# Course Outcome of E.C.E Department

## [New Syllabus]

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| Department | ECE |
| Course Code | BS-CH-101 |
| Title of Course | Chemistry-1 |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | L3 + T1 |
| Total Contact Hours | 42 |
| Course Out Come | CO1: Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.<br><br>CO2: Rationalise bulk properties and processes using thermodynamic considerations.<br><br>CO3: Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.<br><br>CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.<br><br>CO5: List major chemical reactions that are used in the synthesis of molecules. |

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| Department | ECE |
| Course Code | BS-M-102 |
| Title of Course | Mathematics -IB |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | L + T<br>3 + 1 |
| Total Contact Hours | 42 |
| Course Out Come | **CO1**: Apply the concept integral calculus to determine curvature and evaluation of different types of improper integrals.<br><br>**CO2:** Understand the domain of applications of mean value theorems, limit and maxima-minima to engineering problems.<br><br>**CO3:** Learn the tools of power series and Fourier series to analyse |

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| | engineering problems and apply the concept of sequence and convergence of infinite series in many approximation techniques in engineering disciplines.<br><br>**CO4:** Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points if different surfaces of higher dimensions and concept of vector differentiation.<br><br>**CO5:** Understand the concept of determinant and learn different types of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems. |

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| Department | ECE |
| Course Code | ES-EE101 |
| Title of Course | Basic Electrical Engineering |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | L + T<br>3 + 1 |
| Total Contact Hours | 40 |
| Course Out Come | CO1: To understand and analyze basic electric and magnetic circuits<br><br>CO2: To study the working principles of electrical machines and power converters.<br><br>CO3: To introduce the components of low voltage electrical installations |

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|---|---|
| Department | ECE |
| Course Code | BS-CH-191 |
| Title of Course | Chemistry-1 Lab |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | P 3 |
| Total Contact Hours | 30 |
| Course Out Come | **CO1:** Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. |

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| | **CO2:** Rationalise bulk properties and processes using thermodynamic considerations.<br><br>**CO3:** Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.<br><br>**CO4:** Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.<br><br>**CO5:** List major chemical reactions that are used in the synthesis of molecules. |

| Department | ECE |
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| Course Code | ES-EE191 |
| Title of Course | Basic Electrical Engineering Laboratory |
| Nature of Course | Compulsory |
| Type of Course | Laboratory |
| Contact Hours | P3 |
| Total Contact Hours | 20 |
| Course Out Come | CO1: To learn about the operation, calibration and application of different electrical elements, instruments respectively and observe the constructional details of different electrical machines.<br><br>CO2: To learn about the RLC circuit behaviour under AC and DC excitation.<br><br>CO3: To learn about the characteristics features of a single-phase transformer<br><br>CO4: To learn about three phase circuitanalysis.<br><br>CO5: To learn about the characteristic behaviours of different rotating electrical machines.<br><br>CO6: To learn about the operation of different converters and LT switchgear. |

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|---|---|
| Department | ECE |
| Course Code | ES-ME191 |
| Title of Course | Engineering Graphics & Design Lecture |
| Nature of Course | Compulsory (Engineering Science Courses Course) |
| Type of Course | Practical |
| Contact Hours | L + T<br>3 + 1 |
| Total Contact Hours | 52 |
| Course Out Come | CO1: Introduction to engineering design and its place in society<br>CO2: Exposure to the visual aspects of engineering design<br>CO3: Exposure to engineering graphics standards<br>CO4: Exposure to solid modelling |

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|---|---|
| Department | ECE |
| Course Code | BS-PH-201 |
| Title of Course | Physics-I |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | L + T<br>3 + 1 |
| Total Contact Hours | 44 |
| Course Out Come | **CO1:** Ability to know the basic concepts of mechanics and oscillation.<br>**CO2:** Elaborate the concept of optics and introduction to the principle of laser.<br>**CO3:** Ability to understand electromagnetism, dielectric and magnetic properties of materials.<br>**CO4:** Familiarize with the basic laws of quantum mechanics introduction to Schrodinger wave equation.<br>**CO5:** Understand the basic concept of Statistical mechanics. |

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| Department | ECE |
| Course Code | BS-M-202 |
| Title of Course | Mathematics -IIB |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | L + T<br>3 + 1 |
| Total Contact Hours | 40 |
| Course Out Come | **CO1**: Learn the methods for evaluating multiple integral and their applications to different physical problems.<br><br>**CO2:** Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences.<br><br>**CO3:** Learn different tools of differentiation and integration of functions of a complex variable and application of different types of transformation between two 2- dimensional planes for analysis of engineering problems. |

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| Department | ECE |
| Course Code | ES-CS201 |
| Title of Course | Programming for Problem Solving |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | L + T<br>3 + 0 |
| Total Contact Hours | 44 |
| Course Out Come | CO1: To formulate simple algorithms for arithmetic and logical problems<br><br>CO2: To translate the algorithms to programs (in C language).<br><br>CO3: To test and execute the programs and correct syntax and logical errors.<br><br>CO4: To implement conditional branching, iteration and recursion.<br><br>CO5: To decompose a problem into functions and synthesize a complete program using divide and conquer approach.<br><br>CO6: To use arrays, pointers and structures to formulate algorithms and |

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| | programs.<br>CO7: To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.<br>CO8: To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration. |

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| Department | ECE |
| Course Code | HM HU 201 |
| Title of Course | English |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | 2L + 0T |
| Total Contact Hours | 25 |
| Course Out Come | CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills. |

