

SAMPLE PAPER
Examinations Commencing from 7th January 2021 to 20th January 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev2016

Examination: TE Semester V

Course Code: ELX502 and Course Name: Digital Communication

Time: 2 hours

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Mean of a random variable X is given by _____
Option A:	$E(X^2) - (E(X))^2$
Option B:	$E(X^2)$
Option C:	$E(X)$
Option D:	$(E(X))^2$
2.	Shannon's theorem states that
Option A:	As probability decreases, number of bits increase
Option B:	As probability decreases, number of bits decrease
Option C:	As probability decreases, number of bits remain the same
Option D:	There is no relation between probability and number of bits
3.	The capacity of a Gaussian channel for infinite bandwidth is given as _____
Option A:	$1.44 S / N_0$
Option B:	$2.44 N_0 / S$
Option C:	$1.44 N_0/S$
Option D:	$2.44 S/N_0$
4.	Given $x_i = \{x_1, x_2, x_3\}$ with probabilities as $p(x_i) = \{0.6, 0.2, 0.2\}$ respectively. Find Average Codeword length using Huffman technique.
Option A:	1.4 bits/ message
Option B:	1.8 bits/ message
Option C:	2 bits/ message
Option D:	1.4 bits/ message
5.	The hamming distance between codeword 11001 and 10010 is
Option A:	2
Option B:	3
Option C:	4
Option D:	1
6.	The Generator Matrix dimensions are _____
Option A:	$1 \times n-k$
Option B:	$k \times n-k$
Option C:	$k \times n$
Option D:	$n-k \times n$
7.	Which statement is not correct for error correcting codes?

Option A:	They are classified as Convolution codes and block codes
Option B:	Convolution codes need memory
Option C:	Block codes need memory
Option D:	Hamming codes are linear block codes.
8.	According to linearity property, what operation is performed on two code words in a cyclic code to create another valid code word?
Option A:	Product
Option B:	Difference
Option C:	Sum
Option D:	Division
9.	In which modulation technique the amplitude and phase is varied according to information in the digital signal?
Option A:	QPSK
Option B:	QAM
Option C:	BFSK
Option D:	BASK
10.	PSD of modulated signal = _____ of PSD of baseband signal and PSD of carrier signal
Option A:	Sum
Option B:	Difference
Option C:	Product
Option D:	Convolution
11.	Minimum shift keying is
Option A:	QPSK
Option B:	FSK
Option C:	M-ary PSK
Option D:	Continuous phase frequency shift keying
12.	The toggle flip flop generates even and odd signals for
Option A:	QPSK
Option B:	BPSK
Option C:	BFSK
Option D:	BASK
13.	BPSK system modulates at the rate of
Option A:	1 bit/ symbol
Option B:	2 bits/symbol
Option C:	3 bits/ symbol
Option D:	4 bits/ symbol
14.	In precoding of Duo Binary Technique, the binary sequence is _____ with the previous precoded bit.
Option A:	ANDed
Option B:	EXORed
Option C:	EXNORed
Option D:	ORed

15.	Interference that occurs when a pulse spreads out in such a way that it interferes with adjacent pulses at the sample instant is called
Option A:	Inter channel Interference
Option B:	Adjacent Channel Interference
Option C:	Intra Symbol Interference
Option D:	Inter Symbol Interference
16.	The Transmission bandwidth for a line code must be
Option A:	Exactly Equal to Bit rate
Option B:	No restriction
Option C:	As High as possible
Option D:	As less as possible
17.	For a (4,1) LBC the generator matrix is given by $G = [1 \ 1 \ 1 \ 1]$. Find the code word generated.
Option A:	Code word 0000,1111
Option B:	Code word 0001,1110
Option C:	Code word 1000,1101
Option D:	Code word 0000,1101
18.	In case of cyclic code, when highest degree of generator polynomial is 3 and data word is 3, what is the highest degree of codeword?
Option A:	7
Option B:	6
Option C:	4
Option D:	3
19.	Which modulation technique uses: square law device, bandpass filter, and frequency divider by two, for carrier recovery?
Option A:	BASK
Option B:	QPSK
Option C:	BPSK
Option D:	16QAM
20.	The coding techniques in which the maximum synchronizing capability is present is called
Option A:	Huffman Coding
Option B:	Shannon Fano Coding
Option C:	AMI
Option D:	Manchester coding

Q2. (20 Marks)	
A	<i>Solve any two, 5 marks each</i>
i.	Explain ISI , Nyquist Rate and Eye pattern with a neat diagram
ii.	Write a short note on Duo Binary Encoding.

iii.	Define Mean, Variance, Central Moment, Entropy and Standard Deviation,
B	<i>Solve any one, 10 marks each</i>
i.	Explain with neat block diagrams, the transmitter and receiver of M-ary PSK. Also sketch the PSD of M-ary PSK and determine the bandwidth.
ii.	A discrete memoryless source emits 5 messages s_1, s_2, s_3, s_4, s_5 with probabilities 0.12, 0.26, 0.18, 0.34, 0.1 respectively. Construct Shannon Fanno table and encode these messages. Obtain entropy, average length, efficiency and redundancy.

Q3. (20 Marks)	
A	<i>Solve any two, 5 marks each</i>
i.	Derive an expression for error probability of matched filter.
ii.	For a bit sequence 110101, plot Polar RZ, AMI NRZ and Manchester Line codes.
iii.	For a convolution encoder with code rate 1/3, the generator vectors are $g_1=(1,1,1)$ $g_2=(1,1,0)$ and $g_3=(0,1,1)$. Draw the encoder and find the code word for 10101. Draw the state Diagram.
B	<i>Solve any one, 10 marks each.</i>
i.	Write a short note on Optical Communication System and Satellite Communication System.
ii.	Consider a Systematic Block Code whose Parity Check Equations are $C_5 = m_1 + m_2 + m_3$ $C_6 = m_2 + m_3 + m_4$ $C_7 = m_1 + m_3 + m_4$ $C_8 = m_1 + m_2 + m_4$ Find n, k Find code words for 1010 Construct Syndrome Look up table. If received vector is 10111110, find if it is correct or erroneous and if so, which bit has error.