Simulation Results (Week-2)

1. **Team Details:**
    - Shaik Mastan Vali - EE18BTECH11039
    - Dasari Shree Ujjwal - EE18BTECH11010

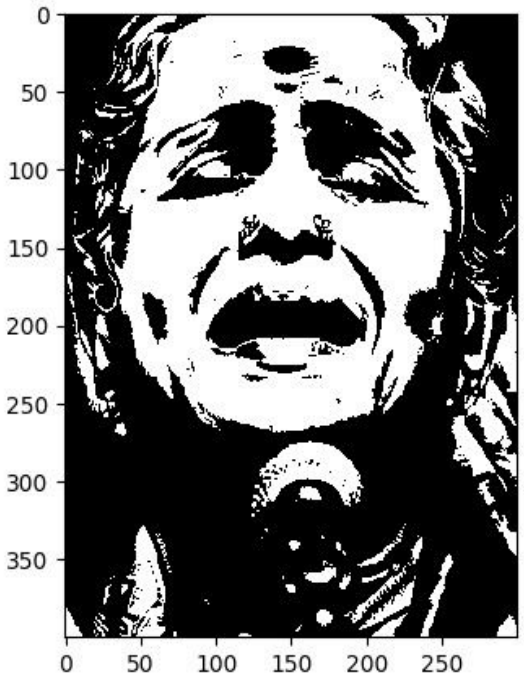
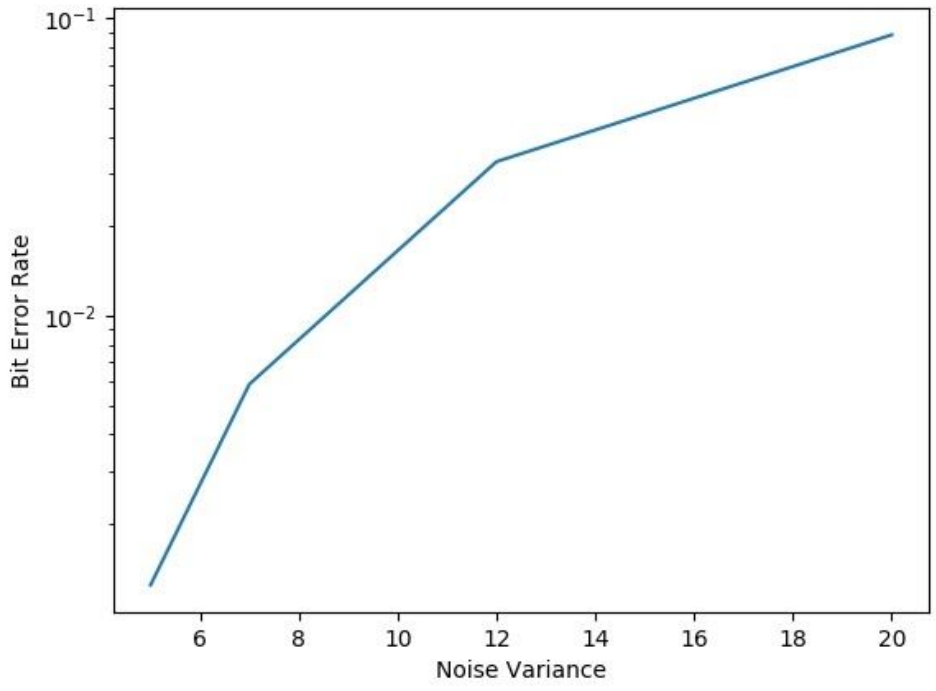


