B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E   Semester: VI

Branch: Electronics and Telecommunication Engineering   Duration: 3 hrs.

Course Code: 19ET6PCDCM   Max Marks: 100

Course: Digital Communication   Date: 20.09.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
             2. Missing data, if any, may be suitably assumed.

UNIT - I

1   a)   With block diagram explain PAM-TDM   **06**

     b)   Derive equations to show practical aspects of sampling.   **08**

     c)   A signal $x(t)$ consists of two frequency components $f_1 = 3.9kHz$ and $f_2 = 4.1kHz$ in such a relationship that they just cancel out each other when the signal $x(t)$ is sampled at the instants t=0, T,2T… where T=125μs. The signal $x(t)$ is defined as   **06**

$$x(t) = \cos\left(2\pi f_1 t + \frac{\pi}{2}\right) + A\,\cos(2\pi f_2 t + \emptyset).$$

Find the values of amplitude A and phase ϕ of the second frequency component.

OR

2   a)   With block diagram and equations explain DPCM   **08**

     b)   Derive the expression for SNR for binary PCM if full sinusoid is employed.   **08**

     c)   Consider the message signal given by $x(t) = 8\sin(2\pi t)$. Sketch the signal and the delta modulated binary data transmitted, assuming a step size of 2 and sampling interval of 0.2 sec.   **04**
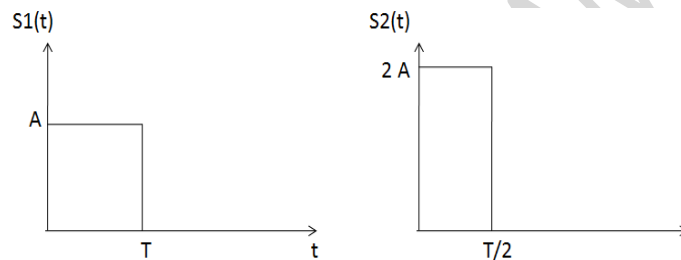
UNIT - II

3   a)   Derive the Nyquist criterion for distortionless baseband binary transmission and thereby mention its practical limitations and also solution to overcome the same.   **08**

     b)   i)Derive the equation for overall transfer function and impulse response of modified duo binary encoder with precoder.   **08**

        ii)For the given input binary sequence   11010101 Obtain the modified duobinary coder output with precoder

     c)   What is eye pattern? Explain its significance of it in understanding the ISI problem?   **04**

UNIT - III

4 a) Discuss the properties of matched filter.   **04**

      b) Discuss the procedure of Gram Schmidt Orthogonalisation   **06**

      c) Explain coherent PSK transmitter and receiver with block diagram. Derive the expression for probability of error.   **10**

OR

5 a) With block diagram and waveforms explain the generation and recovery of ASK modulation technique.   **05**

      b) Derive an expression for probability of error in binary FSK generation scheme   **08**

      c) Two functions s1(t) and s2(t) are given in the below figure. The interval is $0 \leq t \leq T$ seconds. Using gram-Schmidt procedure express these functions in terms orthonormal functions. Also sketch $\Phi1(t)$ and $\Phi2(t)$ **07**

UNIT - IV

6 a) Give advantages and disadvantages of OFDM.   **04**

      b) Describe DPSK transmitter and receiver with appropriate block diagram.   **06**

      c) Derive expression for the average probability of symbol error in terms of Eb/No for QPSK modulation technique along with signal space diagram   **10**

UNIT - V

7 a) What is spread spectrum communication? What is its primary advantage? What are the commonly used spread spectrum technique?   **06**

      b) Explain the principle of DS-SS communication system.   **06**

      c) With block diagram explain slow FH/MFSK system.   **08**

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