**23EE12T2-ELECTRICAL CIRCUIT ANALYSIS-II**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Pre-requisite:** | Fundamental concepts of Electrical circuits. | **Sessional Evaluation: External Exam Evaluation:**  **Total Marks:** | 30  70  100 |

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| **Course Objectives** | To make the student learn about: | | |
| 1. The concepts of Laplace transforms, formulation of various circuit topologies (R, L and C components) and basic filters 2. The three phase balanced and unbalanced circuits, different circuit configurations and it’s mathematical modeling, network parameters and various filters 3. The Laplace transforms to solve various electrical network topologies and filter design concepts 4. The three phase circuits, transient response of various network topologies, electric circuits with periodic excitations and filter characteristics 5. The suitable electrical circuits and various filters for different applications. | | |
| **Course**  **Outcomes** | After completing the course the student will be able to | | **Blooms level** |
| CO1 | Remember the concepts of Laplace transforms, formulation of various circuit topologies (R, L and C components) and basic filters | **L1** |
| CO2 | Understand three phase balanced and unbalanced circuits, different circuit configurations and it’s mathematical  modeling, network parameters and various filters | **L2** |
| CO3 | Apply Laplace transforms to solve various electrical network  topologies and filter design concepts | **L3** |
| CO4 | Analyze three phase circuits, transient response of various  network topologies, electric circuits with periodic excitations and filter characteristics | **L4** |
| CO5 | Design suitable electrical circuits and various filters for  different applications | **L5** |
| **Course Content** | **UNIT I**  **Three phase circuits:**  Advantages of three phase system over single phase system - Phase sequence, star and delta connection of sources and loads, relation between line and phase quantities, analysis of balanced three phase circuits, measurement of active and reactive power.  Analysis of three phase Unbalanced circuits: Loop method, Star-Delta transformation technique, two-wattmeter method for measurement of three phase power.  **UNIT II**  **Laplace transforms** – Definition and Laplace transforms of standard functions– Shifting theorem – Transforms of derivatives and integrals, Inverse Laplace transforms and applications.  **Transient Analysis:** Transient response of R-L, R-C and R-L-C circuits (Series and parallel combinations) for D.C. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform approach. | | |

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|  | **UNIT III**  **Network Parameters:** Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, conversion of Parameters from one form to other, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations- problems.  **UNIT IV**  **Analysis of Electric Circuits with Periodic Excitation**: Fourier series and evaluation of Fourier coefficients, Trigonometric and complex Fourier series for periodic waveforms, Application to Electrical Systems – Effective value and average value of non-sinusoidal periodic waveforms, power factor, effect of harmonics.  **UNIT V**  **Filters:** Classification of filters-Low pass, High pass, Band pass and Band Elimination filters, Constant-k filters -Low pass and High Pass, Design of Filters. |
| **Text Books & Reference Books** | **TEXT BOOKS:**   1. Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, 8th Edition McGraw-Hill, 2013 2. Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N. O. Sadiku, 3rd Edition, Tata McGraw-Hill, 2019   **REFERENCE BOOKS:**   1. Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI, 2019. 2. Network Theory, N. C. Jagan and C. Lakshminarayana, 1st Edition, B. S. Publications, 2012. 3. Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyam Mohan S. Palli, 5th Edition, Tata McGraw-Hill, 2017. 4. Engineering Network Analysis and Filter Design (Including Synthesis of One Port Networks)- [Durgesh C. Kulshreshtha Gopal G. Bhise, Prem R.](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Durgesh%2BC.%2BKulshreshtha%2BGopal%2BG.%2BBhise%2C%2BPrem%2BR.%2BChadha&search-alias=stripbooks) [Chadha](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Durgesh%2BC.%2BKulshreshtha%2BGopal%2BG.%2BBhise%2C%2BPrem%2BR.%2BChadha&search-alias=stripbooks) ,Umesh Publications 2012. 5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai &   Co., 2018, 7th Revised Edition. |
| **E-**  **Resources** | 1.<https://archive.nptel.ac.in/courses/117/106/117106108/> 2.https://archive.nptel.ac.in/courses/108/105/108105159/ 3.[http://iete-elan.ac.in](http://iete-elan.ac.in/) 4.<http://freevideolectures.com/university/iitm> |