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|---|---|
| Department | ECE |
| Course Code | BS-PH-291 |
| Title of Course | Physics-I Laboratory |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | 3P |
| Total Contact Hours | 30 |
| Course Out Come | **CO1**: Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity.<br>**CO2**: Ability to know optical property.<br>**CO3**: Ability to learn electrical property. |

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| | **CO4**: Ability to understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell.<br><br>**CO5**: Ability to learn Electricity and Magnetism with the help of experiments like Hall Effect of semiconductors, Specific charge of electron |

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|---|---|
| Department | ECE |
| Course Code | ES-CS291 |
| Title of Course | Programming for Problem Solving |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | L + T<br>0 + 4 |
| Total Contact Hours | 48 |
| Course Out Come | CO1: To formulate the algorithms for simple problems To translate given algorithms to a working and correct program<br><br>CO2: To be able to correct syntax errors as reported by the compilers<br><br>CO3: To be able to identify and correct logical errors encountered at run time<br><br>CO4: To be able to write iterative as well as recursive programs<br><br>CO5: To be able to represent data in arrays, strings and structures and manipulate them through a program<br><br>CO6: To be able to declare pointers of different types and use them in defining self-referential structures.<br><br>CO7: To be able to create, read and write to and from simple text files. |

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| Department | ECE |
| Course Code | ES-ME 292 |
| Title of Course | Workshop/ Manufacturing Practices |
| Nature of Course | Compulsory (Engineering Science Courses Course) |

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| Type of Course | Lecture |
| Contact Hours | L + T+ P<br>1 + 0+ 4 |
| Total Contact Hours | 56 |
| Course Out Come | CO1: Upon completion of this laboratory course, students will be able to fabricate components with their own hands.<br><br>CO2: They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.<br><br>CO3: By assembling different components, they will be able to produce small devices of their interest |

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|---|---|
| Department | ECE |
| Course Code | HM HU 291 |
| Title of Course | Language Laboratory |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 2P |
| Total Contact Hours | 19 |
| Course Out Come | CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills. |

## Course Outcome of ECE Department

## [New Syllabus]

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|---|---|
| Department | ECE |
| Course Code | EC301 |
| Title of Course | Electronic Devices |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T+0P |
| Total Contact Hours | 32 Hours |
| Course Outcomes | CO1: Differentiate the conduction techniques in semi-conductor materials.<br>CO2: Analyze characteristics of Semi-conductor diodes and solve problems.<br>CO3: Analyze characteristics of Bi-polar Transistors and solve problems.<br>CO4: Analyze characteristics of MOS Transistors and solve problems.<br>CO5: Differentiate between different Opto-electronic devices. |

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|---|---|
| Department | ECE |
| Course Code | EC302 |
| Title of Course | Digital System Design |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T+0P |
| Total Contact Hours | 32 Hours |

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| Course Outcomes | CO1: Design and analyze combinational logic circuits<br>CO2: Design & analyze modular combinational circuits with UX/DEMUX, Decoder, Encoder<br>CO3: Design & analyze synchronous sequential logic circuits |

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|---|---|
| Department | ECE |
| Course Code | EC303 |
| Title of Course | Signals and System |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T+0P |
| Total Contact Hours | 32 Hours |
| Course Outcomes | CO1: Analyze different types of signals<br>CO2: Represent continuous and discrete systems in time and requency domain using different transforms<br>CO3: Investigate whether the system is stable<br>CO4: Sampling and reconstruction of a signal |

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|---|---|
| Department | ECE |
| Course Code | EC304 |
| Title of Course | Network Theory |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T+0P |
| Total Contact Hours | 32 Hours |

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| Course Outcomes | CO1: Understand basics electrical circuits with nodal and mesh analysis.<br>CO2: Appreciate electrical network theorems.<br>CO3: Apply Laplace Transform for steady state and transient analysis.<br>CO4: Determine different network functions.<br>CO5: Appreciate the frequency domain techniques. |

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|---|---|
| Department | ECE |
| Course Code | ES-CS301 |
| Title of Course | Data Structure & Algorithms |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T+0P |
| Total Contact Hours | 30 Hours |
| Course Outcomes | CO1: For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.<br>CO2: For a given Search problem (Linear Search and Binary Search) student will able to implement it.<br>CO3: For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.<br>CO4: Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.<br>CO5: Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity. |

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|---|---|
| Department | ECE |
| Course Code | BSM-301 |
| Title of Course | Probability and Statistics |
| Nature of Course | Compulsory |
| Type of Course | Lecture |
| Contact Hours | L + T<br>3 |
| Total Contact Hours | 32 |
| Course Out Come | **CO1:** Learn the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment.<br><br>**CO2:** Understand the basic ideas of statistics with different characterisation of a univariate and bivariate data set.<br><br>**CO3:** Apply statistical tools for analysing data samples and drawing inference on a given data set. |

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|---|---|
| Department | ECE |
| Course Code | EC391 |
| Title of Course | Electronics Devices Lab |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L+0T+2P |
| Total Contact Hours | 20 |
| Course Outcomes | CO1: An ability to verify the working of different diodes, transistors, CRO probes and measuring instruments. Identifying the procedure of doing the experiment.<br>CO2: Ability to understand the characteristics of BJT and FET and how to Determine different parameters for designing purpose.<br>CO3: Ability to understand properties of photoelectric devices.<br>CO4: Ability to measure and record the experimental data, analyze the results, and prepare a formal laboratory report. |

