

FACULTY OF ENGINEERING**B.E. 3/4 (ECE) II – Semester (Main) Examination, April / May 2014****Subject: Digital Communication****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 Draw the block diagram of a digital communication system.
- 2 Write about the need for a compander in digital communication.
- 3 One of the five possible messages Q_1 to Q_5 having probabilities $1/2, 1/4, 1/8, 1/16$ & $1/16$ respectively are transmitted. Calculate average information.
- 4 List the properties of mutual information.
- 5 Differentiate between LBC's and convolutional codes.
- 6 Define "error". Write the causes for its occurrence in digital communication systems.
- 7 What is a matched filter? Write its properties.
- 8 Compare various digital modulation techniques with respect to band width, power and immunity to channel variations.
- 9 Draw block diagram for the generations of FHSS signals.
- 10 Write advantages of spread spectrum technique.

PART – B (50 Marks)

- 11 (a) Explain any three line coding techniques with their merits and demerits.
(b) Derive an expression for quantization error in PCM.
- 12 (a) Consider the four messages Q_1, Q_2, Q_3 and Q_4 with probabilities $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$ and $\frac{1}{8}$ respectively. Calculate H and R if $r=1$ message/sec.
Find the rate at which binary digits are transmitted, if the signal is sent after encoding $Q_1 \dots Q_4$ as 0, 10, 110 and 111.
(b) Explain Huffman coding in detail with suitable example.
- 13 (a) Consider a (7,4) linear code whose generation matrix

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$
 - i) Find all code vectors of this code
 - ii) Find parity check matrix
 - iii) Find minimum weight of this code.
 (b) Explain sequential decoding with suitable example.
- 14 (a) Draw the block diagram for PSK transmitters and receivers and explain in detail their operations.
(b) Derive an expression for optimum filter design.
- 15 Explain generation and detection of FHSS signals in detail.
- 16 (a) Compare ASK, FSK and PSK techniques.
(b) Explain the terms channel capacity, information rate and rate distortion.
- 17 Write short notes on:
 - a) Synchronization techniques
 - b) Companding and expanding in PCM.
 - c) PN sequence generation.
