National University of Computer and Emerging Sciences, Lahore Campus

Quiz ……6 [BS(CS): Section B] Fall 2024

Computer Networks (Code: CS3001) **Quiz Date: December 5, 2024**

Total Marks: 20 **Duration: 20 -Minutes**

Name ---------- Roll #---------- Section --------

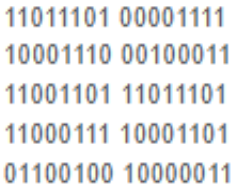
Instructions: Answer the question(s) on this sheet. You can make use of rough sheet (not to be attached).

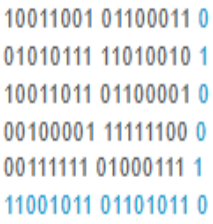
Q1: Suppose that a packet's payload consists of 10 eight-bit values (e.g., representing ten ASCII-encoded characters) shown below. (Here, we have arranged the ten eight-bit values as five sixteen-bit values):

Figure 1 (on left) shows an arrangement of ten eight-bit values as five sixteen-bit values.

Figure 2 (at the center) shows both the payload and parity bits. One of these bits is flipped.

Figure 3 (on right) shows both the payload and parity bits are shown; Either one or two of the bits have been flipped. [12 Marks]





Answer the following questions:

a) For figure 1, compute the two-dimensional parity bits for the 16 columns. Combine the bits into one string.

Answer: 0011110111111111

b) For figure 1, compute the two-dimensional parity bits for the 5 rows (starting from the top). Combine the bits into one string.

Answer: 01110

c) For figure 1, compute the parity bit for the parity bit row from question 1. Assume that the result should be even.

Answer: 1

d) For figure 2, indicate the row and column with the flipped bit (format as: x,y), assuming the top-left bit is 0,0.

Answer: 4,0

e) For figure 3, is it possible to detect and correct the bit flips? Yes or No

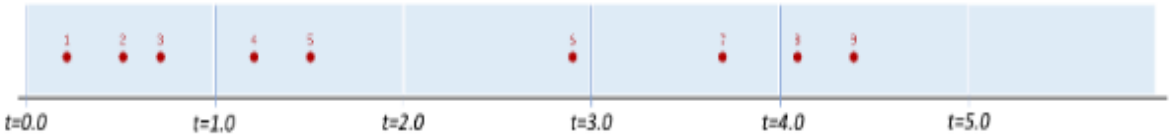
Answer: Yes

f) In part e), if your answer is Yes, then indicate the row and column with the flipped bit (format as: x,y), assuming the top-left bit is 0,0. Moreover, indicate corrective action for the flipped bit.

Answer: 0,8 --- The bit at this location will be inverted i.e., invert it from 0 to 1.

Note: In part d) and part f), for format x,y: x indicates the row number while y represents the column number.

Question 2: Consider the figure below, which shows the arrival of 9 messages for transmission at different multiple access wireless nodes at times
t = <0.2, 0.5, 0.7, 1.2, 1.5, 2.9, 3.7, 4.1, 4.4> and each transmission requires exactly one time unit.



a) Suppose all nodes are implementing the Aloha protocol. For each message, indicate the time at which each transmission begins. Separate each value with a comma and no spaces.

Answer: 0.2,0.5,0.7,1.2,1.5,2.9,3.7,4.1,4.4

b) Which messages transmit successfully? Write your answer as a comma separated list with no spaces using the messages' numbers

Answer: (as no message will be transmitted successfully

c) Suppose all nodes are implementing Carrier Sense Multiple Access (CSMA), but without collision detection. Suppose that the time from when a message transmission begins until it is beginning to be received at other nodes is 0.4 time units. (Thus if a node begins transmitting a message at t=2.0 and transmits that message until t=3.0, then any node performing carrier sensing in the interval [2.4, 3.4] will sense the channel busy.) For each message, indicate the time at which each message transmission begins, or indicate that message transmission does not begin due to a channel that is sensed busy when that message arrives. Separate each value with a comma and no spaces, and if the channel is sensed busy, substitute it with 's'

Answer: 0.2,0.5,s,s,s,2.9,s,s,4.4

d) Which messages transmit successfully assuming that messages are never retransmitted after the occurrence of collision (if any)? Write your answer as a comma separated list with no spaces using the messages' numbers

Answer: 6,9