

**II Year – I SEMESTER**

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**ELECTRICAL CIRCUIT ANALYSIS-II****Preamble :**

This course aims at study of three phase systems, transient analysis, network synthesis and fourier analysis for the future study and analysis of power systems.

**Objectives:**

- i. To study the concepts of balanced three-phase circuits.
- ii. To study the concepts of unbalanced three-phase circuits.
- iii. To study the transient behaviour of electrical networks with DC, pulse and AC excitations.
- iv. To study the performance of a network based on input and output excitation/response.
- v. To understand the realization of electrical network function into electrical equivalent passive elements.
- vi. To understand the application of fourier series and fourier transforms for analysis of electrical circuits.

**UNIT-I Balanced Three phase circuits**

Phase sequence- star and delta connection - relation between line and phase voltages and currents in balanced systems - analysis of balanced three phase circuits - measurement of active and reactive power in balanced three phase systems.

**UNIT-II Unbalanced Three phase circuits**

Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter methods for measurement of three phase power.

**UNIT-III Transient Analysis in DC and AC circuits**

Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.

**UNIT-IV Two Port Networks**

Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations, Cascaded networks - poles and zeros of network functions.

**UNIT-V Network synthesis**

Positive real function - basic synthesis procedure - LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function - Foster and Cauer methods.

**UNIT-VI Fourier analysis and Transforms**

Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non sinusoidal periodic waveforms.

Fourier integrals and Fourier transforms – properties of Fourier transforms and application to electrical circuits.

**Outcomes:**

- i. Students are able to solve three- phase circuits under balanced condition.
- ii. Students are able to solve three- phase circuits under unbalanced condition.
- iii. Students are able find out transient response of electrical networks with different types of excitations.
- iv. Students are able to estimate the different types of two port network parameters.
- v. Students are able to represent electrical equivalent network for a given network transfer function.
- vi. Students are able to extract different harmonics components from the response of a electrical network.

**Text Books:**

1. Engineering Circuit Analysis by William Hayt and Jack E. Kemmerley, Mc Graw Hill Company, 6th edition.
2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd.

**Reference Books:**

1. Introduction to circuit analysis and design by Tildon Glisson. Jr, Springer Publications.
2. Circuits by A. Bruce Carlson, Cengage Learning Publications.
3. Network Theory Analysis and Synthesis by Smarajit Ghosh, PHI publications.
4. Networks and Systems by D. Roy Choudhury, New Age International publishers.
5. Electric Circuits by David A. Bell, Oxford publications.
6. Circuit Theory (Analysis and Synthesis) by A. Chakrabarti, Dhanpat Rai & Co.