Code No. 5176

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) II - Semester (Main) Examination, May 2016

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 What are the advantages of ADM system? 2

2 What are the commonly used compression laws in a compander. 2

3 Why coding of information is required? 3

4 If the input signal to matched filter is s(t) = cos (ωt). Find the impulse response of matched filter. 3

5 What is hamming distance? Mention its significance. 3

6 The generator matrix for (6,3) block code is $G = \begin{bmatrix} 100011 \\ 010101 \\ 001110 \end{bmatrix}$. Find code vector for message block (1,0,1). 3

7 Explain advantages of coherent over non coherent digital modulation schemes. 3

8 Compare M-ary PSK with M-ary QAM. 2

9 Define processing gain and explain its significance. 2

10 Write the merits of spread spectrum modulation. 2

PART – B (50 Marks)

11 a) Derive the overall signal to noise power ratio in a Delta Modulation system. 6

b) Explain how adaptive delta modulation overcomes the problems of DM system. 4

12 a) Apply Shannon fano coding procedure for following message ensembles $[x] = [x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8]$ with probability [P]=[1/4, 1/8, 1/16, 1/16, 1/4, 1/16. 1/8, 1/16]. 6

b) Explain binary symmetric channel and calculate mutual information for the channel. 4

13 a) What are code tree, code trellis and state diagrams for convolutional encoders? 6

b) Write the error detection and error correction capabilities of Linear block codes. 4

14 a) Draw the block diagram of DPSK modulator and explain how synchronization problem is avoided for its detection. 6

b) Explain non coherent detection of ASK signals and derive probability of error. 4

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15 a) Discuss the frequency hopping spread spectrum technique in detail 6

b) Explain the advantages and applications of spread spectrum modulation. 4

16 a) Explain Binary symmetric channel and calculate mutual information and channel capacity for the same. 6

b) Calculate the capacity of low pass channel with a usable bandwith of 3000Hz and S/N = 1000 at the channel output. Assume the channel noise to be Gaussian and white. 4

17 a) In coherent binary PSK system the symbol probabilities are p(0 sent)=P and p(1 sent)=1-P. The receiver is operating with a signal to noise ratio $\left(A^2T_b/\eta\right)=4$, $\eta/2=10^{-8}$, $\eta_b=10^6$. Find the optimum threshold setting for P=0.4, 0.5 and 0.6 and find the probability of error P_e for p = 0.4, 0.5 and 0.6. 6

b) Explain the demodulation techniques used in frequency hopped spread spectrum. 4

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