**SNS LAB 05**

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**K036**

**Semester 3**

**B. Tech Cybersecurity**

clc;

clear all;

close all;

T=2\*pi;

t=linspace(-T,T,1000);

signal = square(t);

N=10;

a=0;

a\_n=zeros(1,N);

n\_n=zeros(1,N);

for n=1:N

a\_n(n) = (2/T) \* trapz(t,signal.\*cos(n \*(2\*pi/T)\* t));

b\_n(n) = (2/T) \* trapz(t,signal.\*sin(n \*(2\*pi/T)\* t));

end

disp('Fourier series Coefficients:');

disp(['a\_0 = ',num2str(a)]);

disp('n a\_n b\_n');

for n=1:N

disp([num2str(n),' ',num2str(a\_n(n)),' ',num2str(b\_n(n))]);

end

if all(abs(a\_n) < 1e-6)

disp('the signal is odd (a\_n = 0 for all n).');

else

disp('the singal is even(a\_n!=0 for some n).');

end

if all (abs(b\_n)< 1e-6)

disp('The signal is even(b\_n=0 for all n).');

else

disp('the signal is not even (b\_n!=0 for some n).');

end

figure;

plot(t,signal);

title('Original signal');

xlabel('Time(t)');

ylabel('signal')

grid on;

figure;

stem(1:N,a\_n, 'r', 'DisplayName','a\_n(cosine)');

hold on;

stem(1:N,b\_n,'b','DisplayName','b\_n(sine)');

title('Fourier series coefficients');

xlabel('Harmonic number(n)');

ylabel('Coeffcient value');

legend show;

grid on;





