

Examinations Commencing from 22nd November 2021 to 5th January 2022

Program: **Electronics Engineering**

Curriculum Scheme: Rev2019

Examination: TE Semester V

Course Code: ELC504 and Course Name: Digital Communication

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Standard deviation is
Option A:	Square of Mean
Option B:	Square root of mean
Option C:	Square of variance
Option D:	Square root of variance
2.	The period of a PN sequence in spread spectrum, produced by m shift registers is _____
Option A:	2m
Option B:	m
Option C:	2 ^m
Option D:	2 ^{m-1}
3.	In DSSS system, to increase the bandwidth, a baseband signal is _____ with the PN sequence
Option A:	Added
Option B:	Subtracted
Option C:	Multiplied
Option D:	Divided
4.	Hamming distance between 1000 and 0001 is -----
Option A:	3
Option B:	1
Option C:	4
Option D:	2
5.	Bandwidth of Mary FSK is
Option A:	2 ^N fb/2N
Option B:	2 ^(N+1) fb/N
Option C:	2 ^N fs/N
Option D:	2 ^(N+1) fs/N
6.	The maximum synchronizing capability in coding techniques is present in
Option A:	Manchester format
Option B:	Polar NRZ
Option C:	Polar RZ
Option D:	Polar quaternary NRZ

7.	In linear block code, for the received code-word Y , syndrome(S) is calculated by:
Option A:	Y/H^T
Option B:	$Y*H^2$
Option C:	$Y*H$
Option D:	$Y*H^T$
8.	Choose the correct sentence
Option A:	Noise immunity of 16 QAM is better than 16 PSK and QPSK
Option B:	Noise immunity of 16 QAM is better than 16 PSK but poorer than QPSK
Option C:	Noise immunity of 16 QAM is poorer than 16 PSK but better than QPSK
Option D:	Noise immunity of 16 QAM is poorer than both 16 PSK and QPSK.
9.	The value of the probability density function of random variable is
Option A:	Positive function
Option B:	Negative function
Option C:	Zero
Option D:	One
10.	The sequence of operations in which PCM is done is
Option A:	Sampling, quantizing, encoding
Option B:	Quantizing, encoding, sampling
Option C:	Quantizing, sampling, encoding
Option D:	Sampling, encoding, quantizing

Q2 (20 Marks)	Solve any Four out of Six (5 marks each)
A	Why MSK is called shaped QPSK. Explain
B	In the presence of White Gaussian noise, with a constant signal power the channel capacity reaches its upper limit with the increase in the bandwidth B. Prove that this upper limit of C is given by $C_{\infty} = 1.44(S/N_0)$.
C	Write short note on Optimum receiver.
D	For a convolutional encoder with code rate 1/3 and constraint length 3 and generating Vectors $g_1 = (1\ 1\ 1)$, $g_2 = (1\ 0\ 1)$, $g_3 = (1\ 1\ 0)$. (i) Draw the encoder and find the codeword for input sequence 11010 by code tree method.
E	Differentiate between offset and nonoffset QPSK
F	Write short note on PN sequence.

Q3 (20 Marks)	Solve any Two Questions out of Three (10 marks each)
A	Draw the signal constellation of 16 PSK and 16 QASK. Determine Euclidean distance and expression for symbol energy in both the systems. Compare them and comment about noise immunity

B	A DMS X(Discrete memoryless source) has following 5 symbols with probabilities					
	Symbol	X1	X2	X3	X4	X5
	Probability	0.4	0.1	0.19	0.15	0.16
	i. Construct Shanon Fano code for X and calculate the efficiency of code ii. Repeat for Huffman code and compare the result					
C	Discuss the problem of Inter symbol Interference(ISI). Explain the measures to be taken to reduce ISI. How to study ISI using Eye pattern					

Q4. (20 Marks)	
A	Solve any Two 5 marks each
i.	Explain coherent reception of M-ary PSK with a neat block diagram.
ii.	Draw the NRZ AMI and Manchester representation of 10111011
iii.	Explain Central Limit Theorem.
B	Solve any One 10 marks each
i.	A (8,4) cyclic code is generated by using generator polynomial $g(x)=x^4 + x^2 + 1$. Draw the encoder and find the code word generated for message bits 1110(LSB) by tracing the path through encoder .Verify the result by using division method
ii.	With neat block diagrams, explain both DSSS and FHSS methods of Spread Spectrum