



# SNS COLLEGE OF ENGINEERING

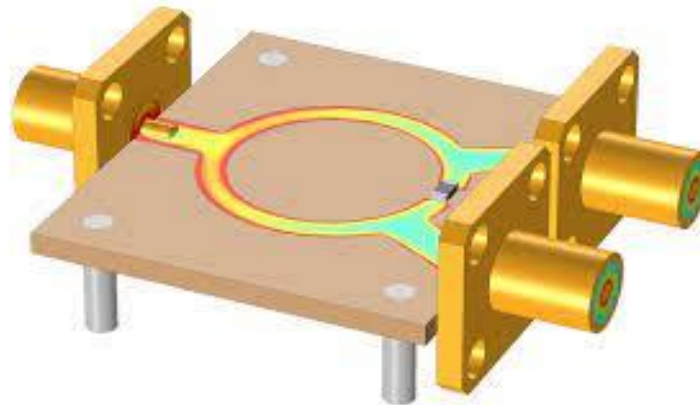
(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



## 19EC602- MICROWAVE AND OPTICAL ENGINEERING

### UNIT-3 SPECTRUM ANALYZER





# SPECTRUM ANALYSER



The electronic instrument, used for analyzing waves in frequency domain is called **spectrum analyzer**. Basically, it displays the energy distribution of a signal on its CRT screen. Here, x-axis represents frequency and y-axis represents the amplitude.

## Types of Spectrum Analyzers

We can classify the spectrum analyzers into the following **two types**.

- Filter Bank Spectrum Analyzer
- Superheterodyne Spectrum Analyzer



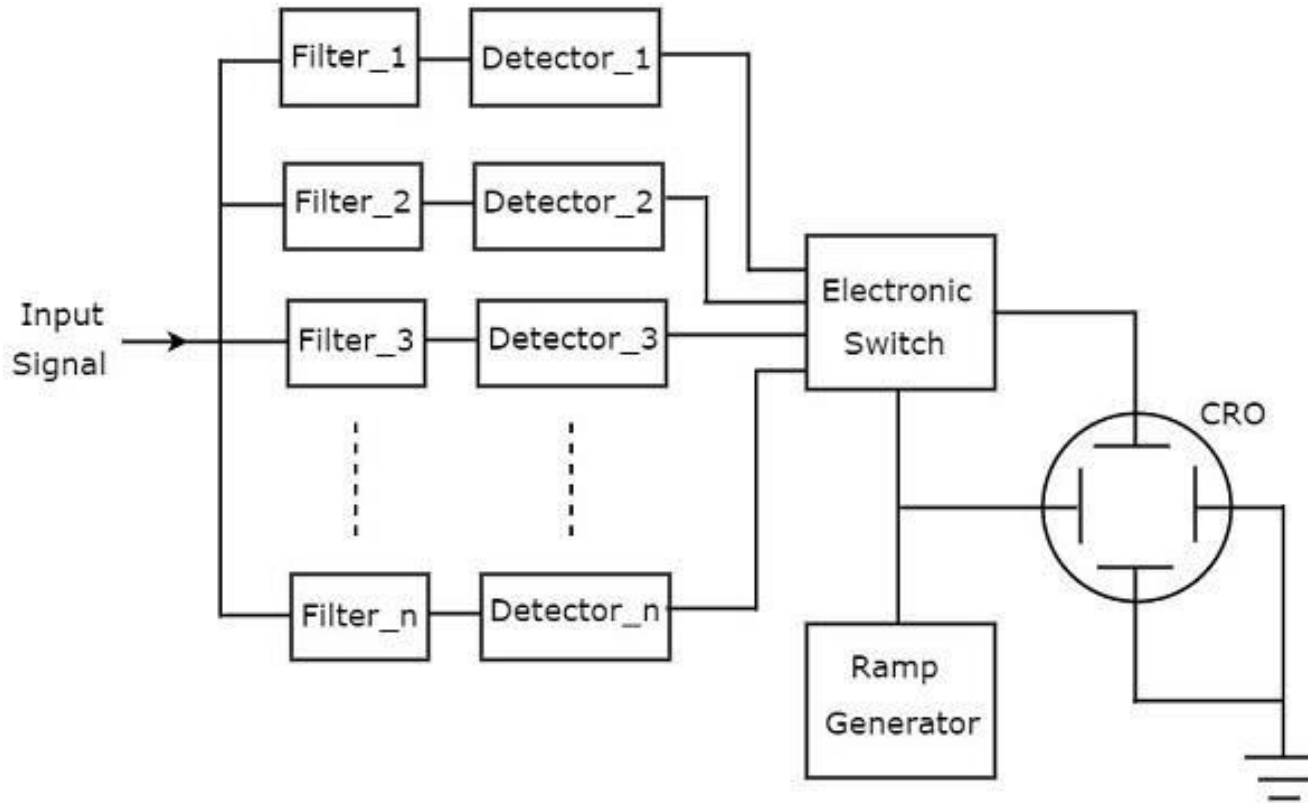


### Filter Bank Spectrum Analyzer

The spectrum analyzer, used for analyzing the signals are of AF range is called filter bank spectrum analyzer, or **real time spectrum analyzer** because it shows (displays) any variations in all input frequencies.



