ROLL NO. _____

Code: DE63 **Subject: DIGITAL COMMUNICATIONS**

DipIETE – ET

Time: 3 Hours **DECEMBER 2012** **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. Analog information with a BW of 5000Hz can be digitized by sampling at:

(A) 1000Hz **(B)** 3000Hz
(C) 6000Hz **(D)** 12000Hz

b. Channel capacity is directly proportional to:

(A) Power **(B)** Multiplexing
(C) information transmission rate **(D)** Log_2 of SNR

c. Quantization error is caused due to:

(A) Over sampling **(B)** Bigger stepsize
(C) Smaller changes in step size **(D)** Use of Sample and hold circuit

d. Differential PCM helps in reducing the:

(A) Conversion time **(B)** Over load error
(C) Bits required **(D)** Sampling time

e. Eye pattern indicates:

(A) Type of modulation **(B)** Modulation index
(C) Noise Margin **(D)** Number of errors

f. In a 8-PSK, the incoming signal rate is 1.54Mbps, the raw bit rate will be:

(A) 192.5 Kbps **(B)** 38.5 Kbps
(C) 51.33 Kbps **(D)** 77 Kbps.

g. N number of digital sources can be transmitted on the same carrier using:

(A) FDM **(B)** TDM
(C) WDM **(D)** CDM

h. A DSS technique uses:

(A) Random carrier frequencies **(B)** Random codes
(C) Random phases **(D)** Random amplitudes

i. BER can be found out if:

(A) Signal energy is known
(B) Bandwidth of the system is known
(C) Signal energy to Noise density is known
(D) Quantization noise density is known

j. QAM is represented by:

(A) Change in amplitude
(B) Change in phase
(C) Change in phase and frequency
(D) Change in amplitude and phase

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

Q.2 a. Distinguish between source coding and channel coding, how Huffman codes are generated, give example? **(8)**

b. Describe signal processing operations in Digital Communications. **(8)**

Q.3 a. What is the difference between low pass sampling and band pass sampling. How reconstruction takes place? **(6)**

b. What is the need of sample and hold circuit, how does it help in quantization. **(6)**

c. Two signals of 1KHz and 1.5KHz are to be transmitted over a common channel as TDM signals. What is the minimum sampling rate required. **(4)**

Q.4 a. What are the various noise that effect the performance of a digital system? Show that in a uniform quantizer the noise variance grows as square of step size. How this problem is taken care of? **(8)**

b. Explain the process of Delta modulation. What are the various errors that occurs in this type of waveform coding? **(8)**

Q.5 a. What is the Nyquist criterion for distortion less base band transmission? If a 8 bit PCM voice data is to be transmitted in the TDM mode calculate the BW requirement when a cosine filter with roll off of 0.6 is used. Assume the frame period to be 125 microsec. **(8)**

b. What is Inter symbol interference? Explain its effects and methods to reduce it. **(8)**

Q.6 a. How many message points does a QPSK represent, draw the signal space characteristic of a QPSK. **(8)**

b. Find the probability of error if E_b/N_o requirement is 8dB in the case of BPSK and QPSK? **(8)**

Q.7 a. What is a maximum- likelihood detector, explain its operation using a phasor diagram. **(8)**

b. What are the properties of a matched filter, explain each one of them? **(8)**

Q.8 a. What are the advantages of spread spectrum modulation? Show that the effect of interference is minimized in this technique. **(8)**

b. Explain the following wrt a spread spectrum system: **(8)**
(i) Processing gain
(ii) Anti jamming
(iii) Frequency hopping
(iv) Maximum length sequence

Q.9 a. What is the need of bit stuffing in multiplexer hierarchy? **(4)**

b. What is meant by TDMA, how does it work? **(6)**

c. Explain the use of spread spectrum in CDMA. **(6)**