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|---|---|
| Department | ECE |
| Course Code | EC392 |
| Title of Course | Digital System Design Lab |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L+0T+2P |
| Total Contact Hours | 26 |
| Course Outcomes | CO1: Ability to know the basic principles of Digital Electronics and digital design techniques.<br>CO2: Ability to develop Combinational and sequential circuits design using |

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| | logic gates<br><br>CO3: Ability to develop Combinational and sequential circuits design using PSPICE software and VHDL\Verilog |

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| Department | ECE |
| Course Code | ES-CS391 |
| Title of Course | Data Structure & Algorithm Lab. |
| Nature of Course | Compulsor |
| Type of Course | Practicals |
| Contact Hours | 0L+0T+2P |
| Total Contact Hours | 20 |
| Course Outcomes | CO1: Ability to implement the concept of searching, sorting, data structures, stacks, queues etc.<br><br>CO2: Ability to implement above concepts in c, c++ using concepts of pointers, structures, arrays and dynamic allocation of memory. |

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|---|---|
| Department | ECE |
| Course Code | MC381 |
| Title of Course | Environmental Science |
| Nature of Course | Compulsory |
| Type of Course | Sassional |
| Contact Hours | 0L+0T+2P |
| Total Contact Hours | 20 |

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| Course Outcomes | CO1: Ability to sensitize on environment protection through Awareness Activities such as Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste, Slogan making event, Poster making event, Cycle rally, Lectures from experts<br><br>CO2: Ability to sensitize on environment protection through Actual Activities such as Plantation, Gifting a tree to see its full growth, Cleanliness drive, Drive for segregation of waste, To live some big environmentalist for a week or so to understand his work, to work in kitchen garden for mess, shutting down the fans and ACs of the campus for an hour or so. |

| 4th Semester from Academic Year 2018-19 | |
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| Department | ECE |
| Course Code | EC401 |
| Title of Course | Analog Communication |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |

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| Course Outcomes | CO1: Ability to learn concept of analog modulation and its classification.<br>CO2: Ability to identify the type of modulation & know different types of associated the calculation.<br>CO3: Ability to learn the importance of Multiplexing, find out their application areas.<br>CO4:Ability to study random signals and noise in communication system. |
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| Department | ECE |
| Course Code | EC402 |
| Title of Course | Analog circuits |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the characteristics of diode and transistors.<br>CO2: Design and analyze various rectifier and amplifier circuits.<br>CO3: Design sinusoidal and non-sinusoidal oscillators.<br>CO4: Understand the functioning of OP-AMP based circuit. |
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| Department | ECE |
| Course Code | EC403 |
| Title of Course | Microprocessor & Microcontroller |
| Nature of Course | Compulsory |
| Type of Course | Lectures |

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| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Do assembly language programming<br>CO2: Do interfacing design of peripherals likes I/O, A/D, D/A, Timer etc.<br>CO3: Develop system using different microprocessors.<br>CO4: Understand RSIC processors and design ARM microcontroller-based systems |
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| Department | ECE |
| Course Code | ES-CS401 |
| Title of Course | Design and Analysis of Algorithm |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.<br>CO2: Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.<br>Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.<br>CO4: Describe the dynamic-programming paradigm and explain when an algorithmic<br>design situation calls for it. For a given problems of dynamic-programming and |

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| | develop the dynamic programming algorithms, and analyze it to determine its<br>computational complexity.<br><br>CO5: For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.<br><br>CO6: Explain the ways to analyze randomized algorithms (expected running time,<br>probability of error).<br><br>CO7: Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS). |
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| Department | ECE |
| Course Code | BS-M401 |
| Title of Course | Numerical Methods (BS) |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 2L+0T |
| Total Contact Hours | 22 |
| Course Outcomes | CO1: Ability to understand numerical computation & Interpolation.<br><br>CO2:Ability to learn Numerical integration & solution of linear equations.<br><br>CO3:Ability to solve Numerical solution of Algebraic & differential equation. |
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| Department | ECE |
| Course Code | BS-B401 |
| Title of Course | Biology for Engineers |

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|---|---|
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 2L+1T |
| Total Contact Hours | 33 |
| Course Outcomes | CO1: Describe how biological observations of 18th Century that lead to major discoveries.<br><br>CO2: Convey that classification per se is not what biology is all about but highlight the underlying<br>criteria, such as morphological, biochemical and ecological<br><br>CO3: Highlight the concepts of recessiveness and dominance during the passage of genetic material<br>from parent to offspring<br><br>CO4: Convey that all forms of life have the same building blocks and yet the manifestations are as<br>diverse as one can imagine<br><br>CO5: Classify enzymes and distinguish between different mechanisms of enzyme action<br><br>CO6: Identify DNA as a genetic material in the molecular basis of information transfer.<br><br>CO7:Analyse biological processes at the reductionistic level<br><br>CO8:Apply thermodynamic principles to biological systems.<br><br>CO9: Identify and classify microorganisms. |
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| LAB | LAB |
| Department | ECE |
| Course Code | EC491 |
| Title of Course | Analog Communication Lab |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L+0T+2P |
| Total Contact Hours | 18 |
| Course Outcomes | CO1: Ability to learn concept of analog modulation and Demodulation technique.<br>CO2:Ability to know different types of associated the calculation.<br>CO3:Ability to learn different application areas of analog communication. |
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| Department | ECE |
| Course Code | EC492 |
| Title of Course | Analog Electronic Circuits Lab |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L+0T+2P |
| Total Contact Hours | 18 |

