

B.E. (Electronics and Communication Engineering)
Sixth Semester
EC-603: Digital Communication

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part. Use of scientific calculator is allowed.

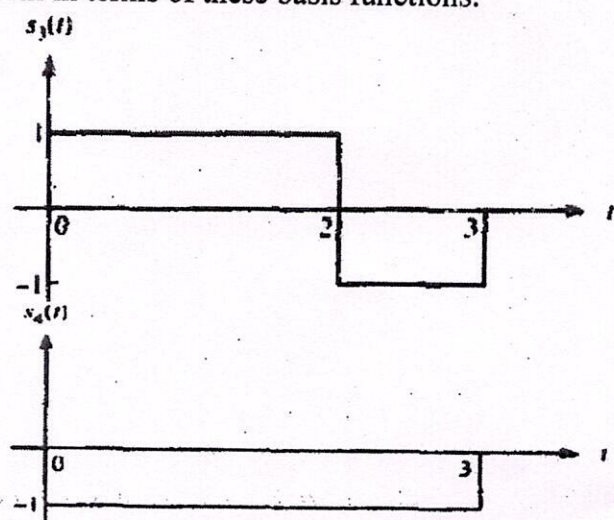
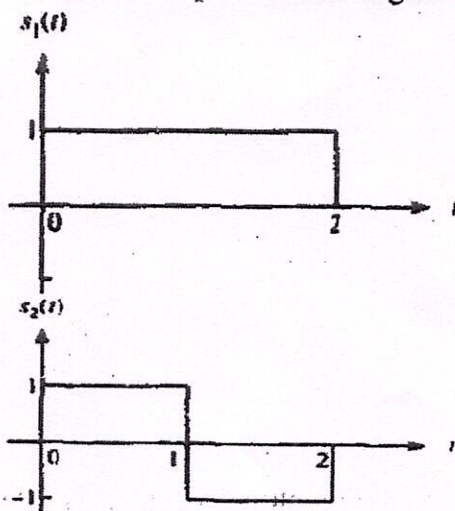
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- I. (a) Why we preferred to use low pass equivalent of any pass-band signal. (2)
(b) Define error bounds for convolutional codes. (2)
(c) Differentiate between orthogonal and bi-orthogonal signals. (2)
(d) Define and express PN sequence using bipolar sequence. (2)
(e) What is run property of PN sequence. (2)

Part-A

- II. (a) What is linear block code? A (7,4) systematic linear block code is given by the following parity-check equation: $p_1 = m_1 \oplus m_2 \oplus m_3$; $p_2 = m_1 \oplus m_2 \oplus m_4$; and $p_3 = m_1 \oplus m_3 \oplus m_4$, where m_1, m_2, m_3 and m_4 are the message bits and p_1, p_2, p_3 are the parity-check bits. Find the generator matrix G and the parity-check matrix H . Hence show that GH^T is a null matrix. (5)
(b) Two quadrature carriers $\cos 2\pi f_c t$ and $\sin 2\pi f_c t$ are used to transmit digital information over AWGN channel at two different data rates of 10kbps and 100kbps respectively. Determine relative amplitude of the for the two carriers such that SNR for the two channels is same. (5)

- III. Apply Gram-schmidt procedure on the signals in the sequence s_4, s_3, s_2 and s_1 to construct basis functions. Represent each signal waveform in terms of these basis functions. (10)



(2)

- IV (a) Explain how to calculate capacity of Gaussian channels. What do you mean by bandwidth S/N trade off? (5)
- (b) Show that BPSK and OPAK have same error probabilities. (5)

Part-B

- V. (a) Explain anti-jamming application using spread spectrum signals. (5)
- (b) Explain capacity of CDMA systems. How reverse link capacity is calculated. Derive the Equation. (5)
- VI. (a) If CDMA system has 50watt carrier signal. How much power is on pilot channel and how much power is on synchronization channel? (5)
- (b) Differentiate TDM/TDMA and FDM/FDMA. (5)
- VII.(a) A binary PAM wave is transmitted over baseband channel with maximum bandwidth of 75kHz. The bit duration is 10 μ sec. Find raised cosine spectrum that satisfy these requirements. (5)
- (b) Explain Nyquist criterion for zero ISI. How ISI can be controlled. (5)