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B.E. / B.Tech. (Part Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

ELECTRONICS AND COMMUNICATIONS ENGINEERING BRANCH

FIFTH SEMESTER

PTEC341/PTEC382 – DIGITAL COMMUNICATION

Time: 3 hr (REGULATIONS 2002/2005) Max Mark: 100

Answer ALL Questions

Part – A (10 X 2 = 20 Marks)

1. State Nyquist criteria.
2. Draw the waveform for the digital signal [0110 1001], while it is transmitted with Bipolar return-to-zero signaling format.
3. What is the need of synchronization in a digital modulation system?.
4. Draw the signal-space diagram for coherent binary FSK system.
5. A high-resolution black and white TV picture consists of about $2X10^6$ picture elements and 16 different brightness levels. Pictures are repeated at the rate of 32 per second. All picture elements are assumed to be independent and all levels have equal likelihood of occurrence. Calculate the average rate of information conveyed by this TV picture source.
6. State noiseless channel and find its capacity.
7. Differentiate systematic and non-systematic codes.
8. What is trellis coded modulation? Give its basic features.
9. A spread-spectrum communication system has the information bit duration of 4.095 ms and PN chip duration of 1μs. Find the processing gain and the length of the shift-register.
10. List the advantages of Code division Multiple access.

Part – B (5 X 16 = 80 Marks)

11. (i). Discuss any one technique which is used to reduce Intersymbol Interference. (8)
    (ii). Describe the working principles of adaptive equalizer. (8)

12. (a).(i). Draw the Block diagram of BPSK and explain its operation in detail. (8)
    (ii). Explain the carrier Synchronization in detail. (8)

(or)

(b). (i). Explain in detail about the QAM techniques with relevant diagrams. (8)
    (ii). With neat diagram, explain the working principle of DPSK technique. (8)

13. (a).(i). Consider a BSC, with $P(x_1)=\alpha$, Show that the mutual information I(X,Y) is given by $I(X,Y) = H(Y) + p \log_2 p + (1-p) \log_2(1-p)$ (6)

(ii). Calculate I(X,Y) for $\alpha = 0.5$ and $p= 0.1$ (5)

(iii) Calculate I(X,Y) for $\alpha = 0.5$ and $p= 0.5$, and comment on the result. (5)

(or)

(b). A discrete memoryless source has an alphabet of five symbols {Si, i=1,2,3,4,5} with probabilities {0.55, 0.15, 0.15, 0.10, 0.05}

(i). Encode the symbols using Huffman coding technique. (6)

(ii). Encode the same using Shannon-Fano coding technique. (6)

(iii). Calculate the efficiency offered by the above two techniques and compare. (4)

14. (a). (i). The convolutional encoder has two generator sequence of (1,1,1) and (1,0,1). Encode the message sequence (10011), using transform domain method. (8)

(ii). A bit stream 10011101 is transmitted using the standard CRC method. The generated polynomial is X^3+1. Show the actual bit stream transmitted. Suppose the third bit from the left is inverted during transmission. Show that this error is detected at the receiver's end. (8)

(or)

(b). Explain in detail about the Trellis – coded Modulation techniques with an example.

15. (a). Discuss the frequency-Hop spread spectrum technique in detail.

(or)

(b). Write short notes on PN sequence, Code synchronization, Direct sequence spread spectrum