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| Course Outcomes | CO1: Design and test rectifiers, clipping circuits, clamping circuits and voltage regulators.<br><br>CO2: Compute the parameters from the characteristics of JFET and MOSFET devices<br><br>CO3: Design, test and evaluate BJT amplifiers in CE configuration.<br><br>CO4: Design and test JFET/MOSFET amplifiers.<br><br>CO5: Design and test a power amplifier.<br><br>CO6: Design and test various types of oscillators. |
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| Department | ECE |
| Course Code | EC493 |
| Title of Course | Microprocessor & Microcontroller Lab |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L+0T+2P |
| Total Contact Hours | 16 |
| Course Outcomes | CO1: Ability to develop an in depth understanding on operation of microprocessors and microcontrollers.<br><br>CO2:Ability to understand assembly language program for 8051.<br><br>CO3:Ability to comparative study of higher versions of microcontroller. |
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| Department | ECE |
| Course Code | BS-M(CS)491 |
| Title of Course | Numerical Methods Lab (BS) |

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|---|---|
| Nature of Course | Compulsory |
| Type of Course | Practicals |
| Contact Hours | 0L+0T+2P |
| Total Contact Hours | 12 |
| Course Outcomes | CO1: Ability to understand numerical computation & Interpolation.<br><br>CO2:Ability to learn Numerical integration & solution of linear equations.<br><br>CO3:Ability to get Numerical solution of Algebraic & differential equation. |

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|---|---|
| Department | ECE |
| Course Code | HS-HU48 |
| Title of Course | Soft Skill Development Lab |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L+0T+2P |
| Total Contact Hours | 20 |
| Course Outcomes | **CO1: Ability to develop skills of technical communication in English through Language Lab practice sessions.**<br><br>**CO2: Ability to Communicate confidently and competently in English in all spheres.** |

## 5th and 6th SEMESTER NEW SYLLABUS

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|---|---|
| Department | ECE |
| Course Code | EC501 |
| Title of Course | Electromagnetic Waves |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 34 |
| Course Outcomes | CO1: Understand characteristics and wave propagation on high frequency transmission lines.<br>CO2: Carryout impedance transformation on TL.<br>CO3: Use sections of transmission line sections for realizing circuit elements.<br>CO4: Characterize uniform plane wave.<br>CO5: Calculate reflection and transmission of waves at media interface.<br>CO6: Analyze wave propagation on metallic waveguides in modal form.<br>CO7: Understand principle of radiation and radiation characteristics of an antenna. |

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|---|---|
| Department | ECE |
| Course Code | EC502 |
| Title of Course | Computer Architecture |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 34 |
| Course Outcomes | CO1: Learn how computers work.<br>CO2: Know basic principles of computer's working.<br>CO3: Analyze the performance of computers.<br>CO4: Know how computers are designed and built.<br>CO 5: Understand issues affecting modern processors (caches, pipelines etc.). |

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|---|---|
| Department | ECE |
| Course Code | EC503 |
| Title of Course | Digital Communication and Stochastic Process |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the concept of Stochastic Process in Communication System.<br>CO2: Represent various signals in different mathematical forms.<br>CO3: Analyze baseband transmission mode of digital data.<br>CO 4: Analyze different career modulation techniques considering noise aspects. |

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|---|---|
| Department | ECE |
| Course Code | EC504 |
| Title of Course | Digital Signal Processing |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 34 |
| Course Outcomes | CO1: Represent signals mathematically in continuous and discrete time and frequency domain.<br>CO2: Get the response of an LSI system to different signals.<br>CO3: Design of different types of digital filters for various applications. |

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|---|---|
| Department | ECE |
| Course Code | PE-EC505A |
| Title of Course | Information Theory and Coding |
| Nature of Course | Elective |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |

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| Course Outcomes | CO1: Understand the concept of information and entropy<br>CO2: Understand Shannon's theorem for coding<br>CO3: Calculation of channel capacity<br>CO4: Apply coding techniques |

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|---|---|
| Department | ECE |
| Course Code | PE-EC505B |
| Title of Course | Speech and Audio Processing |
| Nature of Course | Elective |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Ability to know production and transmission of acoustic signals.<br>CO2: Ability to understand the time domain methods for Speech processing.<br>CO3: Ability to have the knowledge of Speech Codec standards and applications. |

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|---|---|
| Department | ECE |
| Course Code | PE-EC505C |
| Title of Course | Power Electronics |
| Nature of Course | Elective |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Build and test circuits using power devices such as SCR<br>CO2: Analyze and design-controlled rectifier, DC to DC converters, DC to AC inverters.<br>CO3: Learn how to analyze these inverters and some basic applications.<br>CO4: Design SMPS. |

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|---|---|
| Department | ECE |
| Course Code | PE-EC505D |
| Title of Course | Scientific Computing |
| Nature of Course | Elective |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the significance of computing methods, their strengths and application areas.<br>CO2: Perform the computations on various data using appropriate computation tools. |

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|---|---|
| Department | ECE |
| Course Code | OE-EC506A |
| Title of Course | Soft Skill and Interpersonal Communication |
| Nature of Course | Elective |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |

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| Total Contact Hours | 32 |
| Course Outcomes | CO1: Recognise the importance of interpersonal skills<br>CO2: Describe how good communication with other can influence our working relationships<br>CO3: Outline the roles we play in our work groups and teams. |

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|---|---|
| Department | ECE |
| Course Code | OE-EC506B |
| Title of Course | Cyber Law & Intellectual Property Rights |
| Nature of Course | Elective |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the role of intellectual property rights.<br>CO2: Identify the main types of intellectual property rights.<br>CO3: Understand the steps for successful registration and protection of intellectual property rights at national, regional and international levels.<br>CO4: Search patent and trademark databases.<br>CO5: Understand the legal aspects for intellectual property protection. |

