ROLL NO. _____

Code: DE63/DE114 **Subject: DIGITAL COMMUNICATIONS**

DipIETE – ET (Current & New Scheme)

Time: 3 Hours **DECEMBER 2018** **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. A signal is having a highest frequency component F. The minimum Nyquist rate to recover this signal is _____.
(A) 2F **(B)** 1F
(C) 3F **(D)** 4F

b. In a digital communication system, which of the following is not considered as one of the basic signal processing operation?
(A) Source coding **(B)** Channel coding
(C) Multiplexing **(D)** Modulation

c. Channel capacity is directly proportional to:
(A) Power **(B)** Multiplexing
(C) Information transmission rate **(D)** Log_2 of SNR

d. Quantizing noise occurs in
(A) PCM **(B)** TDM
(C) PAM **(D)** CDMA

e. Eye pattern indicates:
(A) Type of modulation **(B)** Modulation index
(C) Noise Margin **(D)** Number of errors

f. In which of the following format spectrum has a dc null.
(A) NRZ **(B)** RZ
(C) Polar **(D)** Bipolar

g. For each symbol 1 and 0 in PSK phase of carrier differs by _____ degree.
(A) 45 **(B)** 90
(C) 180 **(D)** 360

h. Each frame in a T-1 carrier system consists of _____
(A) 8 bits **(B)** 192 bits
(C) 193 bits **(D)** 24 bits

i. _____ is a measure of the average information content per source symbol.
(A) Information **(B)** Uncertainty
(C) Prefix Coding **(D)** Entropy

j. Which of the following is the application of spread-spectrum technique?
(A) Digital Multiplexers **(B)** CDMA
(C) T1 **(D)** M12 Multiplexer

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.	Define mutual information with mathematical equation. Write properties of Mutual information.	**(8)**
Q.3	a.	State and prove sampling theorem for low pass signal and band pass signals.	**(8)**
	b.	Draw the block diagram of a time division multiplexing system. Explain the process using two-sinusoidal message signals.	**(8)**
Q.4	a.	Explain Robust quantization. Also explain μ- law and *A* – law companding.	**(8)**
	b.	Explain with the help of a neat block diagram the working of Delta Modulation. Also discuss its advantages over DPCM.	**(8)**
Q.5	a.	Explain the importance of eye pattern to study intersymbol interference.	**(8)**
	b.	Discuss the different formats for the representation of binary data sequence 0110101100.	**(4)**
	c.	Write down the power spectra of discrete PAM signals for sequence 0110101100 .	**(4)**
Q.6	a.	What is Inter symbol interference? Explain its effects and methods to reduce it.	**(8)**
	b.	Construct NRZ bipolar format for the binary sequence 011010110.	**(4)**
	c.	Explain Base-Band M-ary PAM Systems in brief.	**(4)**
Q.7	a.	Explain the correlator receiver. Obtain its signal output and noise output.	**(8)**
	b.	What are matched filters? State and explain the properties of the matched filters.	**(8)**

Q.8 a. Explain Direct Sequence Spread Coherent Binary Phase Shift Keying system with the help of neat block diagrams. **(8)**

b. A PN sequence is generated using a feedback shift register of length, m = 4. The chip rate is 10^7 chips per second. Find the following parameters. **(8)**
1) PN sequence length.
2) Chip duration of the PN sequence.
3) PN sequence period.

Q.9 Write Short note on any **TWO** of the following: **(2x8)**

(i) CDMA
(ii) Digital Multiplexers
(iii) Applications of digital modulation techniques.