Batch:A2

Roll Number: 16010421063 **Experiment Number:**

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Title of the Experiment:

Program:

```
def Transmitter():
    DW=input("Enter 7 bit data word: ")
    DW=DW[::-1]

    if(len(DW)<7 or len(DW)>7):
        print("Invalid data word")
        return

    for i in DW:
        if i=='0' or i=='1':
            pass
        else:
            print("Invalid bit value")
            return

    codeword=''

    r1=int(DW[6])^int(DW[5])^int(DW[3])^int(DW[2])^int(DW[0])
    r2=int(DW[6])^int(DW[4])^int(DW[3])^int(DW[1])^int(DW[0])
    r4=int(DW[5])^int(DW[4])^int(DW[3])
```

```
    r8=int(DW[2])^int(DW[1])^int(DW[0])


    codeword=DW[:3]+str(r8)+DW[3:6]+str(r4)+DW[6]+str(r2)+str(r1)
    print(f"Hamming code- {codeword}")
    print(f"r1=={r1}")
    print(f"r2=={r2}")
    print(f"r4=={r4}")
    print(f"r8=={r8}")




def Receiver():
    code=input('Enter the hamming code: ')
    reversed_code=code[::-1]


    if len(reversed_code)!=11:
        print("Invalid Code")
        return


    for i in reversed_code:
        if i=='0' or i=='1':
            pass
        else:
            print("Invalid bit value")
            return
```

```
r1=str(int(reversed_code[2])^int(reversed_code[4])^int(reversed_code[6]
)^int(reversed_code[8])^int(reversed_code[10])^int(reversed_code[0]))

r2=str(int(reversed_code[2])^int(reversed_code[5])^int(reversed_code[6]
)^int(reversed_code[9])^int(reversed_code[10])^int(reversed_code[1]))

r4=str(int(reversed_code[4])^int(reversed_code[5])^int(reversed_code[6]
)^int(reversed_code[3]))

r8=str(int(reversed_code[8])^int(reversed_code[9])^int(reversed_code[10
])^int(reversed_code[7]))


   print(f"r1:{r1}\nr2:{r2}\nr3:{r4}\nr8:{r8}")


   if(r1+r2+r4+r8=="0000"):


       data=reversed_code[2]+reversed_code[4:7]+reversed_code[8:]


       print(f"Correct word(No error): {data}")
   else:


       error_bin=r8+r4+r2+r1

       error_dec=int(error_bin,2)


       print(f"Error at bit: {error_dec}")

       error_dec-=1
```

```
        if reversed_code[error_dec]=='1':

reversed_code=reversed_code[:error_dec]+'0'+reversed_code[error_dec+1:]
        else :

reversed_code=reversed_code[:error_dec]+'1'+reversed_code[error_dec+1:]


        data=reversed_code[2]+reversed_code[4:7]+reversed_code[8:]


        print(f"Correct word: {data}")




if __name__=='__main__':
    print("1. Generate Hamming code\n2. Decode hamming code")
    option=input("Enter your choice: ")
    if option=='1':
        Transmitter()
    elif option=='2':
        Receiver()
    elif option=='3':
        print("Exiting ...")
    else:
        print("Invalid Option")
```

Output:

```
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$ python3 script.py
1. Generate Hamming code
2. Decode hamming code
Enter your choice: 1
Enter 7 bit data word: 1111101
Hamming code- 10101111101
r1==1
r2==0
r4==1
r8==0
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$ python3 script.py
1. Generate Hamming code
2. Decode hamming code
Enter your choice: 2
Enter the hamming code: 10101111101
r1:0
r2:0
r3:0
r8:0
Correct word(No error): 1111101
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$
```

```
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$ python3 script.py
1. Generate Hamming code
2. Decode hamming code
Enter your choice: 2
Enter the hamming code: 10101011101
r1:0
r2:1
r3:1
r8:0
Error at bit: 6
Correct word: 1111101
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$
```

```
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$ python3 script.py
1. Generate Hamming code
2. Decode hamming code
Enter your choice: 2
Enter the hamming code: abcd
Invalid Code
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$ python3 script.py
1. Generate Hamming code
2. Decode hamming code
Enter your choice: 1
Enter 7 bit data word: asjhbd
Invalid data word
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$
```

```
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$ python3 script.py
1. Generate Hamming code
2. Decode hamming code
Enter your choice: 2
Enter the hamming code: 101
Invalid Code
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$ python3 script.py
1. Generate Hamming code
2. Decode hamming code
Enter your choice: 1
Enter 7 bit data word: 1101
Invalid data word
barelyexisting@pop-os:~/Kam_Karte_Chalo/testing$
```

Post Lab Question- Answers (If Any):

1. What are the different methods used for error detection
   Ans: Detection:
   1. 2d parity check
   2. Checksum
   3. Cyclic redundancy Check
   4. Simple parity

   Correction:
   1. Hamming code

2. Which layer of the OSI model usually does the function of error detection? Ans
   Ans: Data link layer does the error detection

3. If the data unit is 111111 and the divisor is 1010,wht is the dividend at the Transmitter?
   Ans dividend 1.01

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

Conclusion: We understood the implementation of receiver and transmitter of hamming code