B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Third Semester

Computer Science and Engineering

(Common to Information Technology)

20ESEC301 - COMMUNICATION ENGINEERING

Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)
Answer ALL Questions

		Marks	K-Level	CO

1. Which of the following modulation techniques is most power efficient? — 1, K1, CO1
   (a) DSB-SC   (b) AM   (c) SSB-SC   (d) VSB

2. Which of the following method is used for detecting SSB wave? — 1, K1, CO1
   (a) coherent detection   (b) enevlope detection
   (c) square-law detection   (d) phase shift method

3. Any error in the local oscillator signal w.r.t the carrier wave results in the distortion of _____. — 1, K1, CO1
   (a) modulated signal   (b) carrier signal
   (c) demodulated signal   (d) none of the mentioned

4. On which of the following factors the pull-in time is dependent. — 1, K1, CO2
   (a) Initial phase of the signal
   (b) Loop gain
   (c) Filter characteristics
   (d) Frequency difference between the incoming signal and VCO
   (e) All of the mentioned

5. Which of the following are the modes of PLL. — 1, K1, CO2
   (a) Free running   (b) Capture   (c) Locking of input signal   (d) All of the mentioned

6. In FM, the modulation index is the ratio of: — 1, K1, CO2
   (a) Carrier frequency to modulating frequency
   (b) Frequency deviation to modulating frequency
   (c) Carrier amplitude to modulating amplitude
   (d) Modulating frequency to carrier amplitude

7. In Pulse Time Modulation (PTM), information can be conveyed through variations in: — 1, K1, CO3
   (a) Amplitude   (b) Pulse width or pulse position
   (c) Pulse height   (d) Carrier frequency

8. Aliasing occurs when: — 1, K1, CO3
   (a) The signal is sampled at twice its maximum frequency
   (b) The signal is sampled at a rate lower than the Nyquist rate
   (c) The signal is quantized with too many levels.
   (d) The signal is amplified before sampling

9. Which of the following relation between sampling rate f_s and maximum frequency of signal f_m is related to the Nyquist sampling theorem. — 1, K1, CO3
   (a) $f_s \geq 2f_m$ (b) $f_s < 2f_m$ (c) $f_s \geq f_m$ (d) $f_s < f_m$

10. The eye pattern resembles like a closed eye if. — 1, K1, CO4
    (a) ISI is present   (b) channel noise present
    (c) either ISI or noise is present   (d) neither ISI or noise is present

11. Amplitude equalizers are used when   *1*   *K1*   *CO4*
    (a) different frequencies reach the receiver at different times
    (b) transmission rate and ringing frequencies are not matched
    (c) peak of pulses are reduced
    (d) channel bandwidth is more than the transmission rate
12. Which of the following cause inter symbol interference (ISI)   *1*   *K1*   *CO4*
    (a) phase distortion   (b) timing inaccuracies
    (c) amplitude distortion   (d) all the mentioned
13. Syndrome is calculated by   *1*   *K1*   *CO5*
    (a) H^T/r (b) rH^T (c) rH (d) None of the mentioned
14. Entropy is the measure of   *1*   *K1*   *CO5*
    (a) Amount of information at the output
    (b) Amount of information that can be transmitted
    (c) Number of error bits from total number of bits
    (d) None of the mentioned
15. A shannon-fano algorithm _____ average information per bit.   *1*   *K1*   *CO5*
    (a) Increases   (b)Decreases   (c) Has no effect   (d) None of the mentioned
16. A linear code is   *1*   *K1*   *CO5*
    (a) Sum of code words is also a code word
    (b) All-zero code word is a code word
    (c) Minimum hamming distance between two code words is equal to weight of any non zero code word
    (d) All of the mentioned
17. The near-far problem is particularly difficult in ……………………………. systems, where transmitters share transmission frequencies and transmission time.   *1*   *K1*   *CO6*
    (a) space division multiple access   (b) Frequency division multiple access
    (c) time division multiple access   (d) code division multiple access
18. In a fixed channel assignment strategy,------   *1*   *K2*   *CO6*
    (a) Each cell is assigned a predetermined set of frequencies
    (b) The call is served by unused channels of the cell
    (c) The call gets blocked if all the channels of the cell are occupied
    (d) All of the Mentioned
19. CDMA and TDMA differ by _____.   *1*   *K1*   *CO6*
    (a) bandwidth   (b) link   (c) carrier   (d) timesharing
20. FHSS is categorized into _____.   *1*   *K1*   *CO6*
    (a) slow-hop   (b) fast-hop
    (c) Both slow-hop and fast-hop   (d) None of the Mentioned

PART - B (10 × 2 = 20 Marks)
Answer ALL Questions

21. Define amplitude modulation (AM).	2	K1	CO1
22. What is modulation index in AM?	2	K1	CO1
23. How does a Phase Modulation (PM) demodulator recover the message signal?	2	K2	CO2
24. What is the role of an FM demodulator, and name one common type used?	2	K1	CO2
25. What is called multiplexing? Give its types.	2	K1	CO3
26. What is the Nyquist rate, and why is it important in the sampling theorem?	2	K1	CO3
27. Examine the bandwidth and baud for FSK signal with a Mark frequency of 49 kHz and Space frequency of 51 kHz and a bit rate of 2kbps.	2	K2	CO4
28. Draw the phasor diagram of QPSK.	2	K1	CO4
29. Mention the properties of information.	2	K1	CO5
30. State Kepler's third law.	2	K1	CO6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13086**

PART - C (6 × 10 = 60 Marks)
Answer ALL Questions

31. a) i) With suitable block diagram and equation, Explain the generation of AM using balanced modulator.   *5   K2   CO1*

    ii) Explain the principle of square law modulator with circuit diagram.   *5   K2   CO1*

<div align="center">OR</div>

    b) Explain the working of super heterodyne receiver with neat block diagram.   *10   K2   CO1*

32. a) Explain the process of FM demodulation using frequency Discriminator.   *10   K2   CO2*

<div align="center">OR</div>

    b) Draw the circuit of reactance tube modulator and explain its Principle of operation. Derive an expression for the equivalent Capacitance in terms of the g_m of the device and circuit Components.   *10   K2   CO2*

33. a) Define Frequency Division Multiplexing (FDM). Explain how FDM is used in communication systems, its advantages and disadvantages, and the challenges of implementing FDM in high-bandwidth systems.   *10   K2   CO3*

<div align="center">OR</div>

    b) i) Explain the generation of Delta Modulation with its waveform.   *5   K2   CO3*

      ii) What are the drawbacks of DM? Describe about ADM with its advantages and disadvantages.   *5   K2   CO3*

34. a) Describe how eye pattern illustrates the performance of data transmission system with respect to Inter Symbol Interference with neat sketch.   *10   K2   CO4*

<div align="center">OR</div>

    b) Write a note on QPSK Modulator & demodulator. Draw its phasor and constellation diagram .Explain bandwidth consideration of QPSK.   *10   K2   CO4*

35. a) The source of information A generates the symbols {A0, A1, A2, and A3 & A4} with the corresponding probabilities {0.4, 0.3, 0.15, 0.1 and 0.05}. Encoding the source symbols using binary encoder and Shannon - Fano encoder and compare its efficiency.   *10   K2   CO5*

<div align="center">OR</div>

    b) Explain how viterbi decoding procedure is used for decoding convolutional codes.   *10   K2   CO5*

36. a) Summarize the direct sequence spread spectrum techniques with neat block diagram.   *10   K2   CO6*

<div align="center">OR</div>

    b) Explain the Bluetooth technology with neat diagram.   *10   K2   CO6*