Fig: Original Image

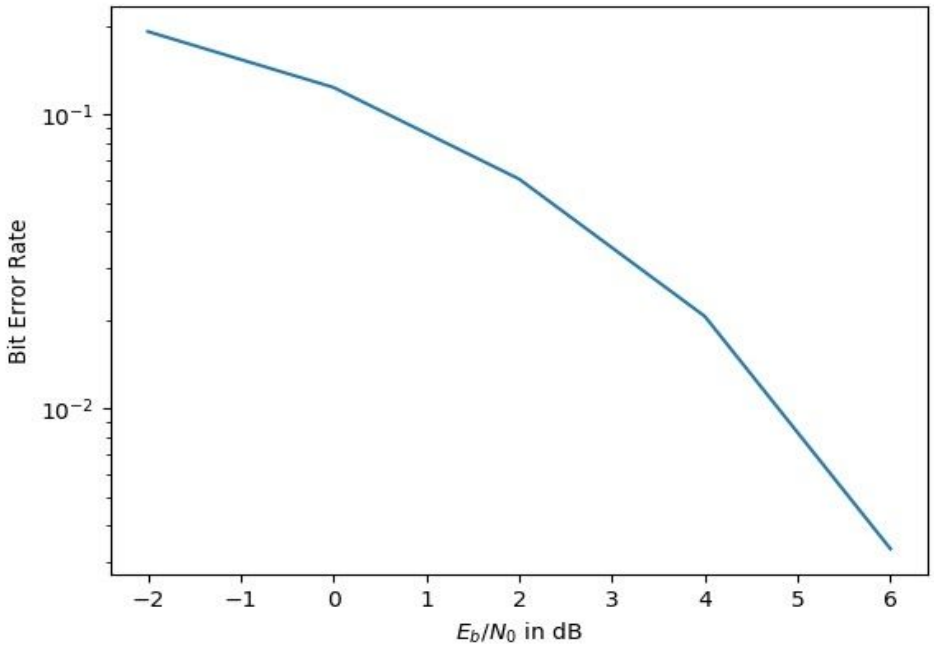
2.Using rate ½ linear channel coding:

```
shaik-mastan@shaik-mastan-HP-Laptop-15-da1xxx:~/IDP/Week2$ python -u "/home/shaik-mastan/IDP/Week2/channel_coding_1.py"
For varying noise variance values....
For variance = 20
No. of incorrectly demodulated bits: 10570
Bit Error rate: 0.08808333333333333

For variance = 12
No. of incorrectly demodulated bits: 3957
Bit Error rate: 0.032975

For variance = 7
No. of incorrectly demodulated bits: 706
Bit Error rate: 0.005883333333333333

For variance = 5
No. of incorrectly demodulated bits: 149
Bit Error rate: 0.0012416666666666667

For varying E_b/N_0 values....
For Eb_N0 = -2 dB
No. of incorrectly demodulated bits: 23054
Bit Error rate: 0.19211666666666666

For Eb_N0 = 0 dB
No. of incorrectly demodulated bits: 14875
Bit Error rate: 0.12395833333333334

For Eb_N0 = 2 dB
No. of incorrectly demodulated bits: 7251
Bit Error rate: 0.060425

For Eb_N0 = 4 dB
No. of incorrectly demodulated bits: 2471
Bit Error rate: 0.020591666666666668

For Eb_N0 = 6 dB
No. of incorrectly demodulated bits: 399
Bit Error rate: 0.003325
```

