagnolization andformulation of state transition matrix</p>
5.	<p><b>A1216 – Electrical Technology</b></p> <p>CO1 State and define the basic laws related to operating principle of DC and AC machines, and Classify the types based on its applications.</p> <p>CO2 Analyze the constructional details and principle of operation of DC machines and alsodepict their characteristics.</p> <p>CO3 Implement the concept of speed control of DC motors along with evaluation ofefficiency.</p> <p>CO4 Compute the equivalent circuit parameters of single phase transformer and conduct thetests to determine the efficiency and regulation.</p> <p>CO5 Analyze the constructional parts and principle of operation of AC machines with theircharacteristics. Apply the method employed in determination of voltage regulation of an alternator.</p>
6.	<p><b>A1411 –Electronic Circuit Analysis Laboratory</b></p> <p>CO1 Analyze and design multistage amplifiers at low, mid and high frequencies.</p> <p>CO2 Find the gain of feedback amplifiers.</p> <p>CO3 Design RC and LC oscillators.</p> <p>CO4 Determine the efficiencies of power amplifiers.</p>

	CO5 Draw the frequency response of tuned amplifiers. CO6 Able to Analyze all the circuits using simulation software and Hardware.
7.	<b>A1412 - Analog Communication Systems Laboratory</b> CO1 Design different types of modulators and demodulators for analog continuous wave modulation. CO2 Design FM modulator and demodulator CO3 Design Phase Locked Loop CO4 Study the characteristics of a mixer CO5 Design pre-emphasis and de-emphasis circuits CO6 Design different types of modulators and demodulators for analog pulse modulation.
8.	<b>A1217 - Electrical Technology Laboratory</b> CO1 Conduct experiments to obtain the no load and load characteristics of Dc Generators and Identify the reason as to why DC Generator is not building up voltage. CO2 Conduct test on DC Motors for Predetermination of efficiency. CO3 Control the speed of DC Motor in a given range using appropriate method. CO4 Compute the Performance of Single Phase Transformer along with its equivalent circuit parameters. CO5 Acquire good practical knowledge about the operation , testing and characteristics of A.C equipment like Induction Motors and Alternators
9.	<b>A1012 - Quantitative Aptitude-1</b>
10.	<b>A1413 - Comprehensive Online Examination</b>

  
**PRINCIPAL**  
**G.Pullaiah College of Engg & Tech.**  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

**COURSE OUTCOMES-R18 REGULATION**

V

S.NO	Course Outcomes (COs)
1.	<b>A1701 Managerial Economics and Financial Analysis</b>
	A1701.1 Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
	A1701.2 Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
	A1701.3 Classify the market structure to decide the fixation of suitable price
	A1701.4 Apply capital budgeting techniques to select best investment opportunity
	A1701.5 Analyze and prepare financial statements to assess financial health of business
2.	<b>A1418 Antennas and Wave Propagation</b>
	A1418.1 Compare the performance of different antennas using antenna parameters
	A1418.2 Analyze dipole and array antennas by computing fields, radiated power and radiation resistance
	A1418.3 Select appropriate antenna for a specific application like TV, AM/FM radio, radar, satellite link
	A1418.4 Design horn, helical and reflector antennas for VHF, UHF and microwave communication applications
	A1418.5 Formulate the design equations of microstrip antennas for a given application
3.	<b>A1419 Digital Communication Systems</b>
	A1419.1 Analyze different digital modulation techniques to convert analog signals to digital form.
	A1419.2 Distinguish between baseband and passband transmission techniques in terms of SNR and BER.
	A1419.3 Examine the concepts of geometric representation of signals and constellation diagrams.
	A1419.4 Compare digital carrier modulation schemes in terms of bandwidth, complexity and spectral efficiency.
	A1419.5 Interpret the differences between linear block codes and convolutional codes for noisy and noiseless channels.
4.	<b>A1420 Linear Integrated Circuit Applications</b>
	A1420.1 Analyze the characteristics of operational amplifier.
	A1420.2 Design different amplifier and oscillator circuits using op-amp.
	A1420.3 Make use of IC 555 and PLL effectively in communication systems.
	A1420.4 Construct different active filters using op-amp.
	A1420.5 Design different analog to digital and digital to analog converters effectively.
5.	<b>Professional Elective – 1</b>
	<b>A1451 Data Communications and Networking</b>
	A1451.1 Analyze the layers of reference models used for communication in various networks.
	A1451.2 Apply the principles of error detection and correction to transfer data without errors.
	A1451.3 Interpret various IEEE standards and channelization protocols.
	A1451.4 Analyze the issues with host naming, addressing, and routing packets in internet.
	A1451.5 Inspect the process to delivery data using TCP and UDP in transport layer.
	<b>A1452 Electronic Measurements and Instrumentation</b>
	A1452.1 Analyze the performance characteristics of different measurement instruments and their errors.
	A1452.2 Analyze the function of CRO used to measure frequency, amplitude and phase.
	A1452.3 Compare the operation of different signal generators and wave form analysers.
	A1452.4 Select an appropriate bridge network for the measurement of electrical quantities.
	A1452.5 Make use of Sensors and transducers to measure the required physical quantities.
	<b>A1453 Advanced Digital System Design</b>

*Elina*  
PRINCIPAL

G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

	<p>A1453.1 Compare the performance of various digital logic families.</p> <p>A1453.2 Analyze the sequential circuits using state reduction techniques.</p> <p>A1453.3 Apply the sequential network to solve synchronous &amp; asynchronous design behaviour.</p> <p>A1453.4 Design advanced digital systems using finite state machines.</p> <p>A1453.5 Design complex circuits using programmable logic devices.</p>
	<b>A1454 Internet of Things</b>
	<p>A1454.1 Analyze IoT applications using IoT design principles, protocols and levels.</p> <p>A1454.2 Distinguish sensors and actuators in terms of their functions and applications.</p> <p>A1454.3 Interface I/O devices, Sensors using Arduino.</p> <p>A1454.4 Apply Python concepts for programming of Raspberry Pi.</p> <p>A1454.5 Develop IoT applications using Raspberry Pi and Arduino.</p>
<b>6.</b>	<b>Open Elective – 1</b>
	<b>A1283 Electrical Measuring Instruments</b>
	<p>A1283.1 Categorise various electrical instruments used for measuring electrical parameters.</p> <p>A1283.2 Design appropriate arrangement for extension of range in measuring instruments.</p> <p>A1283.3 Analyze the errors and compensations in various electrical measuring instruments.</p> <p>A1283.4 Measure current, voltage, power and energy in 1-phase and 3-phase circuits.</p> <p>A1283.5 Estimate the unknown quantities of resistance, inductance and capacitance using bridges.</p>
<b>7.</b>	<b>A1421 Digital Design through Verilog HDL Laboratory</b>
	<p>A1421.1 Develop hardware digital designs using Verilog HDL</p> <p>A1421.2 Use various modeling styles appropriately for digital design</p> <p>A1421.3 Design, simulate and synthesize combinational circuits using Verilog descriptions</p> <p>A1421.4 Design, simulate and synthesize sequential circuits using Verilog descriptions</p> <p>A1421.5 Use finite state machines to design complex circuits</p>
<b>8.</b>	<b>A1422 Digital Communication Systems Laboratory</b>
	<p>A1422.1 Demonstrate the working of various digital modulation and demodulation schemes.</p> <p>A1422.2 Design various digital modulation schemes to obtain desired modulation index.</p> <p>A1422.3 Analyze the performance of time division multiplexing and de-multiplexing.</p> <p>A1422.4 Study and verify sampling theorem.</p> <p>A1422.5 Verify digital modulation techniques using MATLAB.</p>
<b>9.</b>	<b>A1423 Linear Integrated Circuit Applications Laboratory</b>
	<p>A1423.1 Implement different configurations of operational amplifiers.</p> <p>A1423.2 Generate various shapes of signals using op-amps and timers.</p> <p>A1423.3 Construct and analyze various active filters and data converters using op-amp.</p> <p>A1423.4 Analyze the characteristics and applications of PLL.</p>
<b>10.</b>	<b>A1016 Advanced English Language Communication Skills</b>
	<p>A1016.1 Build inferences and predictions based on the information provided in the context.</p> <p>A1016.2 Choose academic vocabulary appropriately both in speaking and in writing.</p> <p>A1016.3 Develop effective technical writing skills.</p> <p>A1016.4 Construct necessary skills to deliver presentation confidently for improving in respective domains.</p> <p>A1016.5 Apply language structures to construct good relations.</p>

