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| 11. Compare the bandwidth requirements of QPSK and BPSK:
(a) QPSK requires less bandwidth than BPSK
(b) QPSK and BPSK require the same bandwidth
(c) QPSK requires more bandwidth than BPSK
(d) None of the above | 1 | K2 | CO3 |
| 12. Rephrase the advantage of M-ary QAM in a communication system:
(a) Improves error correction capability
(b) Increases data rates by combining amplitude and phase modulation
(c) Decreases signal complexity
(d) Simplifies transmitter design | 1 | K2 | CO3 |
| 13. Define what entropy measures in information theory:
(a) Signal power (b) Uncertainty or randomness of information
(c) Bandwidth (d) Error rate | 1 | K1 | CO4 |
| 14. Identify the type of codes Viterbi decoding is applied to:
(a) Linear block codes (b) Convolutional codes
(c) Huffman codes (d) Shannon codes | 1 | K1 | CO4 |
| 15. State what Shannon-Hartley law determines:
(a) Channel capacity in a noisy channel (b) Bandwidth requirement for modulation
(c) Power efficiency of a system (d) Error rates in data transmission | 1 | K1 | CO4 |
| 16. Classify the types of source coding techniques:
(a) Lossless and lossy (b) Huffman and cyclic
(c) Convolutional and linear (d) Predictive and block | 1 | K2 | CO4 |
| 17. Recall what is used to spread the signal in Direct Sequence Spread Spectrum (DSSS):
(a) Frequency hopping (b) Pseudo-noise (PN) sequence
(c) Amplitude modulation (d) Pulse coding | 1 | K1 | CO5 |
| 18. Identify the technique used in CDMA for multiple access:
(a) Frequency hopping (b) Code assignment (c) Time slots (d) Signal compression | 1 | K1 | CO5 |
| 19. Define the function of synchronization in spread spectrum systems:
(a) Compress the signal (b) Align the PN sequences of the transmitter and receiver
(c) Increase signal bandwidth (d) Filter the noise | 1 | K1 | CO5 |
| 20. State the processing gain of a spread spectrum system as the ratio of:
(a) Message bandwidth to signal bandwidth (b) Spread bandwidth to message bandwidth
(c) Signal power to noise power (d) Frequency to time | 1 | K1 | CO5 |

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

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| 21. Define Modulation Index. | 2 | K1 | CO1 |
| 22. Draw the spectra of DSB-SC & SSB-SC. | 2 | K1 | CO1 |
| 23. How can aliasing be avoided? | 2 | K1 | CO2 |
| 24. Discuss the applications of PCM. | 2 | K2 | CO2 |
| 25. State the necessity of equalizers. | 2 | K1 | CO3 |
| 26. Draw the block diagram of the QPSK demodulator. | 2 | K1 | CO3 |
| 27. Define entropy and its property. | 2 | K1 | CO4 |
| 28. Differentiate between lossless and lossy coding. | 2 | K2 | CO4 |
| 29. Enumerate the applications of FHSS. | 2 | K1 | CO5 |
| 30. Mention the uses of spread spectrum. | 2 | K1 | CO5 |

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

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| 31. a) Discuss any two methods of generation of SSB-SC signals. | 10 | K2 | CO1 |
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OR

- b) Explain the Principle of Super heterodyne receiver with neat block diagram. 10 K2 CO1
32. a) With the neat block diagram of Delta Modulator (DM) in detail. 10 K2 CO2
- OR**
- b) Draw the block diagram of the DPCM system and elaborate the working principle of DPCM transmitter and receiver. 10 K2 CO2
33. a) Discuss the operation of a QPSK modulator and demodulator with a neat diagram. Draw its phasor and constellation diagram. 10 K2 CO3
- OR**
- b) With a neat diagram, explain in detail the Transmitter of 16-QAM along with a truth table, phasor diagram and constellation diagram. 10 K2 CO3
34. a) Consider a discrete memoryless source with seven possible symbols $X_i = \{1, 2, 3, 4, 5, 6, 7\}$ with associated probabilities $P_r = \{0.37, 0.33, 0.16, 0.04, 0.02, 0.01\}$. Show the Huffman's code and Shannon-fano code and determine the coding efficiency and redundancy 10 K2 CO4
- OR**
- b) Explain how encoding is done by convolutional codes with an example. 10 K2 CO4
35. a) Describe the Code division multiple access technique in detail. 10 K2 CO5
- OR**
- b) Illustrate the concept of the FHSS and DSSS communication system with suitable diagrams. 10 K2 CO5
36. a) i) Discuss error control codes with suitable examples. 5 K2 CO4
ii) Explain the properties of PN sequences. 5 K2 CO5
- OR**
- b) i) Show the advantages of Error control codes. 5 K2 CO4
ii) Summarize the advantages of spread spectrum. 5 K2 CO5