

DiplETE – ET (Current & New Scheme)

Time: 3 Hours

JUNE 2017

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. Which type of signal is represented by discrete values?
 (A) Analog (B) Digital
 (C) Noisy signal (D) Non linear
- b. ASK, PSK, FSK, and QAM are examples of _____ conversion.
 (A) digital to analog (B) digital to digital
 (C) analog to analog (D) analog to digital
- c. If the bit rate for an FSK signal is 1200 bps, the baud rate is _____.
 (A) 300 (B) 400
 (C) 600 (D) 1200
- d. The constellation diagram of QPSK has _____ dots.
 (A) 2 (B) 3
 (C) 4 (D) 5
- e. Quadrature amplitude modulation (QAM) is a combination of _____.
 (A) ASK and FSK (B) FSK and PSK
 (C) ASK and PSK (D) none of these
- f. Unipolar, bipolar, and polar encoding are types of _____ encoding.
 (A) line (B) block
 (C) NRZ (D) Manchester
- g. The Nyquist theorem specifies the minimum sampling rate to be _____.
 (A) equal to the lowest frequency of a signal
 (B) equal to the highest frequency of a signal
 (C) equal to the bandwidth of a signal
 (D) twice the highest frequency of a signal
- h. The first step in PCM is _____.
 (A) quantization (B) modulation
 (C) sampling (D) none of these
- i. The signal rate is sometimes called the _____ rate.
 (A) baud (B) bit
 (C) signal (D) none of these

- j. _____ is a technique which transforms an analogue telephone circuit into a digital signal, and involves three consecutive processes: sampling, quantization and encoding.
 (A) Frequency Modulation (FM) (B) Pulse Code Modulation (PCM)
 (C) Amplitude Modulation (AM) (D) Phase Modulation (PM)

Answer any FIVE Questions out of EIGHT Questions.

Each question carries 16 marks.

- Q.2** a. Write the advantages and disadvantages of a Digital Communication System. (8)
 b. A discrete source emits one of five symbols once every milliseconds with probabilities $1/2, 1/4, 1/8, 1/16$ and $1/16$ respectively. Determine the source entropy and information rate. (8)
- Q.3** a. A band limited signal $X(f)$ is sampled by a train of rectangle pulses of width Z and period T .
 (i) Find an expression for sampled signal.
 (ii) Determine the spectrum of the sampled signal and sketch it. (10)
 b. For a pulse – amplitude modulated (PAM) transmission of voice signal having maximum frequency equal to $f_m = 3$ kHz, calculate the transmission band width. It is given that the sampling frequency $f_s = 8$ kHz & the pulse duration $Z = 0.1 T_s$. (6)
- Q.4** a. Compare PCM, DM, ADM & DPCM (8)
 b. A Television signal having a bandwidth of 4.2 MHz is transmitted using binary PCM system. Given that the number of quantization levels is 512. Determine
 (i) Code word length (ii) Transmission bandwidth
 (iii) Final bit rate (iv) Output signal to quantization noise ratio (8)
- Q.5** a. Explain the various techniques to detect the baseband digital signal. (8)
 b. White noise of two sided density $2 \times 10^{-6} V^2/Hz$ is applied to a simple R-C low pass filter whose 3db cut off frequency is 4 KHz. Find the squared value of the noise output. (8)
- Q.6** a. Draw the block diagram of DPSK/DBPSK modulator and explain how synchronization problem is avoided for its detection. (8)
 b. Compare BPSK, DPSK, QPSK & M ary PSK. (8)
- Q.7** a. Explain the principle and process of correlation detection. (8)
 b. Prove that the maximum signal to noise ratio for the matched filter is found to be $(S/N)_0 \max = 2E/N_0$. (8)
- Q.8** a. A Direct- Sequence system with a 5- megabits code clock is travelling at a relative velocity of 1000 mi/ h away from the receiver. The carrier frequency is 400 MHz. What would be the receiver code clock rate and carrier frequency? (8)
 b. Discuss on synchronization Procedure in spread spectrum technique. (8)
- Q.9** Write a Short Notes on the following
 (i) Hierarchy digital multiplexer. (8)
 (ii) Code Division multiple access. (8)