Total No. of Questions : 12]

SEAT No. :

P 1626

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T.E. (Electronics Engineering)

DATA COMMUNICATION

(2008 Course) (Semester - I) (304202)

Time : 3 Hours] *[Max. Marks :100]*

Instructions to the candidates:

1) ***Answer and 3 questions from each Section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***Use of non programmable electronic pocket calculators is allowed.***

SECTION - I

Q1) a) With suitable example explain random process. What is ensemble average and time average? **[8]**

b) Define autocorrelation. State and explain any three properties of auto correlation. **[6]**

c) List various standard probability models with their PDF & CDF. **[4]**

OR

Q2) a) Explain the following terms. **[10]**

i) Wide sense stationary.

ii) Ergodic Process.

iii) Auto correlation function.

iv) Power spectral density.

v) Gaussian Process.

b) Show that impulse function of matched filter is time reverse and delayed version of input signal. **[8]**

Q3) a) What are desirable properties of various line codes? **[8]**

b) Explain Intersymbol interference and Eye diagram. **[8]**

OR

Q4) a) What is the need of bit synchronization in Digital Multiplexing? Explain bit synchronizer. **[8]**

b) Sketch PSD for Polar NRZ & Bipolar NRZ formats . **[8]**

P.T.O.

Q5) a) Consider a (7,4) linear block code whose generator matrix is given below **[8]**

$$G = \left(\begin{array}{cccc|ccc} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{array}\right)$$

Find all code vectors

Find parity check matrix of this code.

Find maximum weight of this code.

b) Explain the various methods of convolution codes. **[8]**

OR

Q6) a) Compare FEC and ARQ systems of error control. Compare different ARQ system on basis of their operation & performance. **[8]**

b) A rate 1/3 convolution encoder has generating vector as g1=(1,0,0) g2=(1,1,1), g3= (1,0,1)

sketch the encoder configuration

Draw the code tree, state transition and trellis diagram

If encoder message sequence is 10110, determine the output sequence of encoder. **[8]**

SECTION - II

Q7) a) State and explain all three Shannon's theorems of information theory. **[8]**

b) What is entropy? For discrete memory less source what is the upper bound on entropy. Show that. **[8]**

OR

Q8) a) What is mutual Information? How is the channel capacity related to mutual information? **[8]**

b) Explain various channels with their Models. **[8]**

Q9) a) Explain with block diagram and waveforms DPSK transmitter and receiver. **[8]**

b) Draw signal space representation for orthogonal and non-orthogonal BFSK. **[8]**

OR

Q10)a) Explain with block diagram 16 bit QAM transmitter and receiver mathematically. **[8]**

b) Compare error probabilities for ASK & BFSK. **[8]**

Q11)a) Write a short note on ALOHA & Slotted ALOHA. **[8]**

b) What are the properties of maximum length sequences? Give the graphical representation of auto correlation property of random data of PN sequence. Comment on the graphs. **[10]**

OR

Q12)a) Explain in detail the operation of CDMA and compare performance parameters of FDMA, TDMA and CDMA. **[8]**

b) Explain the working of DSSS transmitter and reciver. **[10]**

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