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|---|---|
| Department | ECE |
| Course Code | OE-EC506C |
| Title of Course | Human Resource Management |
| Nature of Course | Elective |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact | 32 |

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| Hours | |
| Course Outcomes | CO1: Know the professional and personal qualities of a HR manager.<br>CO2: Learn different methods of selecting human resources through recruitment, training and performance appraisal system.<br>CO3: Know how to develop a favourable working environment in an organisation through participation in management and maintain a good industrial relation for benefit of the society.<br>CO4: Know about consequence of industrial dispute and employee indiscipline of an organization. |

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|---|---|
| Department | ECE |
| Course Code | MC-HU501 |
| Title of Course | Effective Technical Communication |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L:0T:3P |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Build confidence in listening, speaking, reading and writing English professionally.<br>CO2: Enable the students to think and speak effectively on everyday topics, including topics related to technical concepts.<br>CO3: Equip students with the basics of Academic writing.<br>CO4: Developing industry-ready attitude towards professional communication.<br>CO5: Prepare for competitive exams like TOEFL, IELTS. |

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|---|---|
| Department | ECE |
| Course Code | EC591 |
| Title of Course | Electromagnetic Wave Laboratory |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L:0T:2P |
| Total Contact | 18 |

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| Hours | |
| Course Outcomes | **CO1:** Ability to plot of standing wave pattern along a transmission line when the lines open circuited, short circuited and terminated by a resistive load at the load end.<br>**CO2:** Ability to study of smith chart on MATLAB platform.<br>**CO3:** Ability to study the radiation pattern of different type of linear Antenna. |

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|---|---|
| Department | ECE |
| Course Code | EC592 |
| Title of Course | Digital Communication Laboratory |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L:0T:2P |
| Total Contact Hours | 24 |
| Course Outcomes | **CO1:** Ability to develop fundamental understanding of Digital Communication system.<br>**CO2:** Ability to develop concept of analog digitization using techniques as PCM, digital modulation and demodulation.<br>**CO3:** Ability to develop the design of digital modulation and de modulation technique such as ASK, PSK and FSK**.** |

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|---|---|
| Department | ECE |
| Course Code | EC593 |
| Title of Course | Digital Signal Processing Laboratory |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L:0T:2P |
| Total Contact Hours | 24 |
| Course Outcomes | **CO1:** Ability to analysis in signal processing using mathematical tools such as Z transform and Discrete Fourier transforms.<br>**CO2:** Ability to design FIR filter.<br>**CO3:** Ability to design Butterworth filter with different set of parameters<br>**CO4:** Ability to know the verification of different algorithm associated with filtering. |

## 6th SEMESTER

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|---|---|
| Department | ECE |
| Course Code | EC601 |
| Title of Course | Control System and Instrumentation |
| Nature of Course | Compulsory |
| Type of Course | Lectures |

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| Contact Hours | 3L+0T |
| Total Contact Hours | 34 |
| Course Outcomes | CO1: Characterize a system and find its steady state behavior.<br>CO2: Investigate stability of a system using different tests.<br>CO3: Design various controllers.<br>CO4: Solve linear, non-linear and optimal control problems.<br>CO5: Study with CRO, Wave analyzer, Spectrum analyzer knowing their functional details. |

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|---|---|
| Department | ECE |
| Course Code | EC602 |
| Title of Course | Computer Network |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: learn how computers work.<br>CO2: know basic principles of computer's working.<br>CO3: analyze the performance of computers.<br>CO4: know how computers are designed and built.<br>CO5: Understand issues affecting modern processors (caches, pipelines etc.). |

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|---|---|
| Department | ECE |
| Course Code | PE-EC603A |
| Title of Course | Introduction to MEMS |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Appreciate the underlying working principles of MEMS and NEMS devices.<br>CO2: Design and model MEM devices. |

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|---|---|
| Department | ECE |
| Course Code | PE-EC603B |
| Title of Course | Bio-Medical Electronics |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the application of the electronic systems in biological and medical applications.<br>CO2: Understand the practical limitations on the electronic components while handling bio substances.<br>CO3: Understand and analyze the biological processes like other electronic processes. |

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|---|---|
| Department | ECE |
| Course Code | PE-EC603C |
| Title of Course | CMOS VLSI Design |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand ASIC Design Flow and Design Styles.<br>CO2: Understand Electrical Characters of MOSFET.<br>CO3: Understand Steps of IC Fabrication Process.<br>CO3: Understand different Methods of Digital ASIC design using CMOS Technology: Static, Transmission Gate, Dynamic etc.<br>CO4: Understand different Performance aspects of Digital ASIC: Transfer Character, Power, Delay etc.<br>CO5: Understand Physical Design aspects of Digital ASIC. |

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|---|---|
| Department | ECE |
| Course Code | PE-EC603D |
| Title of Course | Nano Electronics |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand various aspects of nano-technology and the processes involved in making nano components and material.<br>CO2: Leverage advantages of the nano-materials and appropriate use in solving practical problems.<br>CO3: Understand various aspects of nano-technology and |

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| | the processes involved in making nano components and material.<br>CO4: Leverage advantages of the nano-materials and appropriate use in solving practical problems. |

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|---|---|
| Department | ECE |
| Course Code | OE-EC604A |
| Title of Course | Electronic Measurement & Measuring Instruments |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Describe the fundamental concepts and principles of instrumentation<br>CO2: Explain the operation of various instruments required in measurements<br>CO 3: Apply the measurement techniques for different types of tests<br>CO4: To select specific instruments for specific measurement function.<br>CO5: Understand principle of operation and working of different electronic instruments Students will understand functioning, specification and application of signal analyzing instruments |

