Exercise 3: Error Correction

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BTech IT 3rd Year, 5th Sem

1)

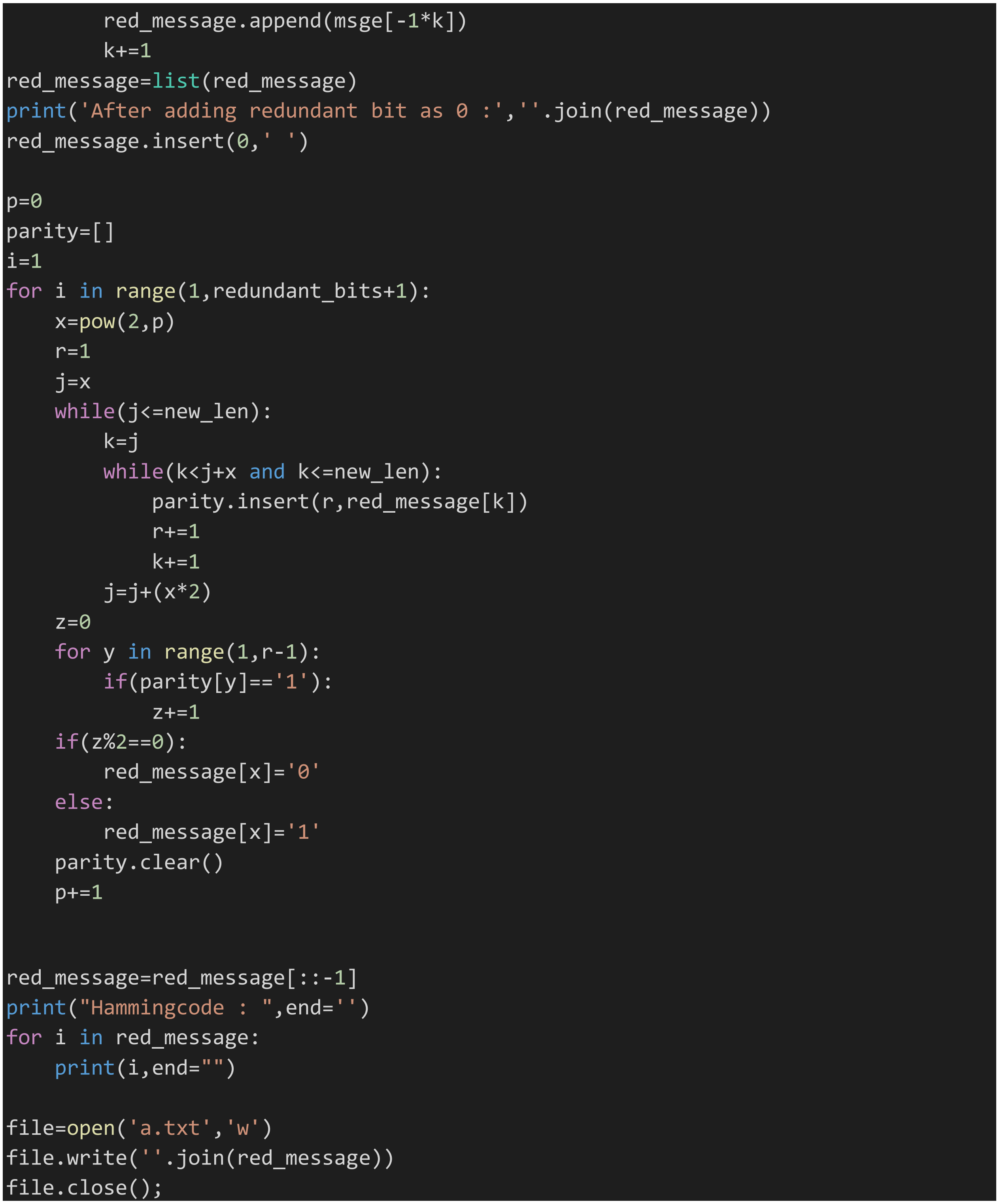
Problem: Write a program for correction of error using hamming code.

