SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Permanent Affiliation to JNTUK, Kakinada), PEDATADEPALLI, TADEPALLIGUDEM-534 101

Department of Electronics & Communication Engineering

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Department of Electronics & Communication Technology

Course Outcomes (V18 Regulation)

Semester	Course Code & Name	Course Outcomes
I-Semester	V18ENT01 ENGLISH-I	**Course Outcomes:** • **CO-1:** Understand human resources and their contribution to the society, listen to and read a text to comprehend, interpret and answer questions, and use prepositions and tenses appropriately. • **CO-2:** Appraise the problems of transport and the solutions, write the gist of a short-story, know the etymological roots of words, use pre ixes and exhibit basic skills in writing. • **CO-3:** View Solar Energy as a viable alternative source, and read for comprehension, analysis and interpretation and present narratives in writing. • **CO-4 :** Evaluate various alternative sources of energy, spell words appropriately, pronounce them with proper stress, punctuate sentences correctly and narrate instances and stories. • **CO-5:** Realize the value of our living environment, describe animals, birds, objects, events, processes, etc., write paragraphs coherently and use connectors effectively. • **CO-6:** Grasp the vital role of training in industrial organizations, use prepositions, take notes, follow the of ice etiquette and write impressive narrations.
I-Semester	V18MAT01 MATHEMATICS -I	**Course Outcomes:** **At the end of the course student will be able to:** **CO1:** Apply matrix technique to solve system of linear equation. **CO2:** Find Eigenvalues and Eigen vectors **CO3:** Solve the ordinary differential equations of irst order & irst degree **CO4:** Solve the linear differential equations of higher order **CO5:** Calculate maxima and minima of functions of two variables **CO6:** Solve irst order partial differential equations.
I-Semester	V18CHT01 ENGINEERING CHEMISTRY	**Course Outcomes:** At the end of the course, the student should be able to: **CO1:** Apply different plastics and rubbers for various engineering applications. **CO2:** Assess the quality of fuels and apply the knowledge of fuels for the preservation of natural fuels. **CO3:** Understand relevant concepts of Electro Chemistry to apply them in designing electrochemical energy systems. **CO4:** Analyze boiler troubles arising due to poor water quality and suggest suitable water treatment methods for different industrial applications. **CO5:** Analyze the causes for practical corrosion problems and apply corrosion principles for protection of metallic structures from corrosion. **CO6:** Identify the important applications of advanced engineering materials. Activate Windows Go to Settings to activate Windo
I-Semester	V18CST01 PROGRAMMING IN C FOR PROBLEM SOLVING	**Course Outcomes:** **CO1:** Describe various problem solving strategies such as Algorithms and Flowcharts **(K2)** **CO2:** Develop various programming constructs using Control Structures. **(K3)** **CO3:** Summarize the process of modular programming approach **(K5)** **CO4:** Illustrate the usage of String handling functions and pointers **(K3)** **CO5:** Construct Programs using Structures and Unions. **(K3)** **CO6:** Distinguish between Sequential iles and Random access iles. **(K4)**

I-Semester	**V18MET01** **ENGINEERING GRAPHICS**	**Course Outcomes:** After successful completion of the course, the student will be able to **CO1:** Demonstrate the usage of drawing instruments and sketch conic sections **(K3)** **CO2:** Construct different types of scales and special curves **(K5)** **CO3:** Draw the projections of the points, lines and planes with reference to the principal planes. **(K2)** **CO4:** Develop the projections of solids and its surfaces. **(K3)** **CO5:** Draw the Isometric projections of solids. **(K2)** **CO6:** Convert the isometric view to orthographic view and vice versa. **(K2)**
I-Semester	**V18ENL01** **ENGLISH COMMUNICATION SKILLS LAB-I**	**Course Outcomes** **CO-1:** Listen to and make inquiries on phone, thank and respond to thanks in appropriate spoken idiom. **CO-2:** Make requests, give permissions and directions in luent English **CO-3:** Articulate well in the contexts of clarifying, inviting, complaining, congratulating, apolozing, advising, agreeing and disagreeing in conversational mode **CO-4:** Distinguish and pronounce letters and sounds of English phonetically **CO-5:** Practice and pronounce consonants, vowels and diphthongs and consonant clusters **CO-6:** Listen to and understand different accents in English, and pronounce English words and speak sentences with right stress and intonation.
I-Semester	**V18CSL01** **PROGRAMMING LAB IN 'C' FOR PROBLEM SOLVING**	**Course Outcomes:** **CO 1:** Demonstrate problem solving techniques using Control Structures. **(K3)** **CO 2:** Construct Programmes using the concepts of Arrays, Strings and Pointers. **(K3)** **CO3:** Apply the concepts of Functions, Structures and Unions. **(K3)** **CO4:** Use various ile processing operations to develop real time applications. **(K4)**
I-Semester	**V18CHL01** **ENGINEERING CHEMISTRY LABORATORY**	**Course Outcomes:** At the end of the course, the student will be able to: **CO1:** Analyse quantitatively a variety of samples using volumetric methods and instrumental methods. **CO2:** Applying volumetric and instrumental methods for the determination of water quality parameters namely Alkalinity, Hardness and pH. **CO3:** Prepare polymeric materials and analyse the given coal samples.
II-Semester	**V18ENT02** **ENGLISH-II**	**Course Outcomes** **CO-1:** Understand the real import of education and work of noble men, use nouns, verbs and adjectives appropriately, identify and correct common errors in usage and write of icial letters. **CO-2:** Derive inspiration from real life samples, interpret and speak on them, use synonyms and antonyms of words properly and do E-correspondence with required netiquette. **CO-3:** Assimilate and adjust to new cultural environments, write on life-sketches, make the right use of tense and aspect and concord in sentences and plan and develop speech-writing. **CO-4:** Imbibe ideas from the lives and works of successful men, use adverbs, develop view-points and topics and write different types of essays. **CO-5:** Emulate personality-development inputs, elaborate on inspiring scientists use one-word substitutes, develop précis writing and write for the media. **CO-6:** Learn from the paradigm of great contributors, use collocations and write professional and technical reports in standard formats.
II-Semester	**V18MAT02** **MATHEMATICS -II**	**Course Outcomes:** At the end of the Course student will be able to: **CO1:** Estimate approximate root of algebraic and transcendental equations **CO2:** Compute interpolating polynomial for the given data **CO3:** Solve ordinary differential equations using numerical methods **CO4:** Evaluate multiple integrals and improper integrals **CO5:** Calculate gradient of a scalar function, divergence and curl of a vector function. **CO6:** Apply the knowledge of vector integral concepts to ind characteristics of vector ields
II-Semester	**V18PHT02** **OPTO-ELECTRONICS & SEMICONDUCTORS**	**A student who successfully ful ills the course requirements will be able to** **1.** Expose the students to the basic concepts of Lasers, optical ibers and their properties. **2**. Interpret wavelike behavior of matter and how this motivates the need to replace classical mechanics by a wave equation of motion for matter (the Schrödinger equations) **3**. Distinguish fundamental physical laws for better understanding of materials and their properties for engineering applications. **4.** Apply fundamental principles and processes to operational semiconductor devices and their uses.

