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| 1. **Electrical Network Analysis** | | | | | | | | | | | |
| **Contact Hours** | | | Current and voltage transients RLC circuits with DC and AC excitation, resonant circuit: series and parallel resonance in AC circuit, Q-Factor, bandwidth, selectivity. Poly phase generators, star and delta connections, phase sequence, voltage and current relations, vector diagrams for balance and unbalanced three phase networks, three phase unbalanced star and delta connected loads, power in three phase circuits and different methods of its  Measurements. Loop and node analysis using matrix approach. Two-port network, characterization of linear time-invariant, two ports by six sets of parameters, relationship among parameter sets, interconnection of two port network. Initial condition determination, Laplace transform and differential equations, Laplace transform of signals involving generalized functions, convolution, introduction to poles & zeros and stability criteria, impedance functions and network theorems, frequency response, magnitude and phase plots, Fourier series and transform. | | | | | **Credit Hours:** | | | |
| Theory | | **48** | Theory | | **03** | |
| Practical | | **48** | Practical | | **01** | |
| **Total** | | **96** | **Total** | | **04** | |
| **SUGGESTED COURSE LEARNING OUTCOMES:**  Upon successful completion of the course, the student will be able to: | | | | | | | | | | | |
| **S. No** | **CLO** | | | | | | **Domain** | **Taxonomy Level** | **PLO** | | |
| **1** | Analyze AC circuits in time domain and frequency domain. | | | | | | Cognitive | **4** | **1** | | |
| **2** | Analyze balanced three phase systems | | | | | | Cognitive | **4** | **2** | | |
| **3** | Use simple electric circuit models to examine the behavior of complex networks. | | | | | | Cognitive | **3** | **3** | | |
| **4** | Construct circuits on breadboards and perform electrical measurements and analyze using modern engineering tools. | | | | | | Psychomotor | **2** | **5** | | |
| **RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):**  The course is designed so that students will achieve the following PLOs: | | | | | | | | | | | |
| **1** | Engineering Knowledge: | | | **√** | **7** | Environment and Sustainability: | | | | |  |
| **2** | Problem Analysis: | | | **√** | **8** | Ethics: | | | | |  |
| **3** | Design/Development of Solutions: | | | **√** | **9** | Individual and Team Work: | | | | |  |
| **4** | Investigation: | | |  | **10** | Communication: | | | | |  |
| **5** | Modern Tool Usage: | | | **√** | **11** | Project Management: | | | | |  |
| **6** | The Engineer and Society: | | |  | **12** | Lifelong Learning: | | | | |  |
| **Course outline:**  Current and voltage transients RLC circuits with DC and AC excitation, resonant circuit: series and parallel resonance in AC circuit, Q-Factor, bandwidth, selectivity. Poly phase generators, star and delta connections, phase sequence, voltage and current relations, vector diagrams for balance and unbalanced three phase networks, three phase unbalanced star and delta connected loads, power in three phase circuits and different methods of its  Measurements. Loop and node analysis using matrix approach. Two-port network, characterization of linear time-invariant, two ports by six sets of parameters, relationship among parameter sets, interconnection of two port network. Initial condition determination, Laplace transform and differential equations, Laplace transform of signals involving generalized functions, convolution, introduction to poles & zeros and stability criteria, impedance functions and network theorems, frequency response, magnitude and phase plots, Fourier series and transform.  **Lab Work**  Design and implement RLC circuits and observe resonance and impedance characteristics. Verify the node voltages and loop currents in RLC circuits using instruments. Verify Circuit-theorems using lab instruments. Verify circuit transformations using lab instruments. Learn the use of Circuit Simulation computer package such as SPICE. Observe transient and steady state response in RL, RC and RLC circuits using SPICE.  **Recommended Books:**   1. Electric Circuits Fundamentals, S. Franco, Oxford University Press, (Latest Edition). 2. The Analysis and Design of Linear Circuits by R E Thomas, A J Rosa and G J Toussaint, John Wiley, 6th Edition, 2009 3. Fundamentals of Electric Circuits by C Alexander and M Sadiku, McGraw Hill, 4th Edition, 2008 4. Basic Engineering Circuit Analysis by J D Irwin and R M Nelms, Wiley, 9th Edition, 2008 | | | | | | | | | | | |