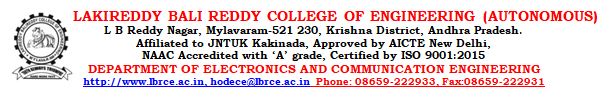
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**R17-Course Articulation Matrix (Revised)**

**(B.Tech – R17- Regulation – 2017 Batch on wards)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  | **CO Statements** | **POs** | | | | | | | | | | | | | | | | | | | | | | | **PSOs** | | | | | |
| **I - Semester** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **17FE01** | **Professional Communication - I** | **PO1** | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | | **PSO3** | |
| CO1 | Use English vocabulary & grammar effectively while speaking and writing. | - | - | | - | | 2 | | - | | - | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | | - | |
| CO2 | Comprehend the given texts and Communicate confidently in formal and informal contexts. | - | 1 | | - | | 2 | | - | | 1 | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | | - | |
| CO3 | Draft E-mails& Memos | - |  | | - | | 2 | | - | |  | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | | - | |
| CO4 | Understand the written and spoken information thoroughly. | - | 1 | | - | | 2 | | - | | 1 | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | | - | |
| CO5 | Face interviews with confidence. | - |  | | - | | 2 | | - | |  | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | | - | |
| **17FE04** | **Differential Equations & Linear Algebra** | **PO1** | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | | **PSO3** | |
| CO1 | Apply first order and first degree differential equations to find Orthogonal trajectories and to calculate current flow in a simple LCR circuit. | 3 | 2 | | - | | 1 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | | - | |
| CO2 | Discriminate among the structure and procedure of solving a higher order differential equations with constant coefficients and variable coefficients. | 3 | 2 | | - | | 1 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | | - | |
| CO3 | Developing continuous functions as an infinite series and compute the Jacobian to determine the functional dependence. | 3 | 2 | | - | | 1 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | | - | |
| CO4 | Distinguish among the pros and cons between the Row operation methods and Iterative methods in solving system of linear equations. | 3 | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | | - | |
| CO5 | Compute the Eigen values and Eigen vectors and powers, Inverse of a square matrix through Cayley – Hamilton theorem. | 3 | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | | - | |
| **17FE15** | **Engineering Chemistry** | **PO1** | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | | **PSO3** | |
| CO1 | Analyze different types of electrodes and batteries for technological applications | 3 | 3 | | 3 | | - | | - | |  | | 2 | | - | | - | | - | | - | | 2 | | - | | - | | - | |
| CO2 | Apply the principles of corrosion in order to maintain various equipments more effectively | 3 | 2 | | 3 | | - | | - | | 2 | | 1 | | - | | - | | - | | - | | 2 | | - | | - | | - | |
| CO3 | Identify the importance of engineering materials like nano materials, plastics and rubbers. | 2 | 2 | | - | | - | | - | | 2 | | 1 | | - | | - | | - | | - | | 2 | | - | | - | | - | |
| CO4 | Analyze various photo chemical processes & applications of liquid crystals | 3 | 3 | | - | | - | | - | |  | | 1 | | - | | - | | - | | - | | 2 | | - | | - | | - | |
| CO5 | Identify the important of analytical and spectroscopic techniques in chemical analyses | 2 | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | | - | |
| **17EC01** | **Electrical Circuits & Networks** | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | | **PSO3** | |
| CO1 | Understand Active & Passive elements, independent & dependent sources, Kirchhoff’s laws, Delta to Star & Star to Delta transformation, AC fundamentals, Self and Mutual inductances, Dot conventions and two port parameters. | 1 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | 1 | | - | |
| CO2 | Apply Mesh & Nodal analysis and Network theorems for solving the parameters of Electrical circuits | 2 | | 3 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | 3 | | - | |
| CO3 | Analyze Steady state & Transient response of RL, RC, & RLC circuits with DC & AC excitation | 2 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 2 | | - | |
| CO4 | Evaluate Bandwidth, Quality factor & Selectivity of Series & Parallel resonant circuits and Two port network parameters of Series, Parallel & Cascade connections | 2 | | 3 | | 2 | | 1 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 3 | | - | |
| **17EC02** | **Electronic Devices & Circuits** | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | | **PSO3** | |
| CO1 | Summarize the transport phenomena of charge carriers in a semiconductors | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | 1 | | - | |
| CO2 | Understand the operation of Diode, Bipolar Junction Transistors and Field Effect Transistors | 1 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | 1 | | - | |
| CO3 | Analyze the operation and characteristics of Bipolar Junction Transistors and Field Effect Transistors. | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 2 | | - | |
| CO4 | Create Rectifier, filter, Regulator and Amplifier circuits to meet the needs of real time electronic circuit applications | 2 | | 3 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 3 | | - | |
| **17EF65** | **Engineering Chemistry Lab** | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | | **PSO3** | |
| CO1 | Assess alkalinity of water based on the procedure given | 3 | | 3 | | - | | 2 | | - | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | |
| CO2 | Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus. | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | |
| CO3 | Acquire practical knowledge related to preparation of polymers. | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | |
| CO4 | Exhibit skills in performing experiments based on theoretical fundamentals. | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | |
| **17ME75** | **Computer Aided Engineering Drawing Lab** | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | | **PSO3** | |
| CO1 | Apply basic CAD commands to develop 2D & 3Ddrawings using Auto CAD | - | | - | | - | | - | | 3 | | 3 | | - | | - | | - | | - | | - | | 2 | | - | | - | | - | |
| CO2 | Perform basic sketching techniques where the speed & accuracy can be achieved | 3 | | - | | - | | - | | 3 | | 2 | | - | | - | | - | | - | | - | | 2 | | - | | - | | - | |
| CO3 | Create orthographic views of an object from the solid model | 3 | | - | | - | | - | | 3 | | - | | - | | - | | - | | - | | - | | 2 | | - | | - | | - | |
| CO4 | Sketch the auxiliary views and sectional views | 3 | | - | | - | | - | | 3 | | - | | - | | - | | - | | - | | - | | 2 | | - | | - | | - | |
| **17EC60** | **Electrical Circuits and Networks Lab** | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | | **PSO3** | |
| CO1 | Apply Kirchhoff's laws and Network theorems to solve the parameters of Electrical circuits. | 3 | | 3 | | 1 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | |
| CO2 | Analyze Kirchhoff's laws, Voltage &Current division principles for electrical circuits. | 2 | | 3 | | 2 | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | |
| CO3 | Evaluate the BW of Series & Parallel resonant circuits, Transient behavior of AC circuits and Two port network parameters of Series, parallel and Cascade connections. | 3 | | 2 | | 3 | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | | - | |
| CO4 | Adapt effective Communication, presentation and report writing skills | - | | - | | - | | - | | - | | - | | - | | 1 | | 2 | | 3 | | - | | 1 | | - | | - | | - | |
| **17EC61** | **Electronic Devices & Circuits Lab** | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | | **PSO3** | |
| CO1 | Demonstrate the characteristics of Diodes, BJT, FET and UJT | 1 | | - | | - | | 2 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | |
| CO2 | Analyze the electrical behaviour and circuit operation of Diodes | 1 | | 2 | | - | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | |
| CO3 | Create Rectifier circuits using Diode. | 2 | | 2 | | 3 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | | - | |
| **CO4** | Adapt effective Communication, presentation and report writing skills | - | | - | | - | | - | | - | | - | | - | | 1 | | 2 | | 3 | | - | | 1 | | - | | - | | - | |

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| **II - Semester** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **17FE02** | **Professional Communication-II** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | **PSO3** | |
| CO1 | Use appropriate vocabulary to interpret data thoroughly and to write reports effectively. | | - | | 1 | | - | | 1 | | - | | 1 | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | - | |
| CO2 | Face any situation with confidence and voice opinions/decisions assertively. | | - | | 1 | | - | | 1 | | - | | 1 | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | - | |
| CO3 | Use English Language effectively in spoken and written forms. | | - | | 1 | | - | | 1 | | - | | 1 | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | - | |
| CO4 | Work effectively in teams for better result. | | - | | 1 | | - | | 1 | | - | | 1 | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | - | |
| CO5 | Communicate effectively using verbal and non-verbal dimensions aptly. | | - | | 1 | | - | | 1 | | - | | 1 | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | - | |
| **17FE06** | **Transformation Techniques and Vector Calculus** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | **PSO3** | |
| CO1 | Apply the concepts of Laplace Transforms to solve ordinary differential equations. | | 3 | | 2 | | - | | 1 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | - | |
