DipIETE – ET

Time: 3 Hours   **JUNE 2013**   **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 of the following system is digital?

     (A) Pulse code modulation   **(B)** Pulse position modulation
     (C) Pulse width modulation   **(D)** Pulse amplitude modulation

   b. In PCM system, output S/N increases

     (A) Linearly with bandwidth   **(B)** Exponentially with bandwidth
     (C) Inversely with bandwidth   **(D)** None of these

   c. The modulation technique used in the GSM is

     (A) QPSK   **(B)** MSK
     (C) GMSK   **(D)** ASK

   d. _____ is most affected by noise

     (A) PSK   **(B)** ASK
     (C) FSK   **(D)** DPSK

   e. Comparison of MSK and QPSK schemes shows that

     (A) MSK requires more bandwidth comparatively
     (B) QPSK requires less power comparatively
     (C) Filtering is simple in MSK
     (D) None of these

f. The amount of information of an event is

(A) Directly proportional to probability of occurrence
(B) Inversely proportional to probability of occurrence
(C) Directly proportional to square of probability of occurrence
(D) Inversely proportional to square of probability of occurrence

g. A signal is having a highest frequency component W. The minimum Nyquist rate to recover this signal is

(A) 2W   **(B)** 1W
(C) 3W   **(D)** 4W

h. For speech coding, the μ law companding is used with μ = _____ generally.

(A) 5255   **(B)** 255
(C) 10255   **(D)** 1255

i. A AWGN channel of bandwidth 4KHz and S/N of 1.25×10^4. The channel capacity is _____ b/s

(A) 54.44 K   **(B)** 200K
(C) 100 K   **(D)** 4K

j. Granular noise is associated with

(A) PCM   **(B)** DPCM
(C) DM   **(D)** QAM

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

Q.2 a. A discrete Memoryless source has four symbols S_0,S_1,S_2,S_3 with probabilities of 0.4,0.3,0.2 and 0.1 respectively.
  (i) Calculate the amount of information in each symbol
  (ii) Calculate entropy of the source   **(8)**

  b. Draw and explain the block diagram of a digital communication system.   **(8)**

Q.3 a. Explain how Sample and Hold circuit is used for signal recovery.   **(8)**

  b. State and prove sampling theorem for low pass signal and bandpass signals.**(8)**

Q.4 a. Explain Delta Modulation (DM) in detail with the help of neat block diagram. Also discuss its advantages and disadvantages.   **(8)**

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   b. A PCM signal uses a uniform Quantizer followed by a 7 bit binary encoder.
      The bit rate of the system is equal to 50×10^6 bits/sec.
      (i) What is the maximum message bandwidth for which system operates
      satisfactory?
      (ii) Calculate the output signal to quantization noise ratio when the full load
      sinusoidal modulating wave of frequency 1 MHz is applied to the input.
                                                                            (8)

Q.5   a. Explain Inter Symbol Interference (ISI). How eye pattern technique is used to
          study ISI.   **(8)**

   b. Explain the working of precoded duo binary system with a suitable block
          diagram.   **(8)**

Q.6   a. Draw and explain the block diagram of QPSK.   **(8)**

       b. For an FSK system, the following data are observed. Transmitted binary data
          rate = 2.5×10^6 bits/sec, power spectra density of noise = 10^{-20} watts/Hz.
          Amplitude of received signal = 1µV. Determine the average probability of
          symbol of symbol error assuming coherent detection [erfc(2.23)=1.84×10^{-3}]
                                                                            (8)

Q.7   a. Explain geometric interpretation of signals.   **(8)**

       b. Obtain the orthonormal basis functions for the signal $S_1(t)$ shown below. **(4)**
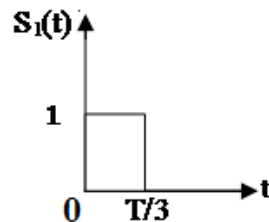
       c. Why do we go for Gram-Schmidit Orthogonalization procedure?   **(4)**

Q.8   a. Draw the block diagram of transmitter and receiver section of direct sequence
          spread spectrum. Also list the advantages of DS-SS.   **(8)**

       b. Explain PN sequence. Enlist its properties.   **(8)**

Q.9   Write Short note on any **<u>TWO</u>**:

          (i) Adaptive Equalizers
          (ii) Digital Multiplexers
          (iii) Lightwave Transmission   **(8+8)**