**COURSE OUTCOMES-R18 REGULATION**

**VI**

<b>S.NO</b>	<b>Course Outcomes (COs)</b>
<b>1.</b>	<b>A1425 Digital Signal Processing</b>
	A1425.1 Apply the Discrete Fourier Transform to represent the signals in frequency domain.
	A1425.2 Analyze various DFT algorithms and their applications.
	A1425.3 Analyze various realization forms of FIR and IIR Filters.
	A1425.4 Design digital FIR and IIR filters and analyse their performances.
	A1425.5 Apply the concepts of multirate signal processing to implement digital filters.
<b>2.</b>	<b>A1426 CMOS VLSI Design</b>
	A1426.1 Analyze the electrical properties of MOS transistors.
	A1426.2 Apply various CMOS processing techniques to fabricate NMOS, PMOS and CMOS devices.
	A1426.3 Analyze the DC and transient characteristics of CMOS logic gates.
	A1426.4 Build logic circuits using transmission gate logic.
	A1426.5 Make use of charge leakage and charge sharing concepts to design dynamic logic circuits.
<b>3.</b>	<b>A1427 Microprocessors and Microcontrollers</b>
	A1427.1 Analyze 8086 microprocessor and MSP430 microcontroller architectures.
	A1427.2 Develop programs using 8086 microprocessor and MSP430 microcontroller.
	A1427.3 Make use of peripherals of MSP430 to interface I/O devices.
	A1427.4 Apply serial communication protocols for interfacing serial devices.
	A1427.5 Design embedded applications using MSP430 microcontroller.
<b>4.</b>	<b>Professional Elective – 2</b>
	<b>A1455 Microwave Engineering</b>
	A1455.1 Analyze rectangular waveguide transmission line characteristics using concepts of Electromagnetic theory.
	A1455.2 Evaluate relation between input(s) and output(s) of microwave passive components using scattering parameters.
	A1455.3 Compare performance of O-type and M-type microwave tubes.
	A1455.4 Sketch the characteristics of microwave solid state devices.
	A1455.5 Measure microwave parameters using microwave bench setup.
	<b>A1458 Real Time Operating Systems</b>
	A1458.1 Compare and contrast a real time operating system with other operating system.
	A1458.2 Design the applications to run in parallel either using processes or threads.
	A1458.3 Develop a practical real time system by using optimal core elements.
	A1458.4 Analyze the scheduling schemes for packet switching networks and protocols for the broadcast networks.
	A1458.5 Test for the performance analysis of different real time systems.
	<b>5.</b>
<b>A1459 Radar Engineering</b>	
A1459.1 Distinguish various radar systems and trackers based on characteristics and applications.	
A1459.2 Derive modified radar range equation and characteristics equation of Matched Filter.	
A1459.3 Derive range, relative velocity and angle error for different radars.	
A1459.4 Analyze the functionality of various elements of the radar receiver.	
<b>A1462 Embedded Hardware and Software Co-Design</b>	
A1462.1 Apply techniques for the concurrent design or co-design of embedded systems that are dedicated to specific applications.	

	<p>A1462.2 Apply hardware and software design techniques for construction of embedded systems.</p> <p>A1462.3 Distinguish various target architectures based on architecture specialization techniques.</p> <p>A1462.4 Discuss modern design methodologies with an emphasis on early design phases, including modeling, verification and system-level synthesis.</p>
<b>6.</b>	<p><b>A1539 JAVA Programming Laboratory</b></p> <p>A1539.1 Apply of data types, variables and control structures to solve problems</p> <p>A1539.2 Apply object-oriented concepts to solve problems including generating series primes, searching a pattern in a file.</p> <p>A1539.3 Design, write, debug and execute applet programs using Integrated Development Environment.</p> <p>A1539.4 Develop programs using threads and swing concepts.</p> <p>A1539.5 Apply I/O stream and networking classes to develop client and server interaction.</p> <p>A1539.6 Apply the concepts and create solution effectively as a member or leader in a team during the development of a software project.</p>
<b>7.</b>	<p><b>A1428 CMOS VLSI Design Laboratory</b></p> <p>A1428.1 Construct the schematics and symbols of logic circuits using EDA tool.</p> <p>A1428.2 Analyze the characteristics of CMOS logic circuits using suitable simulator.</p> <p>A1428.3 Construct the layouts for complex CMOS logic circuits following DRC and ERC rules.</p> <p>A1428.4 Analyze VLSI circuit timing to estimate and compute the leakage power consumption of a VLSI circuit.</p> <p>A1428.5 Evaluate the performance of CMOS logic circuits in terms of power, speed and area.</p>
<b>8.</b>	<p><b>A1429 Microprocessors and Microcontrollers Laboratory</b></p> <p>A1429.1 Develop assembly language programs using EMU8086 emulator.</p> <p>A1429.2 Execute 8086 ALPs for arithmetic, logical, string, call operations.</p> <p>A1429.3 Build programs of MSP430 using embedded C.</p> <p>A1429.4 Interface LEDs, push buttons, potentiometer to MSP430.</p> <p>A1429.5 Test and debug 8086 ALPs and MSP430 embedded C programs.</p>
<b>9.</b>	<p><b>A1430 Comprehensive Assessment – II</b></p> <p>A1015.1 Apply human values and ethics in professional life.</p> <p>A1015.2 Develop the moral ideals to maintain good relationships with people.</p> <p>A1015.3 Solve environmental related problems by keeping health of human being into consideration.</p> <p>A1015.4 Make use of the fundamental rights and human rights in life for individual dignity.</p> <p>A1015.5 Build the sound health system both physically and mentally by practicing yoga, karate, sports etc.</p>
<b>10.</b>	<p><b>A1015 Human Values and Professional Ethics</b></p>

  
**PRINCIPAL**  
**G. Pullaiah College of Engg & Tech.**  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)



**COURSE OUTCOMES-R18 REGULATION**

**VII**

<b>S.NO</b>	<b>Course Outcomes (COs)</b>
1.	<b>A1431 Embedded Systems</b>
	A1431.1 Analyze the embedded systems features and architecture considerations
	A1431.2 Develop Programs using TM4C123GH6PM Microcontroller
	A1431.3 Make use of Peripherals of TM4C123GH6PM to interface I/O Devices
	A1431.4 Apply Serial Communication Protocols for interfacing serial Devices.
	A1431.5 Design Embedded Applications using TM4C123GH6PM Controller
2.	<b>A1432 Wireless Communication Systems</b>
	A1432.1 Compare various wireless communication systems.
	A1432.2 Analyze different wireless local area networks and personal area networks.
	A1432.3 Design different parameters of cellular system.
	A1432.4 Identify the appropriate multiple accessing technique for wirelesscommunication.
	A1432.5 Develop the wireless networks.
3.	<b>A1433 Digital Image Processing</b>
	A1433.1 Demonstrate different operations on image pixels.
	A1433.2 Distinguish between different types of image transforms.
	A1433.3 Compare different image enhancement techniques.
	A1433.4 Apply different techniques to perform image segmentation.
	A1433.5 Contrast between different color models and compression techniques.
4.	<b>Professional Elective – 4</b>
	<b>A1463 Cellular and Mobile Communications</b>
	A1463.1 Analyze the cellular mobile system design concepts to improve the signal to noise ratio and cell coverage.
	A1463.2 Interpret the Co-channel interferences and their parameters to improve the system capacity.
	A1463.3 Illustrate the importance of cell coverage for signal and traffic, diversity techniques and mobile antennas to a caller.
	A1463.4 Utilize the Omni directional and directional antennas to improve the channel capacity and interference reduction.
	A1463.5 Demonstrate the Interim Standard, Digital Enhanced Cordless System, multiple access schemes of the wireless networks and standards and types of handoff.
	<b>A1465 Low Power VLSI Design</b>
	A1465.1 Comprehend different sources of power dissipation.
	A1465.2 Realize switched capacitance and arrive at ways to minimize.
	A1465.3 Analyze and minimize dynamic and static power consumption in VLSI circuits. A1465.4 Outline the working principles of adiabatic logic.
	A1465.5 Establish ways to minimize power in software design.
	<b>A1466 Development of Secure Embedded Systems</b>
	A1466.1 Analyze the embedded systems security concepts.
	A1466.2 Utilize the systems software considerations for embedded security.
A1466.3 Make use of Development Tool Security to secure embedded software development.	
A1466.4 Apply Cryptographic concepts for embedded systems security.	
A1466.5 Analyze the data protection protocols.	
5.	<b>Open Elective – 2</b>
	<b>A1582 Fundamentals of DBMS</b>