| CO2 | Apply Z - Transforms to solve difference equations | | 3 | | 2 | | - | | 1 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | - | |
| CO3 | Discriminate among Cartesian, Polar and Spherical coordinates in multiple integrals and their respective applications to areas and volumes. | | 3 | | 2 | | - | | 1 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | - | |
| CO4 | Evaluate the directional derivative, divergence and angular velocity of a vector function | | 3 | | 2 | | - | | 1 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | - | |
| CO5 | Apply Vector Integration for curves, surfaces and volumes and relationship among themselves | | 3 | | 2 | | - | | 1 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | - | - | |
| **17FE12** | **Applied Physics** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | **PSO3** | |
| CO1 | Define the nature of Interference and Diffraction. | | 3 | | 3 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | - | - | |
| CO2 | Describe the polarization and LASER, types of lasers and their applications. | | 3 | | 3 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | - | - | |
| CO3 | Estimate the electrical conductivity in metals. | | 3 | | 3 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | - | - | |
| CO4 | Design the circuits of semiconductor diodes, LED, Photodiode, Solar cell. | | 3 | | 3 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | - | - | |
| CO5 | Classify the different types of polarizations in dielectric materials. | | 3 | | 3 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | - | - | |
| **17EC03** | **Analog Electronic Circuits** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | **PSO3** | |
| CO1 | Outline the effect of capacitances on frequency response | | 1 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | 1 | - | |
| CO2 | Analyze single stage & multistage amplifiers, Tuned amplifiers and Power amplifiers | | 1 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | 2 | - | |
| CO3 | Apply negative feedback amplifiers in real time applications | | 3 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 2 | - | |
| CO4 | Design Sinusoidal oscillators using BJT and FET | | 2 | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 3 | - | |
| **17EC04** | **Digital Electronic Circuits** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | **PSO2** | **PSO3** | |
| CO1 | Understand the importance of number systems, Boolean algebraic minimization for the realization of Digital electronic circuits. | | 2 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | 1 | - | |
| CO2 | Analyze the Minimization and realization methods for Combinational & Sequential logic circuits | | 2 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 2 | - | |
| CO3 | Apply minimization techniques for the realization of Combinational, Sequential, Finite state machines and Algorithmic State Machines | | 3 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 3 | - | |
| CO4 | Create Digital Electronic circuits at Gate level, Combinational level and Sequential levels. | | 2 | | 3 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | | - | | 3 | - | |
| **17FE62** | **Applied Physics Lab** | | PO1 | | PO2 | | PO3 | | PO4 | | PO5 | | PO6 | | PO7 | | PO8 | | PO9 | | PO10 | | PO11 | | PO12 | | PSO1 | | PSO2 | PSO3 | |
| CO1 | Analyze the wave characteristics of light. | | 3 | | 3 | | 3 | | 2 | | - | | - | | - | | - | | 3 | | - | | - | | 3 | | - | | - | - | |
| CO2 | Estimate the wave length and width of the slit with laser light source. | | 3 | | 3 | | 3 | | 2 | | - | | - | | - | | - | | 3 | | - | | - | | 3 | | - | | - | - | |
| CO3 | Analyze the characteristics of semi conductor Diodes. | | 3 | | 3 | | 2 | | 2 | | - | | - | | - | | - | | 3 | | - | | - | | 3 | | - | | - | - | |
| CO4 | Determine the energy band gap and the Dielectric constant of a material. | | 3 | | 3 | | 2 | | 2 | | - | | - | | - | | - | | 3 | | - | | - | | 3 | | - | | - | - | |
| **17EC62** | **Analog and Digital Electronic Circuits Lab** | | PO1 | | PO2 | | PO3 | | PO4 | | PO5 | | PO6 | | PO7 | | PO8 | | PO9 | | PO10 | | PO11 | | PO12 | | PSO1 | | PSO2 | PSO3 | |
| CO1 | Analyze Analog amplifiers, Oscillators, Flip-flops, Shift registers and Counters . | | 2 | | 2 | | - | | 1 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | 2 | - | |
| CO2 | Apply knowledge on discrete components in the implementation of Amplifiers, Logic Gates and Combinational logic circuits. | | 2 | | 2 | | 3 | | 2 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | - | |
| CO3 | Design of Analog amplifiers, Oscillators, Flip-flops, Shift registers and Counters . | | 1 | | 2 | | 3 | | 2 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | - | |
| CO4 | Adapt effective Communication, presentation and report writing skills | | - | | - | | - | | - | | - | | - | | - | | 1 | | 2 | | 3 | | - | | 1 | | - | | - | - | |
| **17FE60** | **English Communications Skills Lab** | | PO1 | | PO2 | | PO3 | | PO4 | | PO5 | | PO6 | | PO7 | | PO8 | | PO9 | | PO10 | | PO11 | | PO12 | | PSO1 | | PSO2 | PSO3 | |
| CO1 | Articulate English with good pronunciation. | | - | | - | | - | | 3 | | - | | - | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | - | |
| CO2 | Manage skilfully through group discussions. | | - | | - | | - | | 3 | | - | | - | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | - | |
| CO3 | Communicate with the people effectively. | | - | | - | | - | | 3 | | - | | - | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | - | |
| CO4 | Collect and interpret data aptly. | | - | | - | | - | | 3 | | - | | - | | - | | - | | 3 | | 3 | | - | | 2 | | - | | - | - | |
| **17ME60** | **Engineering Workshop** | | PO1 | | PO2 | | PO3 | | PO4 | | PO5 | | PO6 | | PO7 | | PO8 | | PO9 | | PO10 | | PO11 | | PO12 | | PSO1 | | PSO2 | PSO3 | |
| CO1 | Design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint. | | 3 | | - | | 2 | | 3 | | 3 | | 3 | | - | | - | | 3 | | - | | - | | 2 | | - | | - | - | |
| CO2 | Fabricate and model various basic prototypes in the trade of fitting such as Straight fit, V- fit. | | 3 | | - | | 2 | | 3 | | 3 | | 3 | | - | | - | | 3 | | - | | - | | 2 | | - | | - | - | |
| CO3 | Produce various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder. | | 3 | | - | | 2 | | 3 | | 3 | | 3 | | - | | - | | 3 | | - | | - | | 2 | | - | | - | - | |
| CO4 | Perform various basic House Wiring techniques. | | 3 | | - | | 2 | | 3 | | 3 | | 3 | | - | | - | | 3 | | - | | - | | 2 | | - | | - | - | |
| **III - Semester** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **17FE07** | | **Numerical Methods and Fourier Analysis** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Compare the rate of accuracy between various methods in approximating the root of and equation and Distinguish among the criteria of selection and procedures of various Numerical Integration Rules. | | 3 | | 2 | | - | | 2 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | | - | | - |
| CO2 | | Estimate the best fit polynomial for the given tabulated data using the methods of Newton’s Interpolation formulae and Lagranze’s Interpolation. | | 3 | | 2 | | - | | 2 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | | - | | - |
| CO3 | | Apply various Numerical methods in solving and initial value problem involving and ordinary differential equation. | | 3 | | 2 | | - | | 2 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | | - | | - |
| CO4 | | Estimate the unknown dependent variables using curve fitting methods.. | | 3 | | 2 | | - | | 2 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | | - | | - |
| CO5 | | Generate the single valued functions in the form of Fourier series and obtain the Fourier Transforms | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | | - | | - |
| **17CI01** | | **Computer Programming** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Identify basic elements of C programming structures like data types, expressions, control statements, various simple functions and in view of using them in problem solving. | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | | | - | | 1 |
| CO2 | | Apply various operations on derived data types like arrays and strings in problem solving. | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | | | - | | 1 |
| CO3 | | Design and Implement Modular Programming and memory management using pointers. | | 2 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | | | - | | 1 |
| CO4 | | Implement user defined data structures used in specific applications. | | 2 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | | | - | | 1 |
| CO5 | | Compare different file I/O operations on text and binary files. | | 2 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 3 | | | 1 | |  |
| **17EC08** | | **Analog Integrated Circuits** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Summarize the fundamental concepts of Differential amplifiers and Transistor current sources. | | 1 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | | 1 | | - |
| CO2 | | Interpret the Applications of Op-Amp. | | 2 | | 2 | | - | | - | |  | | - | | - | | - | | - | | - | | - | | 1 | | - | | | 1 | | - |
| CO3 | | Design Active filters and waveform generators. | | 2 | | 2 | | 3 | | 2 | |  | | - | | - | | - | | - | | - | | - | | 2 | | - | | | 2 | | - |
| CO4 | | Apply the 555 Timer circuits and Phased Locked Loop for real time applications. | | 3 | | 2 | | 2 | | 2 | |  | | - | | - | | - | | - | | - | | - | | 2 | | - | | | 2 | | - |
| CO5 | | Evaluate the performance of ADC and DAC. | | 2 | | 2 | | 3 | | 2 | |  | | - | | - | | - | | - | | - | | - | | 2 | | - | | | 3 | | - |
| **17EC07** | | **Pulse and Switching Circuits** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Summarize and Apply the multivibrator circuits for analog and digital circuits. | | 1 | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | 1 | | 1 | | | 3 | | - |
