UNIT-4

(Lecture-1)

Synthesis of Two-Port LCR Networks: Introduction

Introduction

An important property of a two-port LCR network is that it may always be realized as a two-port LC network terminated in a 1-Ω resistor. This theorem, due to Darlington, is the basis of modern network theory. It may be demonstrated by deriving a one-to-one correspondence between the input impedance of a two-port reactance network terminated in a 1-Ω resistance (written in terms of its two-port open-circuit parameters) and the input impedance of a two-port LCR network (written as the ratio of two Hurwitz polynomials).

Introduction

The derivation is completed by verifying that the square matrix obtained by writing the open-circuit impedance parameters in terms of the odd and even parts of the two Hurwitz polynomials is a p.r. matrix.

Introduction

In the special case when the attenuation poles of the transfer function of the two-port network are all at infinity or at the origin, the Darlington method leads a simple ladder network without ideal transformers terminated in a 1-Ω resistor.

Such a ladder network is obtained by forming a Cauer expansion (removal of poles at infinity or at the origin) of the input immittance of the network.