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Question Paper Code : 20468

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Third/Fourth/Sixth Semester

Computer Science and Engineering

EC 8395 — COMMUNICATION ENGINEERING

(Common to Electrical and Electronics Engineering/ Electronics and Instrumentation Engineering/ Instrumentation and Control Engineering)

(Regulations 2017)

Time : Three hours — Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the efficiency of an AM signal if the modulation index is 100%.
2. Write the Carson's rule for bandwidth of FM signal.
3. What are the different types of sampling?
4. Define PWM.
5. What are the disadvantages of DPSK?
6. What is the bandwidth requirement for BPSK and QPSK?
7. A source produces one of the four possible messages during each interval having probabilities $p_1 = \frac{1}{2}, p_2 = \frac{1}{4}, p_3 = p_4 = \frac{1}{8}$. Obtain the amount of information of each of these messages.
8. Write the Shannon's formula for channel capacity.
9. What does spread spectrum mean? What are the advantages of spread spectrum?
10. What are the advantages of TDMA over FDMA?

PART B — (5 × 13 = 65 marks)

11. (a) Derive the expression for AM signal if the modulating signal is $m(t) = A_{m1}\cos 2\pi f_{m1}t + A_{m2}\cos 2\pi f m_2 t + \ldots..$ Also derive the expression for total power and transmission efficiency for the same. Draw the spectrum for the modulated AM signal.

Or

(b) (i) A single tone FM is represented by the voltage equation as $v(t) = 12\cos(6\times10^8 t + 5\sin 1250t)$. Determine the following:

(1) Carrier frequency

(2) modulating frequency

(3) modulation index

(4) maximum deviation

(5) what power will this FM wave dissipate in 10Ω resistor. (10)

(ii) Compare angle modulation with Amplitude modulation. (3)

12. (a) With neat block diagram, explain the working principle of DPCM transmitter and receiver.

Or

(b) Discuss about Natural Sampling and Flat top Sampling. Also explain PAM generation and reconstruction. (13)

13. (a) (i) Explain the operation of QAM transmitter, receiver with neat block diagram. (8)

(ii) Define ASK. Draw the ASK modulated waveform for 1011010111.(5)

Or

(b) (i) What is eye pattern? What do you understand from eye pattern? (6)

(ii) What is BPSK? List out the advantages and disadvantages of BPSK. (7)

14. (a) Write the steps for Huffman coding and Shannon fano coding.

Or

(b) Five symbols of the alphabet of discrete memory less source and their probabilities are given below. $S = \{S_0, S_1, S_2 S_3, S_4\}$ $p(s) = (0.4, 0.2, 0.2, 0.1, 0.1)$ Code the symbols using Huffman coding. Calculate average code length, entropy of the source.

15. (a) (i) Compare DSSS and FHSS. (3)

(ii) Discuss the various multiple access techniques with suitable diagrams. (10)

Or

(b) Explain the operation of FH-SS transmitter and receiver with neat block diagram (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain the properties of FM with the help of Bessel function, Draw the spectrum. Draw the frequency spectrum and phasor diagram. (13)

Or

(b) The parity check matrix of a particular (7,4) linear block code is expresses as

$$[H]=\begin{bmatrix}1&1&1&0&1&0&0\\1&1&0&1&0&1&0\\1&0&1&1&0&0&1\end{bmatrix}$$

(i) Obtain the generator matrix

(ii) List all code vectors

(iii) What will be the minimum distance between code vectors

(iv) How many errors can be detected and corrected

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