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| **KING SAUD UNIVERSITY**  **COLLEGE OF COMPUTER AND INFORMATION SCIENCES**  **COMPUTER SCIENCE DEPARTMENT** | | | |
| **CSC 329: Computer Network** | **Tutorial 9** | | **1st Semester 1437-1438** |
| **Name:** | | **Student ID:** | |
| **Serial Number:** | | **Section Number:** | |

**Part1: Multiple-Choice Questions**

1. \_\_\_\_\_\_\_\_\_ is a controlled-access protocol.

a. Reservation

b. UDMA

c. TDMA

d. CSMA

2.\_\_\_\_\_\_\_\_ is (are) a channelization protocol.

a. FDMA

b. TDMA

c. CDMA

d. All the above

3. In the reservation access method, if there are 10 stations on a network, then there

are \_\_\_\_\_\_\_\_\_ reservation mini slots in the reservation frame.

a. 5

b.9

c. 10

d 11

4. \_\_\_\_\_\_\_\_\_requires one primary station and one or more secondary stations.

a. Reservation

b. Polling

c. Token ring

d CSMA

5. When a primary device asks a secondary device if it has data to send, this is called

a. Polling

b. Selecting

c. Reserving

d. Backing off

6. If an FDMA network has eight stations, the medium bandwidth has \_\_\_\_\_ bands.

a. 1

b. 2

c. 8

d. 16

7. If a TDMA network has eight stations, the medium bandwidth has \_\_\_\_\_\_\_\_\_bands.

a.1

b.2

c. 8

d. 16

8. If a CDMA network has eight stations, the medium bandwidth has \_\_\_\_\_\_\_ bands.

a. 1

b.2

c. 8

d. 16

9. A Walsh table for 16 stations has a chip sequence of \_\_\_\_\_\_\_\_\_ chips.

a. 4

b. 8

c.16

d. 3**Part2: Exercises**

1) Complete the next table for the different protocols discussed in this chapter. Answer yes or no.

|  |  |  |
| --- | --- | --- |
| **Characteristic** | **Token Passing** | **Chanalization** |
| **Multiple access** | no | yes |
| **Carrier Sense** | no | no |
| **Collision checking** | no | no |
| **Acknowledgment** | no | no |

2) A network with one primary and four secondary stations uses polling. The size of a data frame is 1000 bytes. The size of the poll, ACK, NACK frames are 32 bytes. Each station has 5 frames to send how many total bytes are exchanged if each station can send only one frame in response to a poll.

Polling and data transfer:

Frame 1 for all four stations: 4 \* [ poll + frame + ACK]

Frame 2 for all four stations: 4 \* [ poll + frame + ACK]

Frame 3 for all four stations: 4 \* [ poll + frame + ACK]

Frame 4 for all four stations: 4 \* [ poll + frame + ACK]

Frame 5 for all four stations: 4 \* [ poll + frame + ACK]

Polling and sending NAKs

Station 1: [poll+ NAK]

Station 2: [poll+ NAK]

Station 3: [poll+ NAK]

Station 4: [poll+ NAK]

Total activity:

24 polls + 20 frames + 20 ACK s+ 4 NAKs = 21536 bytes.

3) Prove that the inner product of the two same sequences will give N , where N is the number of sequences (stations) for any two entries of your choice in W8.

[+1 -1 +1 -1 +1 -1 +1 -1]. [+1 -1 +1 -1 +1 -1 +1 -1]

=1+1+1+1+1+1+1+1=8 =N

4) Prove that the inner product of the two different sequences will give zero for any two entries of your choice in W8.

[+1 -1 +1 -1 +1 -1 +1 -1]. [+1 +1 -1 -1 +1 +1 -1 -1]

= 1 -1 -1 +1 +1 -1 -1 +1 = 0

5) What is the number of sequences if we have 50 stations in our network?

The number of sequences needs to be 2m

We need to choose m = 6 and Number of sequences = 26 or 64.

We can then use 50 of the sequences as the chips.

6) Get the sequences (chips) for 6 stations. (6 is not power of 2 but 23=8 so we calculate W8 but consider only the first 6 rows as our stations)

1) W1=[1]

W8 = +1 +1 +1 +1 +1 +1 +1 +1 S1

+1 -1 +1 -1 +1 -1 +1 -1 S2

+1 +1 -1 -1 +1 +1 -1 -1 S3

+1 -1 -1 +1 +1 -1 -1 +1 S4

+1 +1 +1 +1 -1 -1 -1 -1 S5

+1 -1 +1 -1 -1 +1 -1 +1 S6

+1 +1 -1 -1 -1 -1 +1 +1

+1 -1 -1 +1 -1 +1 +1 -1

W2 = 1 1

1. -1

W4 = +1 +1 +1 +1

+1 -1 +1 -1

+1 +1 -1 -1

+1 -1 -1 +1

7) Four stations A,B,C and D share a link during 1-bit interval using CDMA channelization method. Assume that station B send a ***0*** bit ,stations A is ***silen***t and both of station C and D send a ***1*** bit and W1=[-1].

1. Determine the common data on the common channel.

* Sequence generation:

We have 4 stations N=4

W4 =  -1 -1 -1 -1

-1 +1 -1 +1

-1 -1 +1 +1

-1 +1 +1 -1

* Each station is assigned a sequence:

A = [-1 -1 -1 -1]

B = [-1 +1 -1 +1]

C = [-1 -1 +1 +1]

D = [-1 +1 +1 -1]

* Encoding:

A is silent 🡪 0

B send 0 bit 🡪-1

C send 1 bit 🡪 1

D send 1 bit 🡪 1

* In the multiplexer:

0\* [-1 -1 -1 -1] **+**-1 \* [-1 +1 -1 +1] + 1 \* [-1 -1 +1 +1] +1\*[-1 +1 +1 -1]

The encoded number is multiplied by each chip in the sequence=

[0 0 0 0] + [+1 -1 +1 -1] + [-1 -1 +1 +1] + [-1 +1 +1 -1]

All first chips are added, as are all second, third and forth= [-1 -1 +3 -1] the result is a new sequence, which is transmitted through the link.

1. Show how does station can detect the data sent by stations A and D

* Station A: [-1 -1 +3 -1] \* [-1 -1 -1 -1] = [+1 +1 -3 +1]

Then the chips in the sequence are added and divided by 4: 1+1-3+1=0/4 =0🡪 silence

* Station B: [-1 -1 +3 -1] \* [-1 +1 -1 +1] =[+1 -1 -3 -1] =-4/4= -1 🡪 bit 0
* Station C: [-1 -1 +3 -1] \* [-1 -1 +1 +1] = [+1 +1+3 -1] =4/4=1🡪bit 1
* Station D: [-1 -1 +3 -1] \* [-1 +1 +1 -1] = [+1 -1 +3 +1] = 4/4 =1🡪bit 1