CS/B.TECH (EE-NEW)/SEM-7/EE-705 C/2013-14

2013

DIGITAL COMMUNICATION

Time Allotted : 3 Hours   Full Marks 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words
as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

$$10 \times 1 = 10$$

i) A carrier recovery circuit is not needed with

   a) BPSK   b) QPSK

   c) DPSK   d) QAM.

ii) Which multiplexing technique transmits digital signal ?

   a) FDM   b) TDM

   c) WDM   d) Both (a) and (b).

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iii) In μ-low compression, μ = 0 corresponds to

   a) Non-uniform Quantization

   b) No Quantization

   c) Betters S/N ratio

   d) Uniform Quantization.

iv) Which of the following gives minimum probability of error ?

   a) ASK   b) FSK

   c) PSK   d) DPSK.

v) In a PCM system, if we increase the quantizatio levels from 2 to 8 how do the relative bandwidth requirements vary ?

   a) Get doubled   b) Get tripled

   c) Remain same   d) Become eight times.

vi) A signal occupies a band limited 5 KHz to 10 KHz. For proper free reconstruction at what rate it should be sampled ?

   a) 10 KHz   b) 20 KHz

   c) 5 KHz   d) (10+5) × 2 KHz.

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vii) In TDM system, the signals are separated from one another

    a)   in time

    b)   in frequency

    c)   in time as well as frequency

    d)   in amplitude.

viii) Eye pattern is used to study

    a)   Error rate   b)   Quantization noise

    c)   ISI   d)   none of these.

ix) Pulse stuffing is used in

    a)   Synchronus TDM   b)   Asynchronus TDM

    c)   any TDM   d)   none of these.

x) The use of non-uniform quantization leads to

    a)   reduce in transmission BW

    b)   increase in Max. SNR

    c)   increase in SNR for low level signals

    d)   simplify of quantization process.

xi) How many bits would be required to represent a 256 level quantization in PCM ?

    a)   6   b)   8

    c)   5   d)   7.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Explain what you understand by the terms 'means', 'auto-correlation', 'auto co-variance', of any random process. Distinguish between strict-sense stationarity and wide-sense stationarity with regard to a random process. $3 + 2$

3. State and proof Sampling theorem.

4. What is the roll of an equalizer ?

5. What is meant by the cumulative distribution function (CDF) of a random variable ? State the properties of the CDF and PDF of a random variable. $2 + 3$

6. Draw and explain QPSK Generator.

7. Compare ASK, FSK and PSK.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. a) What do you mean by stationary and non-stationary random processes ?

b) What is Autocorrelation function ? Write the properties of Autocorrelation function.

c) A random variable X follows Gaussian probability density function with parameters μ and σ. Find its probability distribution function. $3 + 5 + 7$

9. a) Calculate the probability of error for Matched Filter.

b) Calculate the signal to quantization noise ratio (SNR) of PCM system for linear quantization. $8 + 7$

10. a) What is Inter Symbol Interference ?

b) What is Nyquist criterion for zero ISI ?

c) What are the limitations of ideal solution and how can it be solved ? $3 + 7 + 5$

11. a) What is DPSK ?

b) How do you generate and receive DPSK signal ?

c) What are the advantages of DPSK ? $4 + 7 + 4$

12. a) What is eye pattern of digital signal ?

b) What is the important information regarding the quality of transmission obtained from the eye pattern ?

c) How can we reduce the probability of error using optimum filter ? $2 + 5 + 8$

13. a) Derive the condition for no slope overload distortion in Delta Modulation.

b) Calculate the maximum value of the output signal to noise ratio in Delta Modulation assuming no slope overload distortion.

c) What is the working principle of ADM ? $5 + 5 + 5$

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14. Write short notes any *three* of the following :   3 × 5

   a)   Error probability of PSK.

   b)   Minimum shift keying (MSK)

   c)   Pulse amplitude modulation (PAM)

   d)   A-law companding

   e)   Manchester coding.

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