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**Question Paper Code : 50488**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023

Third/Fourth/Sixth Semester

Electrical and Electronics Engineering

EC 8395 – COMMUNICATION ENGINEERING

(Common to: Computer Science and 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. What are the classifications of FM based on modulation index?
2. Write the relation between modulation index and amplitude of the modulated waveform of AM.
3. State Nyquist theorem.
4. Draw the waveform of On – off encoding for the binary sequence 01101001
5. What is the principle of M – ary signaling?
6. Mention the use of equalizer.
7. What are the advantages of cyclic codes?
8. State Shannon's information capacity theorem.
9. Define spread – spectrum modulation.
10. List the applications of Spread – spectrum modulation.

PART B — (5 × 13 = 65 marks)

11. (a) Derive the expression of frequency modulation. What are the advantages of FM over AM?

Or

- (b) (i) Discuss about different types of Amplitude Modulation. (6)
- (ii) Explain the detection of AM signals using envelope detector. (7)

12. (a) Explain the operation of TDM with neat block diagram.

Or

(b) Discuss the operation involved in PCM systems with neat block diagram.

13. (a) Draw the block diagram of QPSK transmitter and receiver and explain the same.

Or

(b) What are the operations involved in DPSK? Explain the generation and detection of DPSK with neat diagram.

14. (a) Consider a discrete memory less source with source alphabets  $S = (S_0, S_1, S_2)$  with respective probabilities  $p_0 = 1/4, p_1 = 1/4, p_2 = 1/2$ . Find the entropy of the source and find the entropy of the second – order extension of the source.

Or

(b) A discrete memory less source has an alphabet of five symbols whose probabilities of occurrences are as described here. Compare the Huffman code for this source.

$S_0$	$S_1$	$S_2$	$S_3$	$S_4$
0.4	0.2	0.2	0.1	0.1

15. (a) (i) Explain the potential applications of spread spectrum modulation. (6)  
(ii) What are the two basic technology independent classifications of frequency hopping spread spectrum and explain them. (7)

Or

(b) (i) State and explain the advantages of Spread spectrum techniques? (5)  
(ii) Explain the operation of direct sequence spread spectrum with neat diagram. (8)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Explain the operation of FM super – heterodyne receiver with neat diagram. (8)
- (ii) Explain the operations of pre – emphasis and de-emphasis (7)

Or

- (b) (i) A modulating signal  $m(t) = 10 \cos(2\pi \times 103t)$  is amplitude modulated with a carrier signal  $c(t) = 50 \cos(2\pi \times 105t)$ . Find the modulation index, the carrier power, and the power required for transmitting wave. (7)
- (ii) An FM wave is given by  $s(t) = 20 \cos(8\pi \times 106t + 9 \sin(2\pi \times 103t))$ . Calculate the frequency deviation, bandwidth, and power of FM wave. (8)