	A1582.1	Apply suitable data models for given application.
	A1582.2	Design database using integrity constraints and ACID properties.
	A1582.3	Construct optimized SQL queries to solve real time problems.
	A1582.4	Apply suitable normal form to eliminate data redundancy.
	A1582.5	Choose appropriate index structure to improve performance.
<b>6.</b>	<b>A1434 Embedded Systems Laboratory</b>	
	A1434.1	Build Embedded C Programs using TM4C123GH6PM microcontroller.
	A1434.2	Execute TM4C123GH6PM Programs using Code Composer Studio.
	A1434.3	Interface LEDs, Push Buttons, Potentiometer to TM4C123GH6PM.
	A1434.4	Test and Debug TM4C123GH6PM Programs using Code Composer Studio.
	A1434.5	Develop embedded systems applications using TM4C123GH6PM.
<b>7.</b>	<b>A1435 Signal and Image Processing Laboratory</b>	
	A1435.1	Compile programs to perform DFT, IDFT and FFT a given sequence.
	A1435.2	Design different filters in discrete time domain.
	A1435.3	Perform different operations on images using MATLAB.
	A1435.4	Analyze the histogram of given images.
<b>8.</b>	<b>A1436 Mini-Project/Internship</b>	
<b>9.</b>	<b>A1437 Project Work Phase – I</b>	

  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

**COURSE OUTCOMES-R18 REGULATION**

**VIII**

S.NO	Course Outcomes (COs)
	<b>MOOCs Course/ Professional Elective – 5</b>
	<b>A1467 Satellite Communications</b>
	A1467.1 Analyze the functionality of various elements of satellite communication system.
	A1467.2 Apply launching procedures and Ephemeris data to place and locate satellite in the orbit.
	A1467.3 Create link budgets to meet specific objectives for C/N.
	A1467.4 Analyze the various GNSS constellations used for navigation.
1.	A1467.5 Differentiate various access techniques used for communication.
	<b>A1470 Embedded System Design</b>
	A1470.1 Analyze the embedded systems components and microcontroller selection.
	A1470.2 Distinguish interrupts in terms of their functions and applications.
	A1470.3 Make use of memory addressing concepts to embedded system design.
	A1470.4 Apply system boot concepts for embedded systems design.
	A1470.5 Differentiate debouncing techniques and switch types.
	<b>Open Elective – 3</b>
	<b>A1583 Basics of Software Engineering</b>
	A1583.1 Apply the phases of software development life cycle in application development.
2.	A1583.2 Identify software requirements for construction.
	A1583.3 Design requirement engineering process for change management.
	A1583.4 Apply the design concepts for design models.
	A1583.5 Construct the various testing techniques for software systems.
3.	<b>A1438 Technical Seminar</b>
4.	<b>A1439 Project Work Phase – II</b>

  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

**G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY**  
(Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade |  
Accredited by NBA (CIV, CSE, ECE & EEE) | Affiliated to JNTUA)  
Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

**COURSE OUTCOMES-R19 REGULATION**

**III**

S.NO	Course Outcomes (COs)
	<b>A2015 Transform Techniques and Complex Variables</b>
1.	A2015.1 Apply Laplace transforms to solve ordinary differential equations.
	A2015.2 Build Fourier series and Fourier transforms of a given function.
	A2015.3 Test for analyticity of complex functions in the given domain.
	A2015.4 Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
	A2015.5 Evaluate improper integrals of complex functions using Residue theorem.
	<b>A2401 Electronic Devices and Circuits</b>
2.	A2401.1 Explain the construction, working principles and applications of various electronic devices.
	A2401.2 Analyze the characteristics of diodes and transistors.
	A2401.3 Design the DC bias circuitry of BJT and FET for various applications.
	A2401.4 Construct the simple amplifier circuits using BJT and FET.
	<b>A2402 Digital Logic Design</b>
3.	A2402.1 Apply arithmetic operations and principles of Boolean algebra to minimize logic expressions.
	A2402.2 Make use of K-map and tabulation methods to minimize Boolean functions.
	A2402.3 Analyze the performance of different combinational and sequential circuits.
	A2402.4 Design various programmable logic devices using combinational circuits.
	<b>A2403 Signals and Systems</b>
4.	A2403.1 Distinguish between different signals and systems.
	A2403.2 Make use of Fourier series for the representation of signals.
	A2403.3 Analyze different signals by using an appropriate transform.
	A2403.4 Examine the transmission characteristics of linear systems.
	A2403.5 Select an appropriate transform to find the transfer function of linear systems.
	<b>A2404 Probability Theory and Stochastic Processes</b>
5.	A2404.1 Apply different probability techniques to observe the different events.
	A2404.2 Determine the characteristics of random variables and random processes.
	A2404.3 Classify the random processes by using different techniques.
	A2404.4 Analyze the temporal and spectral characteristics of stochastic processes.
	A2404.5 Develop the relationship between the input and output statistical characteristic of a linear system.
	<b>A2405 Electronic Devices and Circuits Laboratory</b>
6.	A2405.1 Identify various electronic components and measuring equipment.
	A2405.2 Analyze the V-I characteristics of electronic devices.
	A2405.3 Measure the ripple content present in rectifiers with and without filters.

	A2405.4 Construct single stage amplifier circuits and plot transient and frequency response.
<b>7.</b>	<b>A2406 Digital Logic Design Laboratory</b>
	A2406.1 Make use of LabVIEW software to construct combinational and sequential circuits.
	A2406.2 Test and Debug the combinational and sequential circuits using LabVIEW Software.
	A2406.3 Analyze virtual lab demo for Boolean relations using digital comparators.
	A2406.4 Develop LabVIEW based projects using LabVIEW Software.
<b>8.</b>	<b>A2407 Basic Simulation Laboratory</b>
	A2407.1 Develop programs to generate different signals.
	A2407.2 Compile programs to perform different operations on signals and sequences.
	A2407.3 Analyze different responses of the systems and spectrums of the signals.
	A2407.4 Test the different properties of given signals and systems.
	A2407.5 Estimate the mean skew, kurtosis, and probability distribution function of Gaussian noise.
<b>9.</b>	<b>A2017 Quantitative Aptitude and Reasoning – I</b>
	A2017.1 Identify the problems by applying mathematical fundamentals.
	A2017.2 Apply the suitable logical methods to solve the problems.
	A2017.3 Solve the various problems by using quantitative mathematical fundamentals.
	A2017.4 Analyse the comprehensive data with logical ability.
<b>10.</b>	<b>A2032 Human Values and Professional Ethics</b>
	A2032.1 Apply human values and ethics in professional life.
	A2032.2 Develop the moral ideals to maintain good relationships with people.
	A2032.3 Solve environmental related problems by keeping health of human being into consideration.
	A2032.4 Make use of the fundamental rights and human rights in life for individual dignity
	A2032.5 Build the sound health system both physically and mentally by practicing yoga, karate, sports etc.

  
**PRINCIPAL**  
 G. Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

**COURSE OUTCOMES-R19 REGULATION**

**IV**

S.NO	Course Outcomes (COs)
1.	<b>A2213 Control Systems</b>
	A2213.1 Determine the transfer function of a given system using different techniques. A2213.2 Analyze the response of a given system in time and frequency domains. A2213.3 Test the stability, observability and controllability of a given system. A2213.4 Apply suitable technique for calculating the gain margin and phase margin of a given system.
2.	<b>A2410 Electromagnetics and Transmission Lines</b>
	A2410.1 Apply various laws of electrostatics and magnetostatics to deduce Maxwell's equations in static and time variants fields. A2410.2 Develop boundary conditions for different combinations of media. A2410.3 Make use of Maxwell's equations to deduce EM wave equations. A2410.4 Develop expressions for primary and secondary parameters of transmission line using conventional and graphical methods.  A2410.5 Derive continuity equation, Poisson's, Laplace's equation and Poynting theorem to characterize field.
3.	<b>A2411 Electronic Circuit Analysis</b>
	A2411.1 Analyze the small signal models of BJT amplifiers at high frequencies. A2411.2 Analyze the frequency response of single and multi-stage amplifiers with compound connections. A2411.3 Classify amplifiers based on feedback mechanism. A2411.4 Evaluate the efficiency of large signal amplifiers. A2411.5 Explain the concept of resonant frequency in tuned amplifiers.
4.	<b>A2412 Analog Communication Systems</b>
	A2412.1 Explain the operation of different analog communication systems. A2412.2 Analyze the performance of different modulation schemes used in analog communication systems. A2412.3 Make use of sampling theorem to generate pulse modulation signals. A2412.4 Analyze the performance of AM, FM and PM receivers in the presence of noise. A2412.5 Choose an appropriate modulation technique to design an analog communication system.
5.	<b>A2413 Internet of Things</b>
	A2413.1 Analyze IoT applications using IoT design principles, protocols and levels. A2413.2 Distinguish sensors and actuators in terms of their functions and applications. A2413.3 Interface I/O devices, Sensors using Arduino. A2413.4 Apply Python concepts for programming of Raspberry Pi. A2413.5 Develop IoT applications using Raspberry Pi and Arduino.
6.	<b>A2414 Electronic Circuit Analysis Laboratory</b>
	A2414.1 Design single and multistage amplifiers at low, mid and high frequencies. A2414.2 Determine the gain of feedback amplifiers and efficiency of power amplifiers. A2414.3 Design oscillator circuits for given frequency of oscillation. A2414.4 Compare the frequency response of tuned amplifiers. A2414.5 Analyze all the electronic circuits using simulation software and hardware.
7.	<b>A2415 Analog Communication Systems Laboratory</b>