<table>
<tr>
<td>II-Semester</td>
<td>V18MET02

INTRODUCTION TO ENGINEERING MECHANICS</td>
<td>Course Outcomes:
After successful completion of the course, the student will be able to
CO1: Compute the resultant force of a given system of forces (K3)
CO2: Calculate Equilibrium of different force systems by using free body diagrams (K3)
CO3: Solve the 2D equilibrium problems by considering friction (K3)
CO4: Find the Centroid, Center of Gravity and Moment of Inertia for plane igures and bodies (K3)
CO5: Illustrate the different types of plane motions of a particle to compute its velocity, acceleration and force. (K3)
CO6: Illustrate the concept of Work and Energy (K3)</td>
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<tr>
<td>II-Semester</td>
<td>V18CHT02

ENVIRONMENTAL STUDIES</td>
<td>Course Outcomes:
At the end of the course, the student should be able to:
CO1: Identify the global environmental challenges and the possible means to combat them.
CO2: Examine the natural resources, their availability for the sustenance of the life and conservation.
CO3: Assess the concepts of the ecosystem and the need for protecting various ecosystems.
CO4: Discuss the biodiversity, threats and conservation practices to protect the biodiversity
CO5: Explain various attributes of the pollution and waste management practices.
CO6: Outline the environmental management and environmental legislations in India.</td>
</tr>
<tr>
<td>II-Semester</td>
<td>V18ENL02

ENGLISH COMMUNICATION SKILLS LABORATORY-II</td>
<td>Course Outcomes:

CO-1: Listen to people critically and argue rationally to present a view-point con idently in formal debates.
CO-2: Exhibit team spirit and communicative skill and participate effectively in group discussions.
CO-3: Plan, structure and give presentations in professional manner.
CO-4: Face and perform well in interviews with required etiquette.
CO-5: Compose E-mails in standard formats to communicate clearly and write different types of CV in vogue that befit today's career needs.
CO-6: Make apt use of idiomatic expressions and recognize and correct typical errors that Indian speakers of English make in pronunciation, spelling, vocabulary and grammar.</td>
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<tr>
<td>II-Semester</td>
<td>V18EEL03

ELECTRICAL ENGINEERING WORKSHOP</td>
<td>Course Outcomes:
After successful completion of this course, the students will be able to
<table>
<tr><th>CO No.</th><th>Course Outcome</th><th>Knowledge Level</th></tr>
<tr><td>CO1</td><td>Design different wiring circuits</td><td>K4</td></tr>
<tr><td>CO2</td><td>Use electrical parameter measuring instruments</td><td>K3</td></tr>
<tr><td>CO3</td><td>Construct the circuits on PCB board</td><td>K4</td></tr>
<tr><td>CO4</td><td>Test the domestic appliances</td><td>K4</td></tr>
<tr><td>CO5</td><td>Identify the parts of the Machine</td><td>K3</td></tr>
<tr><td>CO6</td><td>Analyze electrical circuits through simulation</td><td>K4</td></tr>
</table>
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<tr>
<td>II-Semester</td>
<td>V18PHL02

OPTO-ELECTRONICS & SEMICONDUCTORS LAB</td>
<td>Course Outcomes:
After successful completion of this course, the students will be able to
<table>
<tr><th>CO No.</th><th>Course Outcome</th><th>Knowledge Level</th></tr>
<tr><td>CO1</td><td>Analyze the physical principle involved in the various instruments, also relate the principle to new application.</td><td>K4</td></tr>
<tr><td>CO2</td><td>Demonstrate the various experiments in the areas of optics and Electronics in all branches of Engineering.</td><td>K3</td></tr>
<tr><td>CO3</td><td>Think innovatively and also apply the creative skills that are essential for Engineering.</td><td>K4</td></tr>
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<tr>
<td>II-Semester</td>
<td>V18MEL01

