**P1\_2**

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| **Code** | **Mô phỏng** |
| clf;  c=-(1/20)+(pi/6)\*1i;  k=2;  n=0:97;  x=k\*exp(c\*n);  subplot(2,1,1);  stem(n,real(x));  xlabel('Chi so thoi gian n'); ylabel('Bien do');  title('Phan thuc');  subplot(2,1,2);  stem(n,imag(x));  xlabel('Chi so thoi gian n'); ylabel('Bien do');  title('Phan ao'); |  |

**P2\_5**

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| **Code** | **Mộ phỏng** |
| clc;  clf;  x=[1 zeros(1,42)];  n=0:42;  num=[0.06 -0.21 0.32 -0.31 0.1];  den=[1 1.6 2.287 1.329 0.68];  y=filter(num,den,x);  num1=[0.3 -0.2 0.4]; den1=[1 0.9 0.8];  num2=[0.2 -0.5 0.3]; den2=[1 0.7 0.85];  y1=filter(num1,den1,x);  y2=filter(num2,den2,y1);  d=y-y2;  subplot(3,1,1); stem(n,y); ylabel('Bien do');  title('Tin hieu ra cua he thong bac 4'); grid;  subplot(3,1,2); stem(n,y2); ylabel('Bien do');  title('Loi ra cua he thong noi tiep'); grid;  subplot(3,1,3); stem(n,d); xlabel('Chi so thoi gian n'); ylabel('Bien do');  title('Tin hieu sai so'); grid; |  |

**P3\_2**

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| **Code** | **Mô phỏng** |
| clf;  clc;  w=-pi:2\*pi/255:pi; wo=0.49\*pi; D=5;  x=[0 1 2 3 4 5 6 7 8];  h1=freqz(x,1,w);  h2=freqz([zeros(1,D) x],1,w);  subplot(2,2,1);  plot(w/pi,abs(h1)); grid;  title('Pho bien do cua day goc');  subplot(2,2,2);  plot(w/pi,abs(h2)); grid;  title('Pho bien do cua day bi dich');  subplot(2,2,3);  plot(w/pi,angle(h1)); grid;  title('Pho pha cua day goc');  subplot(2,2,4);  plot(w/pi,angle(h2)); grid;  title('Pho pha cua day bi dich'); |  |

**P4\_1**

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| **Code** | **Mô phỏng** |
| clf;  clc;  w=-4\*pi:8\*pi/511:4\*pi;  num=[2.5 0.97];  den=[1 -0.55];  x=freqz(num,den,w);  subplot(2,1,1);  plot(w/pi,real(x));  grid  subplot(2,1,2);  plot(w/pi,imag(x));  grid  pause  subplot(2,1,1);  plot(w/pi,abs(x));  grid  subplot(2,1,2);  plot(w/pi,angle(x));  grid |  |

**P5\_1**

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| **Code** | **Mô Phỏng** |
| clc;  clf;  w=0:4\*pi/255:pi;  num = [1/6 1/6 1/6 1/6 1/6 1/6 1/6];den = 0.97;  h = freqz(num, den, w);  figure(1)  subplot(2,1,1)  plot(w/pi,real(h));  grid  title('Phan thuc cua H(e^{j\omega})')  xlabel('\omega /\pi');  ylabel('Bien do');  subplot(2,1,2)  plot(w/pi,imag(h));grid  title('Phan ao cua H(e^{j\omega})')  xlabel('\omega /\pi');  ylabel('Bien do');  figure(2)  subplot(2,1,1)  plot(w/pi,abs(h));  grid  title('Pho bien do |H(e^{j\omega})|')  xlabel('\omega /\pi');  ylabel('Bien do');  subplot(2,1,2)  plot(w/pi,angle(h));  grid  title('Pho pha arg[H(e^{j\omega})]')  xlabel('\omega /\pi');  ylabel('Pha do bang radians');  figure(3)  h=impz(num,den, 30);  subplot(2,1,2);  stem(h);  grid  xlabel('Chi so thoi gian'); ylabel('Bien do');  title('Dap ung xung don vi');  subplot(2,1,1)  zplane(num,den);  title('Gian do diem cuc/diem khong'); |  |

**P6\_1**

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| **Code** | **Mô Phỏng** |
| clc;  clf;  N =input('chieu dai N cua day =');  M=input ('chieu dai M cua X[k] =');  %N =20;  %M=97;  % Phát ra dy x[n]  x=[ones(1,N)];  %Tính DFT M ?i?m;  X=fft(x,M);  % V? dãy x[n] và X[k]  t = 0:1:N-1;  stem(t,x)  title('day x[n]')  xlabel('chi so thoi gian n'); ylabel('Bien do')  subplot(2,1,1)  k=0:1:M-1;  stem(k,abs(X))  title('Bien do cua DFT X[k]')  xlabel('chi so tan so k'); ylabel( 'Bien do');  subplot(2,1,2)  stem(k,angle(X))  title('Pha cua DFT X[k]')  xlabel('chi so tan so k'); ylabel('Pha cua X[k]') |  |

**P7\_1**

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| **Code** | **Mô phỏng** |
| clc;  clf;  t = 0:0.00049:1;  f=25;  xa = cos(2\* pi\*f\*t);  subplot(2,1,1)  plot(t,xa);  grid  xlabel('thoi gian, msec');  ylabel('Bien do');  title('Tin hieu thoi gian lien tuc x\_{a}(t)');  axis([0 1 -1.2 1.2])  subplot(2,1,2);  T=0.00585;  n= 0:T:1;  xs = cos(2\*pi\*f\*n);  k=0:length(n)-1;  stem(k,xs);grid;  xlabel('Chi so thoi gian n'); ylabel('Bien do');  title('Tin hieu thoi gian roi rac x[n]');  axis([0 (length(n)-1) -1.2 1.2]) |  |

**P8\_1**

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| **Code** | **Mô phỏng** |
| clc;  clf;  b=[0.9720,-1.12200697,0.969798];  a=[1,-1.1275,0.9099];  [H,w]=freqz(b,a,97);  magH=abs(H); phaH=angle(H);  subplot(1,2,1); plot(w/pi,magH); grid; ylabel('Bien do');  title('Dap ung bien do');  subplot(1,2,2); plot(w/pi,phaH/pi); grid; xlabel('Tan so don vi pi');  title('Dap ung pha'); |  |

**P9\_3**

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| **Code** | **Mô phỏng** |
| clc;  clf;  format long  fedge=[750 970];  mval=[1 0];  dev=[0.059 0.03];  F=4000;  [N,fpts,mag,wt]=remezord(fedge,mval,dev,F);  b=remez(N,fpts,mag,wt);  disp('He so FIR'); disp(b);  [h,w]=freqz(b,1,256);  subplot(1,2,1);  plot(w/pi,20\*log10(abs(h))); grid;  title('Bien do mach loc FIR thong thap voi N=28');  xlabel('\omega/\pi'); ylabel('Gain,dB');  N1=110;  fpts1=[0 0.25 0.3 0.5 0.55 1];  mag1=[0 0 1 1 0 0];  wt1=[1 1 1];  b1=remez(N1,fpts1,mag1,wt1);  disp(b1);  [h1,w1]=freqz(b1,1,256);  subplot(1,2,2);  plot(w/pi,20\*log10(abs(h1))); grid;  title('Bien do mach loc FIR thong dai voi N=110');  xlabel('\omega/\pi'); ylabel('Gain,dB'); |  |