Code: EC6T4

III B.Tech - II Semester – Regular/Supplementary Examinations
AUGUST - 2021

DIGITAL COMMUNICATIONS
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer *all* the questions.   All questions carry equal marks

11x 2 = 22 M

1.
   a) What is the difference between PCM and DPCM.
   b) Discuss about the different noise effects in Delta Modulation.
   c) List any two properties of matched filter.
   d) Draw the block diagram of BFSK detector.
   e) Give the Signal Space representation of QPSK.
   f) Define Processing gain and Near-far problem in DS Spread spectrum.
   g) List any two properties of maximum length sequence.
   h) State Shannon First law and Second law.
   i) What is memory less channel? Give one example.
   j) Write the properties of cyclic codes.
   k) Distinguish between Linear Codes and Convolutional codes.

PART – B

Answer any *THREE* questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. a) List the drawbacks in PCM and how do you overcome
using Differential PCM(DPCM)?   8 M

   b) A voice frequency signal, band limited to 3 MHz, is
transmitted with the use of the DM system. The
pulse repetition frequency is 30,000 pulses per second, and
the step size is 40 mV. Determine the maximum possible
speech signal amplitude to avoid a slope overload.

                                                     8 M

3. a) Sketch and Explain the block diagrams of QPSK
transmitter and receiver with waveforms.   8 M

   b) The bit stream 1101010010 is to be transmitted using
DPSK. Determine the transmitted sequence and encoded
Sequence (with assumptions, if required).   8 M

4. a) A Spread spectrum communication system has the
following parameters. Information bit duration $T_b = 1.024$
msecs and PN chip duration of 1μsecs. The average
probability of error of system is not to exceed 10^{-5} .
Calculate
   i) Length of shift register   ii) Processing gain
  iii) Jamming margin   8 M

b) Explain in detail about frequency hopping spread
    spectrum technique.   8 M

5. a) Explain the following:
    i) Shannon-Fano Source Coding Theorem
    ii) Lempel-Ziv Coding   8 M

b) Design Huffman code for the given source which produces
    the letters A, B, C, D, E, F and G with probabilities {0.08,
    0.2, 0.12, 0.15, 0.03, 0.02, 0.4}. Also determine the
    average length of the codeword and coding efficiency. 8 M

6. a) What are the different methods of decoding of
    convolutional codes? Explain.   8 M

b) Consider a $(K,k,n)=(3,1,2)$ convolution code with $g_1=(011)$,
    $g_2=(110)$ (i) Draw encoder Block diagram
    (ii) Obtain encoded sequence using transform domain
    approach for $m=(10101)$
    (iii) Draw Code tree for the above data.   8 M