ENGINEERING & IT WORKSHOP PRACTICE LAB</td>
<td>Engineering Workshop
Course Outcomes:
After successful completion of the course, the student will be able to
CO1: prepare different models in the carpentry trade such as Cross lap joint, Dove tail joint. (K3)
CO2: make various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder (K3)
CO3:model various basic prototypes in the trade of itting such as Straight it, V- it. (K3)
CO4: prepare different models in the Black smithy such as Round rod to Square, S-Hook.. (K3)
CO5: perform various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a luorescent tube, Series wiring, Go down wiring. (K3)
CO6: prepare various basic prototypes in the trade of Welding such as Lap joint, Butt joint. (K3)</td>
</tr>
</table>

Year & Semester	Course Code & Name	Course Outcomes
III Semester	**V18ECT01** **Electronic Devices And Circuits**	**After successful completion of the course, the student will be able to:** **CO1:** Explain the basic concepts of semiconductor physics and explain the formation of p-n Junction. **[K2]** **CO2:** Discuss special semiconductor diodes. **[K2]** **CO3:** Construct and working principle of rectifiers with and without filters with relevant expressions and necessary comparisons. **[K3]** **CO4:** Describe the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations. **[K2]** **CO5:** Explain the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions. [K2] **CO6:** Analyze small signal low frequency transistor amplifier circuits using BJT and FET in different configurations. **[K4]**
III Semester	**V18ECT02** **Digital System Design**	**After successful completion of the course, the student will be able to:** **CO1:** Explain the various types of number systems and their conversions, and logic Gates. **(K2)** **CO2:** Apply the minimization techniques to simplify the hardware requirements of digital circuits. **(K3)** **CO3:** Develop basic digital circuits with combinational logic using IEEE Standard 1076 Hardware Description Language (VHDL). **(K3)** **CO4:** Develop basic digital circuits with sequential logic using IEEE Standard 1076 Hardware Description Language (VHDL). **(K3)** **CO5:** Apply the knowledge of flip flops to construct different finite state machines. **(K3)** **CO6:** Explain the concepts of different programmable logic devices. **(K2)**
III Semester	**V18ECT03** **Signals & Systems**	**After successful completion of the course, the student will be able to:** **CO1:** Apply the knowledge of linear algebra to vector space& analogy, orthogonality and basic signals. **(K3)** **CO2:** Classify systems based on their properties and determine the response of LTI system using convolution. **(K2)** **CO3:** Analyze the spectral characteristics of continuous-time signals and systems using Fourier analysis. **(K4)** **CO4:** Apply sampling theorem concept to convert continuous time signals to discrete time signal and reconstruct. **(K3)** **CO5:** Apply Laplace transform and inverse Laplace transform to analyze continuous time signals and systems with respect to ROC. **(K3)** **CO6:** Apply Z transform to analyze discrete time signals and systems with respect to ROC. **(K3)**
III Semester	**V18ECT04** **Network Theory**	**After successful completion of the course, the student will be able to:** **CO1:** Solve the electrical network using mesh and nodal analysis. **(K3)** **CO2:** Apply network theorems to analyze the Electric circuits. **(K3)** **CO3:** Explain RLC transient circuits and Filters. **(K2)** **CO4:** Describe the steady state analysis of RLC circuits. **(K2)** **CO5:** Analyze the resonance circuits. **(K4)** **CO6:** Solve the two port network parameters. **(K3)**
III Semester	**V18MBT51** **Managerial Economics and Financial Analysis**	**After successful completion of the course, the student will be able to:** **CO1:** Understand the basic concepts of managerial economics, demand, and elasticity of demand and methods of demand forecasting. **[K2]** **CO2:** Estimate the production function with one, two and infinite variables. Understand various cost concepts and calculating breakeven point. **[K2]** **CO3:** Understand and showing a price output determination in different types of market structures and knowing various pricing methods. **[K2]** **CO4:** Understand various forms of business organizations. **[K2]** **CO5:** Prepare financial statements and its analysis. **[K3]** **CO6:** Appraise the projects by using various capital budgeting methods. **[K4]**
III Semester	**V18ECL01** **Electronic Devices and Circuits Lab**	**After successful completion of the course, the student will be able to:** **CO1:** Identify, Test and describe the specifications of various components. **[K2]** **CO2:** Find the unknown Frequency using Cathode Ray Oscilloscope. **[K1]** **CO3:** Interpret the Characteristics of various semiconductor devices. **[K2]** **CO4:** Sketch the Regulation Characteristics of Zener Diode. **[K3]** **CO5:** Examine the Performance of Rectifiers with and without Filters. **[K3]** **CO6:** Sketch the Frequency Response of Amplifiers and Compute Bandwidth. **[K3]**

