SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

Approved by AICTE & Affiliated to Anna University
Accredited by NBA & Accrediated by NAAC with 'A+' Grade,
Recognized by UGC saravanampatti (post), Coimbatore-641035.

Department of Biomedical Engineering

Course Name: Control Systems

III Year : V Semester

Unit II –Frequency Response Analysis

Topic : Frequency Response

Introduction

- The steady state response of a system for an input sinusoidal signal is known as the frequency response.
- If a sinusoidal signal is applied as an input to a Linear Time-Invariant (LTI) system, then it produces the steady state output, which is also a sinusoidal signal.
- The input and output sinusoidal signals have the same frequency, but different amplitudes and phase angles.

Introduction

- Consider a linear system with a sinusoidal input

$$r(t) = ASin\omega t)$$

- The steady state output is

$$c(t) = BSin(\omega t + \varphi)$$

"The magnitude and phase relationship between the sinusoidal input and the steady state output of a system is termed as the frequency response".

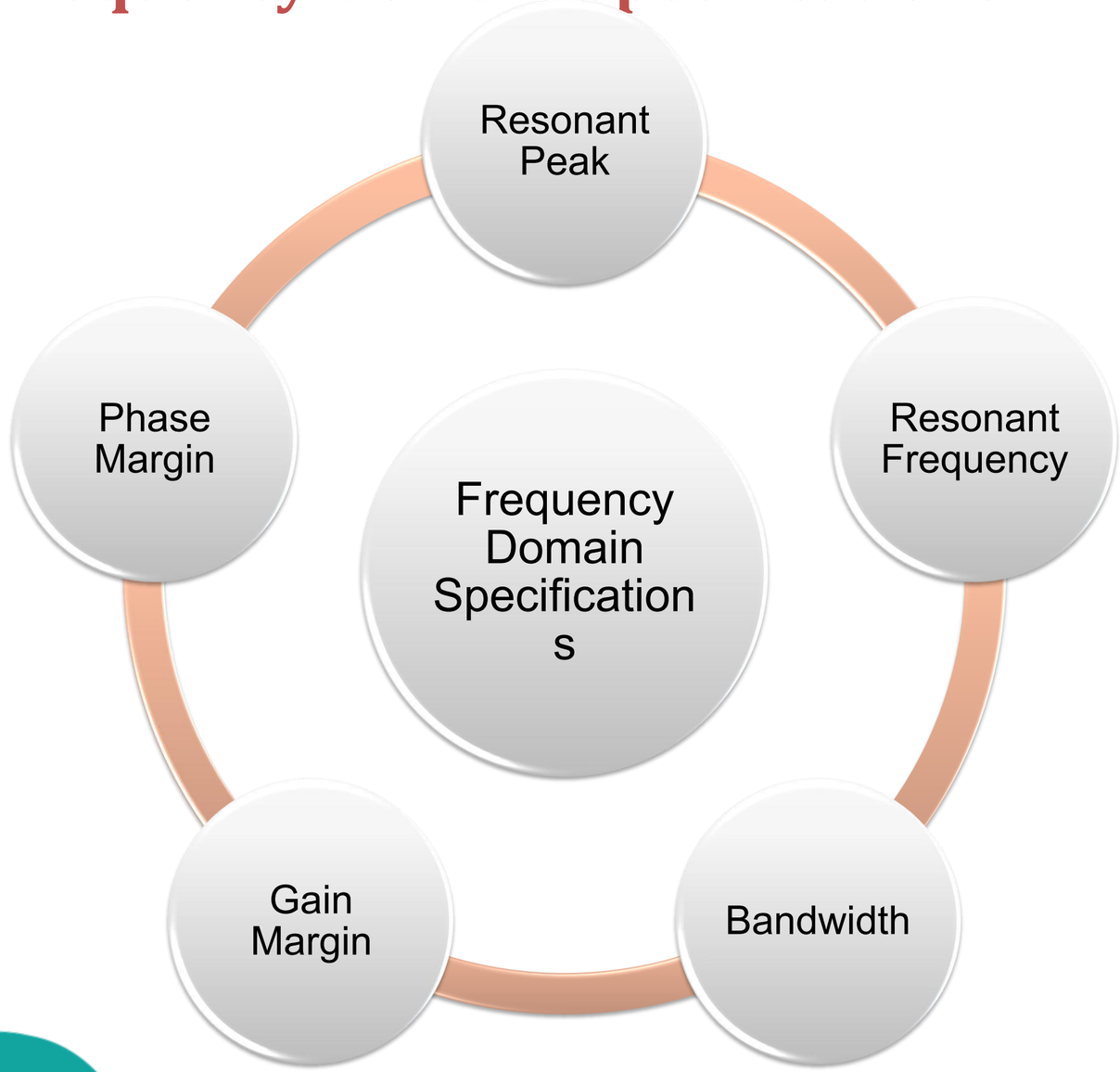
Advantages

- Transfer functions which are complicated to determine the behavior of the experimentally can be determined using the frequency response analysis
- Design of the system and adjusting the parameters of the system can be easily carried out.
- Corrective measurement for noise disturbance generated in the system and parameters variation can be easily determined using frequency analysis
- Absolute and Relative stability of the closed loop system can be estimated from the knowledge of the open loop frequency system
- Frequency domain analysis can also be carried out for the non linear control systems

Disadvantages

- Frequency response test is not recommended for system with very large time constants.
- Frequency response test cannot be performed on non-interruptible systems

Frequency Domain Specifications



Frequency Domain Specifications

- The steady state response of a system to a purely sinusoidal input is defined as the frequency response of a system.