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|---|---|
| Department | ECE |
| Course Code | OE-EC604B |
| Title of Course | Operating System |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.<br>CO2: understand the difference between process & thread, issues of scheduling of user-level processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs.<br>CO3: understand the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system.<br>CO4: understand the design and management concepts along with issues and challenges of main memory, virtual memory and file system.<br>CO5: understand the types of I/O management, disk scheduling, protection and security problems faced by operating systems and how to minimize these problems. |

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|---|---|
| Department | ECE |
| Course Code | OE-EC604C |
| Title of Course | Object Oriented Programming |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |

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| Course Outcomes | CO1: differentiate between structures-oriented programming and object-oriented programming.<br>CO2: use object-oriented programming language like C++ and associated libraries to develop object-oriented programs.<br>CO3: understand and apply various object-oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using C++ language.<br>CO4: apply concepts of operator-overloading, constructors and destructors. 5. apply exception handling and use built-in classes from STL. |

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|---|---|
| Department | ECE |
| Course Code | HS-HU601 |
| Title of Course | Economics for Engineers |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | **CO1:** Ability to understand Economic Decisions Making and considering that students will learn to find out Engineering Costs & Estimation.<br>**CO2:** Ability to learn Cash Flow and also able to calculate Rate of Return Analysis.<br>**CO3:** Ability to know Inflation and Price Change, Present worth Analysis.<br>**CO4:** Ability to learn depreciation and able to analysis the requirement of replacement. |

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| Department | ECE |

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|---|---|
| Course Code | EC691 |
| Title of Course | Computer Network Lab |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L:0T:2P |
| Total Contact Hours | 14 |
| Course Outcomes | CO1: Ability to understand the basics of Networking.<br>CO2: Ability to understand the various protocols used in the current networking system.<br>CO3: Ability to understand the different physical devices used in the networking.<br>CO4: Ability to study the different heuristics for networking. |

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|---|---|
| Department | ECE |
| Course Code | EC692 |
| Title of Course | Control and Instrumentation Laboratory |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L:0T:2P |
| Total Contact Hours | 18 |

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| Course Outcomes | **CO1:** Ability to learn basic concept of control system and familiarization with MATLAB.<br>**CO2:** Ability to learn how to determine step response for first order and second order system and step and impulse response for type -I & type-II system using MATLAB.<br>**CO3:** Ability to evaluate of steady- state-error, setting time, percentage peak overshoots, gain margin, phase margin using MATLAB & PSPICE. |

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|---|---|
| Department | ECE |
| Course Code | EC681 |
| Title of Course | Mini Project/ Electronic Design Workshop |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0L:0T:4P |
| Total Contact Hours | 40 |
| Course Outcomes | CO1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.<br>CO2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.<br>CO3. Write comprehensive report on mini project work |

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|---|---|
| | ECE |
| Course Code | MC681 |
| Title of Course | Universal Human Values |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 2L+0T |
| Total Contact Hours | 32 |

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| Course Outcomes | 1. Understand the significance of value inputs in a classroom and start applying them in their life and profession<br>2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.<br>3. Understand the value of harmonious relationships based on trust and respect in their life and profession<br>4. Understand the role of a human being in ensuring harmony in society and nature.<br>5. Distinguish between ethical and unethical practices, and start identifying a strategy to actualize a harmonious environment wherever they work. |

| **4th Year from Academic Year 2018-19** | |
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| Department | ECE |
| Course Code | HS-**HU701** |
| Title of Course | Principles of Management |
| Nature of Course | Compulsory |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |

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| Course Outcomes | CO1: Recognize the role of a manager and how it relates to the organization's mission. |
| | CO2: Define management, its four basic functions and skills. |
| | CO3: Know critical management theories and philosophies and how to apply them. |
| | CO4: Recognize the concept of social responsiveness and its benefits. |
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| Department | ECE |
| Course Code | **PE-EC701A** |
| Title of Course | **Microwave Theory and Technique** |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand various microwave system components their properties. |
| | CO2: Appreciate that during analysis/ synthesis of microwave systems, the different mathematical treatment is required compared to general circuit analysis. |
| | CO3: Design microwave systems for different practical application. |
| | |
| Department | ECE |
| Course Code | **PE-EC701B** |
| Title of Course | **Satellite Communication** |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Visualize the architecture of satellite systems as a means of high speed, high<br>range communication system. |
| | CO2: State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes. |
| | CO3: Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions. |
| | |
| Department | ECE |
| Course Code | **PE-EC701C** |
| Title of Course | **Mobile Communication and Networks** |
| Nature of Course | Optional |
| Type of Course | Lectures |

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| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the working principles of the mobile communication systems. |
| | CO2: Understand the relation between the user features and underlying technology. |
| | CO4 Analyze mobile communication systems for improved performance. |
| | |
| Department | ECE |
| Course Code | **PE-EC702A** |
| Title of Course | **Adaptive Signal Processing** |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the non-linear control and the need and significance of changing the control parameters w.r.t. real-time situation. |
| | CO2: Mathematically represent the 'adaptability requirement'. |
| | CO3: Understand the mathematical treatment for the modeling and design of the signal processing systems. |
| | |
| Department | ECE |
| Course Code | **PE-EC702B** |
| Title of Course | **Digital Image and Video Processing** |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Mathematically represent the various types of images and analyze them. |
| | CO2: Process these images for the enhancement of certain properties or for optimized use of there sources. |
| | CO3: Develop algorithms for image compression and coding. |
| | |
| Department | ECE |
| Course Code | **PE-EC702C** |
| Title of Course | **Embedded System** |
| Nature of Course | Optional |

