

DiplETE – ET

Time: 3 Hours

JUNE 2014

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. In an S/H circuit, the time that it must hold the sampled voltage is.
- (A) Aperture time (B) Acquisition time
(C) Flat-top time (D) D_{\min}
- b. The quantizing error of PCM systems for weak signals can be made less significant by
- (A) Companding (B) Using time-division multiplexing
(C) frequency-division multiplexing (D) Filtering out the alias frequency
- c. Error signals associated with the sampling process are called
- (A) Foldover distortion (B) Aliasing
(C) Nyquist rate (D) Foldover distortion and aliasing
- d. The advantage(s) of digital and/or data communications over analog include
- (A) Noise performance (B) Regeneration
(C) Digital signal processing (D) All the above
- e. Using an oscilloscope to display overlaid received data bits that provide information on noise, jitter, and linearity is called a(n)
- (A) Eye pattern (B) Constellation pattern
(C) Statistical concentration (D) Loopback

- f. A special digital modulation technique that achieves high data rates in limited-bandwidth channels is called
- (A) Delta modulation
 (B) Pulse-coded modulation (PCM)
 (C) Quadrature amplitude modulation (QAM)
 (D) Pulse amplitude modulation (PAM)
- g. The distortion caused by lengthening the samples is referred to as
- (A) Aperture effect
 (B) Aliasing effect
 (C) Fold over effect
 (D) Sampling
- h. The major difficulty faced by delta modulators is
- (A) Excessive noise producing errors
 (B) Slope overload
 (C) Insufficient frequency response of the intelligence signal
 (D) Complexity of design
- i. The capacity of a telephone channel that has an S/N of 2047 if its bandwidth is 3.5 kHz is
- (A) 30,000 bits per second
 (B) 33,000 bits per second
 (C) 38,500 bits per second
 (D) 35,000 bits per second
- j. PPM and PWM are superior to PAM systems in
- (A) Noise characteristics
 (B) Bandwidth characteristics
 (C) Simplicity in design
 (D) Frequency response of the intelligence signal

**Answer any FIVE Questions out of EIGHT Questions.
 Each question carries 16 marks.**

- Q.2** a. An ensemble (A, z) is given where $A = \{ '000', '001', '010', '011', '100' \}$ and $z = [0.5 \ 0.22 \ 0.2 \ 0.05 \ 0.03]^T$ is given. Find the code-length per symbol before and after Huffman coding. **(8)**
- b. What are the advantages of Digital Communication? **(4)**
- c. Consider a discrete memory less source with source alphabets $S = \{ s_0, s_1, s_2 \}$ with probabilities $p(s_0) = 1/4$, $p(s_1) = 1/4$, $p(s_2) = 1/2$. Calculate the entropy of the source. **(4)**
- Q.3** a. Draw Block diagram of PAM-TDM (pulse amplitude modulation-time division multiplexing) and explain the process in detail. **(8)**

- b. Explain Flat top sampling process in detail. Why amplitude and delay distortion occurs in flat top sampling. How it can be corrected. (8)
- Q.4** a. Explain in detail Differential pulse code modulation (DPCM) with the help of neat block diagram. (8)
- b. What is the need of Robust Quantisation? Explain the model of Robust Quantisation. (8)
- Q.5** a. Write a short note on adaptive equalization for data transmission. (8)
- b. What is Inter symbol interference? Explain its effects and methods to reduce it. (8)
- Q.6** a. Draw and explain the transmitter and receiver section of differential phase shift keying. (8)
- b. Compare Binary and Quaternary modulation techniques. (8)
- Q.7** a. The received signal in a binary communication system that employs antipodal signals is $r(t) = s(t) + n(t)$, where $s(t)$ is shown in the figure below and $n(t)$ is AWGN with power spectral density $N_0/2$ W/Hz.

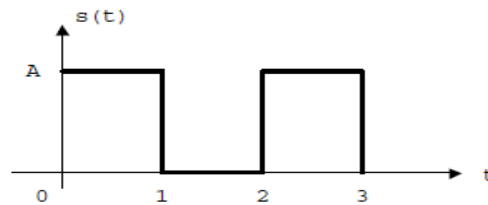


Fig.1

- Obtain the impulse response and output of the matched filter matched to $s(t)$ (8)
- b. What is matched filter receiver? (4)
- c. Write a note on correlation receiver. (4)
- Q.8** a. Explain Direct Sequence Spread Coherent Binary PSK. (8)
- b. Define spread spectrum and enlist the properties of maximum length sequences. (8)
- Q.9** Write Short note on:
 (i) Code division multiple Access (CDMA)
 (ii) Digital Radio (2×8)