M.TECH/ECE/1st SEM/ECEN 5101/2017

ADVANCED DIGITAL COMMUNICATION

(ECEN 5101)

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

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
Any 5 (five) from Group B to E, taking at least one 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) PAM signal can be demodulated using a
(a) low pass filter
(b) high pass filter
(c) bandpass filter
(d) none of these.

(ii) In vestigial spectrum the range of roll of factor is
(a) $1< r < 0$
(b) $0 <= r <= 1$
(c) $0 < r < \infty$
(d) $0 \leq r < \infty$

(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) Adaptive Delta Modulation is preferred over delta modulation
(a) it gives better noise performance
(b) it does not suffer from slope overload and threshold effects
(c) it has simpler circuitry
(d) it uses lesser number of bits for encoding the signal.

(v) Alternate Mark Inversion (AMI) signalling is also known as
(a) bipolar signalling
(b) polar signalling
(c) manchester signalling
(d) unipolar signalling.

(vi) Which of the following modulation techniques is most noise immune?
(a) ASK   (b) PSK   (c) FSK   (d) AM.

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

(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) Regenerative repeaters are used in
(a) digital communication
(b) wireless communication
(c) analog communication
(d) both analog and digital communication.

(x) The most common type of digital modulation scheme in FHSS system is
(a) BPSK
(b) M-ary PSK
(c) BFSK
(d) M-ary FSK.

Group - B

2. (a) Draw and explain the Tx & Rx section of a DPCM system.

(b) Delta Modulation transmits derivative of the message signal – explain.

(c) What are the limitations with Delta modulation.

6 + 4 + 2 = 12

3. (a) What does the term equalization refer to?

(b) Explain how it is carried out by using transverse filters.

(c) Design a Frame Synchronizer circuit.

2 + 6 + 4 = 12

Group – C

4. (a) With a suitable block diagram explain the principle of BFSK modulator & demodulator

(b) How the decision about the received signal is made in DPSK?

8 + 4 = 12

5. (a) A binary data stream 0010010011 is to be transmitted using DPSK. Show the encoding & decoding sequences.

   (b) Distinguish between PSK and M-ary PSK.

   (c) Write a short note on Minimum Shift Keying (MSK).

   5 + 3 + 4 = 12

   Group – D

6. (a) Explain Direct Sequence Spread Spectrum Technique.

   (b) What are the properties of PN sequence.

   (c) Make a comparison between FDM and TDM

   5 + 4 + 3 = 12

7. (a) Compare TDMA and FDMA technique.

   (b) Explain Direct Sequence Spread Coherent Binary Phase shift Keying.

   6 + 6 = 12

   Group - E

8. (a) Obtain an expression for the impulse response of a matched filter.

   (b) When an optimum filter is called a matched filter?

   (c) 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

   4 + 2 + 6 = 12

9. (a) Explain Binary QPSK with corresponding equations and constellation diagrams.

   (b) Obtain the probability of bit error for coherently detected BPSK and compare its probability of bit error performance with QPSK scheme.

   4 + 8 = 12