III Semester	**V18ECL02** **Digital System Design Lab**	**After successful completion of the course, the student will be able to:** **CO1:** Examine the logic behavior of various IC gates. **(K3)** **CO2:** Construct and test combination logic circuits. **(K3)** **CO3:** Construct and test synchronous Asynchronous sequential circuits. **(K3)** **CO4:** Develop and Simulate Combinational logic circuit and validate its functionality using VHDL on Xilinx Software Package. **(K3)** **CO5:** Develop and Simulate Sequential logic circuit and validate its functionality using VHDL on Xilinx Software Package. **(K3)**
IV Semester	**V18ECT07** **Analog & Digital Communications**	**CO1:** Explain the spectral characteristics, generation and detection techniques of Amplitude modulation techniques. **(K2)** **CO2:** Explain the spectral characteristics, generation and detection techniques of angle modulation techniques. **(K2)** **CO3:** Illustrate different types of noise and predict its effect on analog communication Systems. **(K3)** **CO4:** Describe the generation and detection methods of various digital modulation schemes. **(K2)** **CO5:** Analyze Optimal Reception of Digital Signal and explain various multiple access techniques. **(K4)** **CO6:** Describe the concepts of error control coding. **(K4)**
IV Semester	**V18ECT08** **Analog Circuits**	**After successful completion of the course, the student will be able to:** **CO1:** Construct wave shaping circuits for various applications. **(K3**) **CO2:** Analyze transistor amplifier circuits at low and high frequencies. **(K4)** **CO3:** Explain the operation of feedback and Power amplifiers. **(K2)** **CO4:** Explain the operation of sinusoidal and non-sinusoidal oscillators. **(K2)** **CO5:** Construct circuits for different applications using ICs. **(K3)** **CO6:** Explain the operation of Active filters and Data Converters. **(K2)**
IV Semester	**V18ECT09** **Probability Theory & Stochastic Processes**	**After successful completion of the course, the student will be able to:** **CO1:** Explain basic concepts of probability theory through Sets and Relative Frequency. **[K2]** **CO2:** Explain the concept of a random variable, functions based on random variable like distribution and density functions. **[K2]** **CO3:** Compute the expected value, moments on one random variable. **[K3]** **CO4:** Illustrate the concepts of joint distribution & density functions on multiple random variables and their transformations with examples**. [K3]** **CO5:** Compute the statistical characteristics of stochastic processes like auto correlation & cross correlation functions. **[K3]** **CO6:** Calculate the power density spectrum and cross power- density spectrum of signals. **[K3]**
IV Semester	**V18ECT10** **Electro Magnetic Waves & Transmission Lines**	**After successful completion of the course, the student will be able to:** **CO1:** Use various laws of static electric field to determine E. **(K3**) **CO2:** Use Various laws of magneto static field to determine H and Apply Maxwell‟s equations to analyze the time varying behavior of EM waves. **(K3)** **CO3:** Compute the Propagation Characteristics of the EM Waves in different mediums. **(K3)** **CO4:** Calculate Brewster angle, critical angle and total internal reflection. **(K3)** **CO5:** Compute Primary and Secondary constants for a given transmission line. **(K3)** **CO6:** Calculate reflection coefficient, VSWR etc. using smith chart. **(K3)**
IV Semester	**V18ECL06** **Analog Circuits Lab**	**After successful completion of the course, the student will be able to:** **CO1-** Construct circuit for linear wave shaping circuits. **[K3]** **CO2-** Construct feedback amplifiers and obtain their characteristics **[K3]** **CO3-** Construct different RC and LC oscillators using BJT based on the frequency range. **[K3]** **CO4-** Construct circuit and analyze different multivibrator circuits. [**K4]** **CO5-** Construct circuits for verifying linear and nonlinear applications using IC 741 op-amp and IC 555 timer. [**K3]** **CO6-** Sketch the Frequency Response Characteristics of Active filters. **[K3]**
IV Semester	**V18ECL05** **Communications Lab**	**After successful completion of the course, the student will be able to:** **CO-1-** Demonstrate the operation of various pulse modulation and demodulation techniques. **[K3]** **CO-2 -**Construct the pre-emphasis and de-emphasis circuits and verify its frequency response. **[K3]** **CO-3 -**Demonstrate the spectrum analysis of modulated signal using spectrum analyzer, operation of AGC and PLL. **[K3]** **CO-4-** Understand the Time division multiplexing and Demultiplexing, Pulse digital modulation techniques, such as PCM, DPCM, and DM, Companding theorem. **[K2]** **CO-5-** Understand generation and detection of digital modulation techniques, such as ASK, PSK, FSK and DPSK. **[K2]** **CO-6-** Verify the Source encoding and decoding (Huffman Coding) technique and channel encoding and decoding techniques. **[K3]**

