# 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

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### Course Outcomes (V20 Regulation)

| Semester | Course Code & Name | Course Outcomes |
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| I – Semester | **V20MAT01**<br><br>**Linear Algebra and Differential Equations** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No.** — **Course Outcome** — **Knowledge Level**<br>CO1 — Apply matrix technique to solve system of linear equations — K3<br>CO2 — Find Eigenvalues and Eigen vectors — K3<br>CO3 — Solve the ordinary differential equations of first order & first degree — K3<br>CO4 — Solve the linear differential equations of higher order with constant coefficients — K3<br>CO5 — Apply Laplace Transformation to given function — K3<br>CO6 — Find maxima and minima of functions of two variables — K3 |
| I – Semester | **V20CHT01**<br><br>**Engineering Chemistry** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No.** — **Course Outcome** — **Knowledge Level**<br>CO1 — Solve boiler troubles originated due to poor water quality and suggest suitable water treatment methods. — K3<br>CO2 — Choose plastics and rubbers for engineering applications — K3<br>CO3 — Associate concepts of Electro Chemistry in designing electrochemical energy systems — K2<br>CO4 — Assess the quality of fuels — K3<br>CO5 — Apply corrosion principles for protection of metallic structures — K3<br>CO6 — Interpret important applications of engineering materials — K2 |
| I – Semester | **V20ENT01**<br><br>**English for Professional Enhancement** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No.** — **Course Outcome** — **Knowledge Level**<br>CO1 — Identify the central theme of the text, use cohesive items for coherence in a paragraph, recognize nouns and basic sentence structures. — K2<br>CO2 — Restate the central idea of the letter by using appropriate vocabulary. Gain mastery over articles and prepositions — K2<br>CO3 — Find the success formula after reading the text in detail to answer questions. Use appropriate tense and concord, find suitable vocabulary and format to draft letters and e-mails. — K3<br>CO4 — Employ reading skills to comprehend the given biography. Interpret visual information .Use quantifiers appropriately and get acquainted with writing for media and statement of purpose — K3<br>CO5 — Appraise the delivered lecture and text, recognize the contextual vocabulary, write error free academic proposals and prepare poster presentations. — K4 |

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| | | CO6 Infer the real meaning of the text, listen for global comprehension and identify foreign phrases, use active and passive voice, practise note making. K4 |
| **I – Semester** | **V20MEL02**<br><br>**Engineering Workshop** | **Course Outcomes:**<br>After successful completion of the course, the student will be able to<br>**CO No. Course Outcome Knowledge Level**<br>CO1 Prepare different models in the carpentry trade and understand basic concepts of carpentry K3<br>CO2 Develop various basic prototypes in the trade of Tin smithy and understand basic concepts of Tin smithy. K3<br>CO3 Prepare various basic prototypes in the trade of fitting and understand basic concepts of fitting. K3<br>CO4 Prepare different models in the Black smithy and understand basic concepts of Black smithy. K3<br>CO5 Develop various basic House Wiring techniques, Electrical wiring circuits K3<br>CO6 Develop various basic prototype models in Welding and Foundry shop. K3 |
| **I – Semester** | **V20CST01**<br><br>**Programming in 'C' for problem Solving** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No. Course Outcome Knowledge Level**<br>CO1 Describe various problem solving strategies such as Algorithms and Flowcharts K2<br>CO2 Develop various programming constructs using Control Structures K3<br>CO3 Construct Programs using modular programming approach K3<br>CO4 Illustrate the usage of Arrays, String and pointers K3<br>CO5 Construct Programs using Structures and Unions K3<br>CO6 Distinguish between Sequential files and Random access files K4 |
| **I – Semester** | **V20ENL01**<br><br>**Hone your Communication Skills, Lab-I** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No. Course Outcome Knowledge Level**<br>CO1 Identify suitable expressions to greet people, say good bye to them, introduce one another, listen to consonants K2<br>CO2 Select suitable words to invite someone, accept or decline invitations, listen to…, identify and produce vowel sounds K2<br>CO3 Choose suitable expressions to seek/refuse permissions, to apologize and listen to word accent K3<br>CO4 Find apt expressions to give suggestions, express opinions and identify tone groups. K3<br>CO5 Use appropriate words to give commands, requests and identify pauses and prominent syllables K3<br>CO6 Practise listening to dialogues, role-plays using common vocabulary used in dialogues K3 |
| **I – Semester** | **V20CHL01**<br><br>**Engineering Chemistry Laboratory** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No. Course Outcome Knowledge Level**<br>CO1 Analyze quantitatively a variety of samples using volumetric methods and instrumental methods K4<br>CO2 Apply volumetric and instrumental methods for the determination of water quality parameters namely Alkalinity, Hardness and pH K3<br>CO3 Prepare polymeric materials, nanoparticles and analyze the given coal samples K3 |

