## B.Tech III Year I Semester (R15) Regular Examinations November/December 2017

## DIGITAL COMMUNICATION SYSTEMS

(Electronics and Communication Engineering)
Time: 3 hours
Max. Marks: 70

## PART - A

(Compulsory Question)
1 Answer the following: ( $10 \times 02=20$ Marks $)$
(a) List the advantages of digital communication systems.
(b) Discuss the advantages of DM over PCM.
(c) What are the properties of matched filter?
(d) Write the applications for eye pattern.
(e) Explain Signal Space Representation.
(f) Define the probability of error.
(g) Distinguish between Coherent and Non coherent detection.
(h) Compare power bandwidth requirements of BPSK, BFSK, QPSK and DPSK.
(i) What are the conditions to satisfy the hamming code?
(j) Discuss the difference between convolutional codes and block code.

## PART - B

(Answer all five units, $5 \times 10=50$ Marks)

## UNIT - I

2 (a) Discuss delta modulation block diagram and explain the working with waveforms.
(b) A band limited signal has bandwidth equal to 4 kHz . What sampling rate should be used to guarantee a guard band of 1200 Hz ?

## OR

3 (a) Explain the principle of TDM with a neat block diagram.
(b) Compare the features of PCM and DPCM.

## UNIT - II

4 (a) Justify how a matched filter works as an ideal receiver.
(b) What is inter symbol interference? How this can be minimized?

## OR

5 (a) Discuss in detail about baseband transmission in M-ary data
(b) Explain how eye diagrams are useful in describing the performance of digital data transmission system.

## UNIT - III

6 (a) Explain Gram-Schmidt orthogonalization procedure.
(b) Describe the conversion of the continuous AWGN channel into a vector channel.

OR
7 (a) Explain the correlation receiver with neat diagram.
(b) Explain probability of error using matched filter.

> UNIT - IV

8 (a) Derive an expression for error probability of BPSK.
(b) Assume that 3600 bits/sec data is sent over a pass band channel by FSK signaling scheme. Estimate the transmission bandwidth.

## OR

9 (a) Explain generation and detection of DPSK.
(b) Derive an expression for error probability of BFSK.

## UNIT - V

10 (a) Demonstrate the Viterbi algorithm for maximum-likelihood decoding of convolutional codes.
(b) Draw the state diagram, tree diagram, and trellis diagram for $k=3$, rate $1 / 3$ code generated by: $g_{1}(x)=1+x^{2}, g_{2}(x)=1+x$ and $g_{3}(x)=1+x+x^{2}$.
OR

11 (a) Compare linear block codes, cyclic codes and the convolutional codes.
(b) The generator polynomial of a $(15,11)$ Hamming code is defined by $g(x)=1+x+x^{4}$. Develop the encoder and syndrome calculator for this code.

