DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103

Summer Supplementary Examination –2023

Branch: Electronics Engineering **Sem.:- VI**

Subject with Subject Code: - Digital Communication BTEXPE603A **Marks: 60**

Date:-18/07/2023 **Time:- 3 Hr.**

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Instructions to the Students

1. Each question carries 12 marks.
2. Attempt **ALL** questions.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

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			(Level)	(Marks)
Q.1	Solve **Any Two Questions** from the following:			
	A)	Explain Basic Digital Communication system with neat block diagram.	L2	(06)
	B)	A channel with bit rate R_b = 36 kbps is available for PCM voice transmission. Find appropriate values of binary digits N, the number of quantization levels M and the sampling rate f_s, assuming f_m= 3.2 kHz.	L2	(06)
	C)	Explain Adaptive Delta Modulation with neat diagram. Differentiate between Delta Modulation and Adaptive Delta Modulation.	L1	(06)
Q.2	Solve **Any Two Questions** from the following:			
	A)	Explain Narrow band noise. Explain its Representation in terms of phase & quadrature components.	L2	(06)
	B)	A Television signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of quantization levels is 512. Calculate: 1. Code word length 2. Transmission bandwidth 3. Final bit rate 4. Output signal to quantization noise ratio	L3	(06)
	C)	Explain the multiplexing in digital communication.	L1	(06)

Q.3 Solve **Any Two Questions** from the following:

A) Write a note on Ergodic Processes. L3 (06)

B) What is ISI digital communication? Explain it with neat waveforms. L2 (06)

C) Explain various AMI BRZ technique. Explain its advantages. L1 (06)

Q.4 Solve **Any Two Questions** from the following:

A) Explain Binary Phase Shift Keying technique with neat waveforms and block diagram. What is the probability of error in BPSK? L2 (06)

B) Consider an LTI system with impulse response h(t). Let X(t) be a WSS random process. If X(t) is the input of the system, then the output, Y(t), is also a random process. If $Y(t) = \int_{-\infty}^{\infty} h(u)X(t-u)du$, then L3 (06)

Prove that :

1. $R_{xy}(\tau) = R_{xx}(\tau) * h(-\tau)$ and
2. $R_{yy}(\tau) = R_{xy}(\tau) * h(\tau)$ where $*$ denotes convolution
3. $S_{xy}(w) = S_{xx}(w)H^*(w)$ and
4. $S_{yy}(w) = S_{xx}(w)|H(w)|^2$

C) Explain the working of OFDM technique. What are its advantages? L1 (06)

Q.5 Solve **Any Two Questions** from the following:

A) What is Optimum Filter? Explain its working. L2 (06)

B) Explain Jamming. What are the various types of Jammers? L2 (06)

C) Explain the working of FH-SS Scheme with neat block diagram. L2 (06)