	<p>A2415.1 Analyze the performance of different continuous modulation and demodulation schemes.</p> <p>A2415.2 Sketch the characteristics of mixer, pre-emphasis and de-emphasis.</p> <p>A2415.3 Compute the specifications of a phase locked loop.</p> <p>A2415.4 Analyze the performance of different pulse modulation Schemes.</p>
<b>8.</b>	<b>A2416 Internet of Things Laboratory</b>
	<p>A2416.1 Develop embedded C Programs using Arduino UNO and IDE.</p> <p>A2416.2 Execute Arduino C programs for blink LED, push button, potentiometer, fadeLDR, serial interface, LCD, DHT sensor.</p> <p>A2416.3 Build Programs of Raspberry-Pi using python.</p> <p>A2416.4 Interface LEDs, Push Buttons, Potentiometer to Raspberry-Pi.</p> <p>A2416.5 Test and Debug Arduino UNO embedded C and Raspberry-Pi python Programs.</p>
<b>9.</b>	<b>A2018 Quantitative Aptitude and Reasoning – II</b>
	<p>A2018.1 Identify the problems by applying mathematical fundamentals.</p> <p>A2018.2 Apply the suitable logical method to solve the problems.</p> <p>A2018.3. Solve the various problems by using quantitative mathematical fundamentals.</p> <p>A2018.4 Analyse the comprehensive data with logical ability.</p>
<b>10.</b>	<b>A2417 Socially Relevant Project – I</b>
<b>11.</b>	<b>A2418 Comprehensive Assessment – I</b>
<b>12.</b>	<b>A2031 Environmental Science</b>
	<p>A2031.1 Solve environmental problems through higher level of personal involvement and interest.</p> <p>A2031.2 Apply ecological morals to keep up amicable connection among nature and human beings.</p> <p>A2031.3 Recognize the interconnectedness of human dependence on the earth's ecosystems.</p> <p>A2031.4 Apply environmental laws for the protection of environment and wildlife.</p> <p>A2031.5 Influence society in proper utilization of goods and services.</p>

  
**PRINCIPAL**  
 G.Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

**COURSE OUTCOMES-R19 REGULATION**

V

S.NO	Course Outcomes (COs)
	<b>A2421 Antennas and Wave Propagation</b>
1.	<p>A2421.1 Compare the performance of different antennas using antenna parameters.</p> <p>A2421.2 Analyze dipole and array antennas by computing fields, radiated power and radiation resistance.</p> <p>A2421.3 Select appropriate antenna for a specific application like TV, AM/FM radio, radar, satellite link.</p> <p>A2421.4 Design horn, helical and reflector antennas for VHF, UHF and microwave communication applications.</p> <p>A2421.5 Formulate the design equations of microstrip antennas for a given application.</p>
	<b>A2422 Linear Integrated Circuit Applications</b>
2.	<p>A2422.1 Analyze the characteristics of operational amplifier.</p> <p>A2422.2 Design different amplifier and oscillator circuits using op-amp.</p> <p>A2422.3 Make use of IC 555 and PLL effectively in communication systems.</p> <p>A2422.4 Construct different active filters using op-amp.</p> <p>A2422.5 Design different analog to digital and digital to analog converters effectively.</p>
	<b>A2423 Digital Communication Systems</b>
3.	<p>A2423.1 Analyze different digital modulation techniques to convert analog signals to digital form.</p> <p>A2423.2 Distinguish between baseband and passband transmission techniques in terms of SNR and BER.</p> <p>A2423.3 Examine the concepts of geometric representation of signals and constellation diagrams.</p> <p>A2423.4 Compare digital carrier modulation schemes in terms of bandwidth, complexity and spectral efficiency.</p> <p>A2423.5 Interpret the differences between linear block codes and convolutional codes for noisy and noiseless channels.</p>
	<b>Professional Elective – I</b>
	<b>A2451 Optical Communications</b>
4.	<p>A2451.1 Analyze different optical propagation methods and understand cylindrical fibers and mode configurations</p> <p>A2451.2 Differentiate various fabrication methods used in optical fibers and factors causing signal distortion</p> <p>A2451.3 Evaluate the signal degradation at fiber joints and fiber splices</p> <p>A2451.4 Describe the characteristics of optical sources and detectors, and power launching capability of optical fiber</p> <p>A2451.5 Evaluate the power penalties by system considerations in the link, error control corrections and detections</p>
	<b>A2452 Nanotechnology</b>
5.	<p>A2452.1 Distinguish between different types of materials and their properties.</p> <p>A2452.2 Compare different types of nanomaterials.</p> <p>A2452.3 Analyze different properties of nanomaterial.</p> <p>A2452.4 Contrast between different types of carbon nanotubes.</p>



	<b>A2454 Real Time Operating Systems</b>
6.	A2454.1 Analyze the Computer hardware organization and operating System components.
	A2454.2 Understand real time concepts and hardware considerations.
	A2454.3 Make use power management concepts for rtos.
	A2454.4 Apply the Inter process communication algorithms to avoid deadlocks. A2454.5 Utilize the memory algorithms for memory management.
	<b>Open Elective – I</b>
	<b>A2283 Electrical Measuring Instruments</b>
7.	A2283.1 Categorise various electrical instruments used for measuring electrical parameters.
	A2283.2 Design appropriate arrangement for extension of range in measuring instruments.
	A2283.3 Analyze the errors and compensations in various electrical measuring instruments.
	A2283.4 Measure current, voltage, power and energy in 1-phase and 3-phase circuits.
	A2283.5 Estimate the unknown quantities of resistance, inductance and capacitance using bridges.
8.	<b>A2424 Linear Integrated Circuit Applications Laboratory</b>
	A2424.1 Implement different configurations of operational amplifiers.
	A2424.2 Generate various shapes of signals using op-amps and timers.
	A2424.3 Construct and analyse various active filters and data converters using op-amp.
	A2424.4 Analyze the characteristics and applications of PLL.
9.	<b>A2425 Digital Communication Systems Laboratory</b>
	A2425.1 Demonstrate the working of various digital modulation and demodulation schemes.
	A2425.2 Design various digital modulation schemes to obtain desired modulation index.
	A2425.3 Analyze the performance of time division multiplexing and de-multiplexing.
	A2425.4 Study and verify sampling theorem.
	A2425.5 Verify digital modulation techniques using MATLAB.
10.	<b>A2426 Digital Design through Verilog HDL Laboratory</b>
	A2426.1 Develop hardware digital designs using Verilog HDL A2426.2 Use various modeling styles appropriately for digital design
	A2426.3 Design, simulate and synthesize combinational circuits using Verilog descriptions
	A2426.4 Design, simulate and synthesize sequential circuits using Verilog descriptions
	A2426.5 Use finite state machines to design complex circuits
11.	<b>A2016 Professional English Communication Skills Laboratory</b>
	A2016.1 Able to use language effectively in everyday conversations
	A2016.2 Able to get exposed various environments
	A2016.3 Able to pronounce correctly
	A2016.4 Able to acquire fluency in spoken English
	A2016.5 Able to translate from mother tongue to English effectively

	A2016.6 Able to face interviews/ GD to acquire proficiency towards employability
12.	<b>A2033 Indian Constitution</b>
	A2033.1 Understand historical background of the constitution making and its importance for building a democratic India.
	A2033.2 Explain the role of President and Prime Minister.
	A2033.3 Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
	A2033.4 Understand the value of the fundamental rights and duties for becoming good citizen of India
	A2033.5 Analyze the decentralization of power between central, state and local self-government.
	A2033.6 Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