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| **I – Semester** | **V20CSL01**<br><br>**Programming Lab in 'C' for problem Solving** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No.** — **Course Outcome** — **Knowledge Level**<br>CO1 — Demonstrate problem solving techniques using Control Structures — K3<br>CO2 — Construct Programmes using the concepts of Arrays, Strings and Pointers — K3<br>CO3 — Apply the concepts of Functions, Structures and Unions — K3<br>CO4 — Use various file processing operations to develop real-time applications — K4 |
| **II – Semester** | **V20CSL01**<br><br>**Programming Lab in 'C' for problem Solving** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No.** — **Course Outcome** — **Knowledge Level**<br>CO1 — Demonstrate problem solving techniques using Control Structures — K3<br>CO2 — Construct Programmes using the concepts of Arrays, Strings and Pointers — K3<br>CO3 — Apply the concepts of Functions, Structures and Unions — K3<br>CO4 — Use various file processing operations to develop real-time applications — K4 |
| **II – Semester** | **V20MAT02**<br><br>**Numerical Methods and Vector Calculus** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No.** — **Course Outcome** — **Knowledge Level**<br>CO1 — Compute approximate roots of algebraic and transcendental equations and interpolating polynomial for the given data — K3<br>CO2 — Solve ordinary differential equations with initial conditions using numerical methods — K3<br>CO3 — Find multiple integrals and improper integrals — K3<br>CO4 — Calculate gradient of a scalar function, divergence and curl of a vector function — K3<br>CO5 — Apply the knowledge of vector integral concepts to find characteristics of vector fields — K3<br>CO6 — Find Fourier series of a periodic functions — K3 |
| **II – Semester** | **V20PHT01**<br><br>**Engineering Physics** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No.** — **Course Outcome** — **Knowledge Level**<br>CO1 — Grasp the basic principles of structure of materials, crystallography and X-ray diffraction. — K2<br>CO2 — Expose the students to the basic concepts of Lasers and their applications in optical fiber communication link — K3<br>CO3 — Classify the applications of sound waves in various fields. — K2<br>CO4 — Interpret wavelike behavior of matter and motivates the need of fundamental physical laws for better understanding of materials. — K3<br>CO5 — Describe the properties of semiconducting materials — K2<br>CO6 — Illustrate the fundamental concepts of dielectrics and Superconductors. — K4 |
| **II – Semester** | **V20ECT01**<br><br>**Switching Theory and Logic Design** | **Course Outcomes**<br>After going through this course the student will be able to<br>**CO No.** — **Course Outcome** — **Knowledge Level**<br>CO-1 — **Explain** the different types of number Systems, number conversions, codes and logic Gates. — K2<br>CO-2 — **Apply** the concepts of Boolean algebra and use the knowledge of K-maps and tabular method for minimization of Boolean expressions. — K3<br>CO -3 — **Construct** the higher order modules from their lower — K3 |

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| | | order structures of various combinational logic circuits.<br>CO-4 **Explain** the concept of various flip flops K2<br>CO-5 **Develop** various sequential circuits like registers, counters by using basic flip flops. K3<br>**CO-6 Develop the various Finite State Machine Models K3** |
| **II – Semester** | **V20EET03**<br><br>**Electrical Circuit Analysis-I** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No. Course Outcome Knowledge Level**<br>CO1 Apply various network reduction techniques for solving electrical DC circuits. K3<br>CO2 Calculate different parameters of single phase alternating quantities. K3<br>CO3 Understand the concepts of different powers and apply network reduction techniques for solving electrical AC circuits. K3<br>CO4 Determine various parameters in series and parallel resonant circuits. K3<br>CO5 Apply the network theorems for solving electrical DC and AC circuits. K3<br>CO6 Compute electrical parameters for 3-phase balanced systems K3 |
| **II – Semester** | **V20MEL01**<br><br>**Engineering Graphics** | **Course Outcomes:**<br>After successful completion of the course, the student will be able to:<br>**CO No. Course Outcome Knowledge Level**<br>**CO1** Understand the basic commands in CAD Software and draw the conic sections K3<br>**CO2** Construct different types of scales and special curves K3<br>**CO3** Draw the projections of the points and lines K3<br>**CO4** Develop the projections of planes and surfaces of regular solids K3<br>**CO5** Draw the Isometric projections and conversion of views K3 |
| **II – Semester** | **V20EEL03**<br><br>**Electrical Engineering Workshop** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No. Course Outcome Knowledge Level**<br>CO1 Design different wiring circuits K4<br>CO2 Use electrical parameter measuring instruments K3<br>CO3 Construct the circuits on PCB board K4<br>CO4 Test the domestic appliances K4<br>CO5 Identify the parts of the Machine K3<br>CO6 Analyze electrical circuits through simulation K4 |
| **II – Semester** | **V20PHL01**<br><br>**Engineering Physics Lab** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No. Course Outcome Knowledge Level**<br>CO1 Analyze the physical principle involved in the various instruments; also relate the principle to new application. K4<br>CO2 Demonstrate the various experiments in the areas of optics, mechanics and Electronics in all branches of engineering. K3<br>CO3 Think innovatively and also apply the creative skills that are essential for engineering. K4 |
| **II – Semester** | **V20ENL02**<br><br>**Hone your Communication Skills, Lab-II** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to<br>**CO No. Course Outcome Knowledge Level**<br>CO1 Collect suitable expressions and vocabulary to participate in JAM. K1<br>CO2 Prepare, face and perform well in interviews with required etiquette. K3 |