| CO2 | | Develop clippers and clampers using active and passive elements. | | 2 | | 2 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | | 3 | | - |
| CO3 | | Examine the switching characteristics of nonlinear elements in digital circuits. | | 2 | | 2 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | | 3 | | - |
| CO4 | | Analyze the time base generator circuits, sampling gates and output characteristics of linear circuits for different test signals. | | 2 | | 2 | | 1 | | 1 | | - | | - | | - | | - | | - | | - | | - | | 1 | | - | | | 2 | | - |
| **17EC05** | | **Signals and Systems** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Understand the characteristics, graphical representation, operations, approximation and sampling of signals. | | 3 | | 2 | | 1 | | 1 | | 1 | | - | | - | | - | | - | | - | | - | | 2 | | 2 | | | - | | 3 |
| CO2 | | Applythe mathematical tools on signals and systems to solve real time problems. | | 3 | | 3 | | 3 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | 2 | | 3 | | | - | | 3 |
| CO3 | | Analyze the systems for linearity, time invariance, causality and stability. | | 3 | | 3 | | 2 | | 2 | | 1 | | - | | - | | - | | - | | - | | - | | 2 | | 3 | | | - | | 3 |
| CO4 | | Evaluate the Fourier and Laplace Transforms of continuous time domain signals and systems. | | 3 | | 3 | | 3 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | 2 | | 3 | | | - | | 3 |
| **17EC06** | | **Random Variables and Stochastic Processes** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Understand the concepts of random variables, random processes and noise. | | 1 | | 1 | | 1 | |  | | - | | - | | - | | - | | - | | - | | - | | 1 | | 1 | | | - | |  |
| CO2 | | Analyze the statistical behavior of random variables and random processes using distribution and density functions. | | 2 | | 3 | | 1 | |  | | - | | - | | - | | - | | - | | - | | - | | 2 | | 2 | | | - | |  |
| CO3 | | Evaluate the moments, correlation functions of random variables and random processes and power spectral density functions of random processes | | 2 | | 2 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | 2 | | 2 | | | - | |  |
| CO4 | | Apply the knowledge of random variables and stochastic processes for solving real time problems. | | 3 | | 3 | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | 2 | | 2 | | | - | |  |
| **17CI60** | | **Computer Programming Lab** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Apply and practice logical formulations to solve some simple problems leading to specific applications. | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 2 | | 1 | | | - | | - |
| CO2 | | Demonstrate C programming development environment, compiling, debugging, linking and executing a program using the development environment | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 2 | | 1 | | | - | | - |
| CO3 | | Design effectively the required programming components that efficiently solve computing problems in real world | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | 2 | | - | | 2 | | 1 | | | - | | - |
| CO4 | | Improve individual / team work skills, communication & report writing skills with ethical values. | | - | | - | | - | | - | | - | | - | | - | | 2 | | 2 | | 2 | | - | | - | | - | | | - | | - |
| **17EC64** | | **Analog Integrated Circuits Lab** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Analyze the linear and non-linear applications of op-amps. | | 2 | | 3 | | - | | 1 | | 1 | | - | | - | | - | | - | | - | | - | | - | | - | | | 2 | | - |
| CO2 | | Design arithmetic circuits, Active filters and waveform generators using op-amp and 555 timers. | | 3 | | 3 | | 3 | | 3 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | | 3 | | - |
| CO3 | | Apply knowledge of phase locked loops and Voltage Regulators in realization of Analog Electronic Circuits. | | 3 | | 2 | | 2 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | | 2 | | - |
| CO4 | | Adapt effective communication, presentation and report writing skills. | | - | | - | | - | | - | | - | | - | | - | | 1 | | 2 | | 3 | | - | | 1 | | - | | | - | | - |
| **17EC63** | | **Pulse and Switching Circuits Lab** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Analyze the response of linear and non linear wave shaping circuits. | | 2 | | 3 | | 1 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | | 2 | | - |
| CO2 | | Examine the switching behavior of a transistor. | | 1 | | 2 | | 2 | | 2 | | 2 | | - | | - | | - | | - | | - | | - | | - | | - | | | 2 | | - |
| CO3 | | Develop non-sinusoidal waveform generators. | | 2 | | 2 | | 3 | | 2 | | 3 | | - | | - | | - | | - | | - | | - | | - | | - | | | 3 | | - |
| CO4 | | Adapt effective communication, presentation and report writing skills. | | - | | - | | - | | - | | - | | - | | - | | 1 | | 2 | | 3 | | - | | 1 | | - | | | - | | - |
| **17PD03** | | **Professional Ethics and Human Values** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| CO1 | | Learns about dilemmas and moral issues and be able to apply these concepts to solve various professional problems | | - | | - | | - | | - | | - | | - | | - | | 3 | | - | | - | | - | | - | | - | | | - | | - |
| CO2 | | Acquires and understanding of the basic concepts of Professional ethics and human values &also gain the practical implication of ethical theories. | | - | | - | | 1 | | - | | - | | - | | - | | 3 | | - | | - | | - | | - | | 0 | | | - | | - |
| CO3 | | Knows the duties and responsibilities towards the society being in engineering profession. | | - | | 1 | | 2 | | - | | - | | - | | - | | 3 | | 2 | | - | | - | | - | | - | | | - | | - |
| CO4 | | Students gain the practical implication of evacuation from risk and maintaining confidentiality. | | - | | - | | - | | 1 | | - | | 2 | |  | | 3 | | 1 | | - | | - | | - | | - | | | - | | - |
| CO5 | | Meets the global challenges and develop the skills to sustaining in competitive environment. | | - | | - | | - | | - | | - | | 1 | | 2 | | 3 | | - | | - | | - | | 1 | | - | | | - | | - |
| **17PD01** | | **Problem Assisted Learning** | | **PO1** | | **PO2** | | **PO3** | | **PO4** | | **PO5** | | **PO6** | | **PO7** | | **PO8** | | **PO9** | | **PO10** | | **PO11** | | **PO12** | | **PSO1** | | | **PSO2** | | **PSO3** |
| **CO1** | | Understand the Modern tools in the area of -Electronics & Communication Engineering | | **-** | | **-** | | **-** | | **-** | | **2** | | **1** | | **-** | | **-** | | **2** | | **-** | | **1** | | **2** | | **-** | | | **-** | | **-** |
| **CO2** | | Develop a solution to the basic problems in the area of Electronics & Communication Engineering | | **2** | | **2** | | **2** | | **2** | | **-** | | **-** | | **-** | | **-** | | **2** | | **-** | | **-** | | **2** | | **-** | | | **-** | | **-** |
| **CO3** | | Adapt Communication & Presentation skills | | **-** | | **-** | | **-** | | **-** | | **-** | | **-** | | **-** | | **-** | | **2** | | **3** | | **-** | | **2** | | **-** | | | **-** | | **-** |
| **CO4** | | Improve report writing skills | | **-** | | **-** | | **-** | | **-** | | **-** | | **-** | | **-** | | **2** | | **2** | | **3** | | **-** | | **2** | | **-** | | | **-** | | **-** |
| **CO5** | | Develop the Individual / team work skills with professional and ethical values. | | **-** | | **-** | | **-** | | **-** | | **-** | | **-** | | **-** | | **3** | | **3** | | **-** | | **-** | | **3** | | **-** | | | **-** | | **-** |

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| **IV- Semester** | | | | | | | | | | | | | | | | |
| **17FE03** | **Environmental Science** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions. | **3** | **3** | **-** | **-** | **-** | **3** | **3** | **3** | **-** | **-** | **-** | **3** | - | - | - |
| CO2 | Evaluate local, regional and global environmental issues related to resources and their sustainable management. | **3** | **3** | **-** | **-** | **-** | **3** | **3** | **-** | **-** | **-** | **-** | **3** | - | - | - |
| CO3 | Realize the importance of ecosystem and biodiversity for maintaining ecological balance. | **3** | **-** | **3** | **-** | **-** | **-** | **2** | **-** | **-** | **-** | **-** | **2** | - | - | - |
| CO4 | Acknowledge and prevent the problems related to pollution of air, water and soil. | **3** | **-** | **-** | **-** | **-** | **2** | **3** | **2** | **-** | **-** | **-** | **3** | - | - | - |
| CO5 | Identify the significance of implementing environmental laws and abatement devices for environmental management. | **3** | **3** | **3** | **3** | **-** | **3** | **3** | **3** | **-** | **-** | **-** | **3** | - | - | - |
| **17FE09** | **Functions of Complex Variables** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Construct an analytic function by Milne Thomson’s method when the real or imaginary part is given | 3 | 2 | 1 |  | - | - | - | - | - | - | - | 1 | - | - | - |
| CO2 | Separate complex elementary functions into real and imaginary parts. | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| CO3 | Apply Cauchy’s Integral theorem to integrals. | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| CO4 | Convert the analytic functions into Power series by Taylor series and Laurent series. | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| CO5 | Apply Residue theorem for Real Definite Integrals and understand the Fundamental theorem of Algebra. | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| **17EC09** | **Electromagnetic Fields and Waves** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Identify the basic concepts of Electromagnetic fields in static and time varying conditions. | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Apply Maxwell's equations in solving electromagnetic fields. | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO3 | Analyze the concepts of EM wave propagation in lossy, lossless dielectric, free space and conductors. | 2 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | - | - |
