

Time: Three Hours

Maximum: 100 Marks

PART A – (20 x 2 = 40 Marks)

Answer ALL questions

1. For an AM DSBFC modulator with a carrier frequency $f_c = 150\text{kHz}$ and a maximum modulating signal frequency $f_{m(\text{max})} = 10\text{kHz}$, determine the frequency limits for upper and lower sidebands..
2. Define modulation index of AM wave.
3. Explain about capture effect in FM.
4. How many sets of sidebands are produced when a carrier is frequency modulated by a single input frequency?
5. What are antipodal signals?
6. Why coherent QPSK is preferred over coherent binary PSK?
7. Determine the baud and minimum bandwidth necessary to pass a 10kbps binary signal using amplitude shift keying
8. What is a constellation diagram?
9. List the four most common methods of pulse modulation.
10. What is meant by slope overload distortion? How do you overcome it?
11. What is meant by Companding.
12. Define data communication codes and give few examples.
13. State the difference between error detection and error correction.
14. Mention four advantages of digital transmission.
15. State the difference between asynchronous and synchronous modems.
16. What are the primary responsibilities of the data link layer?
17. Define pseudo noise sequence.
18. Explain why frequency hopping spread spectrum is not affected by near far problem.
19. Write the attractive features of CDMA.
20. Compare TDMA and FDMA.

PART B – (5 x 12 = 60 Marks)

Answer Any FIVE Questions

21. For an AM DSBFC wave with a peak unmodulated carrier voltage $V_c = 10 V_p$, a load resistance $R_L = 10 \text{ ohm}$ and a modulation coefficient $m=1$, determine
 - a. Powers of the carrier and the upper and lower sidebands.
 - b. Total sideband power
 - c. Total power of the modulated waveThen
 - d. Draw the power spectrum
- 22.(a) Write short notes on frequency deviation in angle modulation. (6)
(b) With a suitable block diagram briefly explain about binary phase-shift keying.(6)
- 23.(a) For a QPSK modulator with an input data rate (f_b) equal to 10 Mbps and a carrier frequency of 70 MHz, determine the minimum double-sided Nyquist bandwidth (f_N) and the baud. (6)
(b)With the aid of suitable block-diagram and mathematical expressions write about one of the sophisticated carrier recovery methods, squaring loop. (6)
- 24.(a) With the aid of suitable block-diagram explain the operations of DPCM transmitter and receiver. (8)
(b) Mention about four primary causes of ISI (4)
- 25.(a) For a 12-bit data string of 101100010010, determine the number of Hamming bits required, arbitrarily place the Hamming bits into the data string, and determine the logic condition of each Hamming bit. Assume an arbitrary single-bit transmission error. (6)
(b) Write short notes on data communications hardware namely data terminal equipment and data communication equipment. (6)

- 26.(a) . With suitable block diagram briefly explain about the operations of an asynchronous FSK modem. (6)
- (b) What do you mean by maximal length sequence? And write about the properties of the maximal length sequence. (6)
27. Why do we need spread spectrum techniques? With the help of suitable diagram clearly explain about direct sequence spread spectrum and frequency hopping spread spectrum. (12)
- 28.(a) State and explain the types of redundancy checking in data communication (6)
- (b) Briefly describe the source coding of speech signals for wireless communications (6)

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