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```
%-----%
%%----- SemiExam2 - Digital Communication -----%%
%----- Supervisor: Dr.Shirvani Moghaddam -----%
%----- Source by Mohammad Reza Farhadi Nia ----- Date:24 Dec 2020 --%
%-----%
```

Section A

```
pnSequence1 = comm.PNSequence('Polynomial',[9 6 0], ...
    'SamplesPerFrame',1022,'InitialConditions',[0 0 0 0 0 0 0 0 1]);
Binary_Random_Input = pnSequence1();
Binary_Input_test = [Binary_Random_Input(1:511) Binary_Random_Input(512:1022)];
Binary_Random_Input = Binary_Random_Input(1:256) '

NRZ_on_off = Binary_Random_Input;
NRZ_Polar = Binary_Random_Input;

    for i = 1:length(Binary_Random_Input)
        if Binary_Random_Input(i) == 1
            NRZ_Polar(i) = 5;
        else
            NRZ_Polar(i) = -5;
        end
    end

figure

subplot(4,1,1);stairs([-length(Binary_Random_Input)/2+1:length(Binary_Random_Input)/2],Binary
_Random_Input)
axis([-length(Binary_Random_Input)/2 length(Binary_Random_Input)/2 -2 2]);title('Input Binary
code');grid on; ylabel('Amplitude');

subplot(4,1,2);stairs([-length(NRZ_Polar)/2+1:length(NRZ_Polar)/2],NRZ_Polar)
axis([-length(NRZ_Polar)/2 length(NRZ_Polar)/2 -10 10]);title('NRZ Polar Binary code');grid o
n; ylabel('Amplitude');
```

Binary_Random_Input =

Columns 1 through 13

1 0 0 0 0 0 0 0 0 1 0 0 1

Columns 14 through 26

0	0	1	0	0	0	0	0	1	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 27 through 39

0	0	0	0	1	0	0	1	0	0	1	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 40 through 52

0	0	0	1	0	0	0	0	0	0	0	0	1
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 53 through 65

0	0	1	0	0	1	0	0	0	0	0	1	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 66 through 78

0	0	0	0	0	0	0	1	0	0	1	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 79 through 91

1	0	0	0	0	0	1	0	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 92 through 104

0	0	1	0	0	1	0	0	1	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 105 through 117

0	1	0	0	0	0	0	0	0	0	1	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 118 through 130

1	0	0	1	0	0	0	0	0	1	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 131 through 143

0	0	0	0	0	1	0	0	1	0	0	1	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 144 through 156

0	0	0	0	1	0	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 157 through 169

1	0	0	1	0	0	1	0	0	0	0	0	1
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 170 through 182

0	0	0	0	0	0	0	0	1	0	0	1	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 183 through 195

0	1	0	0	0	0	0	1	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 196 through 208

0	0	0	1	0	0	1	0	0	1	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---

Columns 209 through 221

0 0 1 0 0 0 0 0 0 0 0 1 0

Columns 222 through 234

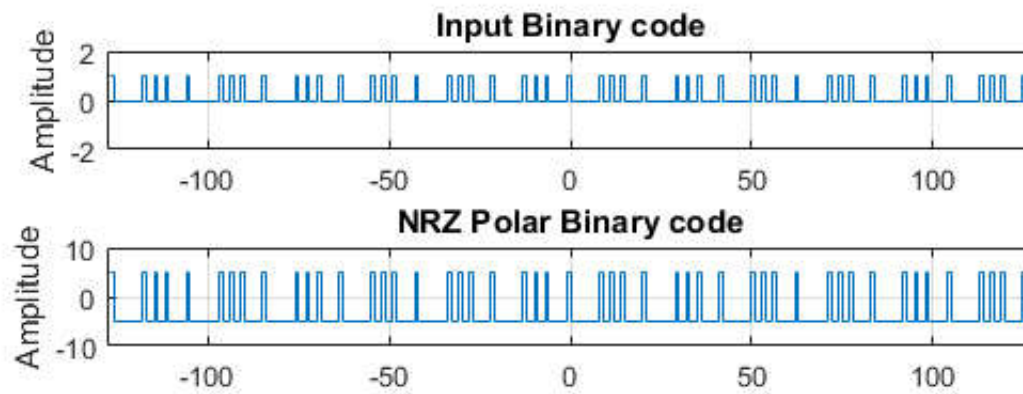
0 1 0 0 1 0 0 0 0 0 1 0 0

Columns 235 through 247

0 0 0 0 0 0 1 0 0 1 0 0 1

Columns 248 through 256

0 0 0 0 0 1 0 0 0



Section B

RZ duty = 0.25

```
b = Binary_Random_Input; l=length(b); b(l+1)=0; n=1; duty = 0.25;
Collect = [];