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|---|---|
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems. |
| | CO2: Become aware of the architecture of the ATOM processor and its programming aspects (assembly Level). |
| | CO3: Design real time embedded systems using the concepts of RTOS. |
| | CO4: Analyze various examples of embedded systems based on ATOM processor. |
| | |
| Department | ECE |
| Course Code | **PE-EC703A** |
| Title of Course | Neural Network and Fuzzy Logic Control |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Analyze and classify neural networks and its implementation algorithms. |
| | CO2: Apply suitable algorithms on different cases. |
| | CO3: Apply fuzzy logic and neural networks. |
| | CO4: Analyze the applications of Neural Network and Fuzzy logic in image processing. |
| | |
| Department | ECE |
| Course Code | PE-EC703B |
| Title of Course | Wireless Sensor Networks |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Design wireless sensor networks for a given application. |
| | CO2: Understand emerging research areas in the field of sensor networks. |
| | CO3: Understand MAC protocols used for different communication standards used in WSN. |
| | CO4: Explore new protocols for WSN. |
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| Department | ECE |
| Course Code | PE-EC703C |
| Title of Course | Wavelet Transforms |

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|---|---|
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Classify various wavelet transform and explain importance of it. |
| | CO2: Describe Continuous Wavelet Transform (CWT) and Discrete Wavelet Transform (DWT). |
| | CO3: Explain the properties and application of wavelet transform. |
| | CO4: Develop and realize computationally efficient wavelet based algorithms for signal and image processing. |
| | CO5: Explain brief features and strength of transform beyond wavelet. |

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|---|---|
| Department | ECE |
| Course Code | OE-EC704A |
| Title of Course | Web Technology |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Design good web pages using different tags, tables, forms, frames and style sheets supported by HTML |
| | CO2: Implement, compile, test and run Java programs, comprising more than one class, to address a particular software problem. |
| | CO3: Demonstrate the ability to employ various types of selection statements and iteration statements in a Java program.. |
| | CO4: Be able to leverage the object-oriented features of Java language using abstract class and interface. |
| | CO5: Be able to handle errors in the program using exception handling techniques of Java. |
| | CO6: Design applets as per the requirements with event handling facility. |
| | |
| Department | ECE |
| Course Code | **OE-EC704B** |
| Title of Course | **Optimization Technique** |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |

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| Course Outcomes | CO1: Formulate fitness functions and cost functions for engineering optimization problems and specify the constraints as required. |
| | CO2: Implement different single variable optimization algorithms including the gradient based methods. |
| | CO3: Analyze and implement different multi variable optimization algorithms and a multi objective optimization techniques based on Parento-Fronts. |
| | CO4: Implement Bio-inspired optimization algorithms for solving complex engineering problems. |
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| Department | ECE |
| Course Code | OE-EC704C |
| Title of Course | Entrepreneurship |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Know the contribution of an entrepreneur and role of SSI units in growth and development of socioeconomic condition of our country. |
| | CO2: Learn market survey, sales promotions and management of working capital through costing and book keeping. |
| | CO3: Know different decision making technique and benefit of personal management system as well as motivational methods of an enterprise.. |
| | CO4: Learn how to prepare a project report and knowledge about different tax system of an enterprise. |
| | |
| Department | ECE |
| Course Code | PE-EC801A |
| Title of Course | Antennas and Propagation |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the properties and various types of antennas. |
| | CO2: Analyze the properties of different types of antennas and their design. |
| | CO3: Operate antenna design software tools and come up with the design of the antenna of required specifications. |
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| Department | ECE |
| Course Code | PE-EC801B |
| Title of Course | Fiber Optic Communication |
| Nature of Course | Optional |

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| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the principles fiber-optic communication, the components and the bandwidth advantages. |
| | CO2: Understand the properties of the optical fibers and optical components. |
| | CO3: Understand operation of lasers, LEDs, and detectors. |
| | CO4: Analyze system performance of optical communication systems. |
| | CO5: Design optical networks and understand non-linear effects in optical fibers. |
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| Department | ECE |
| Course Code | PE-EC801C |
| Title of Course | Error Correcting Codes |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the error sources. |
| | CO2: Understand error control coding applied in digital communication. |
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| Department | ECE |
| Course Code | PE-EC802A |
| Title of Course | Mixed Signal Design |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the practical situations where mixed signal analysis is required. |
| | CO2: Analyze and handle the inter-conversions between signals. |
| | CO3: Design systems involving mixed signals. |
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| Department | ECE |
| Course Code | PE-EC802B |
| Title of Course | Industrial Automation and Control |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact | 32 |

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| Hours | |
| Course Outcomes | CO1: Select suitable sensor to measure industrial parameters and the different types of actuators and its working. They will be able to design proper signal conditioning circuit to the transducer. |
| | CO2: Determine the effect of proportional gain, integral time, derivative gain constant on the system performance and will be able to tune the controller using tuning methods, implement PID using electronic , digital, pneumatic and hydraulic methods.. |
| | CO3: Design the ladder logic to implement any process with given problem statement. |
| | CO4: Analyze DCS hardware and its merits/demerits in an industrial automation. |
| | CO5: Analyze SCADA hardware and software and its merits/demerits in industrial automation. |
| | CO6: Design the complex control scheme to a particular process. |
| | |
| Department | ECE |
| Course Code | PE-EC802C |
| Title of Course | VLSI Design Automation |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Ability to understand the concept of VLSI design.. |
| | CO2: Ability to understanding the microelectronic process for VLSI fabrication. |
| | CO3: Ability to make analog and digital VLSI circuit using CMOS. |
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| Department | ECE |
| Course Code | OE-EC803A |
| Title of Course | Internet of Things(IoT) |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: understand the application areas of IOT.. |
| | CO2: realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks. |
| | CO3: understand building blocks of Internet of Things and characteristics. |
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| Department | ECE |
| Course Code | **OE-EC803B** |
| Title of Course | **Big Data Analysis** |
| Nature of | Optional |

