# FACULTY OF ENGINEERING

### B.E. (ECE)  VI - Semester (CBCS) (Main) Examination, April / May 2019

### Subject : Digital Communication

**Time : 3 hours**                                                                                            **Max. Marks : 70**

*Note:  Answer all questions from Part-A. Answer any Five questions from Part-B.*

## PART – A  (20 Marks)

1   State the A-law of compression and expansion.
2   Contrast between DPCM and DM.
3   What is the need for Source coding?
4   Find the maximum entropy of a computer keyboard with 112 keys.
5   What are different types of errors that occur during transmission?
6   Compare linear block codes and convolutional codes.
7   Differentiate between PSK and QPSK.
8   Briefly discuss the steps involved in optimum receiver design.
9   What is Jamming Margin?  State its significance.
10 Differentiate between fast and slow frequency hopping.

## PART – B  (50 Marks)

11 a)  Explain the working of a DPCM system with the help of suitable block diagram
       and  necessary  pre-requisites.   What  is  the  advantage  of  DPCM  over  PCM
       system.                                                                                                                  6
   b)  A 2 KHz sinusoidal message signal is applied as input to a PCM system with 256
       Quantization levels.  Find the signal to quantization noise ratio ($SNR_Q$)     in dB.     4

12 a)  Illustrate  the  Huffman  source  coding  procedure  for  a  source  that  emits  '6'
       symbols with probabilities given as 0.3, 0.2, 0.16, 0.12, 0.12 and 0.1.  Determine
       the coding efficiency and redundancy.                                                                      6
   b)  Derive the expression for channel capacity of Binary symmetric channel.              4

13 a)  Consider a (7, 4) linear code whose generator matrix

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

   i)   Find all the code vectors of this code
   ii)  Find parity check matrix
   iii) Find minimum weight and minimum distance of the code                               6

   b)  Draw the encoder structure of a rate 1/2 convolutional coder $g_1$=(101) and     $g_2$ =
       (011).  Find the codewood for an input 011.  Find the codeword for an input 011.
       What is the constraint length of this code.                                                              4

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14 a) Derive an expression for probability of error for coherent ASK signaling scheme.     5
   b) With the help of block diagram explain DPSK modulation and demodulation.     5

15 a) Explain the working of Direct sequence spread spectrum system with necessary
     mathematical analysis.     5
   b) Discuss how FHSS signal is tracked using Early-Late Gate.     5

16 a) Explain the working of a PCM system with neat block diagram.     7
   b) Consider an AWGN channel with 4KHz bandwidth and the noise power spectral
     density ($N_0/2$) is $10^{-12}$ W/Hz.  The signal power required at the receiver is 0.1
     mW.  Calculate the capacity of the channel.     3

17 Write short note on :
   a) Minimum Shift Keying     5
   b) PN sequence generation using LFSR (1, 3) and properties     5

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