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| | | CO3 | Use appropriate telephone etiquette to succeed in telephonic interviews. | K3 |
| | | CO4 | Show team spirit and communicative skills in group discussion. | K3 |
| | | CO5 | Arrange ideas and prepare to give presentations in a professional manner. | K4 |
| | | CO6 | Debate rationally and cogently while putting forth the ideas. | K4 |
| **II – Semester** | **V20CHT02**<br><br>**Environmental Studies** | **Course Outcomes:**<br>After successful completion of this course, the students will be able to | | |
| | | **CO No.** | **Course Outcome** | **Knowledge Level** |
| | | CO1 | Recognize the importance of environment and ecosystem services | K2 |
| | | CO2 | Identify the characteristic features, uses and impact of overutilization of natural resources | K2 |
| | | CO3 | Explain biodiversity, biodiversity services and conservation of biodiversity | K2 |
| | | CO4 | Report the causes and impacts of various pollutions | K2 |
| | | CO5 | Illustrate social and global environmental issues; sustainable development practices | K2 |
| | | CO6 | Describe environmental management and environmental legislations in India | K2 |

| Semester | Course Code & Name | Course Outcomes |
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| **III Semester** | **V20ECT02**<br><br>**Electronic Devices Circuits & Analysis** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Explain the formation of p-n Junction, Discuss special semi-conductorDiodes & Explain the working principle of rectifiers with and without filters With relevant expressions and necessary comparisons**[K2]**<br>**CO2:** Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations.**[K2]**<br>**CO3**: Explain the need of transistor biasing, various biasing techniques for BJT. **[K2]**<br>**CO4:** Analyze small signal low frequency transistor amplifier circuits using BJT In Single & Multistage**.[K2]**<br>**CO5:**Explain the operation & Analysis of Feedback and Power amplifiers**.[K2]** |
| **III Semester** | **Probability Theory & Stochastic Processes** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1:** Explain basic concepts of probability theory through Sets and Relative Frequency<br>**(K2)**<br>**CO-2:** Explain the concept of a random variable, functions based on random variable like Distribution and density functions **(K2)**<br>**CO-3:** Compute the expected value, moments on one random variable **(K3)**<br>**CO-4:** Illustrate the concepts of joint distribution & density functions on multiple random Variables **(K3)**<br>**CO-5:** Compute the Temporal and Spectral characteristics of stochastic processes **(K3)** |
| **III Semester** | **V20ECT04**<br><br>**Network Theory** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Apply network theorems to solve the electrical circuits. **[K3]**<br>**CO2:** Describe the steady state analysis of RLC circuits. **[K2]**<br>**CO3:** Analyze the resonance circuits. **[K4]**<br>**CO4:** Solve the two port network parameters. **[K3]**<br>**CO5:** Explain RLC transient circuits. **[K2]** |
| **III Semester** | **V20ECT05**<br><br>**Signals & Systems** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:**Classify the signals and various operations on signals.**[K2]**<br>**CO2:** Determine the response of LTI system to any arbitrary input signal using convolution**[K2]**<br>**CO3:** Analyze the spectral characteristics of signals using Fourier series and Fourier transforms.**[K3]**<br>**CO4:** Apply the various sampling techniques on continuous time signals.**[K3]**<br>**CO5:** ApplytheconceptsofLaplacetransform/Z-transformtoanalyzecontinuous-time/discrete-time signals in complex plane. **[K3]** |
| **III Semester** | **V20ECL01**<br><br>**Electronic Devices, Circuits & Analysis Lab** | **After Successful completion of the Course, the student will be able to:**<br>**CO1-**Identify, Test and Describe the specifications of various components**. [K2]**<br>**CO2-**Interpret the Characteristics of various Semiconductor Devices.**[K2]**<br>**CO3-**Sketch the Regulation Characteristics of Zener Diode.**[K3]**<br>**CO4-**Examine the Performance of Rectifiers with and without Filters.**[K3]**<br>**CO5-**Sketch the Frequency Response of Amplifiers and Compute Bandwidth.**[K3]**<br>**CO6-** Construct different RC and LC oscillators using BJT based on the Frequency range. **[K3]** |
| **III Semester** | **V20ECL02**<br><br>**Signals & Systems Lab** | **After Successful completion of the Course, the student will be able to:**<br>**CO1.** Understand basics of MATLAB syntax, functions and programming. **[K2] CO2.** Describe continuous-time and discrete time signals and systems. **[K2]**<br>**CO3.** Analyze the spectral characteristics of signals using Fourier analysis. **[K4] CO4.** Analyze the systems using Laplace transform and Z-transform. **[K4]** |