  
**PRINCIPAL**  
 G.Pulliah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

**COURSE OUTCOMES-R19 REGULATION**

VI

S.NO	Course Outcomes (COs)
	<b>A2427 Digital Signal Processing</b>
1.	A2427.1 Apply the Discrete Fourier Transform to represent the signals in frequency domain.
	A2427.2 Analyze various DFT algorithms and their applications.
	A2427.3 Analyze various realization forms of FIR and IIR Filters.
	A2427.4 Design digital FIR and IIR filters and analyze their performances.
	A2427.5 Apply the concepts of multirate signal processing to implement digital filters.
	<b>A2428 CMOS VLSI Design</b>
2.	A2428.1 Analyze the electrical properties of MOS transistors
	A2428.2 Apply various CMOS processing techniques to fabricate NMOS, PMOS and CMOS devices
	A2428.3 Analyze the DC and transient characteristics of CMOS logic gates
	A2428.4 Build logic circuits using transmission gate logic
	A2428.5 Make use of charge leakage and charge sharing concepts to design dynamic logic circuits
	<b>A2429 Microprocessors and Microcontrollers</b>
3.	A2429.1 Analyze 8086 microprocessor and MSP430 microcontroller architectures.
	A2429.2 Develop programs using 8086 microprocessor and MSP430 microcontroller.
	A2429.3 Make use of peripherals of MSP430 to interface I/O devices.
	A2429.4 Apply serial communication protocols for interfacing serial devices.
	A2429.5 Design embedded applications using MSP430 microcontroller.
	<b>Professional Elective – II</b>
	<b>A2455 Microwave Engineering</b>
4.	A2455.1 Analyze rectangular waveguide transmission line characteristics using concepts of Electromagnetic theory.
	A2455.2 Evaluate relation between input(s) and output(s) of microwave passive components using scattering parameters.
	A2455.3 Compare performance of O-type and M-type microwave tubes.
	A2455.4 Sketch the characteristics of microwave solid state devices
	A2455.5 Measure microwave parameters using microwave bench setup.
	<b>A2456 Biomedical Signal Processing</b>
	A2456.1 Analyze the nature of biomedical signals and related concepts.
	A2456.2 Apply averaging technique on biomedical signals and extract the features.
	A2456.3 Design various time domain filtering techniques for the removal of artefact from biomedical signal.
	A2456.4 Apply signal compression techniques on biomedical signals.
	A2456.5 Analyze event detection techniques for EEG and ECG signals.
	<b>A2457 FPGA Design</b>
	A2457.1 Discuss different PLDs based on real time applications and compare its architectures.
	A2457.2 Analyze the programmable technologies used in FPGAs.
	A2457.3 Design combinational and sequential circuits using FPGA.
	A2457.4 Distinguish between technology dependent and technology independent optimizations while implementing logic in FPGA.
	A2457.5 Make use of finite state machines to design applications on FPGA.

	<b>Open Elective – II</b>
	<b>A2582 Fundamentals of DBMS</b>
5.	<p>A2582.1 Apply suitable data models for given application.</p> <p>A2582.2 Design database using integrity constraints and ACID properties.</p> <p>A2582.3 Construct optimized SQL queries to solve real time problems.</p> <p>A2582.4 Apply suitable normal form to eliminate data redundancy.</p> <p>A2582.5 Choose appropriate index structure to improve performance.</p>
6.	<b>A2430 Digital Signal Processing Laboratory</b>
	<p>A2430.1 Evaluate the DFT and IDFT of given signals using MATLAB.</p> <p>A2430.2 Analyze various DFT algorithms and their applications.</p> <p>A2430.3 Design IIR and FIR digital filters for the given specifications using MATLAB.</p> <p>A2430.4 Apply the concepts of multirate signal processing using MATLAB.</p> <p>A2430.5 Demonstrate real-time signal Processing applications with DSK kit (TMS320C6713) and Code Composer Studio.</p>
7.	<b>A2539 JAVA Programming Laboratory</b>
	<p>A2509.1 Design solutions for the problems of general purpose applications using object oriented concepts</p> <p>A2509.2 Generate reusable code using inheritance, user defined packages and interfaces</p> <p>A2509.3 Write robust and efficient code using exception handling and multithreading concepts</p> <p>A2509.4 Implement collection frameworks and file handling techniques to store and retrievedata</p> <p>A2509.5 Design user interface using swings</p>
8.	<b>A2431 Microprocessors &amp; Microcontrollers Laboratory</b>
	<p>A2431.1 Develop assembly language programs using EMU8086 emulator.</p> <p>A2431.2 Execute 8086 ALPs for arithmetic, logical, string, call operations.</p> <p>A2431.3 Build programs of MSP430 using embedded C.</p> <p>A2431.4 Interface LEDs, push buttons, potentiometer to MSP430.</p> <p>A2431.5 Test and debug 8086 ALPs and MSP430 embedded C programs.</p>
9.	<b>A2432 Socially Relevant Project – II</b>
10.	<b>A2433 Comprehensive Assessment – II</b>
11.	<b>A2034 Gender Sensitization</b>
	<p>A2034.1 Develop a better understanding of important issues related to gender in contemporary India</p> <p>A2034.2 Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender</p> <p>A2034.3 Acquire insight into the gendered division of labour and its relation to politics and economics</p> <p>A2034.4 Equip to work and live together as equals</p> <p>A2034.5 Develop a sense of appreciation of women in all walks of life</p>

  
**PRINCIPAL**  
 G. Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

**COURSE OUTCOMES-R19 REGULATION**

**VII**

S.NO	Course Outcomes (COs)
1.	<b>A2019 Managerial Economics and Financial Analysis</b>
	A2019.1 Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization.
	A2019.2 Analyze the demand, production, cost and break even to know interrelationship among variables and their impact.
	A2019.3 Classify the market structure to decide the fixation of suitable price.
	A2019.4 Apply capital budgeting techniques to select best investment opportunity.
	A2019.5 Analyze and prepare financial statements to assess financial health of business.
2.	<b>A2434 Digital Image Processing</b>
	A2434.1 Demonstrate different operations on image pixels.
	A2434.2 Distinguish between different types of image transforms.
	A2434.3 Compare different image enhancement techniques.
	A2434.4 Apply different techniques to perform image segmentation.
	A2434.5 Contrast between different color models and compression techniques.
3.	<b>A2435 Embedded Systems</b>
	A2435.1 Analyze the embedded systems features and architecture considerations
	A2435.2 Develop Programs using TM4C123GH6PM Microcontroller
	A2435.3 Make use of Peripherals of TM4C123GH6PM to interface I/O Devices
	A2435.4 Apply Serial Communication Protocols for interfacing serial Devices.
	A2435.5 Design Embedded Applications using TM4C123GH6PM Controller
4.	<b>A2436 Embedded Systems Lab</b>
	A2436.1 Build Embedded C Programs using TM4C123GH6PM microcontroller.
	A2436.2 Execute TM4C123GH6PM Programs using Code Composer Studio.
	A2436.3 Interface LEDs, Push Buttons, Potentiometer to TM4C123GH6PM.
	A2436.4 Test and Debug TM4C123GH6PM Programs using Code Composer Studio.
	A2436.5 Develop embedded systems applications using TM4C123GH6PM.
5.	<b>Professional Elective – 3</b>
	<b>A2459 Cellular and Mobile Communications</b>
	A2459.1 Analyze the cellular mobile system design concepts to improve the signal to noiseRatio and cell coverage.
	A2459.2 Interpret the Co-channel interferences and their parameters to improve the system capacity.
	A2459.3 Illustrate the importance of cell coverage for signal and traffic, diversity techniques and mobile antennas to a caller.
	A2459.4 Utilize the Omni directional and directional antennas to improve the channel capacity and interference reduction.
	A2459.5 Demonstrate the Interim Standard, Digital Enhanced Cordless System, multiple access schemes of the wireless networks and standards and types of handoff.
	<b>A2461 Low Power VLSI Design</b>
	A2461.1 Comprehend different sources of power dissipation.
	A2461.2 Realize switched capacitance and arrive at ways to minimize.
A2461.3 Analyze and minimize dynamic and static power consumption in VLSI circuits.	
A2461.4 Outline the working principles of adiabatic logic.	