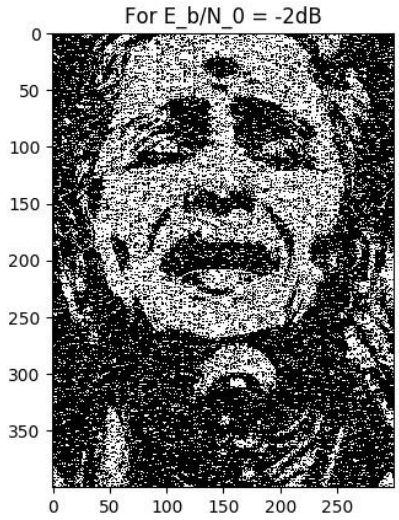
Semilog plot of BER v/s Noise variance

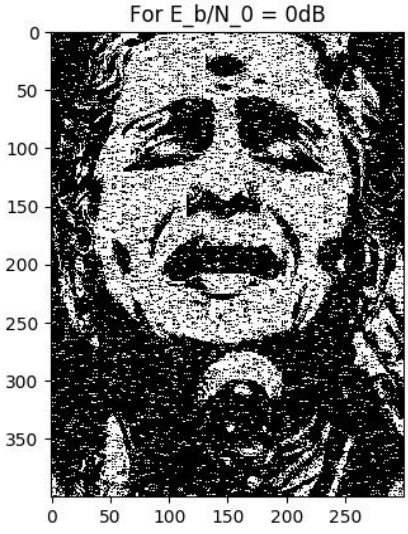


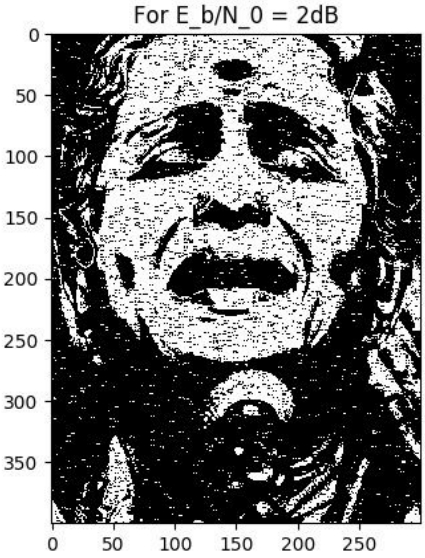
Semilog plot of BER v/s E_b/N_0 (dB)

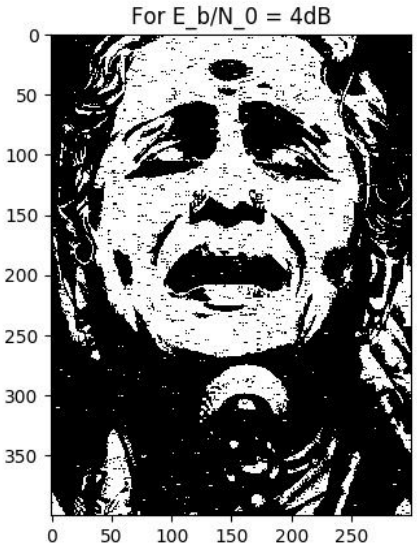


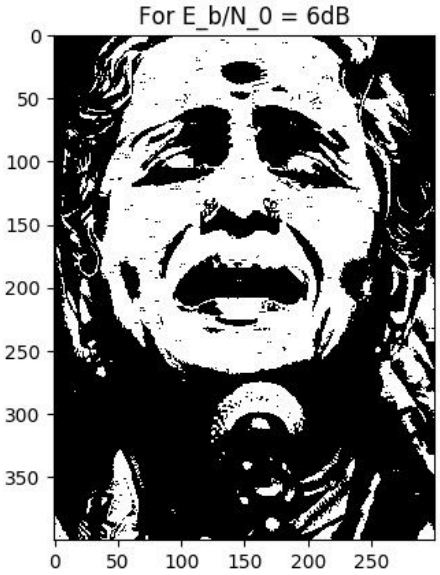
Decoded images for varying values of E_b/N_0 (dB)






