**Problem Statement:**

**2Simulate Discrete memoryless channel (DMC) for a given source probabilities and channel matrix. Calculate various Entropies and mutual information for given channel**

EXPT. NO. 2

%Pratical no.2

clc;

clear;

close all;

n=input("Enter the no of input: ");

q=input("Enter the matrix p(y/x): "); %matrix P(y|x)

disp(q);

disp('');

N=1:n;

p=input("Enter the input probability: "); %probabilities for X

px=diag(p,n,n); %matrix P(X)

disp("P(x) : ");

disp(px);

disp('');

pxy=px\*q; % P(X,Y)=P(X)\*P(Y|X)

disp("P(x,y) : ");

disp(pxy);

disp('');

py=p\*q; % P(Y))

disp('P(y):');

disp(py);

disp('');

%Entropy h(x)

Hx=0;

for i=1:n

Hx=Hx+(-(p(i)\*log2(p(i))));

end

disp('H(x): ');

disp(Hx);

disp('');

% H(y)

Hy=0;

for i=1:n

Hy=Hy+(-(py(i)\*log2(py(i))));

end

disp('H(y): ');

disp(Hy);

disp('');

% H(x,y)

hxy=0

for i=1:n

for j=1:n

hxy=hxy+(-pxy(i,j)\*log2(pxy(i,j)));

end

end

disp('H(x,y): ');

disp(hxy);

disp('');

% H(y/x)

h1= hxy - Hx;

disp('H(x/y): ');

disp(h1);

disp('');

% H(x/y)

h2= hxy - Hy;

disp('H(y/x): ');

disp(h2);

disp('');

% I(x,y)

Ixy= Hx - h2;

disp('I(x,y): ');

disp(Ixy);

disp('');

if h2==0

disp("This channel is a lossless channel ");

end

if Ixy==0

disp ("This channel is a useless channel ");

else

disp ("This channel is a diterministic channel ")

end

if Hx==Hy

if h1==0

disp("This channel is a noiseless channel ");

end

endif

