Simulation 2nd Part:

Hamming Code:

$C(2^r-1,\ 2^r-1-r)$ $\quad r=n-k$

(2^r-1 → n, 2^r-1-r → k)

Hamming codes are single error correcting codes

Let $r=5$ $\quad n=31$ $\quad k=26$

First Find H in systematic form (dec2bin(x,N) command can be used)

You can use the following matlab script to find H

```
H=[ ---- | dec2bin(1); dec2bin(2); dec2bin(4); dec2bin(8); --dec2bin(32)]
```

(---- → other digits are converted here)

Ex: for $r=3$

```
H=[ ---- | dec2bin(4,3); dec2bin(2,3); dec2bin(1,3)]'
```

(---- → other)

dec2bin(4,3) → 100 → 1 0 0

dec2bin(2,3) → 010 → 0 1 0

dec2bin(1,3) → 001 → 0 0 1

It is in character format

change them to real numbers as

H= double(H)-48;

(2)

Obtain your syndrome table using

$S = eH^T$ e are error patterns.

Input your SNR

for a number of frames

- Input your frame
- Divide it into subframes, each of length 26
- encode each subframe using Hamming $G_{31\times 26}$
- BPSK modulate the encoded frame
- generate noise for the given SNR
- add noise to the BPSK modulated data
- BPSK demodulate your frame
- Divide it into subframes
- Decode each subframe using syndrome table
- Compare decoded sub-frame with the orginal one
  - Record error amount
  - Try another frame

end

repeat for-loop for other SNRs

plot your BER vs SNR graph.