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| **IV Semester** | **V20EET11**<br><br>**Control Systems** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:**Determine the mathematical modelling of physical systems **(K3)**<br>**CO2:**Calculation of Time Domain Specification of first and second order systems and understand the effect of Controllers **(K3)**<br>**CO3:**Investigate the stability of closed loop systems using Routh‟s stability criterion and root locus method.**(K3)**<br>**CO4:** Find the stability of control systems using frequency response approaches.<br>**(K3)**<br>**CO5:** Analyze physical systems using state space approach.**(K4)** |
| **IV Semester** | **V20ECT07**<br><br>**Analog & Digital Communication** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:**Explainthespectralcharacteristics,generationanddetection Techniques of Amplitude modulation techniques**(K2)**<br>**CO2:** Explain the spectral characteristics, generation and Detection techniques of angle modulation techniques**(K2)**<br>**CO3:**Illustrate different types of noise and predict its effect on Analog communication Systems.**(K3)**<br>**CO4:** Describe the generation and detection methods of various digital Modulation schemes.**(K2)**<br>**CO5:** Analyze the concepts of error control coding**. (K4)** |
| **IV Semester** | **V20ECT08**<br><br>**Digital IC Applications** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Explain the structure of commercially available digital integrated circuit families. **[K2]**<br>**CO2:**Learn the IEEE Standard 1076 Hardware Description Language (VHDL).**[K2]**<br>**CO3:** Model complex digital systems at several levels of abstractions, behavioural, Structural, simulation, synthesis and rapid system prototyping.**[K2]**<br>**CO4:** Analyze and design basic digital circuits with combinatorial and sequential logic Circuits using VHDL.**[K2]**<br>**CO5:**Develop Programmable logic devices and memories with relevant ICs.**[K2]** |
| **IV Semester** | **V20ECT09**<br><br>**Electro Magnetic Waves & Transmission Lines** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Find static electric field intensity by using various laws of electrostatics. **[K3]**<br>**CO2:**Find static magnetic field intensity by using various laws of magneto statics and<br>Develop the Maxwell‟s equations for time varying fields**. [K3]**<br>**CO3:**Calculate the Propagation Characteristics of the EM Waves in different mediums And find Brewster angle, critical angle and total internal reflection**. [K3]**<br>**CO4:** Compute Primary and Secondary constants for a given transmission line. **[K3]**<br>**CO5:** Calculate reflection coefficient, VSWR etc. using smith chart. **[K3]** |
| **IV Semester** | **V20MBT51**<br><br>**Management Economics & Financial Analysis** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Understand the basic concepts of managerial economics, demand, and elasticity of demand and methods of demand forecasting. **(K2)**<br>**CO2:** Interpret production concept, least cost combinations and various costs concepts in decision making. **(K3)**<br>**CO3:** Differentiate various Markets and Pricing methods along with Business Cycles **(K2)**<br>**CO4:** Prepare financial statements and its analysis. **(K3)**<br>**CO5:** Assess various investment project proposals with the help of Capital Budgeting techniques for decision making. **(K3)** |
| **IV Semester** | **V20ECL04**<br><br>**Analog & Digital Communication Lab** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1-**Demonstrate the operation of various pulse modulation and demodulation Techniques.**[K3]**<br>**CO-2 -**Construct the pre-emphasis and de-emphasis circuits and verify its frequency Response.**[K3]**<br>**CO-3 -**Demonstrate the spectrum analysis of modulated signal using spectrum analyser, Operation of AGC and PLL **[K3]** |

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| | | **CO-4-** Distinguish the Time division multiplexing and DE multiplexing, Pulse digital Modulation Techniques **[K2]**<br>**CO-5-** Distinguish generation and detection of digital modulation techniques **[K2]**<br>**CO-6-** Verify the Source encoding and decoding (Huffman Coding) technique and channel Encoding and decoding techniques. **[K3]** |
| **IV Semester** | **V20ECL05**<br><br>**Digital IC Application Lab** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Identify the importance of various tools available in XILINX ISE12.2.**[K2]**<br>**CO2:** Develop VHDL/Verilog HDL Source code and perform simulation for various Combinational logic circuits using XILINX ISE12.2.**[K3]**<br>**CO3:** Develop VHDL/Verilog HDL Source code and perform simulation for various Sequential logic circuits using XILINX ISE12.2.**[K3]** |
| **V Semester** | **V20ECT10**<br><br>**VLSI Design** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1:** Understand different IC technologies. **(K2)**<br>**CO-2:** Explain basic electrical properties of MOS, CMOS and Bi-CMOS Circuits. **(K2) CO-3:** Develop layouts for MOS & Bi-CMOS circuits using design rules. **(K3)**<br>**CO-4:** Compute the parameters of MOS circuits and assess the effects of scaling **(K3)**<br>**CO-5:** Design Combinational circuits and Subsystems. **(K4)** |
| **V Semester** | **V20ECT11**<br><br>**Microprocessors & Microcontrollers** | **After Successful completion of the Course, the student will be able to:**<br>Describe the basic architecture and Modes of 8086 microprocessor **(K2)**<br>**CO-2:** Construct assembly language programs for arithmetic and Logical Operations **(K3). CO-3:** Describe the basic peripherals interfacing and its programming techniques **(K2)**<br>**CO-4:** Illustrate the Architecture and features of Intel 8051 Microcontroller **(K3)**<br>**CO-5**: Explain the Architecture and features of PIC microcontroller **(K2)** |
| **V Semester** | **V20ECT12**<br><br>**Analog Circuits** | **After Successful completion of the Course, the student will be able to:**<br>Demonstrate Linear wave shaping circuits for various applications. **(K2)**<br>**CO-2:** Explain Non-Linear wave shaping circuits for various applications. **(K2)**<br>**CO-3:** Explain the operation of non sinusoidal oscillators & Illustrate Op-Amp Characteristics **(K2)**<br>**CO-4:** Demonstrate circuits for different applications using ICs. **(K2)**<br>**CO-5:** Discuss the operation of Active filters and Data Converters. **(K2)** |
| **V Semester** | **V20ECT13**<br><br>**Antenna &Wave Propagation (Professional Elective-I)** | **After Successful completion of the Course, the student will be able to:**<br>Understand the radiation mechanism and fundamental parameters of antenna **(K2)**<br>**CO-2:** Solve the field components of dipole (or quarter monopole), loop antenna and their characteristics. **(K3)**<br>**CO-3:** Solve array factor for N element linear array and directivity & Design the Microwave antennas. **(K3)**<br>**CO-4:** Demonstrate the measurement procedure for antenna parameters, develop the rectangular Microstrip antenna and understand the concepts of modern antennas. **(K3)**<br>**CO-5:** Explain the concept of propagation methods and fading in wave propagation. **(K2)** |
| **V Semester** | **V20ECT14**<br><br>**Information Theory & Coding (Professional Elective-I)** | **After Successful completion of the Course, the student will be able to:**<br>Analyze the properties of Information theory **[K4]**<br>**CO2.** Evaluate Source coding efficiencies for different discrete sources **[K4]**<br>**CO3.** Apply various source coding techniques for data compression **[K3]**<br>**CO4.** Analyze linear block code encoding and decoding techniques **[K4]**<br>**CO5.** Analyze cyclic and convolutional code encoding and decoding techniques **[K4]** |

