

M.E. First Semester (Digital Electronics) (Part Time / Full Time) (C.G.S.- New)
13206 : Digital Communication Techniques : 1 UMEF 4

P. Pages : 2

Time : Three Hours



AW - 3489

Max. Marks : 80

- Notes :
1. Answer **three** question from Section A and **three** question from Section B.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answer necessary with the help of neat sketches.
 5. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) How M-ary optimum receiver can be designed using correlators. 6
b) Derive expression for power density spectrum of CPFSK. 7

OR

2. a) Explain memory – less modulation with signal space diagram. Explain digital PAM system. 7
b) Derive an expression for output SNR of matched filter in frequency domain. 6
3. a) Prove the theorem the rate distortion function of memory less continuous amplitude source with zero mean finite variance $6x^2$ with respect to mean square error distortion measure is upper bounded as
$$R(D) \leq \frac{1}{2} \log_2 \frac{6x^2}{D}, \quad 0 \leq D \leq 6x^2$$

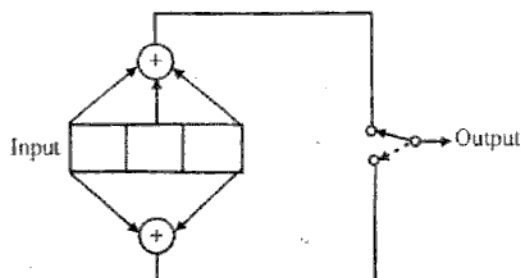
b) Explain with example vector quantization in detail. 6

OR

4. a) Explain Lempel – Ziv algorithm for source coding with suitable example. 6
b) What are the different analog source coding techniques that are designed to represent the time domain characteristics of the signal? Explain any two technique in detail? 7
5. a) Determine the generator polynomial and rate of double error correcting Reed Solomon code with a block length $n = 7$. 7
b) Explain BCH code with example. 7

OR

6. a) A rate $\frac{1}{2}$, $k = 3$, the binary convolutional encoder is shown in fig (a) 7



- i) Find the output sequence if input message is 10101001.
- ii) If the received signal at the decoder for eight message bit is $y = 00101100011100011$ Find out the transmitted bit sequence using Viterbi algorithm.

- b) Explain Reed Muller codes. 7

SECTION – B

7. a) What do you mean by partial response signaling? 6

- b) State and prove Nyquist criterion for zero ISI. 7

OR

8. a) With the help of example explain modified duobinary system for controlling ISI. 6

- b) What is Eye pattern? Draw eye pattern for an 8 PSK signal in the absence of ISI and noise explain in detail. 7

9. a) Discuss in detail the zero forcing algorithm. 7

- b) With regards to the probability of error discuss the linear MSE Equalizer. 6

OR

10. a) Explain LMS algorithm for equalization. 6

- b) Define peak distortion criterion. Explain the minimization of peak distortion assuming that the equalizer have finite number of taps. 7

11. a) Explain Delay locked loop technique of tracking for DS spread spectrum signal. 7

- b) Explain with block diagram time hopping spread spectrum system. 7

OR

12. a) A Pseudo – Noise (PN) sequence is generated using a feedback shift register of length $m = 4$. The chip rate is 10^7 chips per second. Find the following. 7

- i) PN sequence length.
- ii) Chip duration of the PN sequence.
- iii) PN sequence period.

- b) Explain and draw the block diagram of PSK modulator for a DS spread spectrum. 7
