PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641004

Department of Applied Mathematics and Computational Sciences

Computer Networks and TCP/IP Lab – 18XW46

MSc SS - Semester 4

**Data Link layer - Error Detection and Correction Exercises**

**Goal:**

**To understand data link layer functions by implementing the following:**

* Hamming Code for single bit error detection and correction
* CRC polynomial scheme used in error detection
* Go back N ARQ sliding window protocol

1. On the Internet, when systems communication, they follow several sophisticated schemes of error detection and correction at Layer 2. Hamming code serves to detect and correct single bit errors. Implement a model using Hamming codes, in which client sends bit streams to the server, server checks for errors and corrects the single bit error in the bit stream. Client can inform the type of parity followed (Odd/Even) to the server. Client should get dataword as input, add redundant bits and send the codeword to server. Server must process the received codeword, identify the error and correct the error.

(a) Show the bit pattern transmitted for the message **1101 0011 0011 0101**. Assume that even parity is used in the Hamming code.

1. CRC is based on Modulo-2 arithmetic – binary division. In CRC, a sequence of redundant bits, called cyclic redundancy check bits, are appended to the end of data unit. **Simulate a CRC encoder and decoders using client/server communication.**
   1. Consider a data communication protocol which uses a CRC code to detect transmission errors. The generator polynomial is G(x) = x4 + x2+1. The 16-bit binary message to be transmitted is 1101011110111010
   2. CRC Encoder must compute the CRC code for the 16-bit message shown above and create codeword
   3. CRC Decoder must compute syndrome and decide if it must accept received dataword.
2. Implement a simulation for Go-Back-N ARQ sliding window protocol between a sender and receiver of data frames.
3. Provide a simulation, where ACK is lost and all frames in sliding window is retransmitted
4. Receive the following as inputs from the user:

* window size,
* No of frames to be transmitted,
* frame numbers that gets lost

Simulate frame transmission between sender and receiver in this scenario dealing with frame loss and completion of transmitting frames.