



# SNS COLLEGE OF TECHNOLOGY



**An Autonomous Institution  
Coimbatore-35**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade(III Cycle)  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

### **19ECB301-ANALOG AND DIGITAL COMMUNICATION**

III YEAR/ V SEMESTER

### **UNIT 1 – ANALOG COMMUNICATION**

**TOPIC – VESTIGIAL SIDE BAND**



# VESTIGIAL SIDE BAND



- Vestigial sideband (VSB) modulation is a type of amplitude modulation (AM) technique that is commonly used in television broadcasting.
- It is a compromise between full double-sideband (DSB) and single-sideband (SSB) modulation.

**Double-Sideband (DSB) AM:** Involves transmitting the carrier along with both the upper and lower sidebands, which are mirror images of each other and contain the same information.

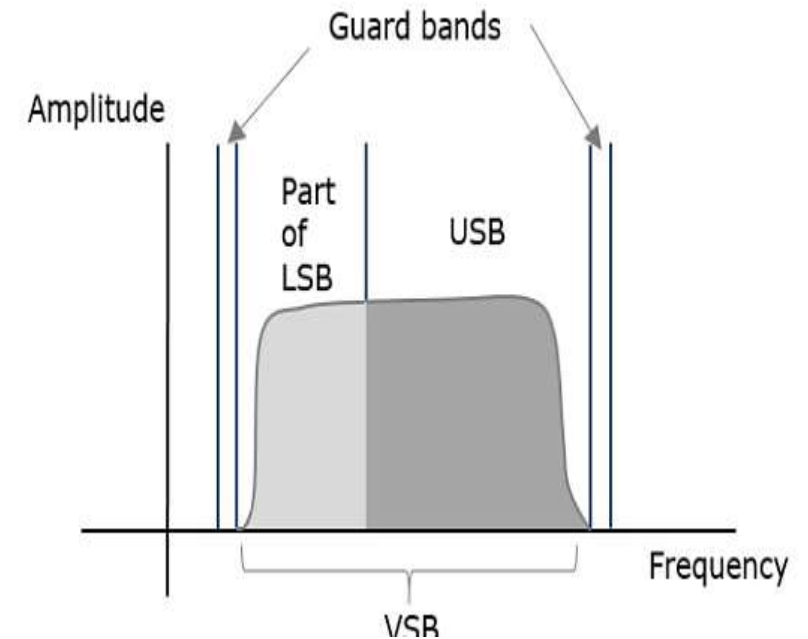
**Single-Sideband (SSB) AM:** Only one of the sidebands (either upper or lower) is transmitted, along with a reduced or suppressed carrier. This method is more bandwidth-efficient but complex to implement.  
of DSB.



# VESTIGIAL SIDE BAND MODULATION



- Both of the sidebands are not required for the transmission, as it is a waste. But a single band if transmitted, leads to loss of information.
- Vestigial Sideband Modulation** or **VSB Modulation** is the process where a part of the signal called as **vestige** is modulated, along with one sideband.
- A VSB signal can be plotted as shown in the figure.