For E_b/N_0 = 2dB
0
50
100
150
200
250
300
350
0
50
100
150
200
250

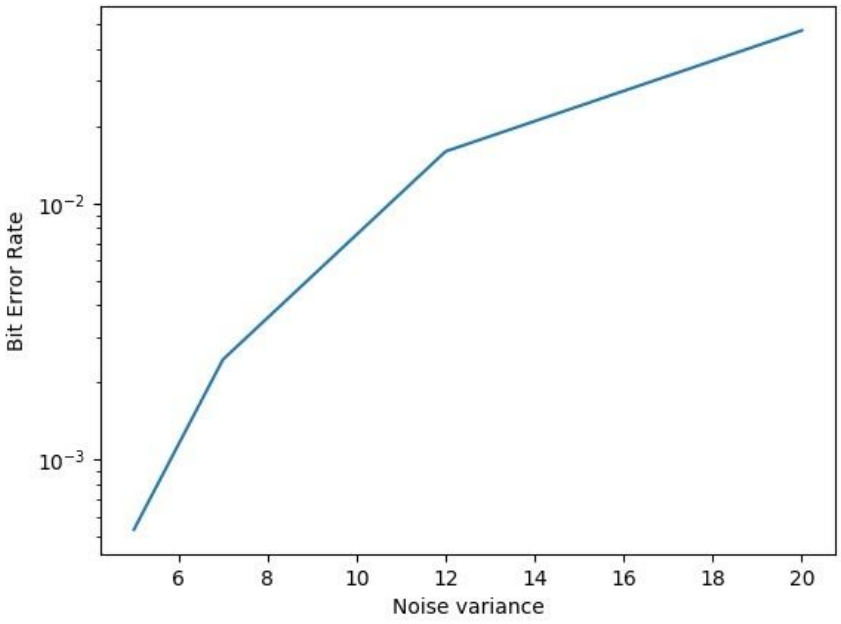

For E_b/N_0 = 4dB
0
50
100
150
200
250
300
350
0
50
100
150
200
250


For E_b/N_0 = 6dB
0
50
100
150
200
250
300
350
0
50
100
150
200
250

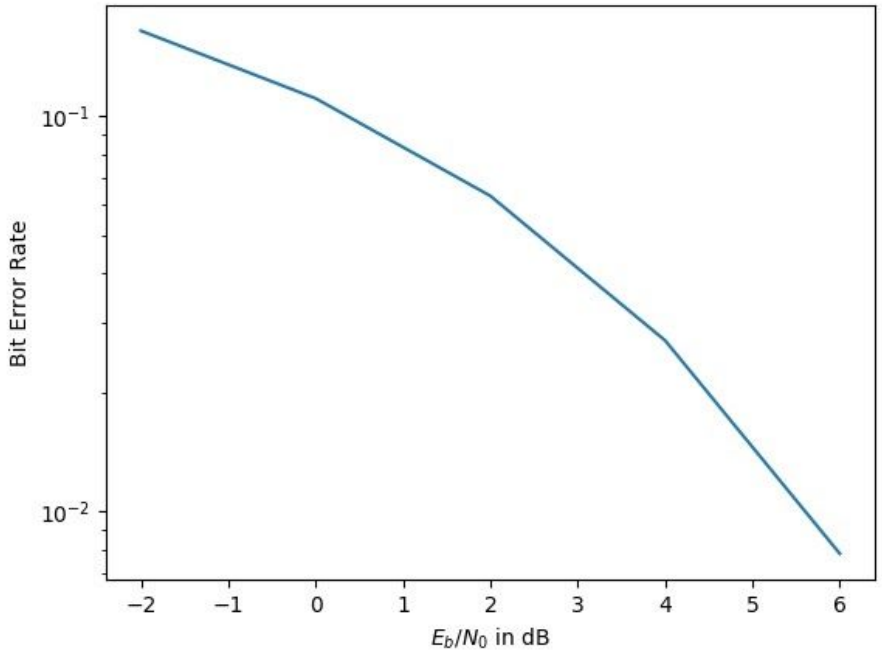
3.Using Rate ⅓ repetition coding:

```
shaik-mastan@shaik-mastan-HP-Laptop-15-da1xxx:~/IDP/Week2$ python -u "/home/shaik-mastan/IDP/Week2/channel_coding_2.py"
For varying noise variance values....
For variance = 20
No. of incorrectly demodulated bits: 5636
Bit Error rate: 0.046966666666666664

For variance = 12
No. of incorrectly demodulated bits: 1858
Bit Error rate: 0.015483333333333333

For variance = 7
No. of incorrectly demodulated bits: 307
Bit Error rate: 0.0025583333333333335

For variance = 5
No. of incorrectly demodulated bits: 48
Bit Error rate: 0.0004

For varying E_b/N_0 values....
For Eb_N0 = -2 dB
No. of incorrectly demodulated bits: 19764
Bit Error rate: 0.1647

For Eb_N0 = 0 dB
No. of incorrectly demodulated bits: 13449
Bit Error rate: 0.112075

For Eb_N0 = 2 dB
No. of incorrectly demodulated bits: 7498
Bit Error rate: 0.062483333333333335

For Eb_N0 = 4 dB
No. of incorrectly demodulated bits: 3137
Bit Error rate: 0.026141666666666667

For Eb_N0 = 6 dB
No. of incorrectly demodulated bits: 939
Bit Error rate: 0.007825
```

