B. TECH
(SEM IV) THEORY EXAMINATION 2022-23
COMMUNICATION ENGINEERING

Time: 3 Hours   *Total Marks: 100*

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

SECTION A

1.   Attempt *all* questions in brief.   2 x 10 = 20

(a)   Explain need of modulation in communication.

(b)   Write down time convolution property of Fourier transform.

(c)   Define frequency modulation and draw its output waveform.

(d)   Find the bandwidth of a frequency modulated signal having frequency deviation 30kHz and maximum message frequency is 500Hz.

(e)   Define term Figure of merit.

(f)   Draw characteristic curve of Additive white Gaussian noise (AWGN).

(g)   Write down difference between DPCM and PCM.

(h)   Find the Nyquist rate and Nyquist interval for signal:
(i). $X(t) = 8 \sin(70\pi t) + 9\cos(75\pi t)$
(ii). $X(t) = 30\sin(100\pi t) \cos(200\pi t)$

(i)   Discuss the reason why non-coherent demodulation is not possible for BPSK.

(j)   Write different types of digital modulation techniques.

SECTION B

2.   Attempt any *three* of the following: 10x3=30

(a) Determine the Fourier transform of rectangular pulse and draw its magnitude spectrum.

(b) Illustrate Narrow Band Frequency Modulation with mathematical expression.

(c) Define threshold effect in angle modulation.Illustrate the relation between the transfer function of Pre-emphasis and De- emphasis for frequency modulation.

(d) State and prove the sampling theorem and explain how you will recover the original signal from its samples.

(e) Construct and explain the block diagram of Transmitter and receiver for a QAM.

SECTION C

3.   Attempt any *one* part of the following: 10x1=10

(a) Draw and explain the modulator and demodulator of DSB-SC.

(b) Derivethe mathematical expression for SSB-SC Modulation.

4.   Attempt any *one* part of the following: 10x1=10

(a) Illustrate Wide Band Frequency Modulation with its spectrum and mathematical expression.

(b) Define phase modulation. Demonstrate the fundamental of the generation of FM with the help of PM and similarly the generation of PM with the help of FM.

5.   **Attempt any *one* part of the following:**   **10x1=10**

   (a) Derive the expression for probability of Error for binary phase shift keying.
   (b) Write down the difference between Probability Density function and Cumulative Distribution Function with their properties.

6.   **Attempt any *one* part of the following:**   **10x1=10**

   (a) Define delta modulation. If a baseband analog message is converted into PCM with a maximum message frequency 40 Hz. If this signal is sampled and encoded by 8-bit encoder, then obtained the bandwidth of PCM.
   (b) Draw and explain the block diagram of transmitter, channel, and receiver of PCM system.

7.   **Attempt any *one* part of the following:**   **10x1=10**

   (a) Write down the difference between BPSK and QPSK. Explain QPSK generation and detection with its signal constellation diagram.
   (b) Draw the block diagram of Transmitter and Receiver of BFSK. Explain its working.