

## UNIT III

### TRANSMITTERS AND RECEIVERS

#### 1. Define Transmitter in communication?

In electronics and telecommunications a **transmitter** is an electronic device which produces radio waves with an antenna. The transmitter itself generates a radio frequency alternating current, which is applied to the antenna. When excited by this alternating current the antenna radiates radio waves. The term is popularly used more specifically to refer to a broadcast transmitter, a transmitter used in broadcasting, as in *FM radio transmitter* or *television transmitter*.

#### 2. What are the different types of AM Transmitters?

There are two types of Am Transmitters

- Low Level AM Transmitter
- High Level AM Transmitter

#### 3. Define requirements of Receiver.

- It should be cost-effective.
- It should receive the corresponding modulated waves.
- The receiver should be able to tune and amplify the desired station.
- It should have an ability to reject the unwanted stations.
- Demodulation has to be done to all the station signals, irrespective of the carrier signal frequency.

#### 4. List the types of Receivers.

- Tuned radio Frequency(TRF) receiver
- Super heterodyne Receiver

#### 5. What are the Characteristics of a Radio Receiver?

- Selectivity
- Sensitivity
- Fidelity
- Image frequency and its Rejection Ratio
- Double Spotting

#### 6. Define Sensitivity of a Radio Receiver.

Sensitivity of a Radio Receiver is Define as the ability of receiver to pickup weak signals and amplify it. It is measured in terms of Decibels or microvolt's.

### 7. Define Selectivity of a Radio Receiver.

Selectivity of a Radio Receiver is Define as the ability of receiver to select desired frequency and reject all other unwanted frequencies which can be interfering signals.

### 8. Define Fidelity of a Radio Receiver.

Fidelity of a Radio Receiver is Define as the ability of receiver to reproduce all modulating frequencies equally well.

### 9. Define Image Frequency and its Rejection Ratio of a Radio Receiver.

- The term  $f_{si}$  is called image frequency and is defined as the signal frequency plus twice the intermediate frequency. Reiterating, we have

$$f_{si} = f_s + 2f_i$$

- The rejection of an image frequency by a single -tuned circuit, i.e., the ratio of the gain at the signal frequency to the gain at the image frequency, is given by

$$\alpha = \sqrt{1 + Q^2 \rho^2}$$

where  $\rho = \frac{f_{si}}{f_s} - \frac{f_s}{f_{si}}$

### 10. Define Double Spotting of a Radio Receiver.

- Double spotting is a condition where the same desired signal is detected at two nearby points on the receiver tuning dial.
- One point is the desired point while the other is called the spurious or image point.
- It can be used to determine the IF of an unknown receiver.
- Poor front-end selectivity and inadequate image frequency rejection leads to double spotting.

### 11. What are the advantages of RF amplifier in Receiver?

- It provides Greater Gain, i.e. better sensitivity.
- It improves Image Frequency Rejection.
- It Improves Signal to Noise Ratio.
- It Improves rejection of adjacent unwanted signals, providing better selectivity.
- It provides better coupling of the receiver to the antenna.

### 12. Define Tracking of a Receiver.

There are three tuned circuits in Receiver i.e. RF tuned circuit, mixer tuned circuit and local oscillator tuned circuit. All these circuits must be tuned to get proper RF input and to get IF frequency at the output of mixer. The process of tuning circuits to get desired output is called Tracking.

### **13. What are the different methods of Tracking?**

There are three common methods used for tracking. These are

- Padder Tracking
- Trimmer Tracking
- Three Point Tracking

### **14. Define Intermediate Frequency (IF) in Receiver.**

An amplifying circuit in a radio-frequency (RF) receiver that processes and enhances a down converted or modulated signal. Signal frequency spectrum down conversion is achieved by multiplying the radio-frequency signal by a local oscillator signal in a circuit known as a mixer. This multiplication produces two signals whose frequency content lies about the sum and difference frequencies of the center frequency of the original signal and the oscillator frequency. A variable local oscillator is used in the receiver to hold the difference-signal center frequency constant as the receiver is tuned. The constant frequency of the down converted signal is called the intermediate frequency (IF), and it is this signal that is processed by the intermediate-frequency amplifier.

### **15. List the Local oscillator circuits used in communication Receivers.**

- Colpitts Oscillator
- Clapps Oscillator
- Armstrong Oscillator
- Ultra-Audion Oscillator
- Hartley Oscillator

### **16. What is mean by AGC (Automatic Gain Control) of a Receiver?**

Automatic Gain Control is a system by means of which the overall gain of a radio receiver is varied automatically with the variation in the strength of the receiver signal, to maintain the output substantially constant.

### **17. List the types of AGC circuits.**

- Simple AGC
- Delayed AGC

### **18. What is use of Mixer circuit in Receivers?**

Mixer is a non linear resistance having two sets of input terminals and set of output terminal. Two inputs to the mixer are the input signal along with any modulation and the input from local oscillator. The output contains several frequencies along with the difference frequency. The difference frequency is called Intermediate frequency(IF).

### **19. What are the different names for a mixer circuit?**

- Frequency changer
- Frequency Converter

### **20. What are the different types of a mixer circuit?**

- Separately Excited FET Mixer
- Self Excited Mixer