V Semester	**V18CST81** **Data Structures and Algorithms**	**After successful completion of the course, the student will be able to:** **CO1:** Explain Sorting and searching techniques. **(K2)** **CO2:** Demonstrate algorithm notations. **(K2)** **CO3:** Develop Singly Linked Lists, Double Linked List. **(K3)** **CO4:** Interpret the Basic Concepts in Data Structures, Stacks and Queues **(K3) CO5:** Develop Binary trees and BST **(K3)** **CO6:** Develop various graph algorithms. **(K3**)
V Semester	**V18ECT11** **VLSI Design**	**After Successful completion of the Course, the student will be able to:** **CO1:** Understand different IC technologies and basic electrical properties of MOS, CMOS and Bi-CMOS Circuits. **(K2)** **CO2:** Develop layouts for MOS & Bi-CMOS circuits using design rules. **(K3)** **CO3**: Calculate the parameters of MOS circuits and assess the effects of scaling. **(K3)** **CO4:** Analyze the concept of Combinational and arithmetic circuits. **(K4)** **CO5:** Describe the fundamentals of low power VLSI design. **(K2)**
V Semester	**V18ECT12** **Microprocessor & Microcontrollers**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe the basic architecture and Modes of 8086 microprocessor. **(K2)** **CO2:** Construct assembly language programs for arithmetic and Logical Operations **(K3)** **CO3:** Describe the Hardware and software requirements in interfacing. **(K2)** **CO4:** Describe Architecture and features of Intel 8051 microcontroller. **(K2)** **CO5**: Construct assembly language programs for 8051 microcontroller. **(K3)** **CO6**: Identify latest technology in microcontroller environment**. (K2)**
V Semester	**V18ECT13** **Antenna & Wave Propagation (Professional Elective-1)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Understand the radiation mechanism and fundamental parameters of antenna **(K2)** **CO2:** Solve the field components of dipole, quarter monopole antenna and their characteristics. **(K3)** **CO3:** Solve array factor for N element linear array and directivity **(K3)** **CO4:** Design basic micro strip antennas such as rectangular and circular and explain the concepts of modern antennas **(K3)** **CO5:** Design Microwave antennas and explain the procedure for antenna gain and Radiation pattern measurement **(K3)** **CO6:** Explain concept of propagation methods and fading in wave propagation. **(K2)**
V Semester	**V18ECT14** **Electronic Switching Systems (Professional Elective-1)**	**CO1:** Explain functioning of Manual and cross bar automatic switching systems **(K2)** **CO2:** Explain the stored program control concept involved in electronic switching systems. **(K2)** **CO3:** Describe the inherent facilities with time division switching, Combinational switching. **(K2)** **CO4:** Analyze the various CCITT signaling models, Various Plans. **(K4)** **CO5:** Investigate the methods of collecting& measuring traffic data. **(K3)** **CO6:** Explain the architecture and services of ISDN. **(K2)**
V Semester	**V18ECT15** **Engineer and Society**	**After Successful completion of the Course, the student will be able to:** **CO-1:** Comprehend different moral perspectives an done's own Ethical standards. **(K2)** **CO-2:** Understand the concept of safety and risk. **(K2)** **CO-3:** Explain different initiativest op rotect nature. **(K2)** **CO-4:** Identify the role of Information Technology. **(K2)** **CO-5:** Understand different types of infringement of Intellectual Property Rights. **(K2)** **CO-6:** Understand the importance of Entrepreneurship. **(K2)**
V Semester	**V18CSL34** **Data Structures and Algorithms Lab**	**After Successful completion of the Course, the student will be able to:** **CO1:** Construct Sorting and searching methods. **(K3)** **CO2:** Construct hash table **(K3)** **CO3:** Implement programs using Singly Linked Lists, Double Linked List. **(K3)** **CO3:** Construct Basic Data Structures, Stacks, Queues and Applications. **(K3)** **CO4:** construct Binary search tree. **(K3)** **CO5:** Implement various graph operations and shortest path algorithm. **(K3)**
V Semester	**V18ECL07** **Microprocessor &Microcontrollers Lab**	**After Successful completion of the Course, the student will be able to:** **CO-1:** Develop algorithm and logic for different operations using 8086 Instructions. **(K3)** **CO-2:** Construct simple programs for 8086 using Assembler directives (MASM)/Machine control Instructions. **(K3)** **CO-3:** Develop ALP to perform arithmetic and logical operations using various instructions. **(K3)** **CO-4:** Develop ALP to perform conversions, finding squares of a numbers by using Loop, Jump instructions. . **(K3)** **CO-5:** Develop Assembly language programs for 8051 Micro controller . **(K3)** **CO-6:** Perform some applications using ARDUINO BOARD **(K3)**

V Semester	**V18ECL08** **VLSI Design lab**	**After Successful completion of the Course, the student will be able to:** **CO1:** Explain the VLSI Design Methodologies using Mentor Graphics Tools. **(K2)** **CO2:** Demonstrate significance of various CMOS Analog and Digital circuits in Full-custom IC Design flow. **(K2)** **CO3:** Explain the Physical Verification in Layout Design. **(K2)** **CO4:** Design and analyze of Analog and mixed signal simulation. **(K2**) **CO5:** Analyze the Significance of Pre-Layout Simulation and Post-Layout Simulation. **(K2)**
VI Semester	**V18CST11** **Computer Networks**	**After Successful completion of the Course, the student will be able to:** **CO1:** Discuss fundamentals of network concepts and Reference Models. **(K2)** **CO2:** Discuss Communication media and switching techniques. **(K2)** **CO3:** Demonstrate Error control and protocols. **(K3)** **CO4:** Apply Routing algorithms and congestion control algorithms. **(K3)** **CO5:** Discuss Transport layer services and protocols. **(K2)** **CO6:** Describe Application layer protocols. **(K2)**
VI Semester	**V18ECT16** **Digital Signal Processing**	**After Successful completion of the Course, the student will be able to:** **CO1:** Classify Discrete Time Signals, systems, estimate the response of various Systems **(K2)** **CO2:** Compute DFT for discrete time signals using FFT Algorithm. **(K3)** **CO3:** Describe the various implementations of digital filter structures. **(K2)** **CO4:** Analyze and design a Digital filter (FIR&IIR) from the given specifications. **(K4)** **CO5:** Use the Multi-rate Processing concepts in various applications. **(K2)** **CO6:** Describe the concepts of DSP Processor. **(K3)**
VI Semester	**V18ECT17** **Embedded Systems-1**	**After Successful completion of the Course, the student will be able to: CO1:** Describe the Basic Concepts of embedded systems. **(K2)** **CO2:** Describe the characteristics of Application & Domain-Specific Embedded Systems. **(K2)** **CO3:** Discuss various hardware, software design approaches in embedded environment. **(K2)** **CO4:** Develop programming and interfacing of 8051 using development tools. **(K3)** **CO5:** Explain the fundamental concepts of ARM Architecture. **(K2)** **CO6:** Develop ALP programs using ARM/Thumb instruction set. **(K3)**
VI Semester	**V18ECT18** **Microwave Engineering (Professional Elective-1)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Derive TE/TM modes in Rectangular waveguide and characteristics.**(K4)** **CO2:** Illustrate the construction, operation and, Derive Power output and efficiency of Two cavity Klystron and Reflex klystron**(K4)** **CO3:** Illustrate the construction and operation of Travelling wave tube, cylindrical cavity magnetron and derive Hull cut off condition **(K4)** **CO4:** Explain operation of various passive waveguide components and calculate Scattering matrix for them **(K3)** **CO5:** Explain the operation of Microwave Solid State Devices and Understand basics of Microwave Integrated circuits and Materials for MIC**(K2)** **CO6:** Explain the procedure for measuring various microwave parameters using a Microwave test bench **(K2)**
VI Semester	**V18ECT19** **CMOS Digital IC Design**	**After Successful completion of the Course, the student will be able to:** **CO1:** Understand the concepts of NMOS and Pseudo NMOS designs. **(K2)** **CO2:** Describe the combinational MOS Logic Circuits. **(K2)** **CO3:** Explain the Principle and Performance of dynamic CMOS Circuits. **(K2)** **CO4:** Apply the concepts of Combinational MOS Logic Circuits in Designing the Transmission Gates. **(K2)** **CO5:** Demonstrate the behavior of Bi-stable Elements and Flip flops. **(K2)** **CO6:** Calculate Leakage Currents in various semiconductor memories. **(K2)**
VI Semester	**V18ECL09** **Digital signal Processing Lab**	**After Successful completion of the Course, the student will be able to:** **CO1:** Design and simulate Digital IIR and FIR filter. **(K3)** **CO2:** Develop and simulate Interpolator and Decimator. **(K3)** **CO3:** Apply DSP algorithms for audio applications. **(K3)** **CO4:** Apply DSP algorithms on a DSP processor for real time applications. **(K3)**
VI Semester	**V18CSL35** **Computer Networks Lab**	**After Successful completion of the Course, the student will be able to:** **CO1:** Implement Error detection techniques. **[K3]** **CO2:** Implement Routing Algorithms. **[K3]** **CO3:** Implement Congestion Algorithms. **[K3]** **CO4**: Implement Sliding Window Algorithms. **[K3]** **CO5:** Implement socket programming. **[K3]**
VI Semester	**V18ECTOE1** **Internet of Things (Open Elective- I)**	**After Successful completion of the Course, the student will be able to:** **CO- 1:** Describe M2M and IOT Technologies. **(K2)** **CO- 2:** Identify the layers and protocols in IOT. **(K2)** **CO- 3:** Describe various communication technologies used in IOT**. (K2)** **CO- 4:** Demonstrate various hardware components required for IOT applications. **(K2)** **CO- 5:** Identify the cloud technologies**. (K2**) **CO- 6:** Explain the applications of IoT. **(K2)**

