**19EE1201-CIRCUITS & NETWORKS**

 (EEE)

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 2-1-0 |
| **Pre-requisite:** | Concepts of Basic electrical sciences, Calculus & Laplace Transforms. | **Sessional Evaluation:****External Exam Evaluation:****Total Marks:** | 4060100 |

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| **Course Objectives:** | To make the student learn about1. Network theorems and their applications
2. The analysis of three phase balanced & unbalanced circuits
3. Necessary conditions for driving point function & transfer function
4. Time domain response from pole-zero plots
5. Transient response of RL, RC, RLC series circuit for DC excitation.
6. Transient response of RL, RC, RLC series circuit for AC excitation.
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| **Course Outcomes:** | After completing the course the student will be able to  |
| CO1 | Apply suitable theorems for a given circuit. |
| CO2 | Analyze three phase balanced & unbalanced circuits and also calculation of power for a given circuit. |
| CO3 | Evaluate the two port network parameters for the given network. |
| CO4 | Draw the pole- zero plot and obtain the time domain response for a given transfer function. |
| CO5 | Find the time constant and transient response of a given circuit with and without D.C excitation. |
| CO6 | Determine the time constant and transient response of a given circuit with and without A.C excitation. |
| **Course Content:** | **UNIT- I****Network Theorems:** Superposition, Reciprocity, Thevenin’s and Norton’s theorems, Maximum power transfer theorem, Millman’s theorem and Compensation theorem. Application of these theorems to DC and AC Excitations **UNIT – II****Three phase A.C circuits:** Advantages of three phase systems - Phase sequence - Star and Delta connection-Relation between line and phase voltages& currents in balanced systems-Analysis of balanced three phase circuits-measurement of power in Balanced and unbalanced three phase systems. Analysis of three phase Unbalanced circuits-Loop method-Application of Milliman’s theorem-Star Delta Transformation Technique.**UNIT – III****Two port Network Parameters** - Open circuit parameters – Short circuit parameters – Transmission parameters - Hybrid parameters – Inter-relationships of different parameters-Interconnections of two port networks –Condition for reciprocity and symmetry of networks with different two port parameters - Terminated two port networks.**UNIT – IV****Network Functions :** Single port &multi port networks - Immittance functions of two port networks – Necessary conditions for driving point functions & transfer function – Complex frequencies – Poles and zeros – Time domain response from pole zero plots – Restrictions on pole-zero locations.**UNIT – V****D.C Transient Analysis:** Transient response of R-L, R-C & R-L-C circuits for DC excitations initial conditions-Time constants -solution using Differential equation & Laplace transform methods.**UNIT – VI****A.C Transient Analysis :** Transient response of R-L, R-C & R-L-C circuits for sinusoidal excitations-initial condition-time constants –Solution using Differential Equation & Laplace transform methods - Transformed circuits - Transient response of R-L, R-C& R-L-C circuits for other types of signals(step, impulse) using Laplace transform methods.  |
| **Text Books & Reference Books:** | **TEXT BOOKS:**1. “Engineering Circuit Analysis”, by Hayt&Kemmerly, 2ndEdition,TMH publishers
2. “Network Analysis”, by M.E Van Valkenburg, Third Edition, PHI learning private Limited, 2006.
3. “Fundamentals of Electric circuits”, by Charles k Alexander, Mathew N O Sadiku, Tata McGraw Hill Education private Limited, 6th Edition,2017.

**REFERENCE BOOKS:** 1. “Circuits & Networks”, by A.Sudhakar and Shyam Mohan, 5th Edition(2015),TMH
2. “Circuit Theory”, by A.Chakrabarti, Dhanpat Rai publishers, 6th Edition 2014.
3. “Circuits & Systems”, by Dr K.M.Soni, S.K.Kataria& sons Publication(2014).
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| **E-Resources:** | <http://nptel.ac.in/courses>http://iete-elan.ac.inhttp://freevideolectures.com/university/iitm |