**20EE1201-CIRCUITS & NETWORKS**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Pre-requisite:** | Concepts of Basic electrical sciences, Calculus & Laplace Transforms. | **Sessional Evaluation:**  **External Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Objectives:** | Students undergoing this course are expected to learn: | |
| 1. Network theorems and their applications 2. The analysis of three phase balanced & unbalanced circuits 3. Transient response of RL, RC, RLC series circuit for DC excitation. 4. Transient response of RL, RC, RLC series circuit for AC excitation 5. The two port network parameters for the given network. 6. Necessary conditions for driving point function & transfer function | |
| **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** | Find the time constant and transient response of a given circuit with and without D.C excitation. |
| **CO4** | Determine the time constant and transient response of a given circuit with and without A.C excitation. |
| **CO5** | Evaluate the two port network parameters for the given network. |
| **CO6** | Draw the pole- zero plot and obtain the time domain response for a given transfer function. |
| **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 -Star Delta Transformation Technique.  **UNIT – III**  **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 – IV**  **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.  **UNIT – V**  **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 – VI**  **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. | |
| **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, DhanpatRai 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 | |