Department of Electronics and Communication Engineering

EC8491 – Communication Theory

Unit I - MCQ Bank

1. In Amplitude Modulation, the instantaneous values of the carrier amplitude changes in accordance with the amplitude and frequency variations of the modulating signal.
   (a) True
   (b) False

2. What is the circuit used for producing AM called?
   (a) Modulator
   (b) Transmitter
   (c) Receiver
   (d) Duplexer

3. The ratio between the modulating signal voltage and the carrier voltage is called?
   (a) Amplitude Modulation
   (b) Modulation frequency
   (c) Modulation index
   (d) Ratio of modulation

4. What is the percentage of modulation if the modulating signal is of 7.5V and carrier is of 9V?
   (a) 100
   (b) 91
   (c) 83.33
   (d) 0

5. When does over-modulation occur?
   (a) Modulating signal voltage < Carrier voltage
   (b) Modulating signal voltage > Carrier voltage
   (c) Modulating signal voltage = Carrier voltage
   (d) Modulating signal voltage =0

6. What is the condition for greatest output power at the transmitter without distortion?
   (a) Modulating signal voltage < Carrier voltage
   (b) Modulating signal voltage > Carrier voltage
   (c) Modulating signal voltage = Carrier voltage
   (d) Modulating signal voltage =0
7. What is the modulation index value if \( V_{\text{max}} = 5.9 \text{v} \) and \( V_{\text{min}} = 1.2 \text{v} \)?
   (a) 0.5
   (b) \textbf{0.662}
   (c) 0.425
   (d) 0.14

8. What is the modulating signal voltage if the maximum and the minimum voltages on the wave was observed to be 5.9v and 1.2v respectively?
   (a) 2.35v
   (b) 2.12v
   (c) 1.85v
   (d) 3.21v

9. Modulation index of an AM signal is ratio of \___________\ to the \___________\%
   (a) Peak carrier amplitude, Peak message signal amplitude
   (b) \textbf{Peak message signal amplitude, Peak carrier amplitude}
   (c) Carrier signal frequency, Message signal frequency
   (d) Message signal frequency, Carrier signal frequency

10. Single sideband AM systems occupy same bandwidth as of conventional AM systems.
    (a) True
    (b) \textbf{False}

11. AM demodulation technique can be divided into \___________\ and \___________\ demodulation.
    (a) Direct, indirect
    (b) Slope detector, zero crossing
    (c) \textbf{Coherent, noncoherent}
    (d) Quadrature detection, coherent detection

12. Non coherent detection requires the knowledge of transmitted carrier frequency and phase at the receiver.
    (a) True
    (b) \textbf{False}

13. A product detector in AM systems is also called \___________\.
    (a) Envelope detector
    (b) Differentiator
    (c) Integrator
    (d) \textbf{Phase detector}

14. AM system use only product detector for demodulation. They never use envelope detectors.
    (a) True
    (b) \textbf{False}
15. The ability of the receiver to select the wanted signals among the various incoming signals is termed as
   (a) Sensitivity
   (b) Selectivity
   (c) Stability
   (d) None of the above

16. Super heterodyne receivers
   (a) Have better sensitivity
   (b) Have high selectivity
   (c) Need extra circuitry for frequency conversion
   (d) All of the above

17. The AM spectrum consists of
   (a) Carrier frequency
   (b) Upper side band frequency
   (c) Lower side band frequency
   (d) All of the above

18. Standard intermediate frequency used for AM receiver is
   (a) 455 MHz
   (b) 455 KHz
   (c) 455 Hz
   (d) None of the above

19. The modulation technique that uses the minimum channel bandwidth and transmitted power is
   (a) FM
   (b) DSB-SC
   (c) VSB
   (d) SSB

20. A modulation index of 0.5 would be same as
   (a) 0.5 of Modulation Depth
   (b) 1/2% of Modulation Depth
   (c) 5% of Modulation Depth
   (d) 50% of Modulation Depth

21. An AM broadcast station transmits modulating frequencies up to 6 kHz. If the AM station is transmitting on a frequency of 894 kHz, the values for maximum and minimum upper and lower sidebands and the total bandwidth occupied by the AM station are:
   (a) 900 KHz, 888 KHz, 12 KHz
   (b) 894 KHz, 884 KHz, 12 KHz
   (c) 894 KHz, 888 KHz, 6 KHz
   (d) 900 KHz, 888 KHz, 6 KHz
22. The total power in an Amplitude Modulated signal if the carrier of an AM transmitter is 800 W and it is modulated 50 percent.
   (a) 850 W
   (b) 1000.8 W
   (c) 750 W
   (d) 900 W