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| Course | |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the key issues in big data management and its associated applications in intelligent business and scientific computing. |
| | CO2: Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics. |
| | CO3 Interpret business models and scientific computing paradigms, and apply software tools for big data analytics. |
| | CO4: Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc. |
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| Department | ECE |
| Course Code | OE-EC803C |
| Title of Course | Cyber Security |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: understand the concept of cyber security. |
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| Department | ECE |
| Course Code | OE-EC804A |
| Title of Course | Artificial Intelligence |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Understand the modern view of AI as the study of agents that receive percepts from the environment and perform actions.. |
| | CO2 Demonstrate awareness of the major challenges facing AI and the complex of typical problems within the field. |
| | CO3: Exhibit strong familiarity with a number of important AI techniques, including in particular search, knowledge representation, planning and constraint management. |
| | CO4: Asses critically the techniques presented and to apply them to real world problems. |
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| Department | ECE |
| Course Code | **OE-EC804B** |
| Title of Course | **Microwave Integrated Circuits** |

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|---|---|
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: Analyze the fabrication techniques of MIC and MMIC, use of active devices with MIC and MMIC, differentiate between MIC and MMIC. |
| | CO2: Aanalyze and design strip lines and micro strip lines, and model the discontinuities in those lines. |
| | CO3: Analyze and design slot lines, fin lines, coplanar lines and coplanar wave-guides. |
| | CO4: Design parallel coupled lines for couplers and power divider circuits. |
| | CO5: Differentiate between various measurement techniques associated with planar transmission lines. |
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| Department | ECE |
| Course Code | OE-EC804C |
| Title of Course | Organizational Behavior |
| Nature of Course | Optional |
| Type of Course | Lectures |
| Contact Hours | 3L+0T |
| Total Contact Hours | 32 |
| Course Outcomes | CO1: know about organisational structure, organisational behaviour and personality development. |
| | CO2: learn about motivational techniques and skill required to work in a group and the process of group decision making. |
| | CO3: know various leadership styles and the role of leader in achievement of organisational objective. |
| | CO4: learn about the reasons organizational change and its development. |
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| Department | ECE |
| Course Code | **EC881** |
| Title of Course | **Project Stage II** |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 0T+15P |
| Total Contact Hours | 15 |
| Course Outcomes | CO1: Ability to generate the specification of the subsystems and forming the block diagram of<br>the complete system. |
| | CO2: Ability to improving the experimental skills of the students in implementing, testing and<br>interfacing different circuits. |

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| | CO3: Ability to utilize scattered materials from several under graduate courses of<br>telecommunication, electronics and propagation. |
| | CO4: Ability to improvise their all-round knowledge, particularly of recent developments<br>which have not yet been included in the curriculum. |
| | CO5: Ability to build different circuits as subparts of the project that can serve in developing<br>laboratory work. |
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| Department | ECE |
| Course Code | **EC781** |
| Title of Course | **INDUSTRIALTRAINING** |
| Nature of Course | Compulsory |
| Type of Course | |
| Contact Hours | 0L+0T |
| Total Contact Hours | |
| Course Outcomes | CO1: Abilitythe meetthe gapbetweentheIndustryrequirements andthelearningatInstitute. |
| | CO2: Abilityto familiartheworking cultureandenvironmentof theindustry. |

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| Department | ECE |
| Course Code | **EC782** |
| Title of Course | **PROJECTPART1** |
| Nature of Course | Compulsory |
| Type of Course | Practical |
| Contact Hours | 3P+0T |
| Total Contact Hours | |
| Course Outcomes | CO1:<br>Abilitytoenablestudentstogeneratethespecificationofthesubsystemsandforming theblockdiagramofthecompletesystem. |
| | CO2:<br>Abilitytoimprovetheexperimentalskillsofthestudentsinimplementing,testingand interfacingdifferentcircuits. |
| | CO3:Toprovidethe studentwithanintegratedapplication,toutilize |

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| | scatteredmaterialsFrom severalundergraduatecoursesoftelecommunication,electronics andpropagation. |
| | CO4: Abilitytoimprovisetheir all-round knowledge, particularly ofrecent developments whichhavenotyetbeenincludedinthecurriculum |
| | CO5: Abilityto builddifferentcircuits assubpartsof theprojectthatcanserve indeveloping laboratorywork. |

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| Department | ECE |
| Course Code | **EC891** |
| Title of Course | **GRANDVIVA** |
| Nature of Course | Compulsory |
| Type of Course | Sessional |
| Contact Hours | 0P+0T |
| Total Contact Hours | 6 |
| Course Outcomes | CO1: Abilitytogetthescopeofrevisethecoreengineeringsubjectslearnsduringthe4yearof graduatecourse. |
| | CO2: Abilitytoknowtherequirementsofthesubjectswhicharenecessarytosolvethereallife problems. |
| | CO3:Abilitytogainthe knowledge howto facetheinterviewforarecruitmentdrive. |