Chettinad College of Engineering & Technology
Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

Department of Electronics and Communication Engineering

EC8491 – Communication Theory

Unit II - MCQ Bank

1. In PM the information is transmitted using _____ .
   (a) Change in frequency
   (b) Change in amplitude
   (c) Change in phase of the carrier

2. With change in modulating frequency (f_m), the modulation index m_p of a phase modulated signal will _____.
   (a) Increase
   (b) Decrease
   (c) remain constant

3. FM can be generated using PM by _____ .
   (a) Passing the modulating signal through a low pass filter
   (b) Passing the modulating signal through a high pass filter
   (c) Using the pre-emphasis
   (d) Using the de-emphasis

4. PM is used in the broadcasting application
   (a) True
   (b) False

5. The frequency deviation in PM is proportional to _____.
   (a) Modulating voltage
   (b) Modulating frequency
   (c) Modulating frequency and voltage

6. The equation for the modulated PM wave is given by
   (a) 5 sin (2 π × 106 t)
   (b) 5 sin 1000 t + 5 sin 106 t
   (c) 5 sin (2 π × 106 t + 10 sin 6280 t)
   (d) 5 sin (2 π × 106 t – 10 sin 6280 t)

7. In a frequency modulated (FM) system, when the audio frequency is 500Hz and audio frequency signal voltage is 2.4 V. The frequency deviation δ is 4.8KHz. If the audio frequency signal voltage is now increased to 7.2 V, then what is the new value of deviation?
   (a) 3.6 KHz
   (b) 0.6 KHz
   (c) 14.4 KHz
   (d) 12.4 KHz

8. The four basic elements in a PLL are loop filter, loop amplifier, VCO and
   (a) Up converter
   (b) Down converter
   (c) Phase detector
   (d) Frequency multiplier

9. An FM signal is represented by $V = 12\sin\left(6\times10^{8}t + 5\sin 1250t\right)$. The carrier frequency f and frequency deviation δ respectively are
   (a) 191 MHz and 665 Hz
   (b) 95.5 MHz and 995 Hz
   (c) 191 MHz and 995 Hz
   (d) 95.5 MHz and 665 Hz

10. Carson's rule is (with B is bandwidth of message signal and Δf is the maximum frequency deivation)
   (a) BW = 2 Δf
   (b) BW = 2 (Δf + B)
   (c) BW = $\sqrt{2}$ (Δf + B)
   (d) BW = $\sqrt{2}$ Δf B

11. Which of the following are the advantages of FM over AM?
   i. Better noise immunity is provided
   ii. Lower bandwidth is required
   iii. Transmitted power is more useful
   iv. Less modulating power is required
   (a) i, ii and iv
   (b) i, ii and iii
   (c) i, iii and iv
   (d) ii, iii and iv

12. The maximum deviation allowed in a frequency modulation system is 100KHz; the modulating signal frequency is 10KHz. The bandwidth requirement as per Carson's rule is
   (a) 110 KHz
   (b) 220 KHz
   (c) 210 KHz
   (d) 120 KHz

13. The main advantage of the pre-emphasis circuit in FM transmitter is
   (a) To increase the carrier power
   (b) To increase the signal to noise ratio at low audio frequencies
   (c) To increase the bandwidth of sidebands
   (d) To improve the signal to noise ratio at high audio frequencies

14. In phase modulation, phase deviation is proportional to
   (a) Carrier amplitude
   (b) Carrier phase
   (c) Message signal
   (d) Message signal frequencies

15. An indirect way of generating FM is
    (a) The Armstrong modulator
    (b) The reactance FET modulator
    (c) The varactor diode modulator
    (d) The reactance bipolar transistor modulator

16. The de-emphasis filter in an FM receiver comes
    (a) Before FM demodulator
    (b) After FM demodulator and before baseband filter
    (c) After baseband filter
    (d) Before RF amplifier

17. Consider the following statements about FM
    i. Modulation index determines the number of significant sideband components
    ii. Theoretical bandwidth is infinite
    iii. Carrier suppression is not possible
    iv. Sidebands are not symmetric about carrier
    Which of these statement(s) is/are correct?