Aim: To write a program for correction of error using hamming code in python.

Program:

Sender side

```
import re
import sys
import logging
msge=input("Enter the message : ")
if re.findall("[^0-1]", msge):
    logging.error("Error, input contains other than 0 and 1's")
    sys.exit(1)
length=len(msge)
redundant_bits=0
while(1):
    if(pow(2,redundant_bits))>=(length+redundant_bits+1):
        break
    else:
        redundant_bits+=1
new_len=length+redundant_bits
j=0
k=1
red_message=[]
for i in range(1,new_len+1):
    if(i==2**j):
        red_message.append('0')
        j+=1
    else:
```



```
        red_message.append(msge[-1*k])
        k+=1
red_message=list(red_message)
print('After adding redundant bit as 0 :',''.join(red_message))
red_message.insert(0,' ')

p=0
parity=[]
i=1
for i in range(1,redundant_bits+1):
    x=pow(2,p)
    r=1
    j=x
    while(j<=new_len):
        k=j
        while(k<j+x and k<=new_len):
            parity.insert(r,red_message[k])
            r+=1
            k+=1
        j=j+(x*2)
    z=0
    for y in range(1,r-1):
        if(parity[y]=='1'):
            z+=1
    if(z%2==0):
        red_message[x]='0'
    else:
        red_message[x]='1'
    parity.clear()
    p+=1


red_message=red_message[::-1]
print("Hammingcode : ",end='')
for i in red_message:
    print(i,end="")

file=open('a.txt','w')
file.write(''.join(red_message))
file.close();
```

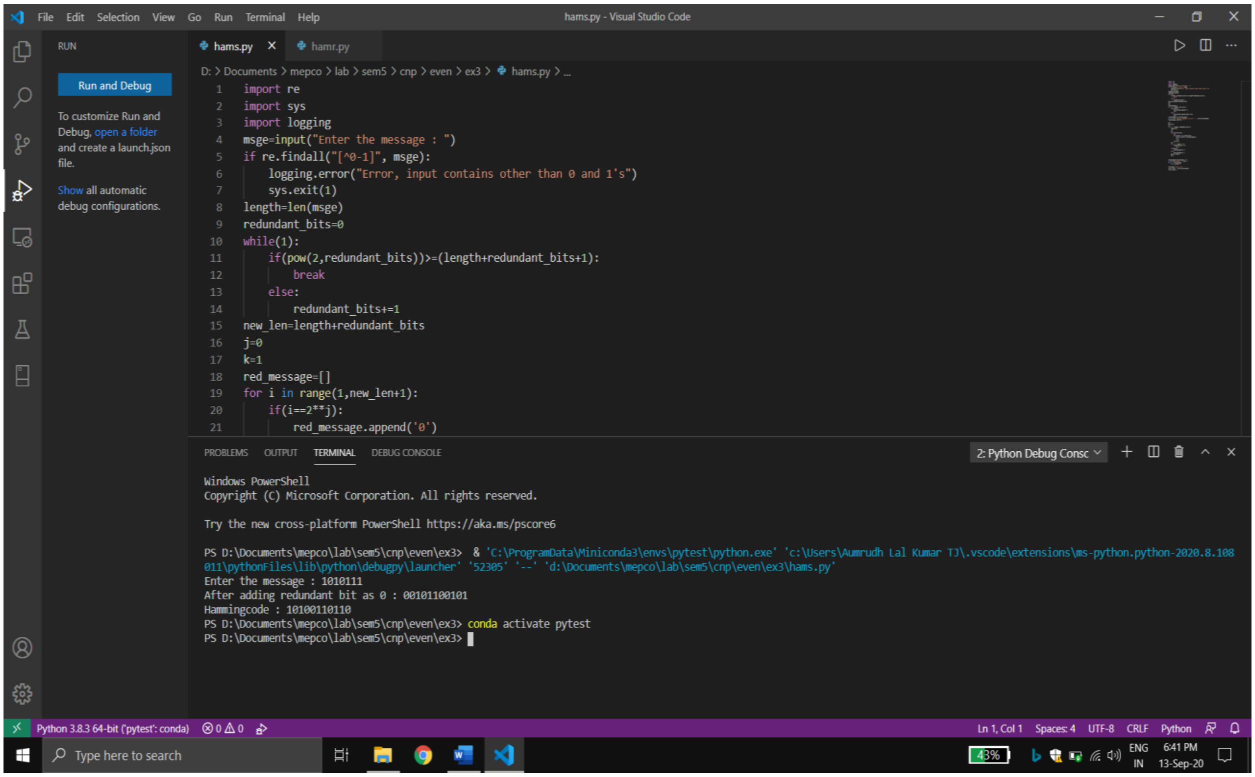
Receiver

```
file=open('a.txt','r')
temp=file.read()
file.close()

red_msge=list(temp)
red_msge=red_msge[::-1]
length=len(temp)-1

redundant_bits=0
parity=[]
flag=0

while(1):
    if(pow(2,redundant_bits))>=(length+redundant_bits+1):
        break
    else:
        redundant_bits+=1
p=0
a=''
for i in range(1,redundant_bits+1):
    x=pow(2,p)
    r=1
    j=x
    while(j<=length):
        k=j
        while(k<j+x and k<=length):
            parity.insert(r,red_msge[k])
            r+=1
            k+=1
        j=j+(x*2)
    z=0
    for y in range(0,r-1):
        if(parity[y]=='1'):
            z+=1
    if(z%2==0):
        a+='0'
    else:
        a+='1'
    parity.clear()
    p+=1
a=a[::-1]
par=int(a,2)
```

```
#print(a)
#print(par)
if(par==0):
    #print("No error")
    #print(red_msge)
    print('No Error :' ,''.join(red_msge))
else:
    print("Error at : ",par, "patching the data...")
    print('Error data',''.join(red_msge))
    if red_msge[par]=='0':
        red_msge[par]='1'
    else:
        red_msge[par]='0'
    print('Correct data',''.join(red_msge))
```

