**Course Handout**

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| **Course No. : 19ECT34** | **Dept.: Electronics and Communication Engineering** |
| **Course Title : Network Analysis** | **Semester: III** |
| **Instructor-in-charge : Mrs. Bhavya V,** [**bhavya\_up@ncetmail.com**](mailto:bhavya_up@ncetmail.com) | **Academic Year: 2020-21** |
| **Lab. Instructor : No Lab** |  |

**Subject Description:**

Network Analysis is a course that includes fundamental principles and techniques of electrical circuit analysis and simplification. The general strategy of circuit analysis is to create and solve a system of independent equations means figuring out voltages and currents in each element. Module-I covers the circuit analysis principles and laws for synthesizing DC and AC electrical circuits and it includes the source transformation techniques. Module-II focus on the geometrical point of circuit visualization in complex networks known as network topology and it also briefs schedule techniques. Electric circuit theorems are always beneficial to find voltage and currents in multi-loop circuits, Module-III emphasize on various network theorems for analyzing DC and AC circuits. Module-IV provides the insights of resonance conditions in electrical networks and also covers the two- port network synthesis. The two-port network model is used in mathematical circuit analysis techniques to isolate portions of larger circuits. This allows the response of the network to signals applied to the ports to be calculated easily, without solving for all the internal voltages and currents in the network. Module-V focus on one of the important continuous time transforms namely the Laplace transform and its property and also extended to find inverse Laplace transforms. It plays a vital role in network synthesis, since it transforms differential equations into algebraic equations and convolution into multiplication. This course provides overall idea and insights in opting the techniques used in solving and designing complex circuit optimally. Conceptual understanding and problem-solving approaches are related effectively.

**Text Books:**

**1.** M. E. Van Valkenburg: “Network Analysis”, (Chapters 1-5), 3rd Edition, Pearson Prentice Hall, New Delhi, 1974. ISBN: 978-81-203-0156-6.

**2.** W. H. Hyatt Jr., and J. E. Kemmerly, S. M. Durbin: “Engineering Circuit Analysis”, 7th Edition, Tata McGraw Hill, New Delhi, 2011, ISBN: 978-0-07-015385-1.

**Reference Books:**

**1.** M. Nahvi, J. A. Edminister: “Electric Circuits”, 10th Edition, Tata-McGraw Hill, NewDelhi, 2007, ISBN 0-07-463591-3.

**2.** C.K. Alexander, M. N O Sadiku: “Fundamentals of Electric Circuits”, 3rd Edition, Tata McGraw Hill, New Delhi, 2007, ISBN: 978-0-07-064803-6.

**PREREQUISITES:**

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| 1. Basic Electricals  2. Basic Electronics | Self-study | **Remarks**  Students have undergone this Course in first year of BE. |

**LECTURE PLAN:**

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| --- | --- | --- | --- |
| **Topic** | **Topic Details** | **Number of**  **Lectures** | **Unit/ Chapter**  **Reference** |
| **Module I**  **Basic Concepts** | **Basic Concepts** | 1 | T1.page no  36-107  R1.page no  32-35 |
| Source transformations, Network reduction using Star – Delta transformation | 1 |
| Loop analysis with linearly dependent and independent sources for DC and AC networks | 2 |
| Node analysis with linearly dependent and independent sources for DC and AC networks | 2 |
| Concepts of super node | 1 |
| Concepts of super mesh | 1 |
| Revision |  |  |  |
| **Module II**  **Network Topology** | **Network Topology** | 1 | T2.page no 107-151 |
| Graph of a network, Concept of tree and co-tree | 1 |
| Incidence matrix Tie-set. | 2 |
| Tie-set principle | 2 |
| cut-set schedule | 2 |
| **Revision** |  |  |  |
| **AAT1** |  |  |  |
| **Module III**  **Network Theorems**  **I & II** | Thevenin’s theorem | 2 | T2 page no 127-158 |
| Norton’s theorems | 1 |
| Maximum Power transfer Theorem | 2 |
| Superposition theorem | 1 |
| Reciprocity theorem | 1 |
| Millman’s theorem | 1 |
| **Revision** |  |  |  |
| **Module IV**  **Resonant Circuits**  **&**  **Two port network parameters** | Series resonance, frequency- response of series circuits | 2 | T2-page no 540-552  T1-page no 326-331 |
| Q –factor, Bandwidth | 2 |
| Parallel resonance frequency- response of parallel circuits, Q –factor, Bandwidth | 1 |
| Definition of z, y parameters | 2 |
| Definition of h and transmission parameters | 1 |
| **Revision** |  |  |  |
| **AAT2** |  |  | T2-page no 466-468  T1-page no 172-213 |
| **Module V**  **Laplace Transformation** | Definition of Laplace transform, Singularity function | 1 |
| Functional Transforms | 2 |
| Properties of Laplace Transforms | 2 |
| Inverse Laplace Transform | 1 |
| Waveform Synthesis | 2 |
| **Revision** |  |  |  |

**Evaluation Scheme:**

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| --- | --- | --- | --- |
| **Component** | **Duration** | **Weightage** | **Date (Time)** |
| **CIE 1** | 90 min | 20% | 29.09.2020 |
| **CIE 2** | 90 min | 20% | 07.11.2020 |
| **AAT 1** | 2 days | 5% | 25.09.2020 |
| **AAT 2** | 2 days | 5% | 02.11.2020 |
| **Make up CIE** | 90 min |  | 26.11.2020 |
| **SEE** | 180 min | 50% | 11.12.2020 onwards |
| **Make up SEE** | 180 min |  | 08.01.2021 onwards |
| **Total** |  | 100% |  |

**Notices:** All notices will be displayed on NCET and in Department website.

**Chamber Consultation Hour:** Tuesday 2:00 pm to 4:00 pm

**Makeup Policy:** To be granted only in case of serious illness or emergency.

**Email Policy:** Communication through email. If you want to discuss anything, you are most welcome to meet me during chamber consultation hours or immediately after the class. Academic queries/doubts can be posted in Moodle.

**NC Policy:**

Mrs. Bhavya V

**Course-in-charge**