| CO4 | Evaluate the performance metrics of EM waves in free space, conductor and dielectric media | 2 | 3 | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 | - | - |
| **17EC12** | **Analog Communications** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the basic concepts of analog communication | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Evaluate the performance of radio transmitters and receivers | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 3 | - | - |
| CO3 | Apply the Sampling techniques in pulse modulation techniques. | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO4 | Analyze the impact of noise in various analog communication systems | 2 | 3 | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| **17EC11** | **Digital System Design** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the concepts of CMOS logic, digital circuits and HDLs | 1 | 1 | 2 | 1 |  | - | - | - | - | - | - | 1 | - | 1 | - |
| CO2 | Apply HDLs concepts for implementation of digital circuits. | 3 | 2 | 2 | 2 |  | - | - | - | - | - | - | 2 | - | 3 | - |
| CO3 | Analyze the modeling of digital circuits using HDLs. | 1 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | - | 3 | - |
| CO4 | Design the combinational and sequential logic circuits using HDLs | 1 | 2 | 3 | 2 | 2 | - | - | - | - | - | - | 2 | - | 3 | - |
| **17EC10** | **Digital Signal Processing** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the operations, properties of discrete time signals and filter characteristics of discrete time systems. | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | 1 |
| CO2 | Analyze the discrete time signals and systems using transformation techniques. | 2 | 3 | - | - | - | - | - | - | - | - | - | 2 | - | - | 2 |
| CO3 | Apply the Z-Transform techniques to solve discrete time signals and to realize discrete time systems. | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - | 2 |
| CO4 | Evaluate linear convolution, circular convolution, DFT and FFT of discrete time signals. | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 | - | - | 3 |
| CO5 | Design IIR digital filters using approximation procedures and FIR digital filter using windowing techniques. | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | - | - | 3 |
| **17EC67** | **Analog Communications Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Analyze the practical aspects of analog modulation schemes. | 1 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | - |
| CO2 | Evaluate the parameters that improve receiver performance. | - | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | - | - |
| CO3 | Apply the programming aspects of MATLAB in simulating various analog modulation techniques. | 3 | 2 | - | 3 | 3 | - | - | - | - | - | - | - | 2 | - | - |
| CO4 | Adapt effective communication, presentation and report writing skills. | - | - | - | - | - | - | - | 1 | 2 | 3 | - | 1 | - | - | - |
| **17EC66** | **Digital System Design Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Demonstrate the functionality of logic gates using HDL simulators. | 1 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | - |
| CO2 | Analyze the behaviour of combinational and sequential circuits using HDL simulators. | 2 | 2 | 3 | 2 | 3 | - | - | - | - | - | - | - | - | 3 | - |
| CO3 | Evaluate the functionality of memories using HDL simulators. | 2 | 2 | 2 | 2 | 3 | - | - | - | - | - | - | - | - | 3 | - |
| CO4 | Adapt effective communication, presentation and report writing skills. | - | - | - | - | - | - | - | 1 | 2 | 3 | - | 1 | - | - | - |
| **17EC65** | **Digital Signal Processing Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Apply the concepts of MATLAB to generate signals and perform operations on them | **3** | **2** | **-** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | - | - | **-** | **3** |
| CO2 | Analyze signals and systems in time and frequency domains using MATLAB and Code Composer Studio | **3** | **3** | **-** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | - | - | **-** | **3** |
| CO3 | Design IIR and FIR Filters and obtain their frequency responses using MATLAB and Code Composer Studio | **3** | **3** | **3** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | - | - | **-** | **3** |
| CO4 | Adapt effective communication, presentation and report writing skills. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **3** | **-** | **1** | **-** | **-** | **-** |
| **17PD02** | **Problem Based Learning** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | Identify basic problems and develop solutions in the area of Electronics & Communication Engineering | **2** | **2** | **2** | **2** | **-** | **-** | **-** | **-** | **2** | **-** | **-** | **2** | **-** | **-** | **-** |
| **CO2** | Apply the Modern tools in the area of Electronics & Communication Engineering | **1** | **-** | **-** | **-** | **2** | **2** | **-** | **-** | **2** | **-** | **2** | **2** | **-** | **-** | **-** |
| **CO3** | Adapt communication & Presentation skills | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **3** | **-** | **2** | **-** | **-** | **-** |
| **CO4** | Improve report writing skills | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **3** | **-** | **2** | **-** | **-** | **-** |
| **CO5** | Develop the Individual / team work skills with professional and ethical values. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **3** | **-** | **-** | **3** | **-** | **-** | **-** |

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| **V- Semester** | | | | | | | | | | | | | | | | |
| **17HS01** | **Engineering Economics and Accountancy** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Capable of analyzing fundamentals of economics concepts which helps in effective business administration. | **3** | **-** | **-** | **-** | **-** | **-** |  | **3** | **3** | **1** | **2** | **3** | **-** | **-** | **-** |
| CO2 | Cost –out put relations understand. | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **2** | **-** | **-** | **-** | **-** |
| CO3 | Crate awareness on market structures and pricing policies of various business | **-** | **-** | **-** | **-** | **3** | **-** | **3** | **-** | **2** | **-** | **2** | **-** | **-** | **-** | **-** |
| CO4 | Identify the types of Business organization of the company and the implementation requirements of each one. | **-** | **-** | **-** | **-** | **3** | **-** | **-** | **-** | **2** | **-** | **2** | **-** | **-** | **-** | **-** |
| CO5 | Financial position of the company can be analyzing with the help of financial statements. | **-** | **-** | **-** | **-** | **2** | **-** | **3** | **3** | **2** | **-** | **2** | **-** | **-** | **-** | **-** |
| **17EC13** | **Computer Organization and Architecture** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Summarize the functional units and the interactions between them of a general purpose computer system. | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **2** | **-** |
| CO2 | Analyze the organizational aspects of Arithmetic unit of a CPU with respect to Addition, Subtraction, Multiplication and division operations on integer and floating point operands. | **2** | **3** | **3** | **1** | - | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **2** | **-** |
| CO3 | Apply the design methods of hardwired and micro programmed control units to study the control unit organization. | **3** | **2** | **2** | **2** | - | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **3** | **-** |
| CO4 | Evaluate the performance of primary/ secondary memory systems and communication aspects of I/O units with CPU by the study of interrupt, DMA and the interfacing of aspects of standard interfaces. | **3** | **3** | **3** | **2** | - | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **3** | **-** |
| **17EC14** | **Transmission Lines and Wave Guides** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the characteristics of a transmission line and waveguides. | **1** | **1** |  | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **1** | **-** | **-** |
| CO2 | Analyze the behavior of waveguides and cavity resonators | **2** | **3** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **-** | **-** |
| CO3 | Evaluate the performance of wave guides in Electromagnetic fields. | **2** | **2** | **2** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **-** | **-** |
| CO4 | Apply knowledge of electromagnetic to solve waveguide parameters | **3** | **3** | **2** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **3** | **-** | **-** |
| **17EC15** | **Digital Communications** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the concepts of digital communication system. | **1** | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **1** | **-** | **-** |
| CO2 | Analyze waveform coding techniques and digital modulation techniques. | **2** | **3** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **-** | **-** |
| CO3 | Evaluate pulse digital and digital modulation techniques for optimal digital transmission. | **3** | **3** | **2** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **-** | **-** |
| CO4 | Apply source coding and error control coding techniques in digital communication process. | **3** | **2** | **2** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **3** | **-** | **-** |
| **17EC16** | **VLSI Design** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Interpret the IC fabrication steps, process sequence, and properties of MOS devices. | **1** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | - | **1** | **-** |
| CO2 | Apply CMOS layout design rules for realization of digital circuit layouts. | **3** | **3** | **2** | **1** | - | - | **-** | **-** | **-** | **-** | **-** | **2** | - | **3** | **-** |
| CO3 | Analyze VLSI design flow for digital IC . | **2** | **3** | **2** | **2** | - | - | **-** | **-** | **-** | **-** | **-** | **2** | - | **2** | **-** |
