

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) Derive the 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.