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| **V Semester** | **V20ECL06**<br><br>**VLSI Design Lab** | **After Successful completion of the Course, the student will be able to:**<br>Explain the VLSI Design Methodologies using Mentor Graphics Tools **(K2)**<br>**CO-2:** Demonstrate significance of various CMOS Analog and Digital circuits in Full-custom IC Design flow **(K2)**<br>**CO-3:** Explain the Physical Verification in Layout Design **(K2)**<br>**CO-4:** Design and analyse of Analog and mixed signal simulation **(K3)**<br>**CO-5:** Analyse the Significance of Pre-Layout Simulation and Post-Layout Simulation. **(K4)** |
| **V Semester** | **V20ECL07**<br><br>**Microprocessor & Microcontrollers Lab** | **After Successful completion of the Course, the student will be able to:**<br>Develop algorithm and logic for different operations using 8086 Instructions. **(K3)**<br>**CO-2:** Construct simple programs for 8086 using Assembler directives (MASM)/Machine control Instructions. **(K3)**<br>**CO-3:** Develop ALP to perform arithmetic and logical operations using various instructions. **(K3)**<br>**CO-4:** Develop ALP to perform conversions, finding squares of a numbers by using Loop,<br>Jump instructions. **(K3)**<br>**CO-5:** Develop Assembly language programs for 8051 Micro controller. **(K3)** |
| **VI Semester** | **V20ECT15**<br><br>**Digital Signal Processing** | **After Successful completion of the Course, the student will be able to:**<br>Classify Discrete Time Signals & systems, Compute DFT for discrete Time signals. **(K3)**<br>**CO-2:** Compute DFT for discrete Time signals using FFT Algorithm **(K3)**<br>**CO-3:** Describe the various implementations of digital filter structures **(K2)**<br>**CO-4:** Analyze and design a Digital filter (FIR&IIR) from the given specifications **(K4)**<br>**CO-5:** Use the Multi-rate Processing concepts in various applications **(K3)** |
| **VI Semester** | **V18ECT16**<br><br>**Microwave Engineering** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:**Solve the TE/TM modes and characteristics of Rectangular waveguide **(K2)**<br>**CO2**: Illustrate the construction, operation, Power output and efficiency of two cavity Klystron Amplifier and Reflex klystron Oscillator **(K3)**<br>**CO3**: Examine the construction, operational details of travelling wave tube Amplifier & cylindrical cavity Magnetron Oscillator **(K4)**<br>**CO4**: Construct the various passive waveguide components based on the Scattering matrix **(K3)**<br>**CO5**: Explain the operation of Microwave Solid State Devices & the procedure for measuring various microwave parameters using a Microwave test bench **(K2)** |
| **VI Semester** | **V20ECT17**<br><br>**Internet of Things: Use Cases** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Describe M2M and IOT Technologies. **[K2]**<br>**CO2:** Explain the layers and protocols in IOT. **[K2]**<br>**CO3:** Describe various communication technologies used in IOT. **[K2]**<br>**CO4:** Illustrate various hardware components required for IOT applications. **[K2]**<br>**CO5:** Discuss the cloud technologies and their services and explain the IoT Applications. **[K2]** |
| **VI Semester** | **V20ECT18**<br><br>**Embedded Systems ( Professional Elective-II)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Describe the Basic Concepts of Embedded Systems- **(K2).**<br>**CO2:** Describe the characteristics of Application & Domain-Specific Embedded Systems –**(K2)**<br>**CO3:** Discuss various hardware design approaches in embedded environment- **(K2)**<br>**CO4:** Describe various Embedded firmware design approaches on Embedded environment. **(K2)**<br>**CO5:** Illustrate the development, implementation & testing of Embedded System. **(K3)** |

