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DEPT; MECHANICAL
ENG 281 TEST QUESTION (4)

Question (4A)

commandwindow

P=55

Q=66

R=55

S=54

T=32

clear R % to remove R from workspace

clear T % to remove T from workspace

clc % to clear command window

`%QUESTION [4B] MATLAB`

```
commandwindow
clear
clc
A = [1,-2,-1,3; 2,3,0,1; 1,0,-4,-2; 0,-1,3,1]
B = [10;8;3;-7]
K = [273;273;273;273]
C = inv(A)
D = C*B
% To convert to kelvin
KA = D + K
|
```

A =

1	-2	-1	3
2	3	0	1
1	0	-4	-2
0	-1	3	1

B =

10
8
3
-7

K =

273
273
273
273

Command Window

C =

0.0267	0.2400	0.4933	0.6667
-0.0933	0.1600	-0.2267	-0.3333
-0.1067	0.0400	0.0267	0.3333
0.2267	0.0400	-0.3067	-0.3333

D =

-1.0000
2.0000
-3.0000
4.0000

KA =

272
275
270
277

$f_x \gg \& T1 = 272k, T2 = 275k, T3 = 270k, T4 = 277k$

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QUESTION (4B)

$$A := \begin{pmatrix} 1 & -2 & -1 & 3 \\ 2 & 3 & 0 & 1 \\ 1 & 0 & -4 & -2 \\ 0 & -1 & 3 & 1 \end{pmatrix}$$

$$B := \begin{pmatrix} 10 \\ 8 \\ 3 \\ -7 \end{pmatrix}$$

$$C := A^{-1} \cdot B$$

$$D := \begin{pmatrix} 273 \\ 273 \\ 273 \\ 273 \end{pmatrix}$$

$$C = \begin{pmatrix} -1 \\ 2 \\ -3 \\ 4 \end{pmatrix}$$

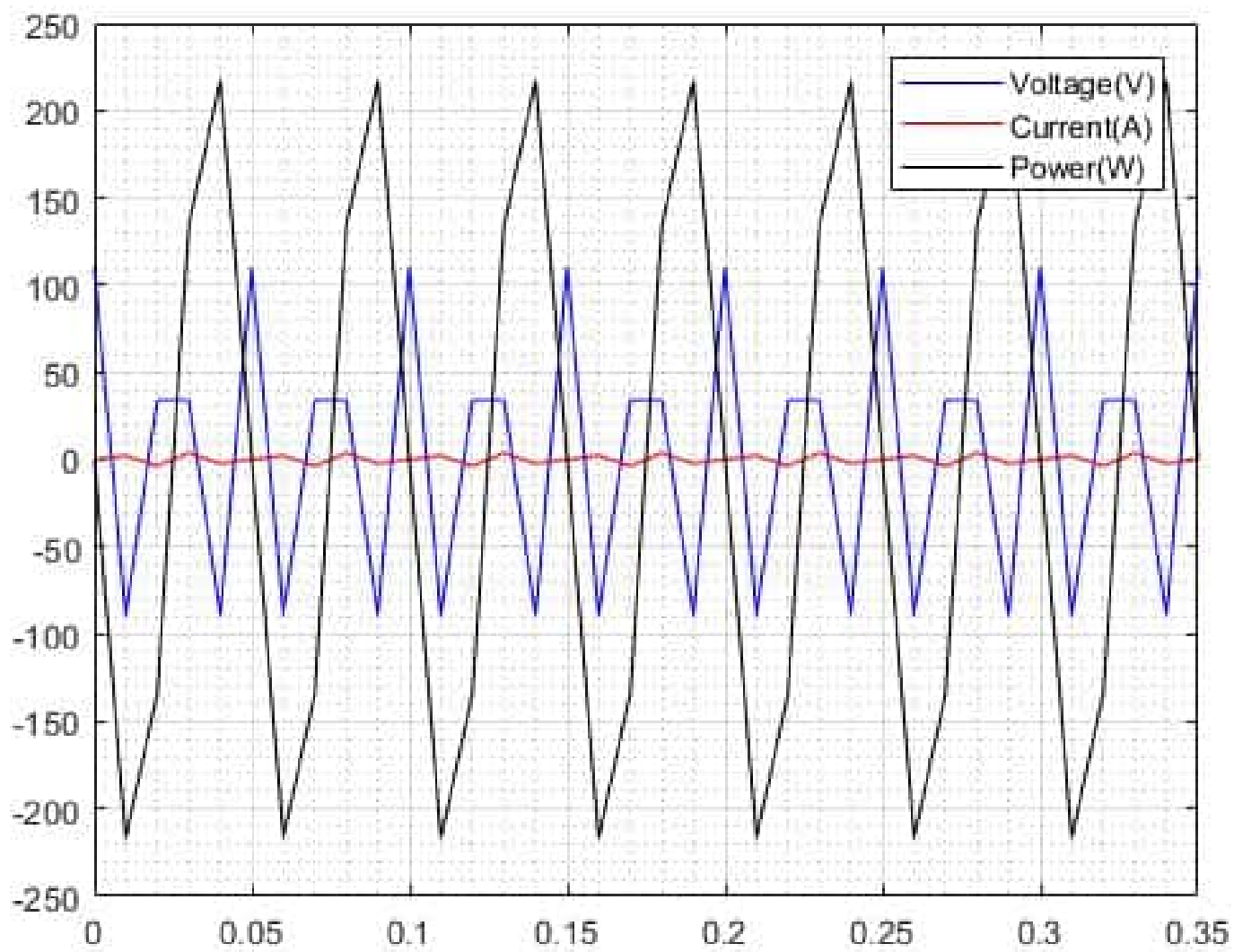
$$E := C + D$$

$$E = \begin{pmatrix} 272 \\ 275 \\ 270 \\ 277 \end{pmatrix}$$

Therefore $T_1 := 272$ $T_2 := 275$ $T_3 := 270$ $T_4 := 277$

QUESTION (4C)

```
commandwindow
clear
clc
close all
syms t
V = 110*cos(120*pi*t)
C = 0.0001
Q = C*V
current = diff(Q) %since current is dq/dt
power = current*V
tn = [0:0.01:0.35]
Vn = subs(V,tn)
In = subs(current,tn)
Pn = subs(power,tn)
plot(tn,Vn,'blue',tn,In,'red',tn,Pn,'black')
xlabel = 'Time(sec)'
ylabel = 'Variable'
grid on
grid minor
legend('Voltage(V)', 'Current(A)', 'Power(W)')
```



QUESTION (4D)

$$f(t) = 2 + 2t - \cos\left(\frac{\pi t}{10}\right)$$

$$g(t) = 2 \sin\left(\frac{\pi t}{70}\right)$$

$t \approx 0..10$

t =	f(t) =	g(t) =
0	1	0
1	3.049	0.09
2	5.191	0.179
3	7.412	0.268
4	9.691	0.357
5	12	0.445
6	14.309	0.532
7	16.588	0.618
8	18.809	0.703
9	20.951	0.786
10	23	0.868

