**19EE1201-CIRCUITS & NETWORKS**

(EEE)

|  |  |  |  |
| --- | --- | --- | --- |
| **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:** | 40  60  100 |

|  |  |  |
| --- | --- | --- |
| **Course Objectives:** | To make the student learn about   1. 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. | |
| **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). | |
| **E-Resources:** | <http://nptel.ac.in/courses>  http://iete-elan.ac.in  http://freevideolectures.com/university/iitm | |