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17/ENG05/033
MECHATRONICS
ELG 381 : TEST

QUESTION 4 :

(4a)

Command Window
Clc
Clear
Close all

Syms n(t)
Eqn = diff(n,t,2) - diff(n,t) - 12*n == 144*(t^3) + 12.5;
Cond = n(0) == 5, diff(n,t,2) == -0.5;
ysol = dsolve(Eqn, cond)
t = 0:0.1:1.5
Yemi = subs(ysol)
fplot(yemi)
grid on
legend('Yemi', 'location', 'best')

(4b)

Command window
Clc
Clear
Closewindow

Syms n(t) y(t)
eqn1 = diff(y,t) - x*x == exp(-1*t);
eqn2 = diff(x,t) + y == exp(-t);
eqn5 = [eqn1 ; eqn2]

Cond = x(0) == 0, y(0) == 0;
Ans = dsolve(eqns, Cond)

xSol(t) = Ans * x
ySol(t) = Ans * y

ii) Visualizing the solution on graph separately continue with
figure
fplot (xSol)
fplot (ySol)
grid on
legend ('x Sol', 'Location', 'best')
legend ('y Sol', 'Location', 'best')

iii) Visualizing the solution on graphs together continue
figure
fplot (xsol)
hold on
fplot (ySol)
grid on
legend (xsol', 'ysol', 'location', 'best')

14c

Command window
cle
clear
Closeall
Syms t s w x K a
x = K * exp(-a*t) * sin(3 * w*t) * cos(3wt)
F = laplace (x, t, s)
Simplify (F)
pretty (ans)

11 Syms t s
f = pi * ((5^2) + 15 * pi * 5 + 24 * (pi ^ 3))
laplace (f)
Simplify (ans)
pretty (ans.