VI Semester	**V18ECTOE2** **Principles of Communication Systems (Open Elective- I)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Demonstrate the fundamentals of communication systems. **(K2)** **CO2:** Compare the various analog modulation and demodulation schemes. **(K2)** **CO3:** Compare the various digital modulation and demodulation schemes. **(K2)** **CO4:** Explain the wireless communication system concepts. **(K2)** **CO5:** outline the satellite communication system principles. **(K2)** **CO6:** outline the Optical communication system principles. **(K2)**
VI Semester	**V18ECTOE3** **Introduction to VLSI Design (Open Elective- I)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Demonstrate the fundamentals of IC technology such as various MOS fabrication technologies**. (K2)** **CO2:** Compute electrical properties of MOS circuits such as Ids – Vds relationship, And MOS circuit parameters. **(K3)** **CO3:**Develop stick diagrams, layouts using design rules of various MOS Technologies**. (K3)** **CO4:** Compute the sheet resistance, area capacitance of various MOS layers And inverter delays. **(K3)** **CO5:** Explain the various MOS circuit parameters scaling and assess the Effects of scaling. **(K2)** **CO6:** Demonstrate VHDL synthesis, simulation, design capture tools design Verification tools. **(K2)**
VII Semester	**V18ECT20** **Radar Engineering**	**After Successful completion of the Course, the student will be able to:** **CO1:** Derive the radar range equation and to solve some analytical problems. **[K2]** **CO2:** Describe the operation of CW and FMCW Radar systems. **[K2]** **CO3:** Illustrate the principle of each and every block of MTI and Pulse Doppler Radar **[K2]** **CO4:** Distinguish the different methods used for tracking targets. **[K2]** **CO5:** Relate the Noise Figure and Noise Temperature in Radar Receivers **[K2]** **CO6:** Explain the various components of radar receiver and its performance. **[K2]**
VII Semester	**V18ECT21** **Optical Communication**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe the overview of optical fiber communication, ray theory transmission and Concepts of modes. **[K2]** **CO2:** Explain thoroughly the operation of optical sources, Quantum efficiency and power. **[K2]** **CO3:** Classify different types of optical detectors and also explain the operation of optical Receiver. **[K2]** **CO4:** Illustrate the concept of power launching and power coupling for optical fibers. Discuss splicing techniques and connector losses. **[K3]** **CO5:** Explain the types of fiber materials with their properties and fiber losses. **[K2]** **CO6:** Construct optical link and becomes familiar with WDM concepts and measurement Techniques. **[K3]**
VII Semester	**V18ECT22** **Digital Image Processing**	**After Successful completion of the Course, the student will be able to:** **CO1:** Illustrate the different Transforms Techniques & their use in Image Processing Applications **(K3)** **CO2:** Examine Spatial & frequency domain filtering like smoothing & sharpening Operation son Images **(K4)** **CO3:** Analyze Restoration operations/techniques on Images **(K4)** **CO4:** Describe the Image compression Techniques and multi-resolution processing on Images **(K3)** **CO5:** Analyze morphological operations on Images & Image segmentation **(K4)** **CO6:** Illustrate the different color Image Processing Techniques on Images **(K3)**
VII Semester	**V18ECT24** **IOT: Use Cases (Professional Elective-III)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe M2M and IOT Technologies. **[K2]** **CO2:** Explain the layers and protocols in IOT. **[K2]** **CO3:** Describe various communication technologies used in IOT. **[K2]** **CO4:** Illustrate various hardware components required for IOT applications. **[K2]** **CO5:** Discuss the cloud technologies and their services. **[K2]** **CO6:** Explain the IoT Applications. **[K2]**