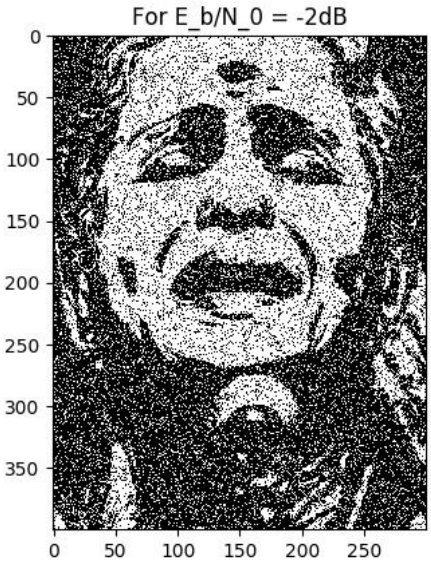
Semilog plot of BER v/s Noise variance

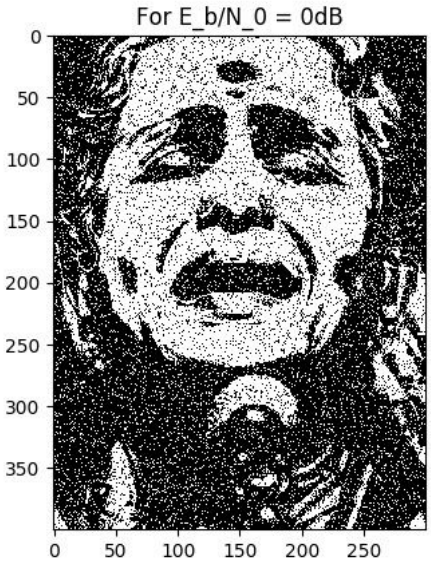


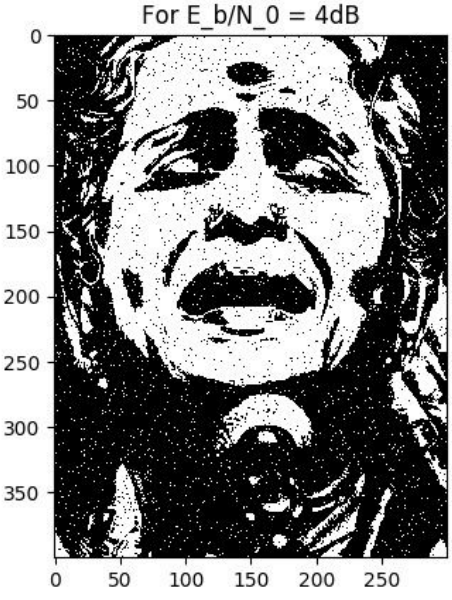
Semilog plot of BER v/s E_b/N_0 (dB)

