|  |  |  |  |
| --- | --- | --- | --- |
| **KING SAUD UNIVERSITY**  **COLLEGE OF COMPUTER AND INFORMATION SCIENCES**  **COMPUTER SCIENCE DEPARTMENT** | | | |
| **CSC 329: Computer Network** | **Tutorial 6** | | **1st Semester 1437-1438** |
| **Name:** | | **Student ID:** | |
| **Serial Number:** | | **Section Number:** | |

**Part1: Multiple-Choice Questions**

**1) Which error detection method uses ones complement arithmetic?**

a. Simple parity check

b. Two-dimensional parity check

c. CRC

d. Checksum

**2) Flow control is needed to prevent \_\_\_\_\_\_\_\_\_\_ .**

1. Bit errors
2. Overflow of the sender buffer
3. Overflow of the receiver buffer
4. Collision between sender and receiver

**3) A timer is set when \_\_\_\_\_\_\_ is (are) sent out.**

1. A data frame
2. An ACK
3. A NAK
4. All the above

**4) For Stop-and-Wait ARQ, for n data packets sent, \_\_\_\_\_\_\_acknowledgments are needed.**

1. n
2. 2n
3. n-1
4. n +1

**5) When data and acknowledgment are sent on the same frame, this is called**

1. Piggybacking
2. Backpacking
3. Carryon
4. Non of the above

**6) In a Go-Back-N ARQ, if the window size is 63, what is the range of sequence numbers?**

1. 0 to 63
2. 1 to 63
3. 1 to 64
4. 1 to 65

**7) In Go-Back-N ARQ ,For a sliding window of size n — 1 (n sequence numbers), there can be a maximum of \_\_\_\_\_\_\_ frames sent but unacknowledged.**

1. 0
2. n-1
3. n
4. n+1

**Part2: Exercises**

1) Find the checksum for the following bit sequence. Assume a 16-bit segment size.

**0001111010110001**

**1001001001000111**

2) Suppose the receiver receives

**1001001110010011 1001100001001101 0100111100000111**

Check if the data received has error or not by using Checksum.

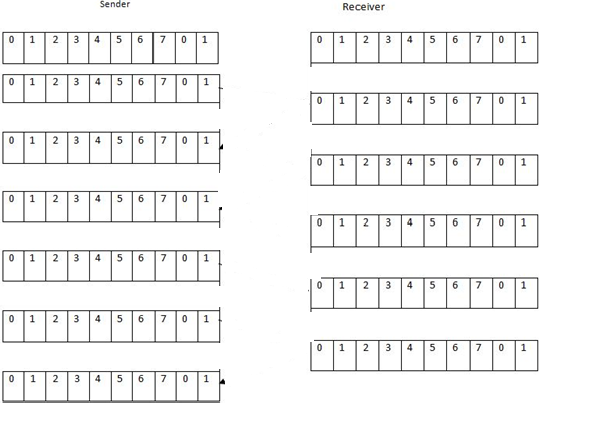
3) Draw the sender and receiver flow diagram for a system using Stop-and-Wait ARQ. Given the following actions:

* 1. **Frame 0** is sent; frame 0 is acknowledged.
  2. **Frames 1** is lost.
  3. **Frame 1** is acknowledged.
  4. **Frames 0** is sent; frame 0 is acknowledged but the acknowledgment is lost.
  5. **Frame 0** is acknowledged.

4) A computer is using **3 bits** to represent the sequence numbers. Draw the sender and receiver windows for a system using Go-Back-N ARQ. Given the following actions:

* 1. **Frame 0** is sent; frame 0 is acknowledged.
  2. **Frames 1 and 2** are sent; frames 1 and 2 are acknowledged.
  3. **Frames 3** is sent and lost.
  4. **Frames 4 and 5** are sent; timer for frame 3 expires.
  5. **Frames 3 through 5** are acknowledged.

Show the value of both sliding windows each time and complete the graph.



5) Using **6-bit** sequence numbers, what is the maximum size of the send and receive window for each of the following protocols?

1. Stop and wait ARQ
2. Go Back N ARQ

6) Computer A uses Stop and Wait ARQ to send packets to computer B. If the distance between A and B is **40000 km**, the packet size is **5000 bytes** and the bandwidth is **10Mbps**. Assume that the propagation speed **is 2.4x108m/s.**

1. Round trip delay.
2. Calculate bandwidth Delay Product.
3. Calculate utilization of link.

7) Repeat exercise 6 for a system that uses Go-Back-N ARQ protocol and window size of **63**.