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22AIE314 Computer Security

Lab Sheet 2
Error Detection and Correction Techniques

1. Write a program to implement LRC(Even Parity) for 4-bit data blocks.
   Sample Input: 1010 1100 1111
   Sample Output 1:
   Original Message: 1010 1100 1111
   LRC: 1001
   Transmitted Message: 1010 1100 1111 1001
   Receiver Check: No Error Detected
   Sample Output 2:
   Original Message: 1010 1100 1111
   Error Introduced: 1111 → 1011
   LRC: 1001
   Transmitted Message: 1010 1100 1011 1001
   Receiver Check: Error Detected
2. Implement VRC (even parity) for a 7-bit binary data stream.
   Sample Input: 1101011
   Sample Output1:
   Original Message: 1101011
   Even Parity Bit: 0
   Transmitted Message: 11010110
   Error Introduced: 11010111
   Receiver Check: Error Detected
   Sample Output2:
   Original Message: 1101011
   Even Parity Bit: 0
   Transmitted Message: 11010110
   Receiver Check: No Error Detected

3. Write a program to implement the Checksum technique using 16-bit words.
   Sample Input: 1010101010101010 1100110011001100
   Sample Output:
   Original Message: 1010101010101010 1100110011001100
   Checksum: 0011011011011011
   Transmitted Message: 1010101010101010 1100110011001100 0011011011011011
   Receiver Check: No Error Detected

Sample Output 2:

Original Message: 1010101010101010 1100110011001100
Error Introduced: 1100110011001100 → 1000110011001100
Checksum: 0011011011011011
Transmitted Message: 1010101010101010 1000110011001100
011011011011011
Receiver Check: Error Detected

4. Implement CRC for error detection using a polynomial divisor.
   Sample Input:
   Binary Data: 101001
   Generator Polynomial: 1101
   Sample Output1:
   Original Message: 101001
   CRC: 101
   Transmitted Message: 101001101
   Receiver Check: No Error Detected
   Sample Output 2:
   Original Message: 101001
   Error Introduced: 101001 → 111001
   CRC: 101
   Transmitted Message: 111001101
   Receiver Check: Error Detected
5. Use Hamming Code (7-bit)- Even Parity, to encode the following 4-bit binary data and detect if there is any error during transmission.
   Sample Input Data: 1011
   Sample Output1:
   Encoded Message: 1011010
   Transmitted Message: 1011010
   Receiver Check: No Error Detected
   Sample Output2:
   Sample Input Data: 1101
   Transmitted Message (with error): 1100011
   Receiver Check: Error Detected at Bit Position: 4
   Corrected Message: 1101011