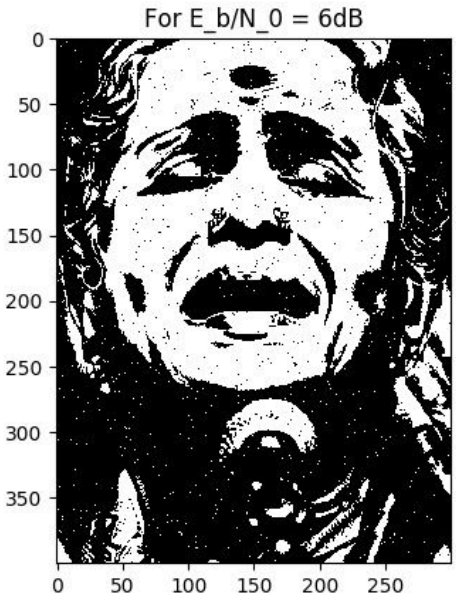


Decoded images for varying values of $E_b/N_0\ (dB)$





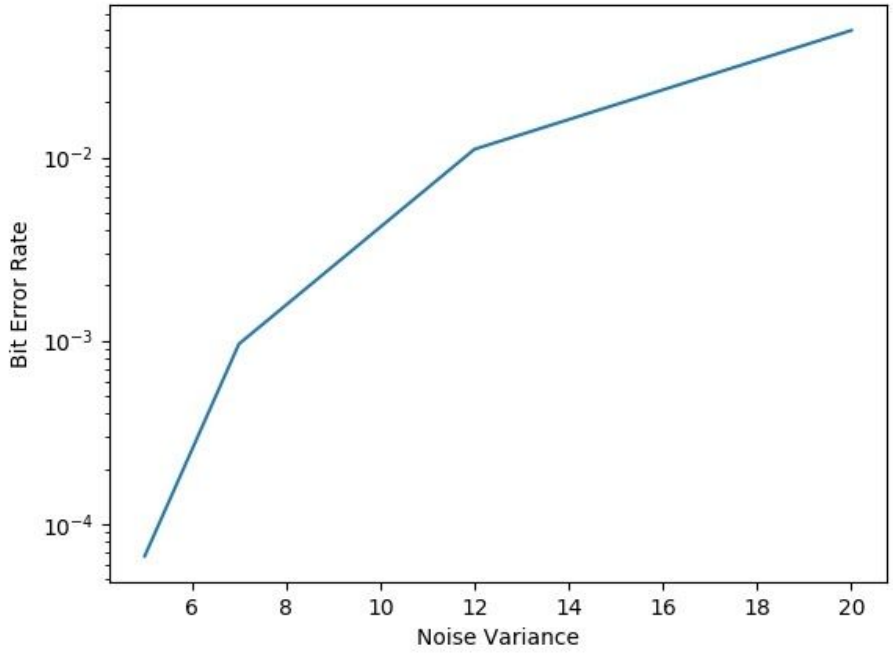




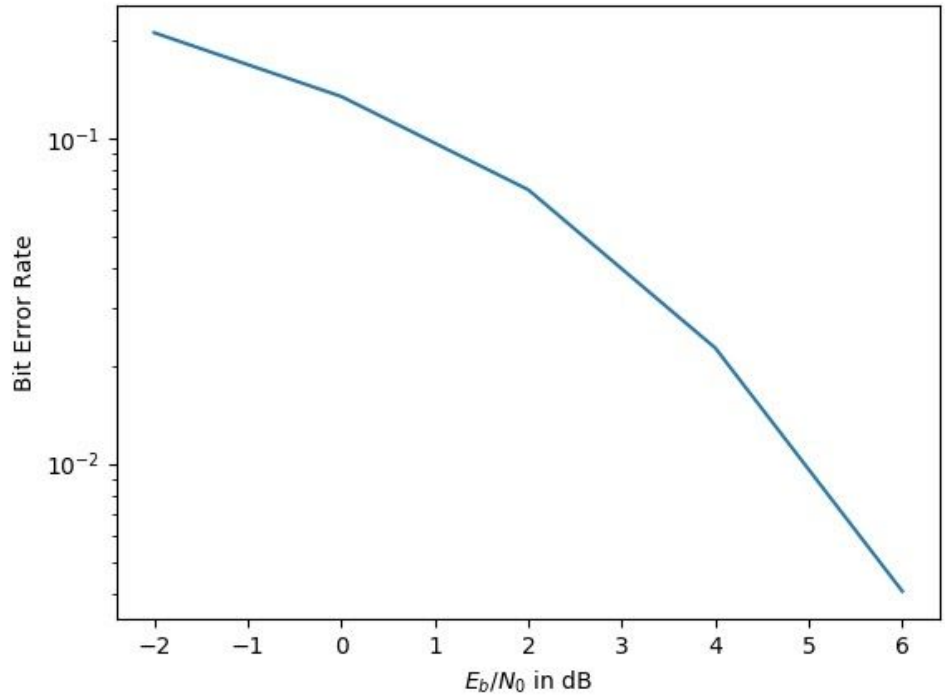
4.Using ⅓ linear channel coding

```
shaik-mastan@shaik-mastan-HP-Laptop-15-da1xxx:~/IDP/Week2$ python -u "/home/shaik-mastan/IDP/Week2/channel_coding_3.py"
For varying noise variance values....
For variance = 20
No. of incorrectly demodulated bits: 6044
Bit Error rate: 0.050366666666666664

For variance = 12
No. of incorrectly demodulated bits: 1363
Bit Error rate: 0.011358333333333333

For variance = 7
No. of incorrectly demodulated bits: 117
Bit Error rate: 0.000975

For variance = 5
No. of incorrectly demodulated bits: 10
Bit Error rate: 8.333333333333333e-05

For varying E_b/N_0 values....
For Eb_N0 = -2 dB
No. of incorrectly demodulated bits: 25239
Bit Error rate: 0.210325

For Eb_N0 = 0 dB
No. of incorrectly demodulated bits: 16421
Bit Error rate: 0.13684166666666667

For Eb_N0 = 2 dB
No. of incorrectly demodulated bits: 8526
Bit Error rate: 0.07105

For Eb_N0 = 4 dB
No. of incorrectly demodulated bits: 2848
Bit Error rate: 0.023733333333333332

For Eb_N0 = 6 dB
No. of incorrectly demodulated bits: 553
Bit Error rate: 0.004608333333333333
```

