SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA

School of Electronics & Communication Engineering

B. Tech. (ECE) Minor-I Examination (Even) 2018-19

Entry No: 17BEC033 **Total Number of Pages:[01]**

Date: 07.02.2019 **Total Number of Questions: [04]**

Course Title: Digital Communication Engineering

Course Code: ECL 2152

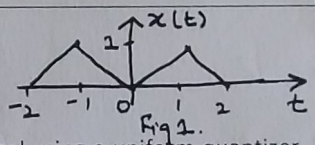
Time Allowed 1.5 Hours **Max Marks: [20]**

Instructions / NOTE

i. ***Attempt All Questions.***

ii. ***Support your answer with neat sketches/diagrams, wherever appropriate.***

iii. ***Assume any missing data to suit the case / derivation / answer.***

	Section - A		
Q1.	(a) Why are digital techniques preferred over analog techniques for transmitting voice signals? Explain the block diagram of Digital Communication System.	[03]	CO1
	(b) Determine the fundamental period of these signals i. $\cos\left(\frac{\pi}{4}t\right) + \sin\left(\frac{\pi}{3}t\right)$ ii. $\sin\sqrt{2}t + \cos 2t$	[02]	CO2
Q2.	(a) The signal $x(t)$ is shown in fig.1. Find the total Energy.  Fig 1.	[02]	CO1
	(b) A sinusoidal message signal is converted to a PCM signal using a uniform quantizer. The required signal-to-quantization noise ratio (SQNR) at the output of the quantizer is 40 dB. The minimum number of bits per sample needed to achieve the desired SQNR is_____	[02]	CO3
	Section - B		
Q3.	(a) A signal $x(t) = 100\cos(24\pi \times 10^3)\,t$ is ideally sampled with a sampling period of 50 µsec and then passed through an ideal low pass filter with cutoff frequency of 15 KHz. Which of the following frequency is/are per present at the filter output?	[02]	CO2
	(b) In a PCM system with uniform quantization, increasing the number of bits from 8 to 9 will reduce the quantization noise power. Explain how much quantization noise power will be reduced?	[03]	CO3
Q4.	(a) What are the factors on which the performance of digital communication system is defined? Elaborate	[03]	CO1
	(b) Explain how PPM and PWN signals can be generated from PAM Signals & Compare all the three techniques PAM,PWM,PPM	[03]	CO2

Course Outcomes

CO1 Understand the theoretical aspects and elements of digital communication system, useful for today's multidisciplinary applications

CO2 Understand and analyze the fundamental concepts of sampling theorem, quantization and coding in engineering applications of digital transmission

CO3 Understand and analyze the different types of digital, pulse, pass and band pass modulation techniques & Shift keying Methods

CO4 Able to Analyze and Calculate probability of error in presence of noise for digital communication system.

CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1	1(a), 2(a), 3(a)	8	
CO2	1(b), 3(a), 4(b)	7	
CO3	2(a), 3(b)	5	
CO4			

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA

School of Electronics & Communication Engineering

B. Tech. (ECE) Minor-II Examination (Even) 2018-19

Entry No: 17BEC033 **Total Number of Pages:[01]**

Date: 19.03.2019 **Total Number of Questions: [04]**

Course Title: Digital Communication Engineering

Course Code: ECL 2152

Time Allowed 1.5 Hours **Max Marks: [20]**

Instructions / NOTE

iv. Attempt All Questions.

v. Support your answer with neat sketches/diagrams, wherever appropriate.

vi. Assume any missing data to suit the case / derivation / answer.

	Section - A		
Q1.	a. Explain Delta Modulation in detail with suitable diagram. Also, explain Adaptive Delta Modulation and compare its performance with Delta Modulation	[03]	CO2
	b. Describe how transmission distortion of a TDM signal can cause cross-talk between two adjacent channels.	[03]	CO3
Q2.	a. Explain the Ideal Solution to the problem of Inter Symbol Interference and state various problems associated with it.	[04]	CO3
	b. Ten 9600 bps lines are to be multiplexed using TDM, what is the total capacity required for synchronous TDM? Assuming that we wish to limit average line utilization to 0.8 and that each line is busy 60% of the time, what is the capacity required for statistical TDM.	[02]	CO3
	Section – B		
Q3.	a. Explain the utility of eye diagram and equalizers in the design of digital communication systems for voice communication.	[04]	CO4
Q4.	a. For the binary data sequence 110110000101. Sketch the transmitted sequence of rectangular pulses for each of the following digital data form at: **Unipolar NRZ, Polar NRZ (M), Bi-phase-L, Bipolar NRZ, HDB-3.**	[04]	CO4