Output

Sender


File Edit Selection View Go Run Terminal Help
hams.py - Visual Studio Code
RUN
Run and Debug
hams.py
hamr.py
D: > Documents > mepco > lab > sem5 > cnp > even > ex3 > hams.py > ...
PROBLEMS
OUTPUT
TERMINAL
DEBUG CONSOLE
2: Python Debug Consc
Python 3.8.3 64-bit ('pytest': conda)
Ln 1, Col 1
Spaces: 4
UTF-8
CRLF
Python
Type here to search
43%
ENG
IN
6:41 PM
13-Sep-20

To customize Run and Debug, open a folder and create a launch.json file.

Show all automatic debug configurations.

```
import re
import sys
import logging
msge=input("Enter the message : ")
if re.findall("[^0-1]", msge):
    logging.error("Error, input contains other than 0 and 1's")
    sys.exit(1)
length=len(msge)
redundant_bits=0
while(1):
    if(pow(2,redundant_bits))>=(length+redundant_bits+1):
        break
    else:
        redundant_bits+=1
new_len=length+redundant_bits
j=0
k=1
red_message=[]
for i in range(1,new_len+1):
    if(i==2**j):
        red_message.append('0')
```

```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Documents\mepco\lab\sem5\cnp\even\ex3>  & 'C:\ProgramData\Miniconda3\envs\pytest\python.exe' 'c:\Users\Aumrudh Lal Kumar TJ\.vscode\extensions\ms-python.python-2020.8.108
011\pythonFiles\lib\python\debugpy\launcher' '52305' '--' 'd:\Documents\mepco\lab\sem5\cnp\even\ex3\hams.py'
Enter the message : 1010111
After adding redundant bit as 0 : 00101100101
Hammingcode : 10100110110
PS D:\Documents\mepco\lab\sem5\cnp\even\ex3> conda activate pytest
PS D:\Documents\mepco\lab\sem5\cnp\even\ex3> 
```
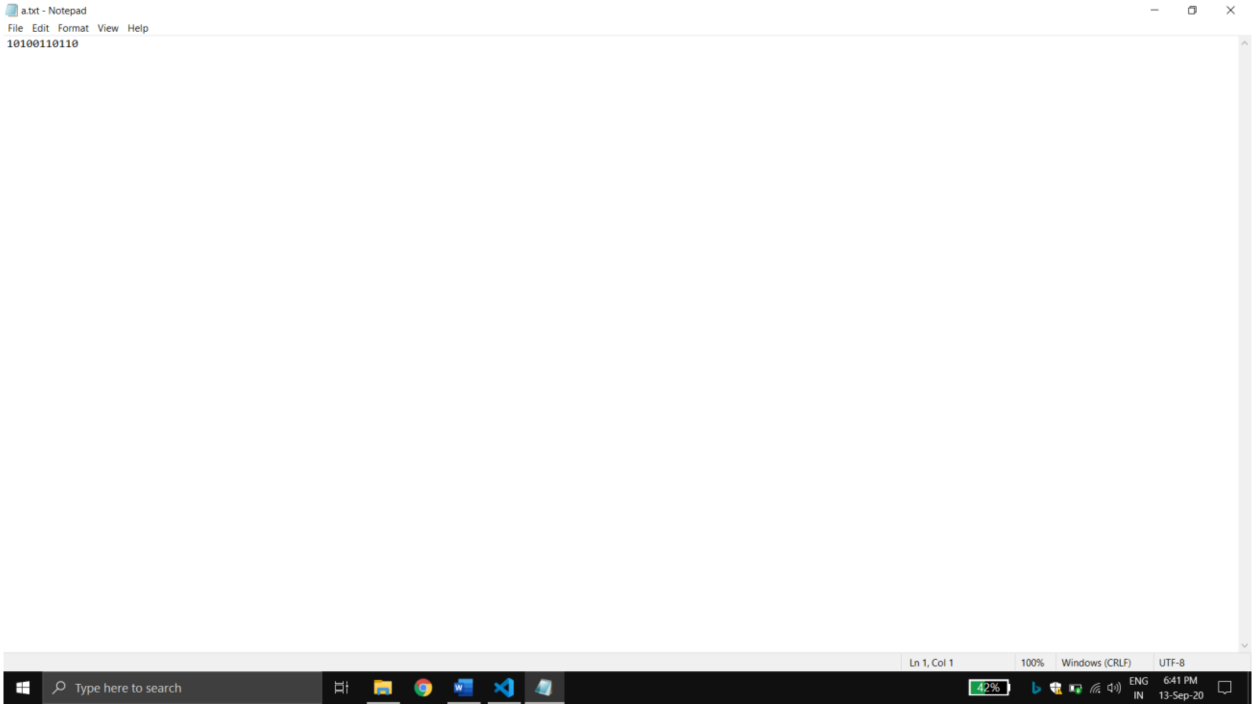
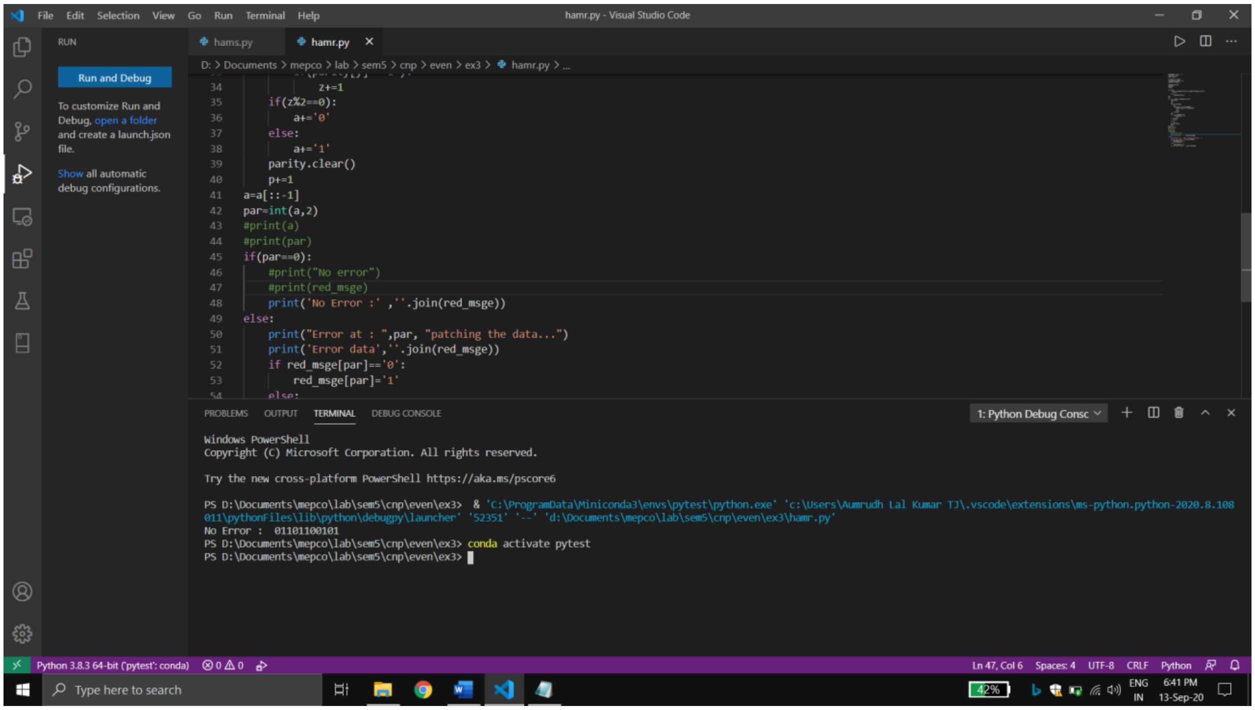