| CO4 | Design subsystems by using combinational and sequential circuits. | **2** | **3** | **3** | **2** | - | - | **-** | **-** | **-** | **-** | **-** | **2** | - | **3** | **-** |
| CO5 | Evaluate chip design methodologies. | **2** | **3** | **3** | **2** | - | - | **-** | **-** | **-** | **-** | **-** | **2** | - | **3** | **-** |
| **17EI18** | **Micro Electro Mechanical Systems** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Illustrate MEMS, Microsystems, Microelectronics including importance of miniaturization and applications of micro scale devices. | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| CO2 | Apply the scaling laws to micro systems for providing information of downscaling | 3 | 2 | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - |
| CO3 | Choose micro fabrication methods suited for the fabrication of a given micro system | 2 | - | - | - | - | - | - | - | - | - | - | 2 | - | 2 | - |
| CO4 | Analyze the static & dynamic behavior of simple micro system like Cantilever beam. | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 2 | - | 2 | - |
| CO5 | Describe the wide range of micro system applications | 2 | 2 | - | 2 | - | - | - | - | - | - | - | 1 | - | 1 | - |
| **17EC17** | **PCB Design** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Illustrate the physical characteristics and design issues of Printed circuit boards. | **1** | **1** | **-** | - | - | **-** |  | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **-** |
| CO2 | Analyze the design procedures of circuit layouts, single layer, multi layer design issues of Printed circuit boards. | **1** | **3** | **-** | 1 | - | - |  | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** |
| CO3 | Create circuits on Printed circuit boards. | **2** | **2** | **3** | 2 | - | - | **-** | **-** |  | **-** | **-** | **-** | **-** | **2** | **-** |
| CO4 | Evaluate the performance metrics of single layer, multi layer PCB designs and Testing of Printed circuit boards. | **2** | **3** | **3** | 2 | - | - | **-** | **-** |  | **-** | **-** | **-** | **-** | **2** | **-** |
| **17EC18** | **Advanced Communications** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the working principles of different mobile phone processors | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **1** | **-** |
| CO2 | Identify the concepts of display technologies used in computers and mobile phones. | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **1** | **1** | **-** |
| CO3 | Analyze the working principle of Of batteries , flexible electronic devices  used in mobile phones, computers. | **2** | **3** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **1** | **-** |
| CO4 | Evaluate the functions of interface technologies used in USBs and Connectors. | **2** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **2** | **-** |
| **17EC19** | **Advanced Digital Signal Processing** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the Correlation functions, Power Spectra, Linear Prediction, Concept of Mean Square Estimation and Power Spectrum Estimation. | **1** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **-** | **1** |
| CO2 | Apply the Nonparametric, Parametric methods in the Power Spectrum Estimation and algorithms for wide area of recent applications. | **3** | **3** | **1** | **2** | - | - | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **2** | **3** |
| CO3 | Analyze the Linear Prediction techniques, Concept of Mean Square Estimation and Power Spectrum Estimation | **2** | **3** | **1** | **2** | - | - | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **-** | **3** |
| CO4 | Create new algorithms with innovative ideas for current applications by using the existing algorithms & techniques. | **3** | **3** | **3** | **3** | - | - | **-** | **-** |  |  | **-** | **3** | **-** | **-** | **3** |
| **17EC68** | **Digital Communications Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Evaluate waveform coding and digital modulation techniques and interpret the modulated and demodulated waveforms. | **2** | **2** | **-** | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **-** |
| CO2 | Apply multiplexing and error control coding techniques for communication applications. | **3** | **2** | **1** | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **-** |
| CO3 | Analyze line coding schemes and digital modulation techniques using MATLAB. | **2** | **3** | **1** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **-** |
| CO4 | Adopt effective communication, presentation and report writing skills. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **3** | **-** | **1** | **-** | **-** | **-** |
| **17EC69** | **VLSI Design Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Apply HDLs statements for modeling of digital circuits. | **3** | **2** | **1** | **2** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | - | - | **1** | **-** |
| CO2 | Analyze the functional and timing simulations of digital circuits using Xillinx/Mentor Graphics tools | **1** | **3** | **2** | **2** | **3** | - | **-** | **-** | **-** | **-** | **-** | - | - | **3** | **-** |
| CO3 | Construct logic gates using Static CMOS, NMOS logic from schematic to layout. | **3** | **3** | **3** | **3** | **3** | - | **-** | **-** | **-** | **-** | **-** | - | - | **3** | **-** |
| CO4 | Adapt effective communication, presentation and report writing skills. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **3** | **-** | **1** | **-** | **-** | **-** |
| **17EC90** | **Electronic Measurement and Instrumentation** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the concepts of measurements and working principles of Voltmeters, Ammeters, RLC meters, Bridges and Oscilloscopes. | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **1** | **-** |
| CO2 | Analyze the working of Bridges, Signal generators, Wave analyzers, and Transducers. | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **1** | **-** |
| CO3 | Apply Bridges, Transducers for the measurement of Force, Pressure, Stress, Temperature, Displacement and Velocity. | **3** | **3** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **2** | **-** |
| CO4 | Design Ammeter, voltmeter, and bridges for measurement of electrical parameters. | **3** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **2** | **-** |
| **17PD04** | **Mini Project** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Identify the complex engineering problems relevant to the society and industry | **2** | **3** | **-** | **-** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **3** | **3** | **3** | **3** |
| CO2 | Apply modern technologies, tools and systems in the field of Electronics & Communication Engineering to analyze the identified problem | **2** | **3** | **3** | **3** | **3** | **3** | **2** | **-** | **-** | **-** | **-** | **3** | **3** | **3** | **3** |
| CO3 | Design and implement a viable solution to the problem. | **2** | **3** | **3** | **2** | **2** | **3** | **2** | **-** | **-** | **-** | **3** | **3** | **3** | **3** | **3** |
| CO4 | Apply communication & Presentation skills | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **3** | **-** | **-** | **-** |
| CO5 | Develop the team work and leadership skills with professional and ethical values. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **3** | **-** | **-** | **3** | **-** | **-** | **-** |
| CO6 | Make the use of report writing skills | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **3** | **-** | **-** | **-** |
| **17PD05** | **Employability Enhancement Skills-I** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | Apply Quantitative techniques and logical thinking to qualify in recruitment tests and other professional tasks. | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **3** | **-** | **3** | **-** | **-** | **-** |
| **CO2** | Communicate effectively in various professional and social contexts. | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **2** | **2** | **3** | **-** | **3** | **-** | **-** | **-** |
| **CO3** | Apply Verbal skills effectively in Job Interviews as well as other real life situations. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **3** | **-** | **3** | **-** | **-** | **-** |
| **CO4** | Demonstrate various principles involved in Quantitative problem solving, thereby reducing the time taken for performing various job functions. | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **3** | **-** | **3** | **-** | **-** | **-** |
| **CO5** | Practice Lifelong learning through personal effectiveness as well as leadership. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **3** | **-** | **3** | **-** | **-** | **-** |

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| **VI- Semester** | | | | | | | | | | | | | | | | |
| **17EC20** | **Linear Control Systems** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Summarize the fundamental concepts of control systems. | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | 1 |
| CO2 | Apply Laplace transform and state space techniques to model dynamic systems. | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - | 2 |
| CO3 | Analyze the stability of the system in time and frequency domain. | 2 | 3 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | 2 | 3 |
| CO4 | Design controllers and the state-space model to test the performance of systems. | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | 3 | - | - | 3 |
| **17EC21** | **Antenna and Wave Propagation** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand radiation mechanism , antenna properties , ground, space, and sky wave propagations | 2 | 2 | - | - | - |  | - | - | - |  | - | 1 | 1 | **-** | **-** |
| CO2 | Analyze wire antenna, ground, space and sky wave propagation mechanism for communication purpose and synthesize various Antenna Arrays | 2 | 3 | 1 | 1 | - | - | - | - | - | - | - | 1 | 2 | **-** | **-** |
| CO3 | Design HF,VHF and UHF Antennas | 1 | 2 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | **-** | **-** |