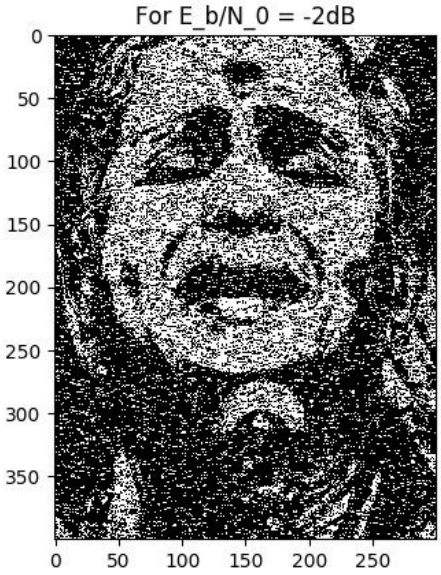
Semilog plot of BER v/s noise variance

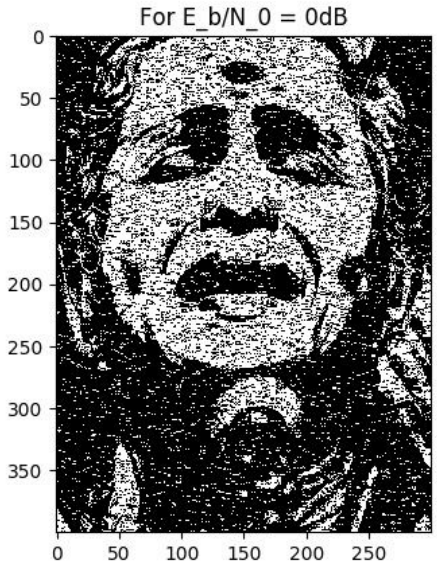


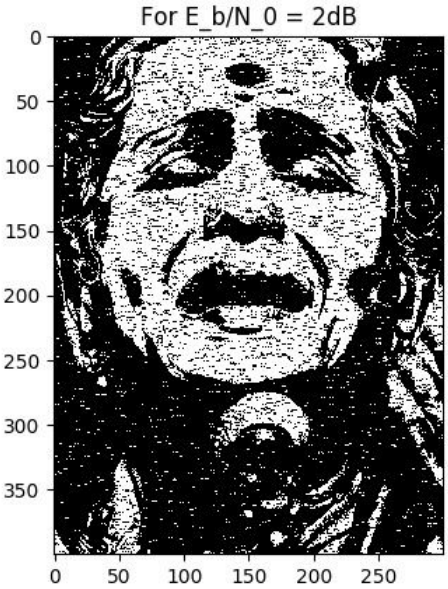
Semilog plot for BER v/s $E_b/N_0\ (dB)$

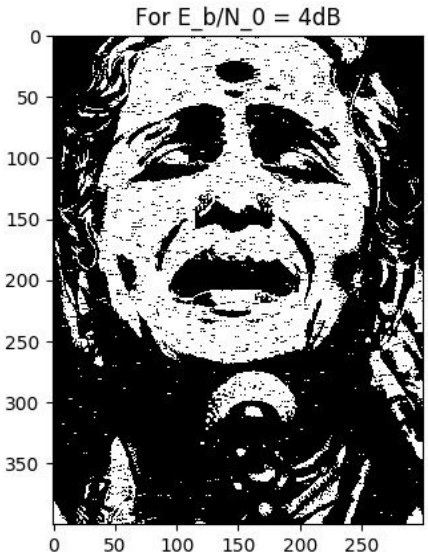


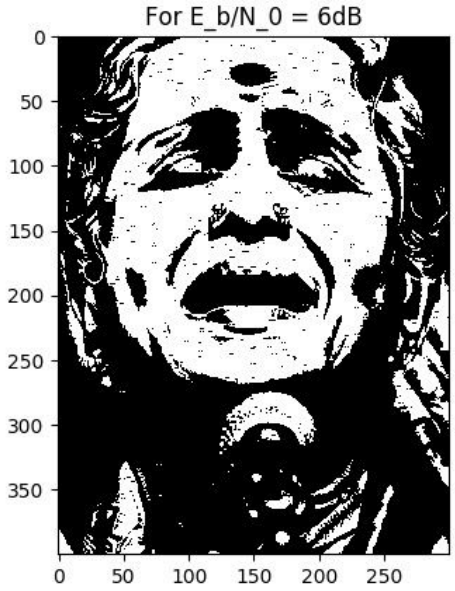
Decoded images for varying values of $E_b/N_0\ (dB)$










For E_b/N_0 = 6dB
0
50
100
150
200
250
300
350
0
50
100
150
200
250