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CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1			
CO2	1(a)	3	
CO3	1(b), 2(a& b	9	
CO4	3 & 4	8	

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA

School of Electronics & Communication Engineering

B. Tech. (ECE) Major Examination (Even) 2018-19

Entry No: 17BEC033

Date: 13.05.2019

Total Number of Pages: [02]

Total Number of Questions: [07]

Course Title: Digital Communication Engineering

Course Code: ECL 2152

Time Allowed 3 Hours

Max Marks: [50]

Instructions / NOTE

*i. **Attempt All Questions.***

*ii. **Support your answer with neat sketches/diagrams, wherever appropriate.***

*iii. **Assume any missing data to suit the case / derivation / answer.***

	Section - A		
Q1.	(a) A source produces 4 symbols with probability 1/2 , 1/4 , 1/8 and 1/8 . For this source, a practical coding scheme has an average codeword length of 2 bits/symbols. Find the code efficiency?	[02]	CO4
	(b) What is the function of Low pass filter on sampling process?	[02]	CO2
	(c) Which parameter is called figure of merit of a digital communication system and why?	[03]	CO1
	(d) What is the information that can be obtained from eye pattern regarding the signal quality? Explain.	[02]	CO3
Q2.	(a) A binary frequency shift keying system employs two signaling frequencies f_1 and f_2. The lower frequency f_1 is 1200 Hz and signaling rate is 500 Baud. Calculate f_2?	[02]	CO3
	(b) Compare uniform and non-uniform quantization.	[03]	CO2
	(c) Draw the block diagram of DPSK system. Explain the working by means of suitable diagram.	[03]	CO3
	Section - B		
Q3.	(a) 24 telephone channels each band limited to 3.4 KHz are to be TDM by using PCM. Calculate the Bandwidth of the PCM system for 128 uniform quantization levels and, 8 KHz sampling Frequency	[04]	CO2
	(b) State the Nyquist sampling theorem. Demonstrate its validity for an analog signal $x(t)$ having a Fourier transform $x(f)$ which is zero outside the interval $-f_m < f < +f_m$	[05]	CO2
Q4.	An analog signal of bandwidth 4.2MHz is to be transmitted over a channel. The SNR at the receiver must be at least 60 dB. Assume bit error rate to be zero and no ISI. Find what will be the appropriate word length and the number of levels needed in the Quantizer? What will be the transmission bit rate?	[04]	CO2
Q5.	Explain the working of maximum likelihood detector. Explain how a matched filter can maximize SNR for a given transmitted symbol.	[05]	CO3
Q6.	Derive the bit error probability due to QPSK receiver. What is the importance of Offset QPSK? Compare the performance of QPSK receiver with that of PSK receiver.	[05]	CO3
Q7.	(a) Define a. Discrete entropy H (X) and joint entropy H (X,Y) and b. Mutual information I(X; Y).	[04]	CO4
	(b) Show that I (X;Y) = H (X)+ H (Y) - H (X,Y)	[02]	CO4
	(c) A discrete memory less source has an alphabet of seven symbols with probabilities {0.3, 0.20, 0.16, 0.14, 0.10, 0.02, and 0.08} resp. Calculate entropy, average code word length & variance of this code	[04]	CO4

Course Outcomes

CO1 Understand the theoretical aspects and elements of digital communication system, useful for today's multidisciplinary applications

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CO3 Understand and analyze the different types of digital, pulse, pass and band pass modulation techniques & Shift keying Methods Able to Analyze and Calculate probability of error in presence of noise for digital communication system

CO4 Understanding Information coding & Theory

CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1	1(c),	3	61
CO2	1(b), 2,(b) 3(a,b), 4(a)	18	61
CO3	1(d),2(a,c),5,6	17	61
CO4	1(a), 7	12	61