*L. Jini*  
PRINCIPAL

G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

	A2461.5 Establish ways to minimize power in software design.
<b>6.</b>	<b>A2583 Basics of Software Engineering</b>
	A2583.1 Apply the phases of software development life cycle in application development.
	A2583.2 Identify software requirements for construction.
	A2583.3 Design requirement engineering process for change management.
	A2583.4 Apply the design concepts for design models.
	A2583.5 Construct the various testing techniques for software systems.
<b>7.</b>	<b>A2437 Mini-Project/Internship</b>
<b>8.</b>	<b>A2438 Project Work Phase – I</b>

### COURSE OUTCOMES-R19 REGULATION

#### VII

S.NO	Course Outcomes (COs)
	<b>Professional Elective – 4</b>
	A2463 Satellite Communications
	A2463.1 Analyze the functionality of various elements of satellite communication system.
	A2463.2 Apply launching procedures and Ephemeris data to place and locate satellite in the orbit.
	A2463.3 Create link budgets to meet specific objectives for C/N.
<b>1.</b>	A2463.4 Analyze the various GNSS constellations used for navigation.
	A2463.5 Differentiate various access techniques used for communication.
	A2466 Embedded System Design
	A2466.1 Understand the basics of an embedded system
	A2466.2 Understand the typical components of an embedded system.
	A2466.3 To understand different communication interfaces.
	A2466.4 To learn the design process of embedded system applications.
	A2466.5 To understand the RTOS and inter-process communication.
	<b>A2485 CISCO Networking</b>
	A2583.1 Analyze the layers of reference models used for communication in various networks.
<b>2.</b>	A2583.2 Apply the principles of error detection and correction to transfer data without errors.
	A2583.3 Interpret various IEEE standards and channelization protocols.
	A2583.4 Analyze the issues with host naming, addressing, and routing packets in internet.
	A2583.5 Inspect the process to delivery data using TCP and UDP in transport layer.
<b>3.</b>	<b>A2439 Project Work Phase – II</b>

*G. Pullaiah*  
PRINCIPAL

G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY::KURNOOL  
(AUTONOMOUS)  
ACCREDITED BY NAAC 'A' GRADE OF UGC AND NBA OF AICTE  
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE OUTCOMES-R20 REGULATION**

**III**

S.NO	Course Outcomes (COs)
1.	<b>A30015 – TRANSFORM TECHNIQUES AND COMPLEX VARIABLES</b>
	30015.1 Apply Laplace transforms to solve ordinary differential equations.
	30015.2 Build Fourier series and Fourier transforms of a given function.
	30015.3 Test for analyticity of complex functions in the given domain
	30015.4 Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper Integrals along contours
	30015.5 Evaluate improper integrals of complex functions using Residue theorem
2.	<b>A30403 – ELECTRONIC DEVICES AND CIRCUITS</b>
	A30403.1 Explain the construction, working principles and applications of various electronic devices.
	A30403.2 Analyze the characteristics of diodes and transistors.
	A30403.3 Design the DC bias circuitry of BJT and FET for various applications.
	A30403.4 Construct the simple amplifier circuits using BJT and FET.
3.	<b>A30404 – DIGITAL LOGIC DESIGN</b>
	A30404.1 Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions.
	A30404.2 Make use of k-map and tabulation methods to minimize Boolean functions and to implement with logic gates.
	A30404.3 Analyze basic components used in digital systems such as adder, subtractor, decoder, encoder, multiplexer, flip-flops, registers and counters.
	A30404.4 Distinguish combinational and sequential logic in terms of their functions.
	A30404.5 Design various PLDs such as ROMs, PALs, PLAs and PROMs.
4.	<b>A30405 – SIGNALS AND SYSTEMS</b>
	A3405.1 Distinguish between different signals and systems.
	A3405.2 Make use of Fourier series for the representation of signals.
	A3405.3 Analyze different signals by using an appropriate transform.
	A3405.4 Examine the transmission characteristics of linear systems.
	A3405.5 Select an appropriate transform to find the transfer function of linear systems.
5.	<b>A30211 – NETWORK ANALYSIS</b>
	A30211.1 Understand the basic Fundamentals of A.C and D.C circuits and solve the basic various circuits by using mesh and node analysis.
	A30211.2 Apply the theorems to solve A.C and D.C complex circuits to calculate the voltage, current and power.
	A30211.3 Apply the fundamental knowledge of circuits to calculate the various parameters for A.C and D.C circuits.
	A30211.4 Apply the basic fundamentals of Laplace transform to calculate the transient and steady state response of D.C and A.C circuits.
	A30211.5 Apply the basic fundamentals of circuits to calculate resonance frequency, quality factor and also analyze the magnetic coupled circuits.
6.	<b>A30406 – ELECTRONIC DEVICES AND CIRCUITS LABORATORY</b>
	A30406.1 Identify various electronic components and measuring equipment.
	A30406.2 Analyze the V-I characteristics of electronic devices.
	A30406.3 Measure the ripple content present in rectifiers with and without filters.
	A30406.4 Construct single stage amplifier circuits and plot transient and frequency response.

7.	<b>A30407 – DIGITAL LOGIC DESIGN LABORATORY</b>
	A30407.1 Construct combinational and sequential circuits using LabVIEW Software. A30407.2 Execute LabVIEW graphical programs for combinational and sequential circuits. A30407.3 Analyze combinational and sequential circuits functioning using LabVIEW Software. A30407.4 Test and Debug the combinational and sequential circuits using LabVIEW Software. A30407.5 Develop LabVIEW based projects using LabVIEW Software.
8.	<b>A30408 – BASIC SIMULATION LABORATORY</b>
	A30408.1 Develop programs to generate different signals. A30408.2 Compile programs to perform different operations on signals and sequences. A30408.3 Analyze different responses of the systems and spectrums of the signals. A30408.4 Test the different properties of given signals and systems.
9.	<b>A30409 – PCB DESIGNING</b>
	A30409.1 Understand the significance of printed circuit board design A30409.2 Analyze various PCB components and their categories A30409.3 Understand the concept of development tools like OrCAD and PROTEUS A30409.4 Develop academic and industrial based projects using OrCAD and PROTEUS.
10.	<b>A30032 – UNIVERSAL HUMAN VALUES</b>
	A30032.1 Understand the significance of value inputs in a classroom and start applying them in their life and profession A30032.2 Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. A30032.3 Understand the value of harmonious relationship based on trust and respect in their life and profession A30032.4 Understand the role of a human being in ensuring harmony in society and nature. A30032.5 Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work. A30032.6 Analyze the value of maintaining ethical values in critical situations

  
**PRINCIPAL**  
 G. Pullaiah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)



## IV

S.NO	Course Outcomes (COs)
1.	<b>A30412 – ANALOG COMMUNICATION SYSTEMS</b>
	A30412.1 Explain the operation of different analog communication systems.
	A30412.2 Analyze the performance of different modulation schemes used in analog communication systems.
	A30412.3 Make use of sampling theorem to generate pulse modulation signals.
	A30412.4 Analyze the performance of AM, FM and PM receivers in the presence of noise.
	A30412.5 Choose an appropriate modulation technique to design an analog communication system.
2.	<b>A30017 – PROBABILITY THEORY AND STOCHASTIC PROCESSES</b>
	A30017.1 Apply different probability techniques to observe the different events.
	A30017.2 Determine the characteristics of random variables and random processes.
	A30017.3 Classify the random processes by using different techniques.
	A30017.4 Analyze the temporal and spectral characteristics of stochastic processes.
	A30017.5 Develop the relationship between the input and output statistical characteristic of a linear system.
3.	<b>A30413 – ELECTRONIC CIRCUIT ANALYSIS</b>
	A30413.1 Analyze the small signal models of BJT amplifiers at high frequencies.
	A30413.2 Analyze the frequency response of single and multi-stage amplifiers with compound connections.
	A30413.3 Classify amplifiers based on feedback mechanism.
	A30413.4 Evaluate the efficiency of large signal amplifiers.
	A30413.5 Explain the concept of resonant frequency in tuned amplifiers.
4.	<b>A30414 – ELECTROMAGNETICS AND TRANSMISSION LINES</b>
	A30414.1 Apply various laws of electrostatics and magnetostatics to deduce Maxwell's equations in static and time variants fields.
	A30414.2 Develop boundary conditions for different combinations of media.
	A30414.3 Make use of Maxwell's equations to deduce EM wave equations.
	A30414.4 Develop expressions for primary and secondary parameters of transmission line using conventional and graphical methods.
	A30414.5 Derive continuity equation, Poisson's, Laplace's equation and Poynting theorem to characterize field.
5.	<b>A30019 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS</b>
	A30019.1 Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
	A30019.2 Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
	A30019.3 Classify the market structure to decide the fixation of suitable price
	A30019.4 Apply capital budgeting techniques to select best investment opportunity
	A30019.5 Analyze and prepare financial statements to assess financial health of business
6.	<b>A30415 – ANALOG COMMUNICATION SYSTEMS LABORATORY</b>
	A30415.1 Analyze the performance of different continuous modulation and demodulation schemes.
	A30415.2 Sketch the characteristics of mixer, pre-emphasis and de-emphasis.
	A30415.3 Compute the specifications of a phase locked loop.
	A30415.4 Analyze the performance of different pulse modulation Schemes.
7.	<b>A30416 – ELECTRONIC CIRCUIT ANALYSIS LABORATORY</b>

