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Code No: 126AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, May - 2017
DIGITAL COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a)	Compare the performance of PCM and DM system.	[2]
b)	What is slope overload distortion? Explain.	[3]
c)	Write the expression for baud rate of BPSK system.	[2]
d)	Explain advantages of coherent digital modulation schemes.	[3]
e)	Sketch the wave form of the FSK signal for the input binary sequence 1100100010.	[2]
f)	Define entropy and conditional entropy.	[3]
g)	Define code rate of block code.	[2]
h)	Mention various types of errors caused by noise in communication channel.	[3]
i)	Define processing gain and jamming margin	[2]
j)	Explain the generation of PN sequence.	[3]

PART - B

(50 Marks)

2.a) A voice frequency signal band limited to 3kHz is transmitted with the use of the DM system. The pulse repetition frequency is 30,000 pulses per second, and the step size is 40mV. Determine the permissible speech signal amplitude to avoid slope overload.
b) Derive the expression for overall SNR in a ADM system. [5+5]

OR

3.a) In a binary PCM system, the output signal to quantizing noise ratio is to be held to a minimum of 40dB. Determine the number of required levels and find the corresponding output signal to quantization noise ratio.
b) Explain the modulation and demodulation procedure in DPCM system. [5+5]

4.a) Explain frequency shift keying. Describe coherent detection of FSK signals. What should be the relationship between bit-rate and frequency-shift for a better performance?
b) Explain non coherent detection method of binary frequency shift keying scheme. [5+5]

OR

5.a) Explain coherent detection of PSK signals and derive probability of error.
b) Differentiate coherent and non-coherent detection techniques. [5+5]

6.a) Derive the bit error probability of a coherent ASK signaling scheme.

b) Apply Shannon-Fano coding procedure of M=2 and M=3 $[x]=[x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8]$ with probability [P]=[1/4, 1/8, 1/16, 1/16, 1/4, 1/16, 1/8 ,1/16]. [5+5]

OR

7.a) Compare code efficiency of Shanon Fano coding and Huffman coding when five source messages have probabilities m1=0.4, m2=0.15, m3=0.15, m4=0.15, m5=0.15.

b) Obtain the probability of bit error for coherently detected BPSK. [5+5]

8.a) We transmit either a 1 or a 0, and add redundancy by repeating the bit. (i) Show that if we transmit 11111 or 00000, then 2 errors can be corrected. (ii) Show that in general if we transmit the same bit 2t+1 times we can correct upto t errors.

b) What are code tree, code trellis and state diagrams for convolution encoders? [5+5]

OR

9.a) Design the encoder for the (7, 4) cyclic code generated by $G(p)=p^3+p^2+1$ and also verify the operation for any message vector.

b) Derive the steps involved in generation of linear block codes. Define and explain the properties of syndrome. [6+4]

10.a) Derive the necessity of DSSS techniques. Draw the transmitter and receiver block diagram and explain.

b) Write a note on CDMA. [6+4]

OR

11.a) Explain the advantages and applications of spread spectrum modulation.

b) Discuss the frequency hopping spread spectrum technique in detail. [4+6]

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