| CO4 | Evaluate and measure antenna parameters radiation pattern, Gain, Impedance, Radiation resistance and Aperture efficiency | 1 | 2 | 3 | 2 | - | - |  |  | - | - | - | 1 | 2 | **-** | **-** |
| **17EC22** | **Microprocessors and Microcontrollers** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Summarize the architectural features and operation of 8086 microprocessor & 8051 microcontroller | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| CO2 | Apply the instructions of 8086/8051 for developing Assembly Language Program based applications. | 3 | 3 | 1 | - |  | - | - | - | - | - | - | 2 | - | 2 | - |
| CO3 | Analyze the operation of peripherals and devices for interfacing applications. | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 3 | - | 3 | - |
| CO4 | Design a 8086/8051 based system by interfacing memory, peripherals and I/O devices. | 3 | 3 | 3 | - |  | - | - | - | - | - | - | 3 | - | 3 | - |
| **17EC23** | **Nano Electronics** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Interpret the integration of fabrication techniques for Nanoelectronics devices. | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 1 | - | 2 | - |
| CO2 | Analyze Carbon Nanotubes for Nano devices. | 1 | 3 | 1 | 2 | - | 1 | - | - | - | - | - | 2 | - | 3 | - |
| CO3 | Apply the knowledge of Nanoelectronics for Logic, Memory and Display devices. | 3 | 2 | 2 | 3 | - | 1 | - | - | - | - | - | 2 | - | 3 | - |
| CO4 | Construct Carbon Nano structures for Nanoelectronics | 2 | 2 | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | - | 3 | - |
| **17EC24** | **Low Power VLSI Design** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Summarize the Fundamentals of Low Power VLSI Design. | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| CO2 | Apply Low-Power Design Approaches for IC designs. | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | - | 2 | - |
| CO3 | Analyze Low-Voltage Low-Power Memories. | 2 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | 3 | - |
| CO4 | Design Low-Voltage Low-Power Adders and Multipliers. | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | - | 3 | - |
| **17EC25** | **Cellular and Mobile Communication** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the concepts of cellular systems, interferences, frequency reuse, Handoff mechanism, frequency management and channel assignment strategies in cellular systems. | 1 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| CO2 | Apply time ,frequency and code division multiple access techniques to digital cellular systems | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| CO3 | Evaluate co-channel and non co-channel interferences in cellular systems | 2 | 2 | 3 | - | - | - | - | - | - | - | - | 2 | 3 | - | - |
| CO4 | Analyze the radio propagation losses at cell site and mobile antennas | 1 | 3 | 1 | - | - | 1 | - | - | - | - | - | 1 | 3 | - | - |
| **17EC26** | **Transform Techniques** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the fundamental concepts of transforms used in engineering. | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | - |  | 1 |
| CO2 | Evaluate 2D DFT, DCT, Haar, Walsh, Hadamard Transforms and Short Time Fourier Transform on signals. | 3 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | - | 3 |
| CO3 | Analyze series expansion, scaling functions and wavelet function on wavelet transforms. | 2 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | - | 3 |
| CO4 | Applytransform for signal denoising, sub band coding of speech signals and signal compression. | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - | 2 |
| **17EC70** | **Micro Processors and Micro Controllers Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Demonstrate arithmetic, logical, data transfer, and program control instructions of the 8086 microprocessor / 8051 microcontroller. | 1 | 2 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | - |
| CO2 | Apply loops and subroutine programming techniques for Assembly Language Programming based applications. | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | - |
| CO3 | Develop assembly language programs for 8086/8051 based systems by interfacing external devices. | 2 | 3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | - |
| **17EC91** | **Telecommunication Switching Systems and Networks** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the concepts of switching systems, network parameters in telecommunications systems | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Analyze Telephone network parameters & Data Network architectures, Switching techniques and higher data rates telecommunication techniques. | 2 | 3 | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO3 | Apply telephone & data network parameters to maintain smooth traffic in networks. | 3 | 2 | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO4 | Evaluate the performance of Switching systems, Data communication networks and higher data rate systems. | 2 | 3 | - | - | - | - | - | - | - | - | - | 2 | 2 | - | **-** |
| **17CI07** | **OOPS Through Java** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Identify Object Oriented concepts through constructs of JAVA. | 3 | 1 | 2 | - | - | - | - | - | - | - | - | 1 | 3 | - | 1 |
| CO2 | Analyze the role of Inheritance, Polymorphism and implement Packages, Interfaces in program design using JAVA | 3 | 3 | 2 | - | 1 | - | - | - | - | - | - | 1 | 3 | - | 1 |
| CO3 | Explore Exception handling and Multi-threading concepts in program design using JAVA. | 3 | 2 | 3 | - | 1 | - | - | - | - | - | - | 1 | 3 | - | 1 |
| CO4 | Develop GUI based applications using Applet class and explore the concept of Event Handling using JAVA | 3 | 2 | 3 | - | 1 | - | - | - | - | - | - | 1 | 3 | - | 1 |
| CO5 | Design some examples of GUI based applications using AWT controls and Swings. | 3 | 2 | 2 | - | 1 | - | - | - | - | - | - | 1 | 3 | 3 | 1 |
| **17CI65** | **OOPS Through Java Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Implement and Test the concepts of OOP in program design with a few example exercises | 2 | 3 | 3 | 1 | 1 | - | - |  |  |  | - | 1 | 3 | - | - |
| CO2 | Implement and Test the performance of Exception handling, Multithreading concepts with a few examples | 2 | 3 | 3 | 1 | 1 | - | - |  |  |  | - | 1 | 3 | - | - |
| CO3 | Implement and Test the performance of GUI based applications using AWT, Swings | 2 | 3 | 3 | 1 | 1 | - | - |  |  |  | - | 1 | 3 | 3 | 1 |
| CO4 | Improve individual / team work skills, communication & report writing skills with ethical values. | - | - | - | - | - | - | - | 2 | 2 | 2 | - | - | - | - | - |
| **17FE61** | **Presentation Skills Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Make power point presentations and oral presentations. | - | 1 | - | 3 | - | 2 | - | - | 3 | 3 | - | 2 | - | - | - |
| CO2 | Face competitive exams like GRE, TOEFL, IELTS etc. | - | 1 | - | 3 | - | 2 | - | - | 3 | 3 | - | 2 | - | - | - |
| CO3 | Face interviews and skillfully manage through group discussions. | - | 1 | - | 3 | - | 2 | - | - | 3 | 3 | - | 2 | - | - | - |
| CO4 | Negotiate skillfully for better placement. | - | 1 | - | 3 | - | 2 | - | - | 3 | 3 | - | 2 | - | - | - |
| **17PD07** | **Seminar** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Review literature, analyze complex engineering problems relevant to the society and industry | **3** | **2** | **1** | **-** | **2** | **2** | **-** | **-** | **2** | **-** | **-** | **3** | **3** | **3** | **3** |
| CO2 | Analyze the insight into modern technologies, tools and systems in the field of Electronics & Communication Engineering | **1** | **2** | **2** | **2** | **3** | **2** | **-** | **-** | **2** | **-** | **-** | **3** | **3** | **3** | **3** |
| CO3 | Adapt communication & Presentation skills | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **3** | **-** | **-** | **-** |
| CO4 | Develop Report writing skills. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **3** | **-** | **-** | **-** |
| **17PD08** | **Employability Enhancement Skills-II** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | Identify, analyze and apply quantitative techniques related to qualify in Placement tests. | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **3** | **-** | **1** | **-** | **-** | **-** |
| **CO2** | Effectively utilize verbal ability & communication skills to qualify in Placement tests. | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **2** | **2** | **3** | **-** | **2** | **-** | **-** | **-** |
| **CO3** | Effectively communicate in professional as well as social contexts. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **3** | **-** | **1** | **-** | **-** | **-** |
| **CO4** | Apply key soft skills effectively in Job Interviews as well in other professional contexts | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **3** | **-** | **1** | **-** | **-** | **-** |
| **CO5** | Inculcate lifelong learning through personal effectiveness as well as leadership. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **3** | **-** | **3** | **-** | **-** | **-** |

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| **VII- Semester** | | | | | | | | | | | | | | | | |
| **17EC27** | **Microwave Engineering** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the operation and use of Microwave solid state devices | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| CO2 | Analyze the characteristics of Microwave tubes. | 2 | 3 | - | - | - | - | - | - | - | - | - | 1 | 3 | - | - |
| CO3 | Apply the properties of S-parameters to evaluate waveguide components. | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 3 | - | - |
| CO4 | Evaluate the microwave signal parameters using microwave bench setup. | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 3 | - | - |