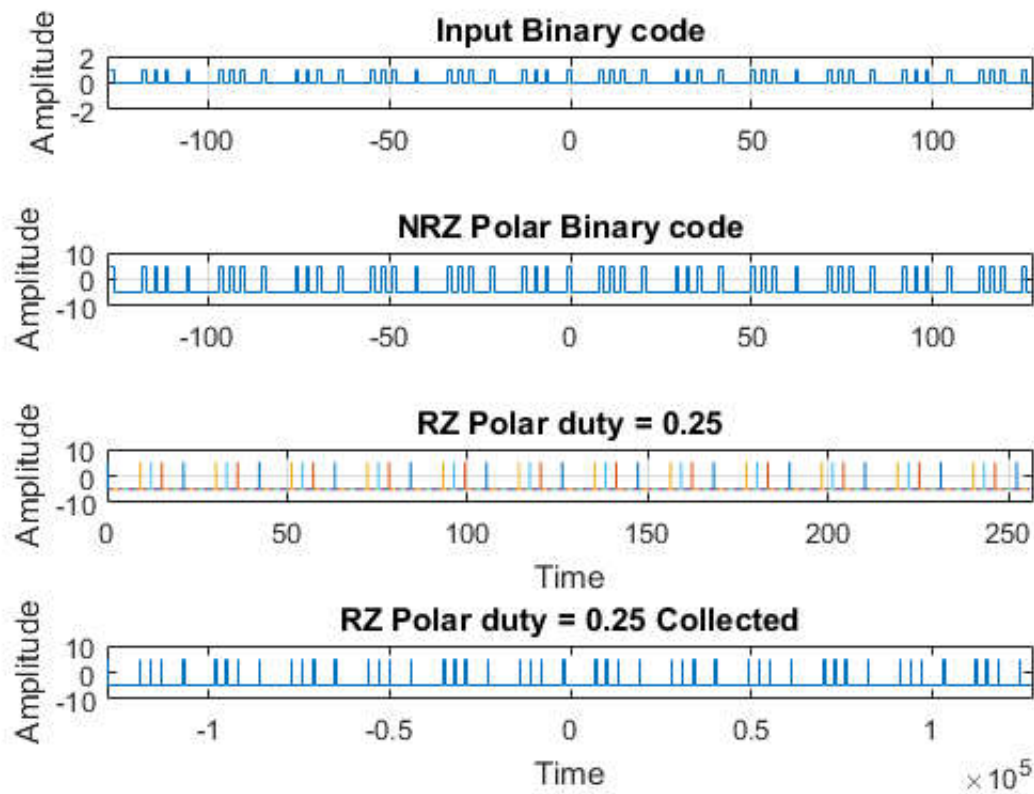
while n<=l
    t=(n-1):.001:n;
    if b(n)==1
```

```

    y = 10*(t<=n-(1-duty) & t>=(n-1))-5;
    Collect = [Collect y];
elseif b(n)==0
    y = -10*(~(t>=n-(1-duty) & t<=(n-1)))+5;
    Collect = [Collect y];
else
    y=0;
    Collect = [Collect y];
end
subplot(4,1,3);plot(t,y)
hold on; grid on;
axis([0 length(b) -10 10]);
n=n+1;
end
title('RZ Polar duty = 0.25'); xlabel('Time'); ylabel('Amplitude');

subplot(4,1,4);stairs([-length(Collect)/2+1:length(Collect)/2],Collect)
axis([-length(Collect)/2 length(Collect)/2 -10 10]);
title('RZ Polar duty = 0.25 Collected'); xlabel('Time'); ylabel('Amplitude');

```



Section C

```

figure
Binary_Random_Noise = randi([0 1],1,256);

% RZ nosie duty = 0.25
c = Binary_Random_Noise; l=length(c); c(l+1)=0; n=1; duty = 0.25;
Noise = [];

```

```

while n<=1
    t=(n-1):.001:n;
    if c(n)==1
        y = 6*(t<n-(1-duty) & t>(n-1))-3;
        Noise = [Noise y];
    elseif c(n)==0
        y = -6*(~(t>n-(1-duty) & t<(n-1)))+3;
        Noise = [Noise y];
    else
        y=0;
        Noise = [Noise y];
    end
    subplot(4,1,1);plot(t,y)
    hold on; grid on;
    axis([0 length(c) -10 10]);
    n=n+1;
end
title('RZ Polar duty = 0.25 Noise'); xlabel('Time'); ylabel('Amplitude');

Signal_and_Noise = Noise + Collect;
subplot(4,1,2);stairs([-length(Signal_and_Noise)/2+1:length(Signal_and_Noise)/2],Signal_and_Noise)
axis([-length(Signal_and_Noise)/2 length(Signal_and_Noise)/2 -10 10]);
title('RZ Polar duty = 0.25 Signal With Noise'); xlabel('Time'); ylabel('Amplitude');

offset1 = 3;
offset2 = -3;
output_NRZ_on_off = Comparator(offset1,Signal_and_Noise');
output_NRZ_Polar = Comparator(offset2,Signal_and_Noise');

```

Undefined function 'Comparator' for input arguments of type 'double'.

Error in SemiFinalExamSecond (line 96)

output_NRZ_on_off = Comparator(offset1,Signal_and_Noise');

Function

```

% % function Output = Comparator(Offset, input)
% %         Output = (input>Offset); % you can change equal to strictly
% % end

```