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| **VI Semester** | **V20ECT19**<br><br>**SYSTEM DESIGN THROUGH VERILOG**<br>**( Professional Elective-II)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Outline basic concepts, constructs and conventions of VERILOG. **(K2)**<br>**CO2:** Develop Verilog codes for combinational and sequential logic cirucits at gate and data flow level. **(K3)**<br>**CO3:** Develop Verilog codes for combinational and sequential logic circuits at behavioral level. **(K3)**<br>**CO4:** Develop Verilog codes for CMOS circuits at switch level and outline the concepts of task, function and complier directives. **(K3)**<br>**CO5:** Explain Synthesize of Combinational and Sequential Circuits. **(K2)** |
| **VI Semester** | **V20ECL08**<br><br>**Digital Signal Processing Lab** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1:** Describe the generation and convolution of discrete time signals **(K2)**<br>**CO-2:** Compute the DFT using FFT **(K3)**<br>**CO-3:** Design Digital IIR and FIR filter **(K4)**<br>**CO-4:** Develop Interpolator and Decimator **(K3)**<br>**CO-5:** Apply DSP algorithms for audio and Image processing applications **(K3)**<br>**CO-6:** Develop DSP algorithms on TMS320C6713 DSP processor Kit **(K3)** |
| **VI Semester** | **V20ECL09**<br><br>**IoT Lab** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Develop Embedded C Program to interface sensors & actuators. **(K3)**<br>**CO2:** Develop Embedded C Program to send the sensor data to cloud. **(K3)**<br>**CO3:** Develop Wireless Module Interface with Embedded device. **(K3)**<br>**CO4:** Develop street light control system, security system, home automation system. **(K4)**<br>**CO5:** Develop mobile application to interface with embedded device. **(K3)** |
| **VI Semester** | **V20ECL10**<br><br>**Microwave Engineering Lab** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Sketch the characteristics of various Microwave & Optical sources **(K3)**<br>**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 micro strip patch antenna using HFSS software **(K4)** |
| **VII Semester** | **V20ECT20**<br><br>**Digital Image Processing (Professional Elective-III)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1.** Explain image fundaments and the different image Transforms Techniques **(K2)**<br>**CO2.** Describe Spatial and frequency domain filtering like smoothing and sharpening operations on Images **(K2)**<br>**CO3.** Describe Restoration operations/techniques on Images **(K3)**<br>**CO4.** Describe the Image compression Techniques and Image segmentation **(K3)**<br>**CO5.** Explain the different color models and color image processing techniques **(K2)** |
| **VII Semester** | **V20ECT21**<br><br>**Computer networks (Professional Elective-III)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Discuss fundamentals of network concepts, Reference Models and physical layer. **(K2)**<br>**CO2:** Demonstrate Error control and protocols. **(K3)**<br>**CO3:** Apply Routing algorithms and congestion control algorithms. **(K3)**<br>**CO4:** Discuss Transport layer services and protocols. **(K2)**<br>**CO5:** Describe Application layer protocols. **(K2)** |
| **VII Semester** | **V20ECT22**<br><br>**Cellular Mobile Communication (Professional Elective-IV)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Demonstrate the limitations of conventional mobile telephone systems; understand the concepts of cellular systems. **[K2]**<br>**CO2:** Illustrate the concept of frequency Reuse channels, deduce Co- channel Interference reduction factor **[K2]**<br>**CO3:** Understand the frequency management, channel assignment strategies and Antennas in cellular systems.**[K2]**<br>**CO4:** Discuss the concepts of Handoff, dropped calls and cell splitting, Intersystem Handoff. **[K2]**<br>**CO5:** Explain the knowledge about different multipleacess schemes, GSM architecture and higher generation cellular standards,.**[K2]** |

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| **VII Semester** | **V20ECT23**<br><br>**Low Power VLSI Design (Professional Elective-IV)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1**: Illustrate the importance of low power design, sources of power dissipation and the factors affecting them. **[K3]**<br>**CO2**: Describe various power reduction techniques possible for Low-Power Design at different levels. **[K2]**<br>**CO3**: Analyze various adder structures for low power applications. **[K4]**<br>**CO4**: Analyze various multipliers and multiplication algorithms for low voltage and low power environment. **[K4]**<br>**CO5**: Discuss the techniques for attaining the low power consumption in memories. **[K2]** |
| **VII Semester** | **V20ECT24**<br><br>**Radar Engineering (Professional Elective-V)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Demonstrate the factors which affecting the radar performance using Radar Equation. **[K2]**<br>**CO2:** Describe the operation of CW and FMCW Radar systems. **[K2]**<br>**CO3:** Illustrate the principle of each and every block of MTI Radar **[K2]**<br>**CO4:** Distinguish the different methods used for tracking targets. **[K2]**<br>**CO5:** Illustrate the basic principle and the importance of Matched Filter Receivers in Radars **[K2]** |
| **VII Semester** | **V20ECT25**<br><br>**CMOS DIGITAL IC DESIGN (Professional Elective-V)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Analyze the concepts of MOS Design. **[K2]**<br>**CO2:** Design and analysis of Combinational MOS Circuits. **[K2]**<br>**CO3:** Design and analysis of Sequential MOS Circuits. **[K2]**<br>**CO4:** Construct Dynamic Logic Circuits Using Various Logic Styles. **[K2]**<br>**CO5:** Describe the Concepts of Semiconductor Memories, Flash Memory, RAM array organization**[K2]** |
| **Semester** | **V20ECTJOC01**<br><br>**FPGA Architecture (Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1** Describe Low end programmable devices and FPGA basics. **[K2]**<br>**CO-2** Describe Spartan 6 basics. **[K2]**<br>**CO-3** Use Virtex 5 clock sources and FIFO. Comprehend various I/O standards. **[K3] CO-4** Use Memory, DSP blocks in complex designs. Comprehend SerDes. **[K3]**<br>**CO-5** Distinguish RISC based Soft processors from Xilinx, Aletra. **[K3]** |
| **Semester** | **V20ECTJOC02**<br><br>**Optical Communication & Networks (Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1.** Describe the overview of optical fiber communication, ray theory transmission and concepts of modes. **[K2]**<br>**CO2.** Explain the Transmission characteristics of fiber and optical fiber Connectors. **[K2]**<br>**CO3.** Describe the operation of optical sources, photo detectors and optical Receiver. **[K2]**<br>**CO4.** Explain WDM Concepts and Components. **[K2]**<br>**CO5.** Explain the Optical switching networks. **[K2]** |
| **Semester** | **V20ECTJOC03**<br><br>**Industrial IoT (Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Describe the key techniques and theory behind Industrial Internet of Things **[K2]**<br>**CO2:** Explain the key techniques and theory behind Industrial Internet of Things **[K2]**<br>**CO3:** Explain the integration of Cloud and IoT, Edge and Fog Computing **[K2]**<br>**CO4:** Apply effectively the various enabling technologies (both hardware and software) for IIoT **[K3]**<br>**CO5:** Illustrate and build IIoT system for different Use cases **[K3]** |
| **Semester** | **V20ECTJOC04**<br><br>**Modern Satellite Communication (Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Describe the basic concepts and orbit mechanics of satellite communication. **[K2]**<br>**CO2:** Discuss the major subsystems of a satellite and satellite link design. **[K2]**<br>**CO3:** Describe the various sub-systems used in Earth stations and the different orbits. **[K2]**<br>**CO4:** Illustrate the various multiple access techniques. **[K2]**<br>**CO5:** Explain the Special purpose communication satellites and Global Positioning System. **[K2]** |
| **Semester** | **V20ECTJOC05**<br><br>**Wireless Sensors And Networks (Job Oriented** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Explain the concepts of Wireless Sensor Networks, it's Architecture. **[K2]**<br>**CO2:** Describe the Networking Technologies. **[K2]**<br>**CO3:** Explain the MAC Protocols. **[K2]**<br>**CO4:** Illustrate the Routing and Transport Layer Protocols. **[K2]**<br>**CO5:** Explain the Security Layer Protocols and Applications of WSN. **[K2]** |

