SHORT QUESTIONS AND ANSWERS

UNIT I
ANALOG COMMUNICATION

1. Define amplitude Modulation.
Amplitude Modulation is the process of changing the amplitude of a relatively high frequency carrier signal in proportion with the instantaneous value of the modulating signal.

2. Define Modulation index and percent modulation for an AM wave.
Modulation index is a term used to describe the amount of amplitude change present in an AM waveform .It is also called as coefficient of modulation. Mathematically modulation index is
m = Em/ Ec
Where, m = Modulation coefficient
Em = Peak change in the amplitude of the output waveform voltage.
Ec = Peak amplitude of the unmodulated carrier voltage.
Percent modulation gives the percentage change in the amplitude of the output wave when the carrier is acted on by a modulating signal.

3. Define Low level Modulation.
In low level modulation, modulation takes place prior to the output element of the final stage of the transmitter. For low level AM modulator class A amplifier is used.

4. Define High level Modulation.
In high level modulators, the modulation takes place in the final element of the final stage where the carrier signal is at its maximum amplitude. For high level modulator class C amplifier is used.

5. What is the advantage of low level modulation?
An advantage of low level modulation is that less modulating signal power is required to achieve a high percentage of modulation.

6. Distinguish between low level and high level modulation.
In low level modulation, modulation takes place prior to the output element of the final stage of the transmitter.It requires less power to achieve a high percentage of modulation.
In high level modulators, the modulation takes place in the final element of the final stage where the carrier signal is at its maximum amplitude and thus ,requires a much higher amplitude modulating signal to achieve a reasonable percent modulation.

7. Define image frequency.
An image frequency is any frequency other than the selected radio frequency carrier that ,if allowed to enter a receiver and mix with the local oscillator ,will produce a cross product frequency that is equal to the intermediate frequency.

8. Define Local Oscillator tracking.

Tracking is the ability of the local oscillator in a receiver to oscillate either above or below the selected radio frequency carrier by an amount equal to the intermediate frequency throughout the entire radio frequency band.

9. Define High side injection tracking.

In high side injection tracking , the local oscillator should track above the incoming RF carrier by a fixed frequency equal to fRF +fIF .

10. Define Low side injection tracking.

In low side injection tracking ,the local oscillator should track below the RF carrier by a fixed frequency equal to fRF -fIF .

11. Define tracking error.How it is reduced.

The difference between the actual local oscillator frequency and the desired frequency is called tracking error.It is reduced by a technique called three point tracking.

12. Define Heterodyning.

Heterodyne means to mix two frequencies together in a nonlinear device or to translate one frequency to another using nonlinear mixing.

13. What are the disadvantages of conventional (or) double side band full carrier system?

In conventional AM ,carrier power constitutes two thirds or more of the total transmotted power.This is a major drawback because the carrier contains no information ;the sidebands contain the information . Second ,conventional AM systems utilize twice as much bandwidth as needed with single sideband systems.

14. Define Single sideband suppressed carrier AM.

AM Single sideband suppressed carrier is a form of amplitude modulation in which the carrier is totally suppressed and one of the sidebands removed.

15. Define AM Vestigial sideband.

AM vestigial sideband is a form of amplitude modulation in which the carrier and one complete sideband are transmitted, but only part of the second sideband is transmitted.

16. What are the advantages of single sideband transmission?
The advantages of SSBSC are
1.Power conservation: Normally ,with single side band transmission ,only one sideband is transmitted and the carrier is suppressed. So less power is required to produce essentially the same quality signal.
2.Bandwidth conservation: Single sideband transmission requires half as much bandwidth as conventional AM double side band transmission.
3.Noise reduction: Because a single side band system utilizes half as much bandwidth as conventional AM,the thermal noise power is reduced to half that of a double side band system.

17. What are the disadvantages of single side band transmission?
1. Complex receivers: Single side band systems require more complex and expensive receivers than conventional AM transmission .
2. Tuning Difficulties: Single side band receivers require more complex and precise tuning than conventional AM receivers.

18. Define direct frequency modulation.
In direct frequency modulation , frequency of a constant amplitude carrier signal is directly proportional to the amplitude of the modulating signal at a rate equal to the frequency of the modulating signal.

19. Define indirect frequency Modulation.
In indirect frequency modulation ,phase of a constant amplitude carrier directly proportional to the amplitude of the modulating signal at a rate equal to the frequency of the modulating signal.

20. Define instantaneous frequency deviation.
The instantaneous frequency deviation is the instantaneous change in the frequency of the carrier and is defined as the first derivative of the instantaneous phase deviation.

21. Define frequency deviation.
Frequency deviation is the change in frequency that occurs in the carrier when it is acted on by a modulating signal frequency. Frequency deviation is typically given as a peak frequency shift in Hertz.The peak to peak frequency deviation ($2\Delta f$) is sometimes called carrier swing. The peak frequency deviation is simply the product of the deviation sensitivity and the peak modulating signal voltage and is expressed mathematically as $\Delta f = K1\ Vm$ Hz .

22. State Carson rule.
Carson rule states that the bandwidth required to transmit an angle modulated wave as twice the sum of the peak frequency deviation and the highest modulating signal frequency.
Mathematically carson's rule is $B = 2(\Delta f + fm)$ Hz.

23. Define Deviation ratio.
Deviation ratio is the worst case modulation index and is equal to the maximum peak frequency deviation divided by the maximum modulating signal frequency. Mathematically ,the deviation ratio is $DR = \Delta f\ (max)/\ fm(max)$.

24. What is multiplexing?

Multiplexing is the transmission of information from one or more sources to only one destination over the same transmission medium.

16 marks

1. Discuss in detail about DSB-SC & explain the operation of DSB balanced modulator with neat diagram. **MAY/JUN 2011**
2. What are the advantages of single side band modulation technique & explain any one method of SSB generation. **MAY/JUN 2012**
3. Draw the block diagram for generation and demodulation of VSB signal & explain the principle of operation. **NOV/DEC 2011**
4. Derive an expression for the NBFM & WBFM wave.
   MAY/JUN 2011, MAY/JUN 2012
5. Explain in detail about how a FM signal can be generated using Armstrong method and using reactance modulation.
   NOV/DEC 2010, APR/MAY2011, NOV/DEC2011, MAY/JUN 2012, MAY/JUN 2013
6. Explain the operation of AM super heterodyne receiver with neat block diagram.
7. Derive an expression for AM wave and its power relation
   APR/MAY 2011, MAY/JUN 2012