**NEPAL COLLEGE OF INFORMATION TECHNOLOGY**

Assessment

|  |  |  |
| --- | --- | --- |
| Level: Bachelor | Fall | Year : 2014 |
| Programme: BE | | Full Marks : 100 |
| Course: Digital Communication | | Time : 3hrs. |

|  |
| --- |
| *Candidates are required to give their answers in their own words as far as practicable.* |
| *The figures in the margin indicate full marks.* |
| Attempt all the questions. |

|  |  |  |
| --- | --- | --- |
|  | 1. Draw a generic block diagram of a digital communication system and explain the basic signal processing operations at the transmitter and receiver. 2. Given that the input to the PCM is a sinusoidal signal. The PCM system uses a uniform quantizer followed by an n bit encoder. Prove that the Signal to noise ratio is approximately given by (1.8 + 6n) dB | 8  7 |
|  | 1. Explain in brief pulse duration modulated signal generation and detection? 2. A numerical keypad has the digits 0,1,2,3,4,5,6,7,8,9. Assume that the probability of sending a one digit is the same as that for sending any of the other digits. Calculate how often the buttons must be pressed in order to send out information at the rate of 2 bits/sec. 3. What are the advantages and disadvantages of Manchester coding as compared to NRZ-HDB3? | 5  5  5 |
|  | 1. Describe the QPSK technique with neat block diagram and signal constellation diagram. 2. Show how the stream of eight bits: 1 1 0 0 0 0 0 1 would transmit at base-band using (i) polar RZ & NRZ (ii)NRZ-HDB3 coding and (iii) Manchester coding. | 8  7 |
|  | 1. A white-noise process W (t) of zero mean and power spectral density N0/2 is applied to an ideal low pass filter of bandwidth B. Find and plot (not to scale) the autocorrelation of the output of the low pass filter. 2. What is white noise? Illustrate RC filtering of white noise. | 8  7 |
|  | 1. Why a matched filter is called an optimum demodulator? Determine the maximum SNR for a matched filter demodulator for a signal pulse with energy E in presence AWGN with power spectral density N0/2. 2. How SNR can be improved using pre-emphasis and de-emphasis networks in FM? Explain. | 8  7 |
|  | 1. Define the terms Channel signal to noise ratio (SNR) c, Output Signal to noise ratio (SNR) o, and Figure of merit (FOM). Derive an expression for the figure of merit for a coherent/synchronous DSB-SC receiver. 2. Define the following terms: i) Codeword ii) Code rate iii) Hamming Weight iv) Hamming Distance with example. | 7  8 |
|  | Write short notes on ***(Any Two)***   1. T1 PCM system. 2. Eye Diagram 3. Companding | 5×2 |