VII Semester	**V18ECT25** **CMOS ANALOG IC DESIGN (Professional Elective-III)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe the Large and Small signal models of different Analog Devices. **(K2)** **CO2:** Analyze the various types of current mirrors**. (K3)** **CO3:** Analyze the different types of single stage MOS amplifiers**. (K3)** **CO4:** Describe the Noise modeling of Various Circuit Elements**. (K2**) **CO5:** Illustrate the construction and working of OP-AMP**. (K3)** **CO6:** Illustrate the types of CMOS Comparators**. (K3)**
VII Semester	**V18ECT26** **Digital TV Engineering (Professional Elective-III)**	**CO1:** Illustrate the fundamentals of television engineering. **[K2]** **CO2:** Explain the colour TV transmission and reception **[K2]** **CO3:** Compare Digital TV transmission standards **[K4]** **CO4:** Discuss factors affecting system noise and transmission errors. **[K2]** **CO5:** Explain the Digital TV transmission and reception. **[K2]** **CO6:** Describe the operation of LCD and Plasma screens . **[K2]**
VII Semester	**V18ECT27** **Low Power IC Design (Professional Elective-IV)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Explain the need of Low power circuit design. **(K2)** **CO2:** Describe the different architectural approaches. **(K2)** **CO3:** Analyze Low-Power Design Approaches. **(K4)** **CO4:** Analyze and design Low-Voltage Low-Power Adders circuits. **(K4)** **CO5:** Analyze and design Low-Voltage Low-Power Multiplier circuits. **(K4)** **CO6:** Analyze and design of Low-Voltage Low-Power Memories. **(K4)**
VII Semester	**V18ECT28** **System on Chip (Professional Elective-IV)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe SOC System Approach, design and its Architecture. **[K2]** **CO2:** Discuss the selection of processor and its micro architecture for SOC. **[K2]** **CO3:** Describe Memory Design for SOC. **[K2]** **CO4:** Explain the concepts of bus models and Interconnect Architectures. **[K2]** **CO5:** Describe the overview of Zynq SOC. **[K2]** **CO6:** Explain the SOC based Applications. **[K2]**
VII Semester	**V18ECT29** **System Design Through VERILOG (Professional Elective-IV)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Outline basic concepts of RTL code for digital circuits. **K2** **CO2:** Model RTL codes for digital circuit at gate level **K3** **CO3:** Model RTL codes for digital circuit at behavioural level **K3** **CO4:** Model RTL codes for digital circuit at data flow and switch level **K3** **CO5:** Ouline the concepts of task, function and complier directives **K2** **CO6:** Analyze Synthesize of Combinational and Sequential Circuits **K2**
VII Semester	**V18ECL11** **Microwave & Optical Comm. Lab**	**After Successful completion of the Course, the student will be able to:** **CO1:** Sketch the characteristics of various Microwave & Optical sources. **(K3)** **CO2:** Compute the various Parameters of Microwave & Optical Components. **(K3)** **CO3:** Measure the radiation pattern of Horn antenna and reflector antenna. **(K5) CO4:** Analyze a rectangular microstrip patch antenna using HFSS software. **(K4)**
VIII Semester	**V18ECT30** **Cellular & Mobile Communication**	**After Successful completion of the Course, the student will be able to:** **CO1:** Demonstrate the limitations of conventional mobile telephone systems; Understand the concepts of cellular systems. **[K2]** **CO2:** Illustrate the concept of frequency Reuse channels, deduce Co- channel Interference reduction factor **[K2]** **CO3:** Understand the frequency management, channel assignment strategies and Antennas in cellular systems. **[K2]** **CO4:** Discuss the concepts of Handoff, dropped calls and cell splitting, Intersystem Handoff. **[K2]** **CO5:** Explain the knowledge about GSM architecture and GSM channels, multiple Access schemes like FDMA, TDMA and CDMA. **[K2]** CO6: Summarize the concepts of upcoming technologies like 3G, 4G etc. **[K2]**
VIII Semester	**V18ECT31** **Electronics Measurements & Instrumentation (Professional Elective-V)**	**After Successful completion of the Course, the student will be able to:** **CO1.** Select the instrument to be used based on the requirements**. [K2]** **CO2.** Understand the design of oscilloscopes for different applications**. [K2]** **CO3.** Explain different signal generators and analyzers**. [K2]** **CO4.** Understand the design of different types of Bridge circuits for different Applications. **[K2]** **CO5.** Explain and Design different types of transducers for different Applications. **[K2]** **CO6.** Explain different types of transducers for measurement of Physical parameters. **[K2]**

