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Question Paper Code: 1064399

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

Fourth Semester

Electronics and Communication Engineering

U20EC402 – ANALOG AND DIGITAL COMMUNICATION

(Regulation 2020)

Time: Three Hours

Maximum: 100 Marks

Answer ALL questions

PART – A

(10 x 2 = 20 Marks)

1. A 400 W carrier is modulated to a depth of 75%. Calculate the total power in the modulated wave.
2. Define Carson's rule.
3. Infer the role of a Hilbert transformer in SSB generation.
4. How does the FM stereo receiver switch between mono and stereo modes automatically?
5. An event has six possible outcomes with probabilities $\{1/2, 1/4, 1/8, 1/16, 1/32, 1/32\}$. Solve for the entropy of the system.
6. Choose the Hamming distance between the following code words $C1=\{1,0,0,0,1,1,1\}$ and $C2=\{0,0,0,1,0,1,1\}$.
7. What is the principle of differential PCM?
8. ISI in communication system, how it can be minimized?
9. Give the advantage of CDMA system.
10. Compare TDMA and FDMA.

PART – B

(5 x 16 = 80 Marks)

11. (a) Illustrate and obtain the concept of bandwidth, power calculation generation and detection of an AM-DSBSC. (16)

(OR)

- (b) (i) Infer the function of Vestigial Sideband (VSB) Modulation with its application and generation. (10)
(ii) A 25MHz carrier is modulated by a 400Hz audio sine wave. If the carrier voltage is 4V and the maximum frequency deviation is 10kHz & phase deviation is 25radians. Detect the equation of this modulated wave for FM & PM. If the

modulating frequency is now changed to 2kHz, all else remaining constant. Write a new equation for FM & PM. (6)

12. (a) Construct the Super-heterodyne AM receiver block diagram with its application, advantages and disadvantages. (16)

(OR)

- (b) Identify and compare Pre-emphasis and De-emphasis and Illustrate the circuits with its characteristics, application, advantages and disadvantages. (16)

13. (a) Explain the concept of reconstruction in the context of the Sampling Theorem. Provide an overview of the different types of reconstruction techniques and their applications in signal processing. (16)

(OR)

- (b) (i) Discover the Huffman code for the following messages, their probabilities are given as $x_1=0.05$, $x_2=0.15$, $x_3=0.2$, $x_4=0.05$, $x_5=0.15$, $x_6=0.3$ and $x_7=0.1$. (8)

- (ii) The generator matrix for a (6,3) block code is given below. Find all the code vectors of this code. (8)

$$G = \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{array} \right]$$

14. (a) (i) With neat sketch explain the generation and basic operating principle of ADM signals. State how it differs from conventional delta modulation techniques and list its advantages. (8)

- (ii) Draw and explain the duo-binary encoder with precoder. (8)

(OR)

- (b) (i) Draw non-coherent Frequency Shift Keying (FSK) modulation and explain its principle of operation in digital communication systems. (8)

- (ii) Explain the concept of an eye pattern in digital communication and discuss its significance in analyzing the quality and performance of a communication channel. (8)

15. (a) Summarize the direct sequence spread spectrum techniques with neat block diagram with its advantages, disadvantages and applications. (16)

(OR)

- (b) Classify SS modulation technique based upon the operating concept and explain in detail of FHSS. (16)