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| **Semester** | **V20ECTJOC06**<br><br>**Digital Signal Processors and Applications**<br>**(Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1:** Describe the concepts of digital signal processing. **(K2)**<br>**CO-2:** Explain architectures used in programmable DSP's.**(K2)**<br>**CO-3:** Illustrate addressing modes and memory organization of TMS32OC54xx processor**. (K3)**<br>**CO-4:** Describe the Instruction set, peripheral devices and programming techniques**. (K2)**<br>**CO-5:** Illustrate the applications of DSP processor (**K3)** |
| **Semester** | **V20ECTJOC07**<br><br>**Modern Wireless Communication Systems**<br>**(Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Describe how to measure the performance of wireless system, in multipath<br>Environment **[K2]**<br>**CO2:** Summarize about Wireless Channel. **[K2]**<br>**CO3:** Explain Principle and properties of CDMA. **[K2]**<br>**CO4:** Discuss the working and advantages of MIMO wireless communication systems **[K2]**<br>**CO5:** Explain the principle and advantages of OFDM system and various modern wireless communication technologies **[K2]** |
| **Semester** | **V20ECTJOC08**<br><br>**CMOS Analog IC Design**<br>**(Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1:** Describe the concept of MOS device and modeling of MOS drain current for large and small signal analysis **(K2)**<br>**CO-2:** Design and analyze Analog CMOS Sub-Circuits **(K4)**<br>**CO-3:** Describe the large signal and small signal analysis of Inverters & differential amplifier **(K2)**<br>**CO-4:** Describe the large signal and small signal analysis of cascade amplifier & Current Amplifiers **(K2)**<br>**CO-5:** Illustrate the CMOS output Amplifiers **(K3)** |
| **Semester** | **V20ECTJOC09**<br><br>**Bio Medical Instrumentation**<br>**(Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Explain the basics concepts of Bio-Medical Instrumentation **(K2)**<br>**CO2:** Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications **(K2)**<br>**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)**<br>**CO4:** Discuss the processing methods in elements used for Patient's Health care & monitoring.<br>**CO5:** Classify different types of monitors, discuss the principals of recorders and Illustrate the methods of accident preventions i.e. Shock Hazards from different Electrical Equipment. **(K2)** |
| **Semester** | **V20ECTJOC10**<br><br>**SPEECH SIGNAL PROCESSING**<br>**(Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO 1:** Outline the basic characteristics of speech signal in relation to speech production and model the speech production system.(**K2)**<br>**CO 2:** List different speech parameters. **(K2)**<br>**CO 3:** Apply various algorithms for speech enhancement and speech coding. **(K3)**<br>**CO 4:** Design a simple system for speech recognition. **(K3)**<br>**CO 5:** Make use of different Speaker Recognition Techniques. **(K3)** |
| **Semester** | **V20ECTJOC11**<br><br>**Electronic Instrumentation**<br>**(Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1.** Select the instrument to be used based on the requirements**.[K2]**<br>**CO2.** Understand the design of oscilloscopes for different applications**.[K2]**<br>**CO3.** Explain different signal generators and analyzers**.[K2]**<br>**CO4.** Understand the design of different types of Bridge circuits for different Applications.**[K2]**<br>**CO5.**Explain and Design different types of transducers for different Applications and for measurement of Physical Parameters.**[K2]** |

