Sub Code: REC502

Paper Id: 130507 Roll No: | | | | | | | | | | | | | |

B.TECH
(SEM V) THEORY EXAMINATION 2019-20
PRINCIPLES OF COMMUNICATION

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	What are the differences between NBFM and WBFM?
b.	Define Sampling Theorem used in communication system.
c.	What is Aliasing effect? How it can be reduced.
d.	Determine the Nyquist Rate and Nyquist Interval of the signal: **sinc^2 (100t).**
e.	Mention the exact data rates for the T-1, T-2, T-3, T-4 digital carrier systems.
f.	List the disadvantages of SSB Modulation scheme.
g.	Write the expression for μ–law compander.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a.	What is delta modulation? How delta modulation differs from PCM and PAM? Explain the noises introduced in delta modulation? How can they be reduced?
b.	For the given binary sequence **011010110**. Construct unipolar NRZ, unipolar RZ, bipolar NRZ, bipolar RZ, Alternate Mark Inversion (AMI) and Manchester format.
c.	Explain the working of ratio detector used to demodulate the FM signal with neat sketch.
d.	Explain different types of non-uniform quantization. Calculate the quantization noise power in Pulse Code modulation.
e.	(i) A speech signal is sampled with **8 kHz** sampling frequency and then quantized with **256** levels. Calculate the data rate and bandwidth required to transmit this signal. (ii)Three signals m1, m2 and m3 are multiplexed. m1 and m2 have a 5kHz bandwidth and m3 has a **10 kHz** bandwidth. Design a commutator switching system so that each signal is sampled at its Nyquist rate.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Explain the working principle of phase shift discrimination method for generation of SSB-SC. List the advantages & disadvantages. Also, calculate the power saving as compared to conventional AM for tone modulation with modulation index=1.
(b)	Explain super-heterodyning receiver with block diagram. Determine the image frequency for a standard broadcast AM receiver using a **455 KHz** IF & tuned to a station at **640 kHz.**

4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Show that DSB-SC Amplitude modulation is Linear while Phase Modulation is not.
(b)	An angle modulated signal with carrier frequency $\boldsymbol{\omega_c = 2\pi \times 10^5}$ is described by the equation $\mathbf{s(t)=10\cos(\omega t + 5\sin 3000t + 10\sin 2000\pi t)}$.Calculate **Frequency Deviation** & **Bandwidth** of this angle modulated signal.

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5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Describe PWM & PPM Generation, Demodulation with a neat labeled diagram. Compare PAM, PWM & PPM.
(b)	A sinusoidal message signal of peak voltage **20 V** & peak frequency of **5 kHz** is transmitted through **256** levels PCM system. The sampling rate is **25%** higher than Nyquist rate. Calculate the sampling frequency, Bit rate, bandwidth, step size, Maximum Quantization error, SNR in dB.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Show that the equivalent noise bandwidth of Noise of a low pass filter is $\frac{\pi}{2}$times of its 3dB bandwidth $\mathbf{f_{3dB}}$.
(b)	What is Adaptive delta modulation? Explain ADM Transmitter, Receiver & advantages of ADM.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Calculate the output signal to noise ratio of frequency modulation. Calculate figure of merit for tone frequency modulation.
(b)	What is Digital Phase Locked Loop? Explain the working of Ex-Or gate based Digital Phase Comparator.