भारतीय प्रौद्योगिकी संस्थान तिरुपति

TIRUPATI

LAB SHEET 06

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DISCRETE TIME PROCESSING OF C.T. SIGNALS

A. LOW PASS FILTERING

Q 1, 2, 3.

```
fc = 3 ;
omega_c = 2*pi*fc ;
omega_s = 2.5*omega_c ;
T = 2*pi/omega_s ;
omega_one = 0.75*omega_c ;
omega_two = 2*omega_c ;
dt = 0.001;
Tmax = 3;
t = 0:dt:Tmax ;
x_c = cos(omega_one * t) + cos(omega_two * t) ;
```

Q 4

```
n = 0 : floor(Tmax/T) ;
ts = n*T ;
x_n = cos(omega_one * ts) + cos(omega_two * ts) ;
```

Q 5, 6.

```
w_c = omega_c * T ;
k = 300 ;
l = -k:k;
hlp = zeros(size(l));

for i = 1:length(l)
    if l(i) == 0
        hlp(i) = w_c / pi;
    else
```

```
        hlp(i) = sin(w_c * l(i)) / (pi * l(i));
    end
end
```

Q 7, 8.

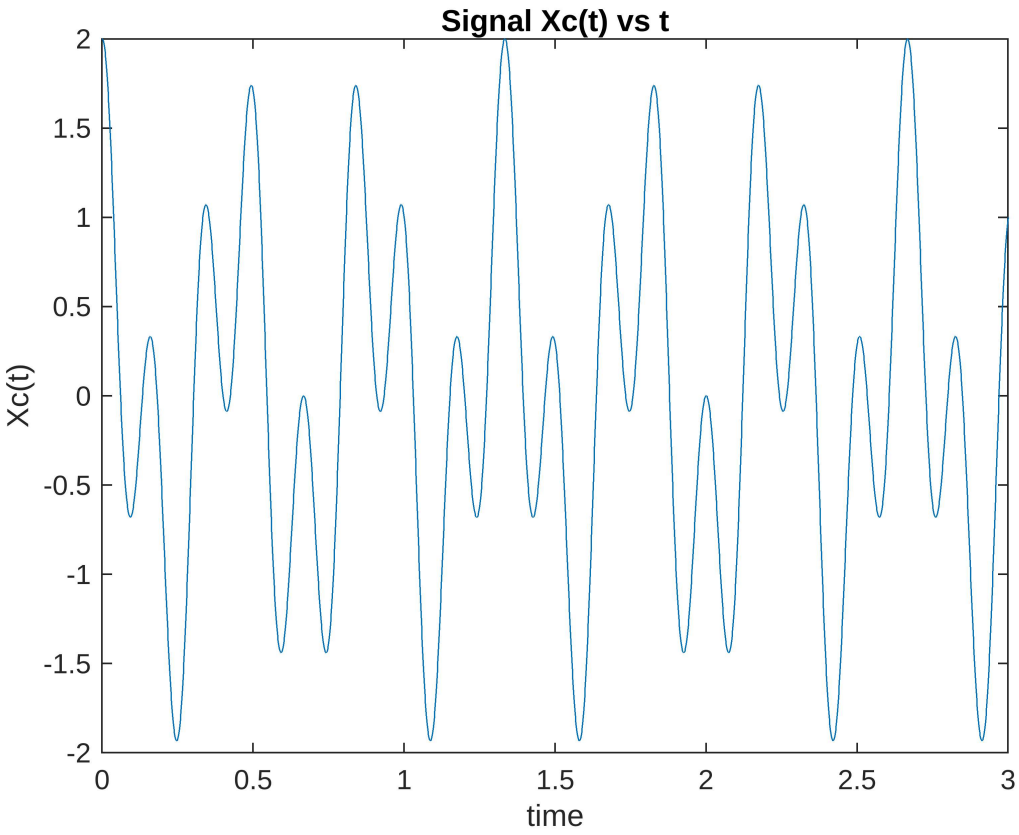
```


y_n = conv(x_n,hlp);
y_s = zeros(size(n));

for i = 1 : length(n)
    y_s(i) = y_n(i);
end
```

Q 9

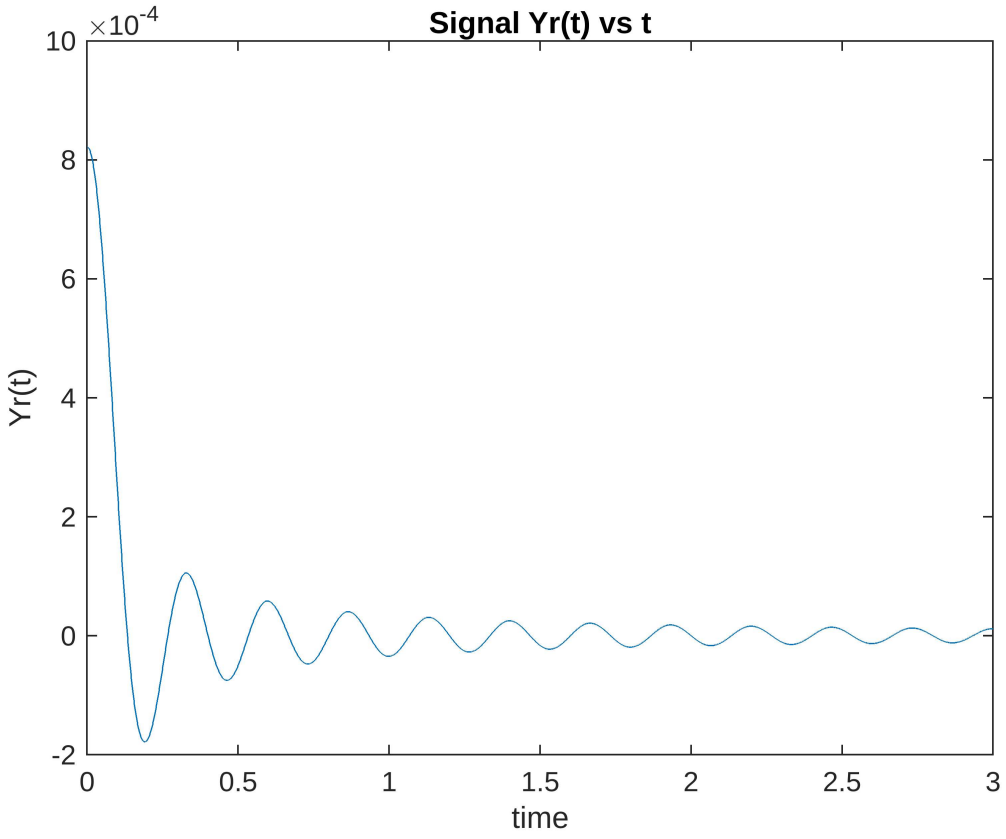
```
hr = @(tc) sin(pi*t / T)./(pi*t/T);
hr_vec = hr(t);

y_r = zeros(size(t));
for k = n
    y_r = y_r + y_s(k+1) * hr(t-k*T);
end
```

Q 10

```
plot(t,x_c);
xlabel('time');
ylabel('Xc(t)');
title('Signal Xc(t) vs t');
```




```
plot(t,y_r);
xlabel('time');
ylabel('Yr(t)');
title("Signal Yr(t) vs t");
```


Signal Yr(t) vs t
×10^-4
10
8
6
4
2
0
-2
Yr(t)
0
0.5
1
1.5
2
2.5
3
time