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MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

EE-705C

DIGITAL COMMUNICATION

Time Allotted: 3 Hours | Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

1. Answer any *ten* questions. $10 \times 1 = 10$

(i) BPSK signal can be demodulated by

(A) a low pass filter (B) a band pass filter
(C) a high pass filter (D) none of these

(ii) In a delta modulation system, the granular noise occur when the modulating signal,

(A) increase rapidly
(B) changes within the step size
(C) decreases rapidly
(D) has high frequency component

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(iii) The entropy of information source is maximum when symbol occurrences are

(A) equiprobable (B) of different probability
(C) both (A) and (B) (D) none of these.

(iv) Which of the digital modulation technique is used for high speed telephone modem?

(A) QAM (B) GMSK
(C) QPSK (D) GFSK

(v) PCM generation requires low-pass filter at the beginning to

(A) Eliminate aliasing effect
(B) Eliminate quantization noise ac
(C) Eliminate decoding noise
(D) None of these

(vi) Coherent demodulation of FSK signal can be effected using

(A) Correlation receiver (B) BPF and envelope detector
(C) Matched filter (D) Discriminator detection

(vii) The signal to quantization noise ratio in n bit PCM system

(A) Depends upon the sampling frequency employed
(B) Is independent of value of n
(C) Increase with increasing value of n
(D) Decrease with the increasing value of n

(viii) The channel capacity under the Gaussian noise environment for a discrete memoryless channel with a bandwidth of 4 MHz and SNR of 31 is

(A) 20 mbps (B) 4 mbps
(C) 8 mbps (D) 4 kbps.

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(ix) In a PCM system the number of quantization levels are 16 and the maximum signal frequency is 4 kHz, the bit transmission rate is

(A) 64 bps (B) 16 kbps
(C) 32 kbps (D) 32 mbps.

(x) The type of modulation spread spectrum is used with direct sequence

(A) PSK (B) FSK
(C) ASK (D) DPSK.

(xi) Spectral density expresses

(A) average voltage
(B) average current
(C) average power in a waveform as a function of frequency
(D) none of these.

(xii) PAM signal can be demodulated by

(A) a low pass filter (B) a band pass filter
(C) a high pass filter (D) none of these.

GROUP B
(Short Answer Type Questions)

Answer any *three* questions. 3×5 = 15

2. State the reason of importance of Gaussian random variable. What is error function? 3+2

3. Write down the sampling theorem. Discuss the different methods of sampling. 3+2

4. What is Aliasing? How it can be eliminated? 2+3

5. What is quantization error? How does it depend upon the step size? 3+2

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6. For data bit 10110001, draw the waveforms for ASK, FSK, PSK, QPSK. 5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×15 = 45

7. (a) Explain flat top sampling. 5+6+4
(b) Draw the block diagram of PCM transmitter. Explain function of each block.
(c) What do you mean by slope overload distortion? How it can be minimized?

8. (a) With the help of necessary diagram explain the basic principle of operation of TDM. 7+4+4
(b) Discuss the relative merits and demerits of ASK, PSK, FSK.
(c) Explain Nyquist criterion for distortion less transmission.

9. (a) What is Aperture effect? 4+6+5
(b) Explain A law and μ law of companding.
(c) Explain generation and detection of BPSK.

10. (a) What is conditional probability? 3+5+5+2
(b) Differentiate between random variable and random process with suitable example.
(c) Discuss the property of auto-correlation functions.
(d) State central limit theorem.

11. Write short notes on any *three* of the following: 3×5
(a) Matched filter.
(b) Adaptive delta modulation.
(c) Pulse time modulation.
(d) Regenerative repeaters.
(e) Eye pattern.

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