Intermediate file



```
10100110110
```

Receiver :


hamr.py - Visual Studio Code
RUN
Run and Debug
To customize Run and Debug, open a folder and create a launch.json file.
Show all automatic debug configurations.
hams.py
hamr.py
D: > Documents > mepco > lab > sem5 > cnp > even > ex3 > hamr.py > ...
PROBLEMS
OUTPUT
TERMINAL
DEBUG CONSOLE
1: Python Debug Consc
Python 3.8.3 64-bit ('pytest': conda)
Ln 47, Col 6
Spaces: 4
UTF-8
CRLF
Python

```
                z+=1
        if(z%2==0):
            a+='0'
        else:
            a+='1'
        parity.clear()
        p+=1
    a=a[::-1]
    par=int(a,2)
    #print(a)
    #print(par)
    if(par==0):
        #print("No error")
        #print(red_msge)
        print('No Error :' ,''.join(red_msge))
    else:
        print("Error at : ",par, "patching the data...")
        print('Error data',''.join(red_msge))
        if red_msge[par]=='0':
            red_msge[par]='1'
        else:
```

```
Windows PowerShell
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PS D:\Documents\mepco\lab\sem5\cnp\even\ex3>  & 'C:\ProgramData\Miniconda3\envs\pytest\python.exe' 'c:\Users\Aumrudh Lal Kumar TJ\.vscode\extensions\ms-python.python-2020.8.108
011\pythonFiles\lib\python\debugpy\launcher' '52351' '--' 'd:\Documents\mepco\lab\sem5\cnp\even\ex3\hamr.py'
No Error :  01101100101
PS D:\Documents\mepco\lab\sem5\cnp\even\ex3> conda activate pytest
PS D:\Documents\mepco\lab\sem5\cnp\even\ex3> 
```
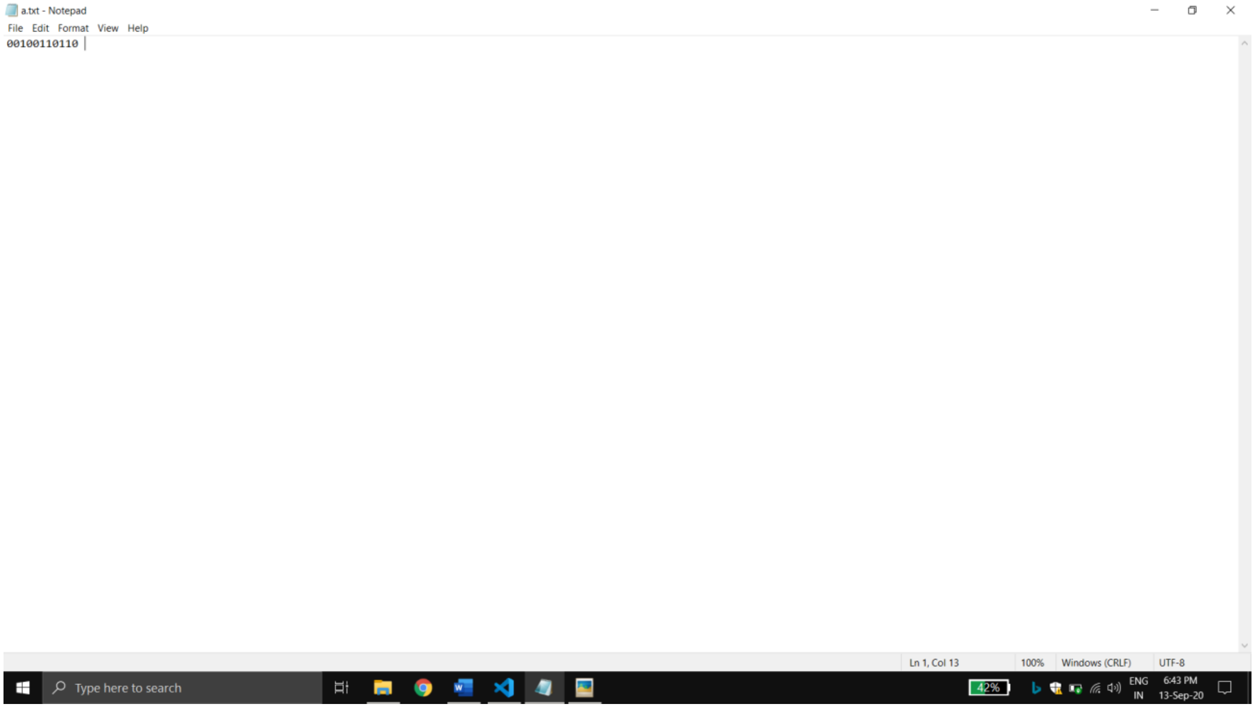
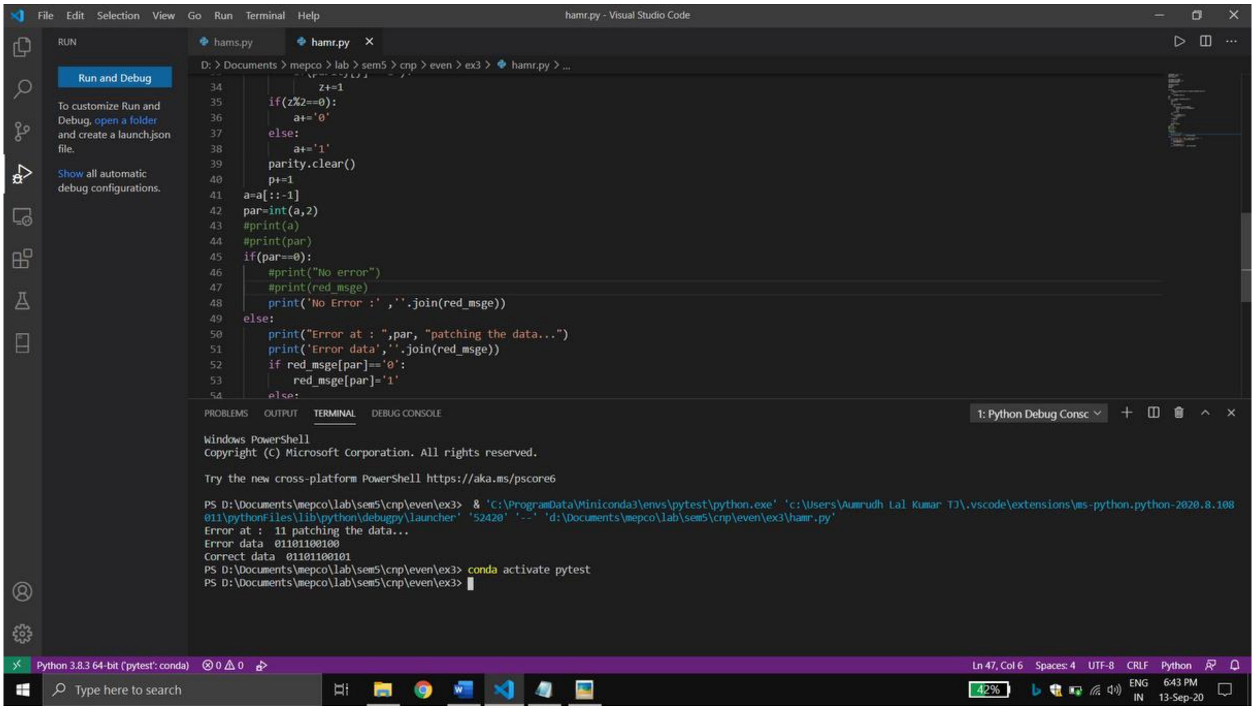

