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**MATRIC NUMBER: 17/ENG01/008**

**DEPARTMENT: CHEMICAL ENGINEERING**

4(a)

CODE

commandwindow

clc

close all

syms n(t)

dn=diff(n)

ode =(diff(n,t,2))-(diff(n,t))-(12\*n)==144\*t^3+12.5;

cond1=dn(0)==-0.5;

cond2=n(0)==5;

cond3=[cond1 cond2];

Ebenezer=dsolve(ode,cond3);

Egbochukwu=simplify(Ebenezer)

t=[0:0.1:1.5]

Uzochiwara=subs(Ebenezer)

plot(t,Uzochiwara)

grid on

grid minor

axis tight

OUTPUT



4(b)i

CODE

commandwindow

clear

clc

close all

syms y(t) x(t)

eqn1=diff(y,t)-2\*x==exp(-2\*t)

eqn2=diff(x,t)+y==exp(-t)

eqn3=[eqn1,eqn2]

cond = [y(0)==0,x(0)==0]

[sol1 sol2]=dsolve(eqn3,cond)

fplot(sol1)

hold on

fplot(sol2)

legend('eqn1','eqn2','location','best')

grid on

grid minor

axis tight

OUTPUT



4(b)(ii)

CODE

commandwindow

clear

clc

close all

syms y(t) x(t)

eqn1=diff(y,t)-2\*x==exp(-2\*t)

eqn2=diff(x,t)+y==exp(-t)

eqn3=[eqn1,eqn2]

cond = [y(0)==0,x(0)==0]

[EbenA EbenB]=dsolve(eqn3,cond)

figure (1)

fplot(EbenA)

grid on

grid minor

figure (2)

fplot(EbenB)

grid on

grid minor

axis tight

OUTPUT 1



OUTPUT 2



4c(i) f(t)=ke-atsin(5wt)cos(3wt)

commandwindow

clear

clc

syms t w k a

ft=k\*exp(-a\*t)\*sin(5\*w\*t)\*cos(3\*w\*t)

fs=laplace(ft)

OUTPUT:

ft = k\*exp(-a\*t)\*cos(3\*t\*w)\*sin(5\*t\*w)

fs = k\*(w/((a + s)^2 + 4\*w^2) + (4\*w)/((a + s)^2 + 64\*w^2))

**(ii) f(s)=**$\frac{π}{(s^{2}+15πs+24π^{3})}$

commandwindow

clear

clc

syms s

fs=pi/(s.^2+15\*pi\*s+24\*pi.^3)

ft=ilaplace(fs)

OUTPUT:

fs =pi/(s^2 + 15\*pi\*s + 1636404563713415/2199023255552)

ft =(pi\*sin(t\*(1636404563713415/2199023255552 - (225\*pi^2)/4)^(1/2))\*exp(-(15\*pi\*t)/2))/(1636404563713415/2199023255552 - (225\*pi^2)/4)^(1/2)