328554(28)

B. E. (Fifth Semester) Examination, April-May/ Nov.-Dec. 2020

(New Scheme)

(Et & T Branch)

DIGITAL COMMUNICATION

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) is compulsory from each question. Attempt any two parts of part (b), (c) and (d) of each question.

Unit-I

1. (a) Define Companding.   2

    (b) State and proof sampling theorem for band pass signal.   7

(c) Consider a signal having probability density

$$f(v) = \begin{cases} Ke^{-|v|} & -4 < v < 4 \\ 0 & \text{elsewhere} \end{cases}$$

(i) Find K.

(ii) Determine the step size if there are four quantization level.

(iii) Calculate the variance of quantization error when there are four quantization level.   7

(d) A Bandpass signal has center frequency f_o and extends from $f_o - 5$ kHz to $f_o + 5$ kHz. The signal is sampled at the rate $f_s = 25$ kHz if the center frequency f_o varies from $f_o = 5$ kHz to 50 kHz. Find the range of f_o for which sampling rate is adequate.   7

Unit-II

2. (a) Define PCM.   2

(b) A PCM system uses a uniform quantizer followed by a v bit encoder. Show that the rms signal to quantization noise ratio is approximately given by $(1 \cdot 8 + 6\,v)$ dB. Assume that input to the PCM is sinusoidal signal.   7

(c) What are the limitation of Delta Modulation? Also explain ADM.   7

(d) A delta modulation system is designed to operate at 4 times the nyquist rate for a signal with a 5 kHz bandwidth. The quantizing step size is 250 mV.   7

(i) Determine the maximum amplitide of a 1 kHz input sinusoidal for which delta modulation does not show slope overload.

(ii) Determine output signal to quantizing noise ratio for the signal of part (i).

Unit-III

3. (a) Define NRZ and RZ line code.   2

(b) Write short notes on :   7

(i) Eye pattern

(ii) Scrambling

(c) What is Bipolar Signalling? Draw the PSD for Bipolar signalling.   7

(d) Explain regenerative repeaters. Also explain zero forcing equalizer.   7

Unit-IV

4. (a) Define Digital Signal.　2

(b) With the aid of block diagram explain generation & detection of BPSK.　7

(c) What is DPSK? Explain DPSK with suitable block diagram.　7

(d) (i) The data $b(t)$ consist of the bit stream 001010011010. Assume that the bit rate f_b is equal to the carrier frequency f_o and sketch $V_{BASK}(t)$.　3

(ii) Differentaite Offset QPSK and non offset QPSK.　4

Unit-V

5. (a) What is Optimum Filter?　2

(b) Derive expression for probability of error for BPSK.　7

(c) Derive expression for impulse response of matched filter.　7

(d) Derive expression for probability of error for optimum filter.　7