VIII Semester	**V18ECT32** **FPGA Architecture (Professional Elective-IV)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe Low end programmable devices. **[K2]** **CO2:** Explain FPGA basics. **[K2]** **CO3:** Comprehend Spartan 6 basics. **[K2]** **CO4:** Use Virtex 5 clock sources and FIFO. Comprehend various I/O standards. **[K2]** **CO5:** Use Memory, DSP blocks in complex designs. Comprehend SerDes. **[K2]** **CO6:** Comprehend JTAG. Distinguish RISC based Soft processors from Xilinx, Aletra. **[K2]**
VIII Semester	**V18ECT33** **Principles of Modern Wireless Communication Systems (Professional Elective-V)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe how to measure the performance of wireless system, in multipath Environment **[K2]** **CO2:** Summarize about Wireless Channel. **[K2]** **CO3:** Explain Principle and properties of CDMA. **[K2]** **CO4:** Discuss the working and advantages of MIMO wireless communication systems. **[K2]** **CO5:** Explain the principle and advantages of OFDM system. **[K2]** **CO6:** Describe of various modern wireless communication technologies. **[K2]**
VIII Semester	**V18ECT34** **Satellite Communication (Professional Elective-VI)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe the basic concepts of Satellite Communications & analyze the concepts of Orbital mechanics & Launchers. **(K4)** **CO2:** Discuss the major Sub-Systems of a Satellite. **(K2)** **CO3.** Design the Communication Link for Satellite**(K4)** **CO4:** Compare the various Multiple Access Techniques**(K3)** **CO5:** Analyze the various sub-systems used in Earth stations & review the different orbits. **(K4)** **CO6:** Analyze the Satellite Navigation & the Global positioning system. **(K4)**
VIII Semester	**V18ECT35** **Bio-Medical Engineering (Professional Elective-VI)**	**After Successful completion of the Course, the student will be able to: CO1:** Explain the basics concepts of Bio-Medical Instrumentation. **[K2]** **CO2:** Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications.**[K2]** **CO3:** Explainhe Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological parameters of Cardiovascular System.**[K2]** **CO4:** Discuss the processing methods in elements used for Patient's Health care & monitoring.**[K2]** **CO5:** Explain the Principles of Diagnostic Techniques and the concepts of Bio-Telemetry.**[K2]** **CO6:** Classify different types of monitors, discuss the principles of recorders and Illustrate the methods of accident preventions i.e. Shock Hazards from different Electrical Equipment.**[K2]**
VIII Semester	**V18ECT36** **Wireless Sensor Networks (Professional Elective-VI)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Explain the concepts of Wireless Sensor Networks, its Architecture. **[K2]** **CO2:** Describe the Networking Technologies**. [K2]** **CO3:** Explain the MAC Protocols**. [K2]** **CO4:** Illustrate the Routing Protocols. **[K2]** **CO5:** Describe the Transport Layer Protocols. **[K2]** **CO6:** Explain the Security Layer Protocols and Applications of WSN. **[K2]**
VII Semester	**V18ECTOE4** **Principles of Wireless Comm. (Open Elective-II)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Discuss the cellular system evolution of mobile radio systems **[K2]** **CO2:** Illustrate the basic cellular concepts. **[K2]** **CO3:** Explain the Various Propagation models. **[K2]** **CO4:** Discuss the need of modulation, diversity and equalization in cellular & Mobile Communication. **[K2]** **CO5:** Demonstrate the knowledge about GSM architecture, multiple accesss chemes like FDMA,TDMA, CDMA. **[K2]** **CO6:** Summarize the concepts of upcoming technologies like 3G, 4G etc. **[K2]**

VII Semester	**V18ECTOE5** **Medical Electronics (Open Elective-II)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Explain the basics concepts of Bio-Medical Instrumentation. **[K2]** **CO2:** Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications. **[K2]** **CO3:** Explain the Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological Parameters of Cardiovascular System. **[K2]** **CO4:** Discuss the elements used for Patient's Health care & monitoring. **[K2]** **CO5:** Explain the Principles of Diagnostic Techniques and the concepts of Bio- Telemetry. **[K2]** **CO6:** Classify different types of monitors, discuss the principles of recorders and Illustrate the methods of accident preventions. **[K2]**
VII Semester	**V18ECTOE6** **Concepts of Embedded Systems (Open Elective-II)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe the Basic Concepts of embedded systems- **(K2).** **CO2:** Describe the characteristics of Embedded Systems - **(K2)** **CO3:** Explain the Architecture and Pin Description of 8051- **(K2)** **CO4:** Explain various Addressing Modes and Instructions of 8051- **(K2)** **CO5:** Discuss the various Interrupts , Modes of Timers/Counters in 8051**-(K2)** **CO6:** Discuss the fundamentals of RTOS based embedded firmware design - **(K2)**
VIII Semester	**V18ECTOE7** **Fundamentals of Digital Image & Video Processing (Open Elective-III)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Analyze Image transforms for various Image processing operations. **(K4)** **CO2:** Examine Spatial & frequency domain filtering like smoothing & sharpening Operations on Images. **(K4)** **CO3:** Estimate Image degradation functions and analyze various Image Restoration Techniques on Images. **(K4)** **CO4:** Analyze various Image segmentation techniques. **(K4)** **CO5:** Describe various Image compression techniques. **(K3)** **CO6:** Explain basic concepts regarding to motion estimation, video filtering and Video standards. **(K2)**
VIII Semester	**V18ECTOE8** **Embedded RTOS (Open Elective-II)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Describe the basics of Real time OS. **[K2]** **CO2:** Explain the tasks, Interrupts, Security. **[K2]** **CO3:** Describe the basics of µCOS-II RTOS. **[K2]** **CO4:** Describe the basics of µCOS-II RTOS. **[K2]** **CO5:** Illustrate the mechanism of target image creation and porting. **[K2]** **CO6:** Explain the Application of RTOS. **[K2]**
VIII Semester	**V18ECTOE9** **Principles of Digital TV Engineering (Open Elective-II)**	**After Successful completion of the Course, the student will be able to:** **CO1:** Illustrate the fundamentals of television engineering **[K2]** **CO2:** Explain about TV signal transmission **[K2]** **CO3:** Explain the colour TV fundamentals **[K2]** **CO4:** Classify Digital TV transmission standards **[K2]** **CO5:** Explain the operation of Digital TV receiver **[K2]** **CO6:** Describe the working of LCD and Plasma screens **[K2]**