*G. Pullaiah*  
PRINCIPAL

	<p>A30416.1 Design single and multistage amplifiers at low, mid and high frequencies.</p> <p>A30416.2 Determine the gain of feedback amplifiers and efficiency of power amplifiers.</p> <p>A30416.3 Design oscillator circuits for given frequency of oscillation.</p> <p>A30416.4 Compare the frequency response of tuned amplifiers.</p> <p>A30416.5 Analyze all the electronic circuits using simulation software and hardware.</p>
8.	<p><b>A30417 – INTERNET OF THINGS LABORATORY</b></p> <p>A30417.1 Develop embedded C Programs using arduino uno and ide.</p> <p>A30417.2 Execute arduino C programs for blink led, push button, potentiometer, fade led, ldr, serial interface, lcd, dht sensor.</p> <p>A30417.3 Build Programs of nodemcu using embedded C.</p> <p>A30417.4 Interface LEDs, Push Buttons, dht sensor, ir sensor, mqtt broker to nodemcu.</p> <p>A30417.5 Test and Debug arduino uno and nodemcu embedded C Programs.</p>
9.	<p><b>A30418 – WEB DEVELOPMENT</b></p> <p>A30418.1 Develop front end of an application using HTML, CSS and JavaScript along with ReactJs.</p> <p>A30418.2 Develop back end of an application using NodeJs.</p> <p>A30418.3 Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone.</p> <p>A30418.4 Develop a website and deploy on a web server.</p> <p>A30418.5 Authenticate, store, and structure user data.</p>

  
**PRINCIPAL**  
**G. Pullaiah College of Engg & Tech.**  
**Nandikotkur Road, VENKAYAPALLI**  
**KURNOOL-518 452 (A.P)**


S.NO	Course Outcomes (COs)
1.	<b>A30425 – ANTENNAS AND WAVE PROPAGATION</b>
	A30425.1: Compare the performance of different antennas using antenna parameters
	A30425.2: Analyze dipole and array antennas by computing fields, radiated power and radiation resistance.
	A30425.3: Select appropriate antenna for a specific application like TV, AM/FM radio, radar, satellite link.
	A30425.4: Design horn, helical and reflector antennas for VHF, UHF and microwave communication applications
	A30425.5: Formulate the design equations of microstrip antennas for a given application
2.	<b>A30426-DIGITAL COMMUNICATION SYSTEMS</b>
	A30426.1 Analyze different digital modulation techniques to convert analog signals to digital form.
	A30426.2 Distinguish between baseband and passband transmission techniques in terms of SNR and BER.
	A30426.3 Examine the concepts of geometric representation of signals and constellation diagrams.
	A30426.4 Compare digital carrier modulation schemes in terms of bandwidth, complexity and spectral efficiency.
	A30426.5 Interpret the differences between linear block codes and convolutional codes for noisy and noiseless channels.
3.	<b>A30427 – LINEAR INTEGRATED CIRCUIT APPLICATIONS</b>
	A30427.1 Analyze the characteristics of operational amplifier.
	A30427.2 Design different amplifier and oscillator circuits using op-amp.
	A30427.3 Make use of IC 555 and PLL effectively in communication systems.
	A30427.4 Construct different active filters using op-amp.
	A30427.5 Design different analog to digital and digital to analog converters effectively.
4.	<b>A30451 – OPTICAL COMMUNICATIONS (Professional Elective-1)</b>
	A30451.1 Analyze different optical propagation methods and understand cylindrical fibers and mode configurations
	A30451.2 Differentiate various fabrication methods used in optical fibers and factors causing signal distortion
	A30451.3 Evaluate the signal degradation at fiber joints and fiber splices
	A30451.4 Describe the characteristics of optical sources and detectors, and power launching capability of optical fiber
	A30451.5 Evaluate the power penalties by system considerations in the link, error control corrections and detections
5.	<b>A30453 – SYSTEM DESIGN THROUGH VERILOG HDL(Professional Elective-1)</b>
	A30453.1 Understand the basics of Hardware Description Languages, Program structure and basic language elements of Verilog. A30453.
	2 Understand types of modelling, modules, functions of Verilog and simulate and synthesize related Programs. A30453.
	3 Design, Simulate and synthesize various Verilog descriptions for Combinational circuits. A30453.
	4 Design, Simulate and synthesize various Verilog descriptions for Sequential circuits. A30453.
	5 Use tasks and functions to design complex circuits like combinational and sequential UDPs.
6.	<b>A30458 – COMPUTER ARCHITECTURE AND ORGANIZATION(Professional Elective-1)</b>
	A30458.1 Recognize basic digital computer components and various microoperations and their implementation in RTL.
	A30458.2 Interpret the various parameters effect the computer performance and techniques to increase

	<p>performance.</p> <p>A30458.3 Experiment with the representation of data, addressing modes, instruction sets, stacks and register organization in a basic computer.</p> <p>A30458.4 Understanding the various techniques to design functional units of the processor such as register file, arithmetic logic unit and control unit.</p> <p>A30458.5 Understand memory hierarchy and analyze the functioning of a multi-processor system and interconnection structures.</p>
7.	<p><b>A30284 – CONTROL SYSTEMS ENGINEERING (Open Elective-1)</b></p> <p>A30284.1 Determine the transfer function of a given system using different techniques.</p> <p>A30284.2 Analyze the response of a given system in time and frequency domains.</p> <p>A30284.3 Test the stability, observability and controllability of a given system.</p> <p>A30284.4 Apply suitable technique for calculating the gain margin and phase margin of a given system.</p>
8.	<p><b>A30428 – DIGITAL COMMUNICATION SYSTEMS LABORATORY</b></p> <p>A30428.1 Demonstrate the working of various digital modulation and demodulation schemes.</p> <p>A30428.2 Design various digital modulation schemes to obtain desired modulation index.</p> <p>A30428.3 Analyze the performance of time division multiplexing and demultiplexing.</p> <p>A30428.4 Study and verify sampling theorem.</p> <p>A30428.5 Verify digital modulation techniques using MATLAB.</p>
9.	<p><b>A30429 – LINEAR INTEGRATED CIRCUIT APPLICATIONS LABORATORY</b></p> <p>A30429.1 Implement different configurations of operational amplifiers.</p> <p>A30429.2 Generate various shapes of signals using op-amps and timers.</p> <p>A30429.3 Construct and analyze various active filters and data converters using op-amp.</p> <p>A30429.4 Analyze the characteristics and applications of PLL.</p>
10.	<p><b>A30430 – PYTHON FULL STACK</b></p> <p>A30430.1 Develop front end of an application using HTML, CSS and JavaScript along with ReactJs.</p> <p>A30430.2 Develop back end of an application using NodeJs.</p> <p>A30430.3 Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone.</p> <p>A30430.4 Develop a website and deploy on a web server.</p> <p>A30430.5 Authenticate, store, and structure user data.</p>
11.	<p><b>A30033 – INDIAN CONSTITUTION</b></p> <p>A30033.1 Understand historical background of the constitution making and its importance for building a democratic India.</p> <p>A30033.2 Explain the role of President and Prime Minister.</p> <p>A30033.3 Understand the functioning of three wings of the government ie., executive, legislative and judiciary.</p> <p>A30033.4 Understand the value of the fundamental rights and duties for becoming good citizen of India</p> <p>A30033.5 Analyze the decentralization of power between central, state and local selfgovernment.</p> <p>A30033.6 Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.</p>

  
 PRINCIPAL  
 G. Sullalah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)

S.NO	Course Outcomes (COs)
1.	<b>A30432 – DIGITAL SIGNAL PROCESSING</b>
	A30432.1 Apply the Discrete Fourier Transform to represent the signals in frequency domain.
	A30432.2 Analyze various DFT algorithms and their applications.
	A30432.3 Analyze various realization forms of FIR and IIR Filters.
	A30432.4 Design digital FIR and IIR filters and analyze their performances.
2.	<b>A30433 – MICROPROCESSORS &amp; MICROCONTROLLERS</b>
	A30433.1 Analyze 8086 microprocessor and MSP430 microcontroller architectures.
	A30433.2 Develop programs using 8086 microprocessor and MSP430 microcontroller.
	A30433.3 Make use of peripherals of MSP430 to interface I/O devices.
	A30433.4 Apply serial communication protocols for interfacing serial devices.
3.	<b>A30434 – CMOS VLSI DESIGN</b>
	A30434.1 Analyze the electrical properties of MOS transistors
	A30434.2 Apply various CMOS processing techniques to fabricate NMOS, PMOS and CMOS devices
	A30434.3 Analyze the DC and transient characteristics of CMOS logic gates
	A30434.4 Build logic circuits using transmission gate logic
4.	<b>A30454 - MICROWAVE ENGINEERING (Professional Elective-2)</b>
	A30454.1 Analyze rectangular waveguide transmission line characteristics using concepts of Electromagnetic theory.
	A30454.2 Evaluate relation between input(s) and output(s) of microwave passive components using scattering parameters.
	A30454.3 Compare performance of O-type and M-type microwave tubes.
	A30454.4 Sketch the characteristics of microwave solid state devices.
5.	<b>A30455 – BIOMEDICAL SIGNAL PROCESSING (Professional Elective-2)</b>
	A30455.1 Analyze the nature of biomedical signals and related concepts.
	A30455.2 Apply averaging technique on biomedical signals and extract the features.
	A30455.3 Design various time domain filtering techniques for the removal of artefact from biomedical signal.
	A30455.4 Apply signal compression techniques on biomedical signals.
6.	<b>A30456 – FPGA Design (Professional Elective-2)</b>
	A30456.1 Discuss different PLDs based on real time applications and compare its architectures.
	A30456.2 Analyze the programmable technologies used in FPGAs.
	A30456.3 Design combinational and sequential circuits using FPGA.
	A30456.4 Distinguish between technology dependent and technology independent optimizations while implementing logic in FPGA.
7.	<b>A30582 – FUNDAMENTALS OF DBMS (Open Elective-2)</b>
	A30582.1 Apply suitable data models for given application.
	A30582.2 Design database using integrity constraints and ACID properties.
	A30582.3 Construct optimized SQL queries to solve real time problems.
	A30582.4 Apply suitable normal form to eliminate data redundancy.
A30582.5 Choose appropriate index structure to improve performance.	

