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| Course No | Course Name | L-T-P: Credits |
| **EE 220** | **Network Synthesis and Application** | **3-0-0: 3** |
| Pre-requisite: EE 205 Co-requisite: NIL |
|  **Course Objectives**:1. To understand network functions and its characterisation.2. To familiarise the students with elementary synthesis of network and its application |
| **SYLLABUS** |
| **Module** | **Contents** | **Hours** |
| I | **Network functions and responses**:Concept of complex frequency, Driving point and Transfer functions for one port and two port networks, Poles and Zeros of network functions, Natural response and natural frequency, Significance of poles and zeros, Restriction on the location of the poles and zeros in the s-plane for driving point function and transfer function, Time domain behaviour from pole-zero plot. Frequency domain behaviour from pole-zero plot. | 09 |
| II | **Elements of realizability:**Elements of realizability theory, Hurwitz polynomials, Positive real functions, Properties of real immittance functions.  | 06 |
| III | **Network synthesis:** Basic synthesis procedure, Methods of synthesis, Driving point synthesis of one port network with two types of elements: Synthesis of LC driving point immittances, Synthesis of RC driving point Impedances, Synthesis of RC impedances or RL admittances, Properties of RL impedances and RC admittances. Synthesis of RLC driving point functions.  | 09 |
| IV | **Filter circuits and design:** Introduction to filter, Passive filters and Attenuators-classification and general relations in filters, Active filters, Advantages and application of active filters. | 08 |
| V | **Indefinite admittance matrix:**Introduction to indefinite admittance matrix (IAM), Properties and application of IAM. | 04 |

**Essential Readings:**

1. Franklin F. Kuo, “Network Analysis and Synthesis”, John Wiley & Sons, Second Edition, 2006.
2. S. P. Ghosh and A. K. Chakraborty, “Network Analysis and Synthesis”, McGraw Hill Education India Pvt. Ltd., Fourth Edition, 2010.
3. D. Roy Choudhary, “Networks and Systems”, Second Edition, New Age International, 2013.
4. M. E. Van Valkenburg, “Network Analysis”, Prentice-Hall of India Pvt. Ltd., Third Edition, 2014.

**Supplementary Readings:**

1. A. Chakrabarti, “Circuit Theory: Analysis and Synthesis”, Sixth Edition, Dhanpat Rai & Co., 2014.
2. C. L. Wadhwa, “Network Analysis and Synthesis”, New Age International Publishers, 2007.
3. W. H. Hayt and J. E. Kemmerley, “Engineering Circuit Analysis”, Tata McGraw Hill, Eighth Edition, 2013.