Nepal College of Information Technology

**Assessment**

Fall 2012

Program : BE ELX Time : 3 hrs

Semester : Fall (VII) FM : 100

Subject : Digital Communication PM : 50

* *Candidates are requested to give their answer as far as practicable in their own words.*
* *The figure in the margin indicates the full marks*
* ***Attempt ALL question***

1. a) An analog signal m(t) = cos2400πt is sampled at the rate of 1000 samples per second and, then passed through an ideal band pass filter with fL = 700 Hz and fH = 1100 Hz. Sketch the signal at output of the filter. [3]

b) What are types of sampling? Compare between them. [7]

1. a) Show that the total noise power in Delta modulation = ∆2/3, where ∆ is the step size. [7]

b) What are the slope-overload noise and Granular noise in DM? Explain how it is removed in ADM. [4]

c) Explain about Linear Prediction Theory. [4]

d) Write short notes on T1-TDM and its hierarchy in Digital Telephony [7]

e) The information in analog signal voltage waveform is to be transmitted over a PCM system with an accuracy of ±0.1%(full scale). The analog voltage waveform has a bandwidth of 100 Hz and an amplitude range of -10 to +10 volts. [8]

i) Find the minimum sampling rate required.

ii) Find the number of bits in each PCM word.

iii) Find minimum bit rate required in the PCM signal.

iv) Find the minimum absolute channel bandwidth required for the transmission of the PCM signal.

1. a) Define entropy of a source? Let a discrete memory-less source is emitting one out of ten different symbols in each four milliseconds having probability of 0.25, 0.2, 0.15, 0.1, 0.08, 0.07, 0.06, 0.04, 0.03 and 0.02. Calculate the information content in each outgoing symbol and entropy of the source. Also, calculate the signaling rate. [7]

b) What is correlative coding technique? Explain modified duobinary encoding technique with example. [7]

c) What is Inter-symbol interference (ISI)? Derive the Nyquist, condition for zero ISI. [8]

d) Represent the binary data1010111010000010100001 by the following base band representation formats: [6]

1. Polar format
2. Bipolar / pseudoternary /AMI format
3. Manchester format

e) What do you mean by M-ary Signaling? Explain any one M-ary signaling which you know. [7]

1. a) Differentiate between block code and convolution code.

Define the terms Hamming Distance, Hamming weight and Minimum distance with example. [7]

b) Given for systematic (7, 4) linear block codes, parity sub matrix, . Assume, as convenient where Iq is q×q identity sub matrix.

[8]

1. How many information bits are there in a code word?
2. Find the generator matrix, G.
3. Find the code word for the message word, M= [0110].
4. Consider the code word obtained above as transmitted code word. Find the syndrome vector, S, if the received code word, R has error in third bit position from the left.
5. Write short notes on (**Any Two**) 2×5

a) Convolution Codes

b) Midtread and Midriser type quantizer

c) Aliasing

d) The eye diagram