

DipIETE – ET (Current & New Scheme)

Time: 3 Hours

June 2016

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)

- The fundamental requirement of communication system is
(A) amplification (B) filtering
(C) mixing (D) modulation
- The process of sampling in pulse code modulation involves
(A) analog modulation (B) digital modulation
(C) quadrature amplitude modulation (D) Impulse modulation
- Nyquist rate is the minimum sampling rate to avoid
(A) foldover distortion (B) Amplitude distortion
(C) frequency distortion (D) phase distortion
- For an available bandwidth of 100 kHz which spans from 200 to 300 kHz, what should be the bit rate if we modulate data by FSK with $d=1$.
(A) 50 kbps (B) 25 kbps
(C) 100 kbps (D) 75 kbps
- A discrete source that generates statistically independent symbols are
(A) memory less (B) optimally matched
(C) with memory (D) maximally matched
- A binary source is generating a binary 1 with probability p and a binary 0 with probability $(1-p)$ then the entropy is maximum when
(A) $p = 0$ (B) $p = 1$
(C) $\log_2 p = \log_2(1-p)$ (D) $p = 0.2$
- Channel capacity C represents
(A) average symbol rate (B) average data rate
(C) maximum symbol rate (D) maximum errorless data rate
- A Channel has a bandwidth of 1 MHz. The SNR for the channel is specified as 63. The approximate bit rate is
(A) 1 Mbps (B) 2 Mbps
(C) 4 Mbps (D) 6 Mbps
- Shannon's theorem emphasizes the fact of high reliability because
(A) symbol rate R need not be very high
(B) code data rate need not be zero
(C) code data rate need not exceed unity
(D) code data rate is independent of error probability

- j. We need to send 256 kbps over a noiseless channel with a bandwidth of 20 kHz. How many signal levels do we need?

(A) 89.7 (B) 98.7
(C) 79.8 (D) 78.8

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

- Q.2** a. Define the term signal. Classify the signals into Analog and Digital Signals with properties. (4)
b. What are the basic communication channels in Digital Communication? (4)
c. What do you mean by Entropy? How is it related to uncertainty in information? (8)
- Q.3** a. What do you mean by source and channel coding? Find the Code length for a DMS having symbols ($x_1, x_2, x_3, x_4, x_5, x_6, x_7$) with probabilities ($p_1=0.05, p_2=0.15, p_3=0.2, p_4=0.05, p_5=0.15, p_6=0.3, p_7=0.1$) (8)
b. Define mutual information with mathematical equation. Write properties of Mutual information. (8)
- Q.4** a. State and explain Sampling theorem. How reconstruction of signal can be done? (8)
b. Draw the block diagram of a time division multiplexing system. Explain the process using two-sinusoidal message signals. (8)
- Q.5** a. What do you mean by noise in PCM system? Derive an expression for probability of error (P_e). (8)
b. Explain Delta Modulation with suitable diagram. What are its drawbacks? (8)
- Q.6** a. What do you mean by Intersymbol interference. Explain method to reduce it. (8)
b. Explain the concept of co-relative coding with explanation of duo-binary coding and decoding. (8)
- Q.7** a. With the help of block diagram, explain QPSK transmitter and receiver systems. (8)
b. Explain the Geometric interpretation of signals in brief. (4)
c. Give a comparison of binary and quaternary modulation techniques. (4)
- Q.8** a. Explain the Generation of PN (Pseudo-Noise) sequences with block diagram. (8)
b. Explain the applications of Digital Modulation techniques. (8)
- Q.9** Write Short note on any **TWO** of the following: (2×8)
(i) Eye pattern
(ii) GRAM Schmidt orthogonalization procedure
(iii) Matched Filter Receiver