| **17EC28** | **Optical Communications** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the concepts of optical communication systems, WDM systems, and optical networks. | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Apply knowledge of signal transmission characteristics on fibers, optical sources and detectors. | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 3 | - | - |
| CO3 | Analyze the optical device characteristics and their signal degradation mechanisms in analog and digital signal transmission. | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO4 | Evaluate the performance of optical fiber communication systems | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 3 | - | - |
| **17EC29** | **Embedded System Design** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Outline the functionality of standard single purpose processors commonly used in embedded systems | 1 | 2 |  | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| CO2 | Apply top-down and bottom-up methodologies for embedded system design | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 2 | - | 2 |  |
| CO3 | Analyze state machine and concurrent process models. | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 2 | - | 3 | - |
| CO4 | Design Control unit and data path using computational models, and develop embedded systems using IC design technologies. | 3 | 3 | 3 | - | - | - | - | - | - | - | - | 3 | - | 3 | - |
| **17EC30** | **Automobile and Consumer Electronics** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the working of loud speakers, microphones, batteries, lights automobile devices and home, electrical office electronic appliances. | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| CO2 | Apply sensors and activators in the development of automobile engine and Regulators concept to real time applications. | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | - | 2 | - |
| CO3 | Analyze the automotive electronic devices working principle. | 1 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | - | 2 | - |
| CO4 | Create the starting system and charging system. | 1 | 1 | 3 | - | - | - | - | - | - | 2 | - | 3 | - | 3 | - |
| **17EC31** | **Analog VLSI Design** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Illustrate the operation of MOS devices and MOS amplifiers. | 1 | 2 | - | - | - | - | - | - | - | - | - | 1 | - | 2 | - |
| CO2 | Analyze the working models of MOS amplifiers. | 2 | 3 | 2 | 1 | - | - | - | - | - | - | - | 1 | - | 2 | - |
| CO3 | Evaluate the frequency response of MOS amplifiers. | 2 | 2 | 3 | 2 | - | - | - | - | - | - | - | 1 | - | 3 | - |
| CO4 | Develop differential and Operational amplifiers | 2 | 2 | 3 | 2 | - | - | - | - | - | - | - | 2 | - | 3 | - |
| **17EC32** | **Satellite Communications** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the concepts of satellite communication, kepler’s laws associated with the motion of a satellite, subsystems and link design | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Apply concepts of satellite communication in real time applications | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| CO3 | Evaluate the orbital model, orbital parameters and orbital effects of a circular and elliptical orbit and also understand the process of launching a satellite. | 2 | 2 | 3 | - | - | - | - | - | - | - | - | 2 | 3 | - | - |
| CO4 | Analyze time division, frequency division and code division multiple access methods and transmitting and receiving earth stations. | 1 | 3 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| **17EC33** | **Digital Image Processing** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the fundamentals of Digital Image Processing. | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | 3 |
| CO2 | Analyze Spatial domain, Frequency domain enhancement techniques and examine the restoration methods in image processing. | 2 | 3 | 2 | 1 | - | - | - | - | - | - | - | 1 | - | - | 3 |
| CO3 | Apply the compression techniques in lossy and loss less compression models. | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | 2 | - | 3 |
| CO4 | Evaluate the segmentation methods, color image models and examine the pseudo and full color image processing. | 3 | 3 | 3 | 2 | - | 1 | - | - | - | - | - | 1 | - | - | 3 |
| **17EC34** | **Medical Electronics** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the function of human body and medical electronic equipment. | 1 | 1 | - | - | - | 1 | - | - | - | - | - | - | 1 | - | - |
| CO2 | Apply the Transducer principles and safety aspects of medical instruments | 3 | 2 | 2 | - | 1 | 2 | - | - | - | - | - | - | 2 | - | - |
| CO3 | Analyze biomedical signals like Cell potentials, ECG, EEG, EMG and working principles of Transducers | 2 | 3 | - | 2 | 1 | 2 | - | - | - | - | - | - | 2 | - | 2 |
| CO4 | Evaluate the patient condition by measuring parameters like Heart rate, Respiration rate, Pulse rate and blood pressure. | 3 | 3 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| **17EC35** | **Advanced Micro Controllers** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the internal architecture and operation of PIC18F and MSP430 Microcontroller | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| CO2 | Apply the instruction set and programming techniques for ALP based applications. | 3 | 3 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | 2 | - |
| CO3 | Analyze the working of peripherals and devices for ALP applications. | 2 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | 2 | - |
| CO4 | Develop microcontroller based DAS, frequency counter and DC motor control applications. | 2 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 | - | 3 | - |
| **17EC36** | **Mobile Computing** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the underlying concepts of wireless and mobile communication networks and their technical features. | 1 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| CO2 | Develop mobile applications using representative mobile devices and platforms using modern development methodologies. | 2 | 2 | 3 | - | - | - | - | - | - | - | - | 3 | 3 | - | - |
| CO3 | Analyze the performance of protocols used in mobile communication and Mobile Ad-hoc Networks. | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 2 | 3 | - | - |
| CO4 | Evaluate the network protocols, routing algorithms, connectivity methods and characteristics of mobile device operating systems. | 2 | 2 | 3 | - | - | - | - | - | - | - | - | 2 | 3 | **-** | **-** |
| **17EC37** | **DSP Processors** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand basic concepts of Digital signal processing techniques in both time and frequency domain. | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | 1 |
| CO2 | Apply different parameters of computational accuracy in DSP implementation. | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | 2 |
| CO3 | Analyze basic architectural requirements of programmable digital signal processors. | 2 | 3 | 2 | 1 | - |  | - | - | - | - | - | 2 | - | - | 3 |
| CO4 | Design architecture aspects of TMS320C54XX and analog devices family DSPs | 2 | 2 | 3 | 2 |  |  |  |  |  |  |  | 3 | - | - | 3 |
| **17EC71** | **Microwave and Optical Communications Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Demonstrate the functions of microwave bench setup | 1 | - | - | 1 | 1 | - | - | - | - | - | - | - | 1 | - | - |
| CO2 | Analyze the losses to verify the propagating conditions in the optical fiber. | 2 | 2 | - | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - |
| CO3 | Estimate the frequency, wave length, VSWR, impedance and scattering parameters of microwave devices | 2 | 2 | - | 3 | 2 | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | Adapt effective communication, presentation and report writing skills. | - | - | - | - | - | - | - | 1 | 2 | 3 | - | 1 | - | - | - |
| **17EC72** | **Embedded System Design Lab** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Evaluate Inter Process Communication applications using ARM based processors | 2 | 2 | 3 | 2 | 3 | - | - | - | - | - | - | - | - | 3 | - |
| CO2 | Develop the Hardware platform using soft processors and applications using C on Xilinx FPGA Zynq 7000 series | 2 | 2 | 3 | 2 | 3 | - | - | - | - | - | - | - | - | 3 | - |
| CO3 | Adap**t** effective communication, presentation and report writing skills. | - | - | - | - | - | - | - | 1 | 2 | 3 | - | 1 | - | - | - |
| **17EC80** | **Satellite Technology** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Identify the applications of satellites, launch vehicles and basic functions of satellite system | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Understand components, characteristics of a power subsystem and the aspects of spacecraft control | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO3 | Evaluate the orbital model, parameters related to satellites and the requirements needed for the selection an earth station | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO4 | **Analyze** thesatellite structures, internal and external design issues of a spacecraft | 1 | 3 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| **17EC92** | **Computer Networks** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the layered architecture of OSI and TCP/IP Reference models. | 1 | 2 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Analyze the Protocols of OSI and TCP/IP Reference models | 2 | 3 | 1 | 1 | 1 | - | - | - | - | - | - | 1 | 3 | - | - |
| CO3 | Evaluate routing algorithms, congestion control Algorithms, IP addressing used in Network layer. | 3 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | 1 | 3 | - | - |
| CO4 | Apply the knowledge of protocols in networking applications. | 2 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | 1 | 3 | - | - |
| **17EC81** | **Analog and Digital Communications** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the fundamental concepts of signals and communications. | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | 1 |