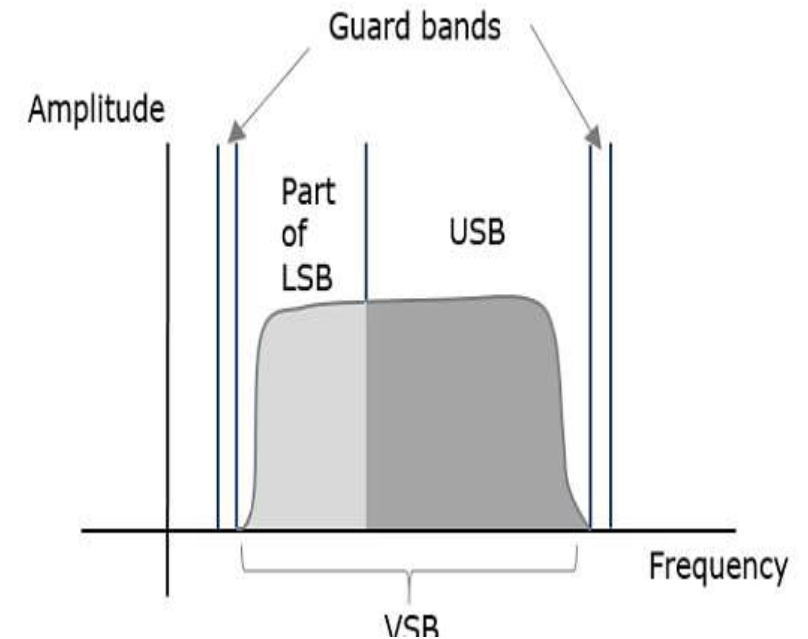




# VESTIGIAL SIDE BAND MODULATION



- Along with the upper sideband, a part of the lower sideband is also being transmitted in this technique.
- A guard band of very small width is laid on either side of VSB in order to avoid the interferences.
- VSB modulation is mostly used in television transmissions.





# VSB MODULATION ADVANTAGES & DRAWBACKS



## ADVANTAGES

- Highly efficient.
- Reduction in bandwidth.
- Filter design is easy as high accuracy is not needed.
- The transmission of low frequency components is possible, without difficulty.
- Possesses good phase characteristics.
- It combines the benefits of DSB and SSB. It conserves bandwidth (like SSB) while maintaining some of the simplicity of DSB.

## DRAWBACKS

- Bandwidth when compared to SSB is greater.
- Demodulation is complex.



# VSB MODULATION APPLICATIONS



- The most prominent and standard application of VSB is for the transmission of **television signals**.
- Also, this is the most convenient and efficient technique when bandwidth usage is considered.

# ACTIVITY



A device that converts digital data to analog signals for transmission over telephone lines.

GUESS ???



# COMPARISON OF ANALOG COMMUNICATION SYSTEMS



## 1. Amplitude Modulation (AM)

### Principle:

The amplitude of the carrier signal varies in proportion to the instantaneous amplitude of the message signal.

### Advantages:

- Simplicity in implementation.
- Longer transmission range compared to FM.
- Can be demodulated using simpler and less expensive receivers.

### Disadvantages:

- Susceptible to noise and interference.
- Lower sound quality due to limited bandwidth.
- Less efficient in terms of power usage.

### Applications:

- AM radio broadcasting.
- Aircraft communication.





# COMPARISON OF ANALOG COMMUNICATION SYSTEMS



## 2. Frequency Modulation (FM)

### Principle:

The frequency of the carrier signal varies in accordance with the instantaneous amplitude of the message signal.

### Advantages:

- Better noise immunity compared to AM.
- Higher sound quality due to wider bandwidth.
- More efficient use of power.

### Disadvantages:

- More complex receivers and transmitters.
- Shorter transmission range compared to AM due to higher bandwidth requirements.

### Applications:

- FM radio broadcasting.
- VHF communication for television and other services.



# COMPARISON OF ANALOG COMMUNICATION SYSTEMS



## 3. Phase Modulation (PM)

### Principle:

The phase of the carrier signal varies according to the instantaneous amplitude of the message signal.

### Advantages:

- Similar noise immunity and sound quality advantages as FM.
- Can be used as the basis for more complex digital modulation schemes (like QAM).

### Disadvantages:

- More complex receiver design.
- Less commonly used for basic analog communication systems.

### Applications:

- Specialized communication systems.
- Basis for digital modulation techniques.



# COMPARISON OF ANALOG COMMUNICATION SYSTEMS



## 4. Single Sideband Modulation (SSB)

### Principle:

A refinement of AM where only one sideband (either upper or lower) is transmitted, and the carrier may be suppressed.

### Advantages:

- More efficient use of power and bandwidth compared to standard AM.
- Reduced interference and noise.

### Disadvantages:

- More complex receivers and transmitters.
- Requires precise frequency control.

### Applications:

- Long-distance voice communication.
- Amateur radio.



# COMPARISON OF ANALOG COMMUNICATION SYSTEMS



## 5. Vestigial Sideband Modulation (VSB)

### Principle:

A compromise between AM and SSB, where one sideband is partially suppressed.

### Advantages:

- Efficient bandwidth usage like SSB but simpler receiver design.
- Widely used in television broadcasting due to its compatibility with video signals.

### Disadvantages:

More complex than standard AM but simpler than full SSB.

### Applications:

Analog television broadcasting.



# ASSESSMENT



- 1.What does the term VSB mean?
- 2.What are all the applications of AM?
- 3.List the Applications of SSB.



THANK YOU