DIGITAL COMMUNICATION
(ECEN 3105)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

   (i)   Aperture effect occurs in communication due to
           (a) sampling at less than nyquist rate
           (b) flat top sampling
           (c) finite bandwidth of transmission channel
           (d) Short duration of samples.

   (ii)   In vestigial spectrum the range of roll of factor is
           (a) $1 < r < 0$ (b) $0 < r < 1$
           (c) $0 < r < \infty$ (d) None of these.

   (iii)   To avoid slope overload in delta modulation, the maximum value of signal amplitude will be
           (a) sf_s (b) w/s (c) sf_s/w (d) f_s/w.
           s=Step size, f_s = sampling frequency, w = Signal frequency

   (iv)   PCM generation requires a LPF at the beginning to
           (a) Eliminate quantization noise
           (b) Eliminate Aliasing effect
           (c) Eliminate decoding noise
           (d) None of these.

   (v)   In eye pattern, as eye closes,
           (a) ISI increases   (b) ISI decreases
           (c) timing jitter increases   (d) timing jitter decrease

(vi)   Which encoding method uses alternating positive and negative values for 1s?

(a) NRZ   (b) RZ   (c) Manchester   (d) AMI.

(vii)   In QPSK the transmission bandwidth required is

(a) f_b (b) 2 f_b (c) $f_b/2$ (d) 4 f_b

f_b = Bit frequency

(viii)   In a DM system, the granular noise occurs when the modulating signal

(a) Increase rapidly

(b) remains constant

(c) decreases rapidly

(d) the nature of modulating signal has nothing to do with this noise.

(ix)   The sensitivity of a system to timing error is determined by _____ of the eye diagram

(a) width   (b) opening

(c) rate of eye closer   (d) shape.

(x)   In QAM _____ identities are varied.

(a) amplitude and phase   (b) frequency and phase

(c) bit rate and phase   (d) baud rate and phase

Group – B

2. (a)   What is the difference between natural sampling and flat top sampling?

(b)   A television signal having a B.W of 4.2 MHz is transmitted using binary PCM system. Given that the no of quantization level is 512.
Determine i) code word length ii) transmission B.W
iii) Final bit rate iv) output signal to quantization noise ratio

4 + 8 = 12

3. (a)   Draw the Tx & Rx section of a DPCM system.

(b)   Explain the limitations of Delta modulation.

6 + 6 = 12

Group – C

4. (a)   The sequence 11001011000111 is given, draw the pattern of

(i)   unipolar NRZ and RZ

(ii)   polar NRZ and RZ

(iii) bipolar NRZ and

(iv) Manchester code

(b)   What is the information obtained from eye pattern?

8 + 4 = 12

5. (a)   Explain Nyquist criterion for zero ISI.

   (b)   Draw the block diagram of the zero forcing equalizer.

   (c)   A communication channel of bandwidth 75 KHz is required to transmit binary data at a rate of 0.1 Mbps using raised cosine pulses. Determine roll off factor.

4+ 4 + 4= 12

Group – D

6. (a)   How matched filter differs from Optimum filter?

   (b)   Explain how a matched filter can maximize SNR for a given transmitted symbol.

4 + 8 =12

7. (a)   In integrate and Dump type filter the integrator enhances the signal relative to the noise and this enhancement increases with bit duration (T) :- Justify the statement.

   (b)   Find the Transfer Function of an Optimum filter.

4 + 8 =12

Group – E

8. (a)   With a suitable block diagram explain the principle of BFSK modulator.

   (b)   For a bit sequence of 100110, draw the resulting waveform for Binary ASK, FSK and PSK modulation scheme.

6 + 6 = 12

9.   With suitable diagram, explain the working principle of BPSK Modulator and Demodulator.

6 + 6 = 12

Department & Section	Submission Link
ECE	https://classroom.google.com/u/0/w/Mjc0NDEwOTkzNDc4/tc/Mjc0NDExOTc2NzE1