| CO2 | Identify the performance parameters of analog and digital modulation techniques. | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 | **-** | **-** |
| CO3 | Analyze the communication systems using analog and digital modulation. | 1 | 3 | 2 | 1 | - | - | - | - | - | - | - | 1 | 3 | - | - |
| CO4 | Apply the modulation techniques for pulse transmission. | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 1 | 2 | - | - |
| **17PD09** | **Internship** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Identify engineering processes relevant to the industry | **3** | **3** | **2** | **3** | **-** | **2** | **2** | **-** | **3** | **-** | **-** | **3** | **3** | **3** | **3** |
| CO2 | Understand the usage of modern technologies & tools in the field of Electronics & Communication Engineering | **3** | **3** | **3** | **3** | **3** | **2** | **-** | **-** | **3** | **-** | **-** | **3** | **3** | **3** | **3** |
| CO3 | Adapt communication & Presentation skills | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **3** | **-** | **3** | **-** | **-** | **-** |
| CO4 | Improve report writing skills | **-** | **-** | **-** | **-** | **1** | **-** | **-** | **3** | **3** | **3** | **-** | **3** | **-** | **-** | **-** |

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| **VIII- Semester** | | | | | | | | | | | | | | | | |
| **17EC38** | **Programmable Logic Devices** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the architecture of Programmable Logic Devices | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| CO2 | Analyze the architectures of Field Programmable Gate Arrays and ASICs | 2 | 3 | 1 | 1 | - | - | - | - | - | - | - | 1 | - | 2 | - |
| CO3 | Evaluate the ASIC cell library | 3 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 2 | - |
| CO4 | Design Application Specific Integrated Circuit cell libraries. | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | - | 3 | - |
| **17EC39** | **Real Time Operating Systems for Embedded Systems** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Interpret the concepts of Linux/UNIX systems and RTOS. | 1 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| CO2 | Analyze the fundamental concepts of objects, services and characteristics of RTOS. | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 2 | - |
| CO3 | Evaluate the effect of Interrupts and Timers in RTOS. | 3 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 3 | - |
| CO4 | Create real time applications using RT Linux, Vx works and Embedded Linux. | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | - | 3 | - |
| **17EC40** | **Radar Systems** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the fundamental concepts and applications of radar | **2** | **-** |  | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **1** | **-** | - |
| CO2 | Apply signal processing techniques on Radar Echo to reprresent the nature of the object. | **3** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **3** | **-** | - |
| CO3 | Analyze the working of RADAR, CW RADAR, FMCW RADAR, Tracking RADARs and RADAR Equipment. | **2** | **3** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **2** | **-** | - |
| CO4 | Interpret the subsystems of radar equipment. | **2** | **2** | **1** |  |  |  |  |  |  |  |  | **1** | **2** | **-** | - |
| **17EC41** | **Neural Networks and Fuzzy Control** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the concepts of Neural Networks and Fuzzy sets. | **1** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **-** | **1** |
| CO2 | Apply Fuzification and Defuzzification methods on Fuzzy Logics systems | **2** | **2** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **-** | **-** | **2** |
| CO3 | Analyze Neuron Activation functions and fuzzy membership functions. | **2** | **3** | **2** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **-** | **2** |
| CO4 | Design single layer feed forward, multi layered feed forward neural Networks, associative memories and Hopfield network. | **2** | **2** | **3** | **1** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** | **-** | **2** |
| **17EC42** | **Radio Frequency Integrated Circuits** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand the basic concepts in RF design | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Develop device modeling and characteristics | 2 | 2 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | - | - |
| CO3 | Analyze Frequency Synthesizers, Phase locked Loops and RF Power amplifiers | 2 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO4 | Design and evaluate Low Noise amplifiers , Mixers and RF Oscillators | 2 | 3 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | - | - |
| **17EC43** | **Design for Internet of Things** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand technologies involved in IoT Development | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - |
| CO2 | Evaluate Big data and visualization issues | 2 | 3 | 3 | - | - | - | - | - | - | - | - | 2 | 2 | 2 | - |
| CO3 | Analyze IoT architecture for performance and security aspects. | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 2 | 3 | 3 | - |
| CO4 | Design IoT platform using Raspberry pi, ARM and Arduino Processors. | 2 | 3 | 3 | - | - | - | - | - | - | - | - | 2 | 3 | 3 | - |
| **17EC44** | **Wireless Sensor Networks** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Interpret the fundamental concepts, protocols and algorithms of wireless sensor networks. | 1 | 2 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Analyze the architecture and protocols of wireless sensor networks. | 2 | 3 | 1 | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 | - |
| CO3 | Evaluate sensor tasking and techniques used to establish infrastructure of wireless sensor networks. | 2 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO4 | Apply the knowledge of sensor network platforms and tools for sensor network application development. | 3 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | 3 | 2 | - |
| **17EC45** | **Bio Medical Signal Processing** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Analyze EEG signal characteristics using linear prediction theory. | 2 | 2 |  |  | - | - | - | - | - | - | - | 2 | - | - | 2 |
| CO2 | Evaluate ECG signal parameters using QRS technique. | 3 | 3 | 3 | 2 | - | - | - | - | - | - | - | 3 | - | - | 3 |
| CO3 | Apply adaptive filtering techniques for noise cancellation and data compression techniques on ECG data. | 2 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - | 3 |
| CO4 | Understand Prony’s methods used in clinical applications | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | 3 |
| **17EC82** | **Elements of Communication System** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Identify the fundamentals of RF transmitter, receivers, transmission lines and antennas. | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO2 | Understand the properties of systems, random signals, and concepts of noise in communication systems, RF transmitters, receivers, transmission lines and antennas. | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| CO3 | Analyze the response of linear systems, impact of noise in communication systems and performance of RF transmitters and receivers. | 2 | 3 | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO4 | Apply the knowledge of Noise characteristics in development of communication systems. | 3 | 2 | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| **17EC83** | **Systems and Signal Processing** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Understand analog, discrete and digital signals with their properties. | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | 1 |
| CO2 | Evaluate the spectrum of signals using Fourier Series, Fourier transform, DFT, FFT and Estimate the response of Linear Systems. | 3 | 2 | 3 | 1 | - | - | - | - | - | - | - | 2 | - | - | 2 |
| CO3 | Apply the process of sampling and reconstruction on continues signals. | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | - | 2 |
| CO4 | Analyze the digital signal processing systems and their applications. | 2 | 3 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - | 2 |
| **17PD11** | **Project work** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Identify the complex engineering problems relevant to the society and industry | **2** | **3** | **-** | **-** | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **3** | **3** | **3** | **3** |
| CO2 | Apply modern technologies, tools and systems in the field of Electronics & Communication Engineering to analyze the identified problem | **2** | **3** | **3** | **3** | **3** | **3** | **2** | **-** | **-** | **-** | **-** | **3** | **3** | **3** | **3** |
| CO3 | Design and implement a viable solution to the problem. | **2** | **3** | **3** | **2** | **2** | **3** | **2** | **-** | **-** | **-** | **3** | **3** | **3** | **3** | **3** |
| CO4 | Apply communication & Presentation skills | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **3** | **-** | **-** | **-** |
| CO5 | Develop the team work and leadership skills with professional and ethical values. | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **3** | **-** | **-** | **3** | **-** | **-** | **-** |
| CO6 | Make the use of report writing skills | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **-** | **3** | **-** | **-** | **-** |
| **17PD12** | **Comprehensive Viva-Voce** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| CO1 | Analyze the concepts of various core subjects in Electronics & Communication Engineering | **3** | **3** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **3** | **3** | **3** |
| CO2 | Apply communication skills | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **3** | **-** | **2** | **-** | **-** | **-** |

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