23. Calculate the power in one of the side band in SSBSC modulation when the carrier power is 124W and there is 80% modulation depth in the amplitude modulated signal.
   (a) 89.33 W
   (b) 64.85 W
   (c) 79.36 W
   (d) 102 W

24. Calculate the frequencies available in the frequency spectrum when a 2MHz carrier is modulated by two sinusoidal signals of 350Hz and 600Hz.
   (a) 2000.35, 1999.65 and 2000.6, 1999.4
   (b) 1999.35, 1999.65 and 2000.6, 2004.4
   (c) 2000.35, 2000.65 and 2000.6, 2000.4
   (d) 1999.35, 1999.65 and 1999.6, 1999.4

25. If an AM signal is represented by
   \[ v = (15 + 3 \sin(2\pi \times 5 \times 10^3 t)) \times \sin(2\pi \times 0.5 \times 10^6 t) \] volts
   i) Calculate the values of the frequencies of carrier and modulating signals.
   ii) Calculate the value of modulation index.
   iii) Calculate the value of bandwidth of this signal.
   (a) 1.6 MHz and 8 KHz, 0.6, 16 MHz
   (b) 1.9 MHz and 18 KHz, 0.2, 16 KHz
   (c) 2.4 MHz and 18 KHz, 0.2, 16 KHz
   (d) 1.6 MHz and 8 KHz, 0.2, 16 KHz

26. Calculate the power saved in an Amplitude Modulated wave when it is transmitted with 45% modulation
   – Without carrier
   – Without carrier and a sideband
   (a) 90%, 95%
   (b) 82%, 91%
   (c) 82%, 18%
   (d) 68%, 16%

27. What is the carrier frequency in an AM wave when its highest frequency component is 850Hz and the bandwidth of the signal is 50Hz?
   (a) 80 Hz
   (b) 695 Hz
   (c) 625 Hz
   (d) 825 Hz
28. The antenna current of the transmitter is 10A. Find the percentage of modulation when the antenna current increases to 10.4A.
   (a) 32%
   (b) **28.5%**
   (c) 64%
   (d) 40%

29. Function of RF mixer is
   (a) Addition of two signals
   **(b) Multiplication of two signals**
   (c) Rejection of noise
   (d) None of the above

30. Advantage of using VSB transmission is
   (a) Higher bandwidth than SSB
   (b) Less power required as compared to DSBSC
   **(c) Both a and b**
   (d) None of the above

31. Bandwidth required in SSB-SC signal is (fm is modulating frequency):
   (a) 2fm
   (b) < 2fm
   (c) > 2fm
   **(d) Fm**

32. Ring modulator is
   (a) Is used for DSB SC generation
   (b) Consists of four diodes connected in the form of ring
   (c) Is a product modulator
   **(d) All of the above**

33. Generation of SSB SC signal is done by
   (a) Phase discrimination method
   (b) Frequency discrimination method
   (c) Product modulator
   **(d) Both a and b**

34. Limitations of Frequency discrimination method are:
   (a) Cannot be used for video signals
   (b) Designing of band pass filter is difficult
   **(c) Both a and b**
   (d) None of the above
35. Phase shift method is
   (a) Includes two balanced modulators
   (b) Two phase shifting networks
   (c) Avoids the use of filters
   (d) All of the above

36. Examples of low level modulation are
   (a) Square law diode modulation
   (b) Switching modulation
   (c) Frequency discrimination method
   (d) Both a and b

37. The advantages of using an RF amplifier are
   (a) Better sensitivity
   (b) Improved signal to noise ratio
   (c) Better selectivity
   (d) All of the above

38. In terms of signal frequency (fs) and intermediate frequency (fi), the image frequency is given by
   (a) fs + fi
   (b) fs + 2fi
   (c) 2fs + fi
   (d) 2(fs + fi)

39. Analog communication indicates:
   (a) Continuous signal with varying amplitude or phase
   (b) No numerical coding
   (c) AM or FM signal
   (d) All of the above

40. Disadvantage of using a DSB or SSB signal modulation is
   (a) Difficult to recover information at the receiver
   (b) Carrier has to be locally generated at receiver
   (c) Both a and b are correct
   (d) None of the above