    (a) i, ii, iii and iv
    (b) i and ii only
    (c) iii only
    (d) iii and iv only

18. If an FM wave is represented by the equation $e = 10\sin\left(9\times10^{8}t + 4\sin 1500t\right)$, then what is carrier frequency?
    (a) 127.32 MHz
    (b) 150.00 MHz
    (c) 143.31 MHz
    (d) 208.00 MHz

19. PLL demodulators are now used in commercial receivers because of which of the following
    i. PLL demodulators do not exhibit threshold in S/N performance
    ii. No requirement of pre-emphasis and de-emphasis
    iii. Cheap PLL ICs are available.
    (a) i and ii
    (b) ii and iii
    (c) i, ii and iii
    (d) i and iii

20. Which of the following are the advantages of FM broadcasting over AM broadcasting
    i. Better S/N Ratio
    ii. Not subject to signal fading
    iii. Power efficiency is superior
    iv. Demodulation is simpler
    (a) i and ii
    (b) ii and iii
    (c) i, ii and iii
    (d) i and iii

21. In TV transmission, the modulation schemes for video and audio are respectively
    (a) FM and AM
    (b) FM and FM
    (c) AM and FM
    (d) AM and AM

22. The FM modulation index:
    (a) increases with both deviation and modulation frequency
    (b) increases with deviation and decreases with modulation frequency
    (c) decreases with deviation and increases with modulation frequency
    (d) is equal to twice the deviation

23. One way to derive FM from PM is:
    (a) integrate the modulating signal before applying to the PM oscillator
    (b) integrate the signal out of the PM oscillator
    (c) differentiate the modulating signal before applying to the PM oscillator
    (d) differentiate the signal out of the PM oscillator

24. The bandwidth of an FM signal is considered to be limited because:
    (a) there can only be a finite number of sidebands
    (b) it is equal to the frequency deviation
    (c) it is band-limited at the receiver
    (d) the power in the outer sidebands is negligible

25. Mathematically, the calculation of FM bandwidth requires the use of:
    (a) ordinary trigonometry and algebra
    (b) Bessel functions
    (c) Taylor series
    (d) Fractals

26. FM bandwidth can be approximated by:
    (a) Armstrong's Rule
    (b) Bessel's Rule
    (c) Carson's Rule
    (d) none of the above

27. An FM receiver switching suddenly between two stations on nearby frequencies is called:
    (a) the capture effect
    (b) the threshold effect
    (c) the "two-station" effect
    (d) none of the above

28. When FM reception deteriorates abruptly due to noise, it is called:
    (a) the capture effect
    (b) the threshold effect
    (c) the noise effect
    (d) the limit effect

29. FM stereo:
    (a) uses DSBSC AM modulation
    (b) is implemented using an SCA signal
    (c) has a higher S/N than mono FM
    (d) is not compatible with mono FM

30. In FM, as the modulating frequency decreases, the modulation index _____.
    (a) Increases
    (b) Decreases
    (c) Remains constant
    (d) None of the above

31. FM is called constant envelope because _____ of carrier wave is kept constant.
    (a) Frequency
    (b) Amplitude
    (c) Phase
    (d) Angle

32. Which of the following are two most important classes of angle modulation?
    (a) Amplitude modulation, frequency modulation
    (b) Amplitude modulation, phase modulation
    (c) **Frequency modulation, phase modulation**
    (d) Single sideband amplitude modulation, phase modulation

33. Frequency modulated signal is regarded as the phase modulated signal in which the modulating wave is differentiated before modulation.
    (a) True
    (b) False

34. Frequency demodulator is a frequency to amplitude converter circuit.
    (a) True
    (b) False

35. Which of the following is not a technique for FM demodulation?
    (a) Slope detection
    (b) Zero crossing detection
    (c) Product detector
    (d) Phase locked discriminator

36. Almost all FM transmissions provide an artificial boost to the electrical amplitude of the higher frequencies. What is this process called?
    (a) Deemphasis
    (b) Capture effect
    (c) Noise suppression
    (d) Preemphasis

37. All communication systems are constrained by _____
    (a) Bandwidth availability
    (b) Reference frequency
    (c) Sound waves
    (d) Absence of modulation

38. _____and phase modulation are interrelated.
    (a) Frequency
    (b) Bandwidth
    (c) Voltage
    (d) Intelligence

39. Calculate the dissipation in power across 20Ω resistor for the FM signal
    v(t)= 20 cos(6600t+ 10sin2100t)
    (a) 5 W
    (b) 20 W
    (c) 10 W
    (d) 400 W

40. A 100MHz carrier is frequency modulated by 10 KHz wave. For a frequency deviation of 50 KHz, calculate the modulation index of the FM signal.
    (a) 100
    (b) 50
    (c) 70
    (d) 90