Nepal College of Information Technology

**Unit Test**

Fall 2012

Program : BE ELX Time : 2 hrs

Semester : (VII) FM : 70

Subject : Digital Communication PM : 35

* *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) Distinguish between PCM and Delta modulation. [5]

b) State and prove Nyquist sampling theorem for band limited signal. Also explain the effect of under-sampling. [8]

2. a) Showing the typical Pulse Code Modulation (PCM) system, prove that the maximum signal to quantization noise power ratio (SQNR) for PCM is equal to **4.8 + 6n** dB**.** Where **n** represents the number of bits required to represent a sample. [7]

b) A television signal (video and audio) has a bandwidth of 30.5 MHz. This signal is sampled quantized and binary coded to obtain a PCM signal. [8]

i) Determine the sampling rate if the signal is to be sampled at a rate 20% above the Nyquist rate.

ii) If the samples are quantized into 1000 levels, determine the number of binary pulses required to encode each sample.

iii) Determine the binary pulse rate (bps) of the binary coded signal and the minimum bandwidth required to transmit the encoded signal.

3. a) Compare digital communication with analog communication system and explain digital communication with the help of functional block diagram. [8]

b) A DM system is designed to operate at 3 times the Nyquist rate for a signal with a 3 KHz bandwidth. The quantization step size is 250m V. Determine the maximum amplitude of a 1 KHz input sinusoid for which the delta modulator doesn't show slope overload. [5]

4. a) What do you mean by Companding? Why non-uniform quantization is better than uniform quantization? Justify. [7]

b) How pulse duration is modulated signal generated? Point out the manor disadvantages of PDM system. Also , describe the recovery of original signal from PDM wave. [8]

c) For a pulse-amplitude modulated(PAM) transmission of voice signal having maximum frequency equal to fm= KHz, calculate the transmission bandwidth. It is given that the sampling frequency fs=8KHz and the pulse duration,ɽ=0.1Ts. [4]

5. Write short notes on (any two) [2×5]

a) Granular noise and slope overload noise in delta modulation

b) T1 PCM system

c) DPCM