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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -1 EXAMINATION- September 2016
B Tech Semester Fifth

COURSE CODE: 10B11EC511   MAX. MARKS: 15

COURSE NAME: Digital Communications

COURSE CREDITS: 4   MAX. TIME: 1Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Following pattern for answering in your notebook must be followed.

1) First 3 pages of your answer book are reserved for questions 1 & 2 only.

2) Exact Answers without explanation of the Questions 1 and 2 must be written serial wise on first page, followed by 2 pages showing any calculations performed to achieve those answers.

3) From page 4 of answer book, questions 3 & 4 can be answered in any order you like.

1. (3 marks) Answer the following multiple choice questions.

    i) Which of the following line-coding has inherent error detection capability

       a) Bipolar   b) Unipolar   c) Polar   d) Manchester   ½

    ii) A unipolar NRZ waveform with rectangular pulse shaping of duration T has to be received using matched filter. The impulse response of the matched filter is

                                                         ½

    iii) For uniform quantizer with unity step size, uniformly distributed quantization error has variance

       a) 1/2   b) 1/10   c) 1/12   d) none of these   ½

    iv) SQNR contribution by adding each extra bit to the code-word of a PCM system is

       a) 6 dB   b) 7.2 dB   c) 3dB   d) none of these   ½

    v) Which of the following eye pattern corresponds to most severe ISI

                                                         ½

    vi) In a regenerative binary baseband transmission system with $m=5$ repeaters, single hope error probability is 10^{-6}, then the error probability at the receiver is approx.

       a) $2.5*10^{-6}$ b) $1.67*10^{-6}$ c) $5*10^{-6}$ d) none of these   ½

2. (4 marks) Assuming PCM system consisting of a sampler, a uniform quantizer with L levels, and a normal binary encoder to obtained binary data from quantized symbols. Let an original audio signal (analog) s(t) with highest frequency component 20 KHz is required to be converted in digital format using PCM. Consider two applications of PCM.

App-1: Telephone communication,

In App-1, assumed that signal components above 3.4 KHz have negligible intelligibility, also a guard band of 1.2 KHz is applied and L=256.

App2: Compact Disc (CD) application.

In App-2, the same audio signal s(t) is considered with high-fidelity (100% exactness), with a guard band of 4.1 KHz, and L=65,536.

Choose the right answer for the following questions:

i)   Nyquist sampling rate for s(t) for App-1   ½
    a) 40 KHz   b) 8 KHz   c) 6.8 KHz   d) none of above

ii) Nyquist sampling rate for s(t) for App-2   ½
    a) 40 KHz   b) 10.9 KHz   c) 44.1 KHz   d) none of these

iii) Symbol rate (samples per second) of sampled version of s(t) for App-1   ½
    a) 40 K   b) 8 K   c) 6.8 K   d) none of these

iv) Symbol rate (samples per second) of sampled version of s(t) for App-2   ½
    a) 10.9 K   b) 40 K   c) 44.1 K   d) none of these

v)   Date rate (bits per second) of the output of PCM for App-1   ½
    a) 64 K   b) 320 K   c) 54.4 K   d) none of these

vi) Data rate (bits per second) of the output of PCM for App-2   ½
    a) 174.4 K   b) 705.6 K   c) 640 K   d) none of these

vii) Required minimum transmission bandwidth for zero ISI for App-1   ½
    a) 16 KHz   b) 64 KHz   c) 32 KHz   d) none of these

viii) Required minimum transmission bandwidth for zero ISI for App-2   ½
    a) 350 KHz   b) 64 KHz   c) 352.8 KHz d) none of these