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| **Semester** | **V20ECTJOC12**<br><br>**Sensors & Applications**<br>**(Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Describe the sensors and theory behind **[K2]**<br>**CO2:** Explain the Sensors used in mechanical systems. **[K2]**<br>**CO3:** Explain the Thermal and electrical Sensors **[K2]**<br>**CO4:** Explain the Magnetic, Acoustic and High frequency sensors **[K2]**<br>**CO5:** Illustrate and build IoT or IIoT systems for different Use cases **[K3]** |
| **Semester** | **V20ECTJOC13**<br><br>**Deep Learning**<br>**(Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Describe the basics of learning algorithms. **(K2)**<br>**CO2:** Explain neural network and various parameters while training neural network. **(K2)**<br>**CO3:** Describe convolution neural network and its training. **(K2)**<br>**CO4:** Discuss various advanced neural network architectures. **(K2)**<br>**CO5:** Discuss various Deep Learning applications. **(K2)** |
| **Semester** | **V20ECTJOC14**<br><br>**Machine Learning**<br>**(Job Oriented Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Explain the principles and concepts of machine learning **(K2)**<br>**CO2:** Describe the different machine learning approaches and techniques **(K2)**<br>**CO3:** Explain the clustering techniques used in Data representation**. (K2)**<br>**CO4:** Explain the neural network concepts **(K2)**<br>**CO5:** Describe the regression and reinforcement learning and solve ML problems using Machine learning tools **(K2)** |
| **Semester** | **V20ECTOE01**<br><br>**Internet of Things**<br>**(Open Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1:** Describe M2M and IOT Technologies. **(K2)**<br>**CO-2:** Identify the layers and protocols in IOT. **(K2)**<br>**CO-3:** Describe various communication technologies used in IOT**. (K2)**<br>**CO-4:** Demonstrate various hardware components required for IOT applications. **(K2)**<br>**CO-5:** Identify the cloud technologies & explain the applications of IoT**.** **(K2**) |
| **Semester** | **V20ECTOE02**<br><br>**Communication Systems**<br>**(Open Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1:** Demonstrate the fundamentals of communication systems **(K2)**<br>**CO-2:** Compare the various analog modulation and demodulation schemes **(K2)**<br>**CO-3:** Compare the various digital modulation and demodulation schemes **(K2)**<br>**CO-4:** Explain the wireless communication system concepts **(K2)**<br>cal communication system principles **(K2)** |
| **Semester** | **V20ECTOE03**<br><br>**Principles of Image Processing**<br>**(Open Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1.** Understand the different Transforms Techniques & their use in Image Processing Applications. **(K2)**<br>**CO2.** Describe Spatial and frequency domain filtering like smoothing and sharpening operations on Images. **(K2)**<br>**CO3.** Describe Restoration operations/techniques on Images. **(K2)**<br>**CO4.** Describe the Image compression Techniques and Image segmentation. **(K2)**<br>**CO5.** Explain the different color Image Processing Techniques. **(K2)** |
| **Semester** | **V20ECTOE04**<br><br>**Medical Electronics**<br>**(Open Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Explain the basics concepts of Bio-Medical Instrumentation. **(K2)**<br>**CO2:** Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications. **(K2)**<br>**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)**<br>**CO4:** Discuss the elements used for Patient's Health care &monitoring. **(K2)**<br>**CO5:** Classify different types of monitors, discuss the principals of recorders and Illustrate the methods of accident preventions **(K2)** |
| **Semester** | **V20ECTOE05**<br><br>**Principles of Wireless Communication**<br>**(Open Elective)** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Discuss the cellular system evolution of mobile radio systems **[K2]**<br>**CO2:** Illustrate the basic cellular concepts. **[K2]**<br>**CO3:** Explain the Various Propagation models. **[K2]**<br>**CO4:** Discuss the need of modulation, diversity and equalization in cellular & Mobile Communication. **[K2]**<br>**CO5:** Demonstrate the knowledge about GSM architecture, &upcoming technologies like 3G, 4G etc. **[K2]** |

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| **Semester** | **V20ECTOE07**<br><br>**Concepts of Embedded Systems** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1:** Describe the Basic Concepts of embedded systems- **(K2).**<br>**CO-2:** Describe the characteristics of Application & Domain-Specific Embedded Systems -**(K2)**<br>**CO-3:** Explain the various elements of embedded hardware and their design principles-**(K2)**<br>**CO-4:** Explain various software design approaches in embedded environment-**(K2)**<br>**CO-5:** Discuss various tools used for Embedded system implementation and testing - **(K2)** |
| **Semester** | **V20HONECT02**<br><br>**Hardware Modeling using Verilog** | **After Successful completion of the Course, the student will be able to:**<br>**CO1**: Describe VLSI design flow and standard cell based design. **[K2]**<br>**CO2**: Discuss various concepts of verilog, Simulation and Synthesis. **[K2]**<br>**CO3**: Develop digital systems using various modelling styles. **[K3]**<br>**CO4**: Synthesize Combinational and Sequential circuits. **[K6]**<br>**CO5**: Construct Memories and Processors using Verilog. **[K3]** |
| **V Sem.** | **V20MINECT01**<br><br>**Introduction to Semiconductor Devices** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Explain the basic concepts of Semiconductor Physics. **(K2)**<br>**CO2:** Discuss the basic concepts of PN Junction Diode. **(K2)**<br>**CO3:** Interpret the Input & Output characteristics of BJT in different Configurations**. (K2)**<br>**CO4:** Explain the construction, principle of operation of J-FET Drain & Transfer characteristics**. (K2)**<br>**CO5:** Discuss the construction, principle of operation of Enhancement & Depletion MOSFET characteristics**. (K2)** |
| **Minors** | **V20MINECT02**<br><br>**Principles of Digital Circuits** | **After Successful completion of the Course, the student will be able to:**<br>**CO1:** Discuss Boolean functions and various Combinational Circuits **[K2]**<br>**CO2:**Analyze various Sequential Circuits **[K3]**<br>**CO3:** Implement designs using Programmable Logic Devices**[K3]**<br>**CO4:** Discuss various Logic Families.**[K2]**<br>**CO5:**Discuss Semiconductor memories **[K2]** |
| **V Sem.** | **V20HONECT01**<br><br>**Synthesis of Digital systems** | **After Successful completion of the Course, the student will be able to:**<br>**CO-1:** Discuss about digital systems modeling with VHDL. **(K2)**<br>**CO-2:** Describe High level synthesis and its processes **(K2)**<br>**CO-3:** Illustrate various Scheduling methods **(K3)**<br>**CO-4:** Analyze timing issues in High level synthesis and FSM encoding methods. **(K4)**<br>**CO-5:** Illustrate Retiming, optimization methods and timing. **(K3)** |