

DIGITAL COMMUNICATION SYSTEMS
(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- What is meant by quantization error? How to reduce it?
 - What is the basic principle of prediction filter in DPCM and give expression for it?
 - What is the difference between base band transmission and band pass transmission?
 - Draw eye pattern and explain the significance of eye pattern for monitoring the performance of base band PAM system.
 - Draw signal constellation diagrams for PSK and QPSK.
 - What is M-ary PAM system? Give expression for probability of error for an M-ary PAM system.
 - Compare coherent and non coherent modulation techniques with bandwidth and power requirements.
 - What is coherent system? Draw the diagram of coherent system of signal reception.
 - What is the difference between FEC system and ARQ system?
 - Explain systematic code word and syndrome vector.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) What are the limitations of Delta modulation? Explain with a neat block diagram, the operation of a Adaptive delta modulation that eliminates the different noises that are occurring in Delta modulation.
- (b) In a single integration DM system, the voice signal is sampled at a rate of 32 kHz, similar to PCM. The maximum signal amplitude is normalized as $A_{max} = 1$.
- Determine the minimum value of the step size to avoid slope overload.
 - Determine the granular noise power N_0 if the voice signal bandwidth is 1.7 kHz.
 - Assuming that the voice signal is sinusoidal, determine S_0 and the SNR.

OR

- 3 (a) Explain the basic principle and operation of TDM with neat diagram.
- (b) What is Line coding? Draw the wave forms for different types of Line codes for data pattern 1101001 and explain.

UNIT – II

- 4 (a) With the help of a block diagram explain baseband binary data transmission.
- (b) A binary PAM wave is to be transmitted over a baseband channel with an absolute maximum bandwidth of 75 kHz. The bit duration is 10 μ s. Find the raised cosine spectrums that satisfy these requirements.

OR

- 5 (a) Explain the principle and operation of correlative coding.
- (b) For input binary data 1011101 obtain the output of duo binary encoder and also the output of decoder.

UNIT – III

- 6 (a) Explain about the Gram-Schmidt process in band pass digital transmission.
- (b) Explain basic principle and operation of correlation receiver.

OR

- 7 (a) What is Matched filter? Derive an expression for probability of error of a Matched filter receiver.
- (b) Explain equivalence of correlation and matched filter receivers.

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UNIT - IV

- 8 (a) Explain the generation and reception of QPSK signals with a neat block diagram.
 (b) A binary data is transmitted over a microwave link at the rate of 10^6 bits/sec and the PSD of the noise at the receiver input is 10^{-10} watts/Hz. Find the average carrier power required to maintain an average probability of error $P_e \leq 10^{-4}$ for coherent binary PSK.

OR

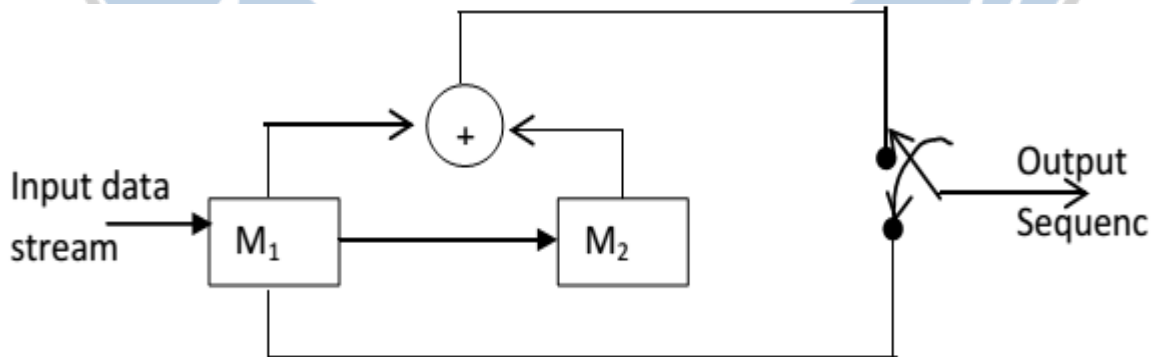
- 9 (a) Explain M-ary digital modulation techniques.
 (b) Derive the expression for probability of error for coherent FSK.

UNIT - V

- 10 (a) Design a syndrome calculator for a (7, 4) cyclic Hamming code generated by the polynomial $g(x) = x^3 + x + 1$. Calculate the syndrome for the received code vector 100101.
 (b) A decimal number N was transmitted using seven bit even parity Hamming code. After transmission, it was received as 1101101. Is there any error introduced during transmission. What is the value of N?

OR

- 11 Construct state diagram & Trellis code tree for the Convolution encode shown in figure below, find the coded sequence for the input sequence 1 1 0 0. If the received sequence has an error in the 4th bit. How Viterbi algorithm is used to correct the errors.



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