Batch: A3 **Experiment Number:6**

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Aim of the Experiment: To interpret the concept of redundancy in data message for error detection and Correction using Hamming Code

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Program/ Steps:

```
def transmitter(dataword):

    p1 = int(dataword[0]) ^ int(dataword[1]) ^ int(dataword[3]) ^ int(dataword[4]) ^
int(dataword[6])

    p2 = int(dataword[0]) ^ int(dataword[2]) ^ int(dataword[3]) ^ int(dataword[5]) ^
int(dataword[6])

    p3 = int(dataword[1]) ^ int(dataword[2]) ^ int(dataword[3]) ^ int(dataword[5]) ^
int(dataword[6])

    codeword = dataword + str(p1) + str(p2) + str(p3)

    return codeword


def receiver(codeword):

    p1 = int(codeword[0]) ^ int(codeword[1]) ^ int(codeword[3]) ^ int(codeword[4]) ^
int(codeword[6]) ^ int(codeword[7])

    p2 = int(codeword[0]) ^ int(codeword[2]) ^ int(codeword[3]) ^ int(codeword[5]) ^
int(codeword[6]) ^ int(codeword[8])

    p3 = int(codeword[1]) ^ int(codeword[2]) ^ int(codeword[3]) ^ int(codeword[5]) ^
int(codeword[6]) ^ int(codeword[9])

    error_pos = p1 * 1 + p2 * 2 + p3 * 4

    if error_pos:

        codeword = list(codeword)

        codeword[error_pos - 1] = '1' if codeword[error_pos - 1] == '0' else '0'
```

```
        codeword = ''.join(codeword)
    original_dataword = codeword[:7]
    print("Original Dataword:", original_dataword)


dataword = input("Enter 7 bits dataword: ")
codeword = transmitter(dataword)
print("Generated Codeword:", codeword)


received_codeword = input("Enter received codeword (11 bits): ")
receiver(received_codeword)
```

Output/Result:

```
Enter 7 bits dataword:
1011010
Generated Codeword: 1011010001
Enter received codeword (11 bits):
10110100001
Original Dataword: 1010010


** Process exited - Return Code: 0 **
Press Enter to exit terminal
```

Post Lab Question-Answers:

What are the different methods used for error detection

Ans: Common methods include Parity Check, Checksums, Cyclic Redundancy Check (CRC), and Hamming Code.

If the data unit is 111111 and the divisor is 1010,wht is the dividend at the Transmitter?

Ans: The dividend is 1111110000 (data unit followed by zeros, where the number of zeros equals the length of the divisor minus one).

Which layer of the OSI model usually does the function of error detection?
Ans: The Data Link Layer (Layer 2) typically performs error detection.

What is Hamming distance ? What is minimum Hamming distance?
Ans: Hamming distance is the number of bit positions at which two binary strings differ. Minimum Hamming distance refers to the smallest distance between any two valid codewords in a code, determining error detection and correction capabilities

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Outcomes:

CO4: Execute their knowledge of computer communication principles, including Error detection and correction, multiplexing, flow control, and error control.

Conclusion (based on the Results and outcomes achieved):

Successfully executed a python program to interpret the concept of redundancy in data message for error detection and Correction using Hamming Code.

References:

Books/ Journals/ Websites:

- Behrouz A Forouzan, Data Communication and Networking, Tata Mc Graw hill, India, 4th Edition
- A. S. Tanenbaum," Computer Networks", 4th edition, Prentice Hall