

GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2020-2021
ANALOG AND DIGITAL COMMUNICATION THEORY
EI502

TIME ALLOTTED:3Hours

FULL MARKS:70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable

GROUP – A

(Multiple Choice Type Questions)

Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

		Marks	CO No
1.	(i) The positive half of an AM modulated wave has maximum amplitude 12 Volt and minimum 4 Volt. If the modulation is single tone modulation, the modulation index is a) 1/3 b) 1/2 c) 1/4 d) 1/5	1	CO1
	(ii) In a commercial FM broadcasting, there is a channel 98.3 MHz, this is a) Modulating frequency b) Carrier frequency c) Image frequency d) Frequency deviation	1	CO1
	(iii) Calculate the Nyquist rate for sampling when a continuous time signal is given by $x(t) = 5 \cos 100\pi t + 10 \cos 200\pi t - 15 \cos 300\pi t$ a) 300Hz b) 600Hz c) 150Hz d) 200Hz	1	CO4
	(iv) SSBSC means a) Signal Side Band Suppressed Carrier b) Single Side Band Suppressed Carrier c) Sample Side Band Sigmoid Carrier d) Signal Sample Band Suppressed Carrier	1	CO1
	(v) The following transform is often referred as “ $\pi/2$ phase shifter” a) Hilbert Transform b) Fourier transform c) Laplace Transform d) Discrete Fourier Transform	1	CO2
	(vi) AMI means a) Alternate Mark Inversion b) Amplitude Modulation Inversion c) Analog Modulation Inversion d) Amplitude Modulation Induction	1	CO4

B. TECH/AEIE//ODD/SEM-V/EI502/R18/2020-2021

(vii)	Frequency domain of square or rectangular wave is a) Sine function b) Sinc function c) Cosine function d) Impulse function	1	CO4
(viii)	In Delta modulation system, Slope overload distortion increases when modulating signal a) increases rapidly with time b) increases slowly with time c) become zero d) None of the above	1	CO2
(ix)	QAM needs phase shifter of phase shifting amount in radian a) $\pi/2$ b) $\pi/4$ c) $\pi/6$ d) $\pi/8$	1	CO1
(x)	How many bits required to represent 256 quantization levels in PC a) 16 b) 8 c) 12 d) 14	1	CO1
(xi)	Calculate power in each sideband, if power of carrier wave is 176W and there is 60% modulation in tone amplitude-modulated signal? a) 13.36W b) 52W c) 67W d) 15.84W	1	CO1, CO2
(xii)	Pre-emphasis requires a) Compression of modulating signal b) Expansion of modulating signal c) PM of lower frequency and FM for higher frequency components of modulating signal d) FM of lower frequency and PM for higher frequency components of modulating signal	1	CO2

GROUP – B*

(Short Answer Type Questions)

Answer any *three* from the following: 3×5=15

		Marks	CO No
2.	How can the envelope detection technique be used for Single side band AM modulation?	5	CO2
3.	How the balanced DSBSC modulation technique works in the communication system?	5	CO2
4.	What is the generation technique of Narrowband FM in the communication process?	5	CO1
5.	Perform the expression derivation process of power efficiency for single tone AM modulation.	5	CO2
6. (a)	Draw a clean diagram of Ring modulator in relation with the DSBSC generation.	3	CO3

B. TECH/AEIE//ODD/SEM-V/EI502/R18/2020-2021

- (b) Explain how the carrier signal is suppressed through this modulator unit and draw the requisite waveform. 2 CO3

GROUP – C*

(Long Answer Type Questions)

Answer any *three* from the following: 3×15=45

		Marks	CO No
7.	(a) What are the different types of sampling techniques?	6	CO2
	(b) How to modulate and demodulate using PWM technique?	9	CO3
8.	(a) How the mid tread and midrise types of quantization techniques work? Give explanation with proper diagram.	8	CO3
	(b) Show the derivation process of the quantization noise power for uniform step size PCM.	7	CO3
9.	(a) Briefly describe the entropy of a discrete memoryless message source.	8	CO4
	(b) What is the significance of ISI diagram?	7	CO4
10.	(a) What are the TDM and FDM systems?	8	CO2
	(b) What do you understand by the aliasing effect? What is Anti-aliasing filter?	7	CO2
11.	Write short notes on any <i>three</i> of the followings.	5*3=15	
	(a) Adaptive Delta Modulation process	5	CO2
	(b) Differential PCM technique	5	CO1
	(c) QAM	5	CO3
	(d) Types of Line codings	5	CO2
	(e) SSBSC method	5	CO2