The following figure shows the **block diagram** of filter bank spectrum analyzer.





## SPECTRUM ANALYSER



The **working** of filter bank spectrum analyzer is mentioned below.

- It has a set of band pass filters and each one is designed for allowing a specific band of frequencies. The output of each band pass filter is given to a corresponding detector.
- All the detector outputs are connected to Electronic switch. This switch allows the detector outputs sequentially to the vertical deflection plate of CRO. So, CRO displays the frequency **spectrum of AF signal** on its CRT screen.





# SPECTRUM ANALYSER

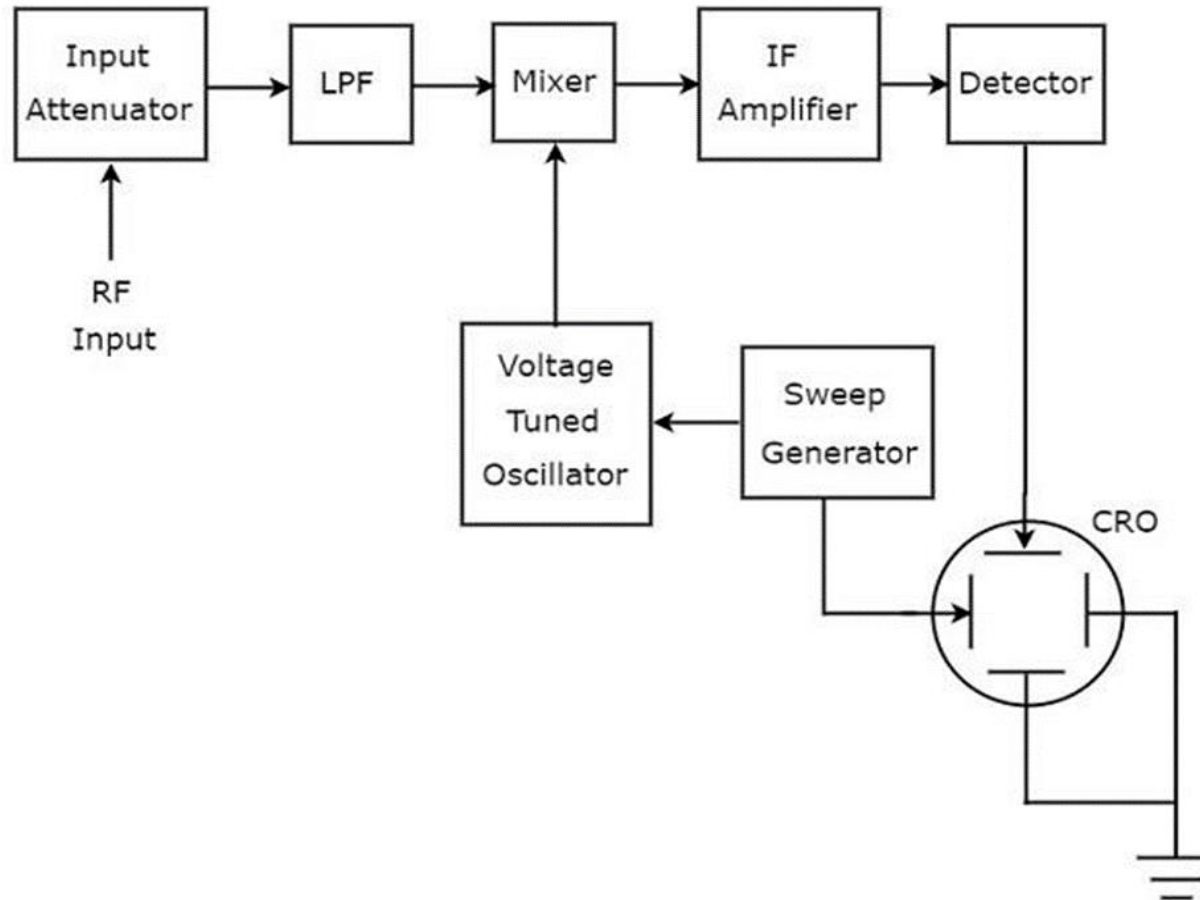


## Superheterodyne Spectrum Analyzer

The spectrum analyzer, used for analyzing the signals are of RF range is called **superheterodyne spectrum analyzer**.



Its **block diagram** is shown in below figure.





## SPECTRUM ANALYSER



The **working** of superheterodyne spectrum analyzer is mentioned below.

- The RF signal, which is to be analyzed is applied to input attenuator. If the signal amplitude is too large, then it can be attenuated by an **input attenuator**.
- **Low Pass Filter (LPF)** allows only the frequency components that are less than the cut-off frequency.
- **Mixer** gets the inputs from Low pass filter and voltage tuned oscillator. It produces an output, which is the difference of frequencies of the two signals that are applied to it.







## SPECTRUM ANALYSER



- **IF amplifier** amplifies the Intermediate Frequency (IF) signal, i.e. the output of mixer. The amplified IF signal is applied to detector.
- The output of detector is given to vertical deflection plate of CRO. So, CRO displays the frequency spectrum of RF signal on its CRT screen.

So, we can choose a particular spectrum analyzer based on the frequency range of the signal that is to be analyzed.





Thank  
you