Error (with bit changed)



```
00100110110
```

Receiver (with error)


File Edit Selection View Go Run Terminal Help
hamr.py - Visual Studio Code
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D: > Documents > mepco > lab > sem5 > cnp > even > ex3 > hamr.py > ...
PROBLEMS
OUTPUT
TERMINAL
DEBUG CONSOLE
1: Python Debug Consc
Python 3.8.3 64-bit ('pytest': conda)
⊗ 0 ⚠ 0
Ln 47, Col 6
Spaces: 4
UTF-8
CRLF
Python
Type here to search
42%
ENG IN
6:43 PM
13-Sep-20

```python
                z+=1
        if(z%2==0):
            a+='0'
        else:
            a+='1'
        parity.clear()
        p+=1
    a=a[::-1]
    par=int(a,2)
    #print(a)
    #print(par)
    if(par==0):
        #print("No error")
        #print(red_msge)
        print('No Error :' ,''.join(red_msge))
    else:
        print("Error at : ",par, "patching the data...")
        print('Error data',''.join(red_msge))
        if red_msge[par]=='0':
            red_msge[par]='1'
        else:
```

```
Windows PowerShell
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PS D:\Documents\mepco\lab\sem5\cnp\even\ex3>  & 'C:\ProgramData\Miniconda3\envs\pytest\python.exe' 'c:\Users\Aumrudh Lal Kumar TJ\.vscode\extensions\ms-python.python-2020.8.108
011\pythonFiles\lib\python\debugpy\launcher' '52420' '--' 'd:\Documents\mepco\lab\sem5\cnp\even\ex3\hamr.py'
Error at :  11 patching the data...
Error data  01101100100
Correct data  01101100101
PS D:\Documents\mepco\lab\sem5\cnp\even\ex3> conda activate pytest
PS D:\Documents\mepco\lab\sem5\cnp\even\ex3> 
```

Result:

The error correction using hamming code was executed successfully in python. If any error is there in transmission then the bit position is indicated and corrected.