8.	<b>A30435 – DIGITAL SIGNAL PROCESSING LABORATORY</b> A30435.1 Evaluate the DFT and IDFT of given signals using MATLAB. A30435.2 Analyze various DFT algorithms and their applications. A30435.3 Design IIR and FIR digital filters for the given specifications using MATLAB. A30435.4 Apply the concepts of multirate signal processing using MATLAB. A30435.5 Demonstrate real-time signal Processing applications with DSK kit (TMS320C6713) and Code Composer Studio.
9.	<b>A30436 – MICROPROCESSORS AND MICROCONTROLLERS LABORATORY</b> A30436.1 Develop assembly language programs using EMU8086 emulator. A30436.2 Execute 8086 ALPs for arithmetic, logical, string, call operations. A30436.3 Build programs of MSP430 using embedded C. A30436.4 Interface LEDs, push buttons, potentiometer to MSP430. A30436.5 Test and debug 8086 ALPs and MSP430 embedded C programs.
10.	<b>A30510 – OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY</b> A30510.1 Design solutions for the problems of general purpose applications using object oriented concepts. A30510.2 Generate reusable code using inheritance, user defined packages and interface A30510.3 Write robust and efficient code using exception handling and multithreading concepts A30510.4 Implement collection frameworks and file handling techniques to store and retrieve data A30510.5 Design user interface using swings
11.	<b>A30524 – R PROGRAMMING</b> A30524.1 Understand and apply the basics in R programming in terms of constructs, control statements, string functions A30524.2 Apply the functions on matrix rows and columns and list operators A30524.3 Work on Data frames and tabular type of DATA A30524.4 Understand and write reliable code using OOP concepts in R A30524.5 Understand and apply R Interfaces for Other languages
12.	<b>A30034 – GENDER SENSITIZATION</b> A30034.1 Develop a better understanding of important issues related to gender in contemporary India A30034.2 Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender A30034.3 Acquire insight into the gendered division of labour and its relation to politics and economics A30034.4 Equip to work and live together as equals A30034.5 Develop a sense of appreciation of women in all walks of life

  
**PRINCIPAL**  
G.Pullaiah College of Engg & Tech.  
Nandikotkur Road, VENKAYAPALLI  
KURNOOL-518 452 (A.P)

## VII

S.NO	Course Outcomes (COs)
1.	<b>A30459 – CELLULAR &amp; MOBILE COMMUNICATIONS (Professional Elective-3)</b>
	A30459.1 Analyze the cellular mobile system design concepts to improve the signal to noise Ratio and cell coverage.
	A30459.2 Interpret the Co-channel interferences and their parameters to improve the system capacity.
	A30459.3 Illustrate the importance of cell coverage for signal and traffic, diversity techniques and mobile antennas to a caller.
	A30459.4 Utilize the Omni directional and directional antennas to improve the channel capacity and interference reduction.
	A30459.5 Demonstrate the Interim Standard, Digital Enhanced Cordless System, multiple access schemes of the wireless networks and standards and types of handoff.
2.	<b>A30461 – LOW POWER VLSI DESIGN(Professional Elective-3)</b>
	A30461.1 Comprehend different sources of power dissipation.
	A30461.2 Realize switched capacitance and arrive at ways to minimize.
	A30461.3 Analyze and minimize dynamic and static power consumption in VLSI circuits.
	A30461.4 Outline the working principles of adiabatic logic.
	A30461.5 Establish ways to minimize power in software design.
3.	<b>A30462 – EMBEDDED SYSTEM DESIGN(Professional Elective-3)</b>
	A30462.1 Analyze the embedded systems features and architecture considerations
	A30462.2 Develop Programs using TM4C123GH6PM Microcontroller
	A30462.3 Make use of Peripherals of TM4C123GH6PM to interface I/O Devices
	A30462.4 Apply Serial Communication Protocols for interfacing serial Devices.
	A30462.5 Design Embedded Applications using TM4C123GH6PM Controller
4.	<b>A30463 – GLOBAL NAVIGATION SATELLITE SYSTEM(Professional Elective-4)</b>
	A30463.1 Understand the principle of operation of GPS and GPS ephemerides.
	A30463.2 Analyze GPS signal structure and significance of various coordinate systems
	A30463.3 Estimate the various errors and their effect on position estimation.
	A30463.4 Compare other global and regional navigational systems.
	A30463.5 Apply DGPS principle and also analyze various augmentation systems. Use of GPS in Surveying, Mapping and Navigation
5.	<b>A30465 – SYSTEM VERILOG &amp; VERIFICATION(Professional Elective-4)</b>
	A30465.1 Develop language constructs of System Verilog HDLs and implements a digital logic effectively.
	A30465.2 Utilize assertions to quickly correct behaviour in simulation.
	A30465.3 Design an interface between the System Verilog test program and the Device Under Test.
	A30465.4 Construct a device driver routine to drive DUT input with stimulus from generator.
	A30465.5 Execute device drivers, monitors and self-checking routines concurrently.
6.	<b>A30468 – DIGITAL IMAGE PROCESSING(Professional Elective-5)</b>
	A30468.1 Demonstrate different operations on image pixels.
	A30468.2 Distinguish between different types of image transforms.
	A30468.3 Compare different image enhancement techniques.
	A30468.4 Apply different techniques to perform image segmentation.
	A30468.5 Contrast between different color models and compression techniques.
7.	<b>A30583 – BASICS OF SOFTWARE ENGINEERING (Open Elective-3)</b>
	A30583.1 Apply the phases of software development life cycle in application development.

	<p>A30583.2 Identify software requirements for construction.</p> <p>A30583.3 Design requirement engineering process for change management.</p> <p>A30583.4 Apply the design concepts for design models.</p> <p>A30583.5 Construct the various testing techniques for software systems.</p>
<b>8.</b>	<p><b>A30588 – INTRODUCTION TO JAVA PROGRAMMING(Open Elective-4)</b></p> <p>A30588.1 Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP like encapsulation, Inheritance and Polymorphism.</p> <p>A30588.2 Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results.</p> <p>A30588.3 Demonstrate an ability to design an object oriented system, swing components and multithreaded processes as per needs and specifications.</p> <p>A30588.4 Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets programs.</p> <p>A30588.5 Demonstrate skills to use latest object oriented programming language and software to analyze OOP problems.</p> <p>A30588.6 Develop confidence for self-education and ability for life-long learning needed for advanced java technologies.</p>
<b>9.</b>	<p><b>A 30022 - PROFESSIONAL ETHICS</b></p> <p>A30022.1 to identify ethical dilemmas and take ethical decisions.</p> <p>A30022.2 to consider the importance of maintaining professional competence and pursuing lifelong learning</p> <p>A30022.3 to understand patterns and channels of communication and their efficiency.</p> <p>A30022.4 to analyze and evaluate available data and information from a variety of sources.</p> <p>A30022.5 to demonstrate leadership qualities in teams effectively and efficiently.</p> <p>A30022.6 the importance of applying an enquiring mind when collecting and assessing data and information.</p>
<b>10.</b>	<p><b>A30438 – VLSI &amp; EMBEDDED SYSTEMS PROGRAMMING</b></p> <p>A30438.1 Design and draw the internal structure of the various digital integrated circuits.</p> <p>A30438.2 Develop Verilog HDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.</p> <p>A30438.3 Verify the logic with the necessary embedded hardware.</p> <p>A30438.4 Build Embedded C Programs using TM4C123GH6PM microcontroller.</p> <p>A30438.5 Develop embedded systems applications using TM4C123GH6PM.</p>

  
**PRINCIPAL**  
 G.Pulliah College of Engg & Tech.  
 Nandikotkur Road, VENKAYAPALLI  
 KURNOOL-518 452 (A.P)