

(EE-214) - Circuit Theory

Course Outline:

Theory:

1. Text and Reference Books:

1. Differential and integral forms of circuit equations.
2. Initial voltage on a capacitor.
3. Initial current in an inductor.
4. First-order circuits.
5. Solution of single first order differential equations.
6. Particular and total solution of second order linear time invariant differential equations.

2. Matrix Analysis:

1. Systematic formulation of network equations.
2. Loop variable analysis.
3. State variable analysis.
4. Formulation of state equations.
5. Source transformations Duality.

3. Elementary Time Functions:

1. Introduction to singularity functions
2. The impulse functions and response.
3. The unit step function and response
4. The Ramp function and response.
5. The Exponential function and response.

4. Exponential Excitation and the Transformed Network:

1. Representation of excitations by exponential functions
2. Single element response.
3. Forced response with exponential excitation.
4. Introduction to the transformed network.
5. Driving point impedance and admittance.

5. Two Port Network

1. Introduction.
2. Characterization of linear time invariant two-ports by six sets of parameters
3. Relationship among parameter sets.
4. Networks Functions and Frequency Response
5. The concept of complex frequency, transform impedance and transform circuits.
6. Network functions.
7. Poles and zeros of network functions.
8. Restrictions on pole and zero transfer function, magnitude and phase.

Suggested Teaching Methodology:

- Lecturing
- Written Assignments Report Writing

Suggested Assessment:

Theory (100%)

- Sessional (20%)
- Quiz (12%)
- Assignment (8%)
- Midterm (30%)
- Final Term (50%)

Text and Reference Books:

1. Engineering Circuit Analysis by William Hayt, 7th Edition, 2006. ISBN: 978- 0073263182
 2. Fundamentals of Electric Circuits by Charles K.Alexander, Matthew N. O. Sadiku. 4th Edition, 2008.ISBN 978-0077263195
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