Hope Foundation’s

International Institute of Information Technology

P-14, Rajiv Gandhi Info Park, Phase 1, Hinjawadi, Pune 411057

Department of Electronics and Telecommunication

**Course Outcomes (COs)**

**SE (Electronics and Telecommunication) – 2019 Pattern**

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| Course  Code | Name of  Subject/Course | Course Outcomes (Cos) |
| 207005 | Engineering Mathematics - III | * Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems. * Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems. * Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing. * Perform vector differentiation & integration, analyze the vector fields and apply to electro-magnetic fields & wave theory. * Analyze Complex functions, Conformal mappings,   Contour integration applicable to electrostatics, digital filters, signal and image processing. |
| 204181 | Electronic Circuits | * Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier. * Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications. * Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies. * Explain internal schematic of Op-Amp and define its performance parameters. * Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications. * Understand and compare the principles of various data   conversion techniques and PLL with their applications. |

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| 204182 | Digital Circuits | * Identify and prevent various hazards and timing problems in a digital design. * Use the basic logic gates and various reduction techniques of digital logic circuit. * Analyze, design and implement combinational logic circuits. * Analyze, design and implement sequential circuits. * Differentiate between Mealy and Moore machines. * Analyze digital system design using PLD. |
| 204183 | Electrical Circuits | * Analyze the simple DC and AC circuit with circuit simplification techniques. * Formulate and analyze driven and source free RL and RC circuits. * Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function. * Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors. * Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles. * Analyze and select a suitable motor for different   applications. |
| 204184 | Data Structures | * Solve mathematical problems using C programming language. * Implement sorting and searching algorithms and calculate their complexity. * Develop applications of stack and queue using array. * Demonstrate applicability of Linked List. * Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity. * Apply the knowledge of graph for solving the problems   of spanning tree and shortest path algorithm. |
| 204191 | Signals & Systems | * Identify, classify basic signals and perform operations on signals. * Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals. * Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform. * Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms. * Define and describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF. * Compute the mean, mean square, variance and |

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|  |  | standard deviation for given random variables using  PDF. |
| 204192 | Control Systems | * Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems. * Determine the (absolute) stability of a closed-loop control system. * Perform time domain analysis of control systems required for stability analysis. * Perform frequency domain analysis of control systems required for stability analysis. * Apply root-locus, Frequency Plots technique to analyze control systems. * Express and solve system equations in state variable form. * Differentiate between various digital controllers and understand the role of the controllers in Industrial automation. |
| 204193 | Principles of Communication Systems | * To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study. * Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems. * Explain generation and detection of FM systems and compare with AM systems. * Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM). * Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM). * Illustrate waveform coding, multiplexing and   synchronization techniques and articulate their importance in baseband digital transmission. |
| 204194 | Object Oriented Programming | * Describe the principles of object-oriented programming. * Apply the concepts of data encapsulation, inheritance in C++. * Understand Operator overloading and friend functions in C++. * Apply the concepts of classes, methods inheritance and polymorphism to write programs C++. * Apply Templates, Namespaces and Exception Handling concepts to write programs in C++. * Describe and use of File handling in C++. |
| 204199 | Employability Skills  Development | * Define personal and career goals using introspective   skills and SWOC assessment. Outline and evaluate |

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|  |  | short-term and long-term goals.   * Develop effective communication skills (listening, reading, writing, and speaking), self- management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace. * Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills. * Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career. * Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and   excel in the professional environment. |
| 204200 | Project Based Learning | * Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives. * Contribute to society through proposed solution by strictly following professional ethics and safety measures. * Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge. * Analyze the results and arrive at valid conclusion. * Use of technology in proposed work and demonstrate learning in oral and written form. * Develop ability to work as an individual and as a team   member. |
| **SEMESTER II** | | |
| 204191 | Signals & Systems | * Identify, classify basic signals and perform operations on signals. * "Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals." * Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform. * "Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms. " * "Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF. " * "Compute the mean, mean square, variance and standard deviation for given random variables using PDF." |
| 204192 | Control Systems | * Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems. * Perform time domain analysis of control systems required for stability analysis. * Apply root locus and Routh Hurwitz criteria to determine the stability of a closed-loop control system. * Perform frequency domain analysis of control systems required for stability analysis. * Express and solve system equations in state variable form. * Differentiate between digital controllers and understand their role in industrial automation. |
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| 204194 | Object Oriented Programming | * Apply the concepts of object-oriented programming to write programs in C++' and learn concepts of operator overloading. * Design simple programs using classes and objects in C++. * Design and implement C++ programs for complex problems, making good use of the features of the language such as classes, inheritance and templates * "Able to Understand and Apply the concepts of constructors &destructors in program design" * Understand exceptional handling concepts using try and catch. * Use the concepts in C++ to for file handling operations. |
| 204195 | Signals & Control System Lab | * Write a program to generate and plot the basic signals in time domain using any simulation tool. * Write a code for verifying the sampling and aliasing components of any arbitrary signal. Implement computing the system response for any arbitrary input with the help of systems impulse response. * Carryout a spectral analysis using Fourier transform on any speech or audio signals and verify the results with the manual computation. * Solve the examples on block diagram reduction techniques, signal flow graph, and find the transfer function of the electrical and mechanical systems. * Implement the first & second order systems and observe the system response for step input. Also verify the systems stability. * Write a code to implement the stability techniques; Root locus, Bode plot, Nyquist plot and comment on Gain Margin, Phase Margin and Stability of the systems observations. |
| 204196 | Principle of Communication Systems Lab | * To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study. * Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems. * Explain generation and detection of FM systems and compare with AM systems. * Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM). * Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM). * Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission. |
| 204197 | Object Oriented Programming Lab | * Apply the concepts of object-oriented programming to write programs in C++' and learn concepts of operator overloading. * Design simple programs using classes and objects in C++. * Design and implement C++ programs for complex problems, making good use of the features of the language such as classes, inheritance and templates * "Able to Understand and Apply the concepts of constructors &destructors in program design. " * Understand exceptional handling concepts using try and catch. * Use the concepts in C++ to for file handling operations. |
| 204198 | Data Analytics Lab | * Install Python Jupyter and write programs using NumPy, Pandas, Matplotlib and Scikit-learn * Write programs to visualize output using various graphs and plots * Illustrate decision making from raw data available. * Demonstrate quantitative research using statistical operations. * Analyze data set to summarize main characteristics and infer based on correlation. * Point out exact relationship between variables and predict the result. |
| 204199 | Employability Skill Development | * Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals. * Develop empathy and emotional intelligence to be able to enhance professional relationships especially in an ethnic and culturally diverse environment * Develop effective communication skills (listening, reading, writing, and speaking), self- management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace. * Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills. * Comprehend the importance of professional ethics, etiquette & morals and demonstrate sensitivity towards it throughout certified career. * Develop practically deployable skill sets involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment. |
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