

Mechanical ENGINEERING

17/ENGG01089.

Open Ebuofelukwu OZOMA

Assignment 4.

Question 4a.

Command window:

clc

clear

close all

Sym  $n(t)$

$$\text{eqn} = \text{diff}(n, t, 2) - \text{diff}(n, t) - 12 * n = 144 * (t^3) + 12.5;$$

$$\text{cond} = n(0) == 5, \text{diff}(n, t, 2) == -0.5;$$

$$y1sol = \text{dsolve}(\text{eqn}, \text{cond})$$

$$t = 0:0.1:1.5$$

$$\text{Ebubef} = \text{subs}(y1sol)$$

$$\text{fplot}(\text{Ebubef})$$

grid on

$$\text{legend}(\text{Ebubef}, \text{Location}, \text{'best'})$$

Question 4b.

• Command window

• clc

• clear

• close

• Sym  $x(t)$   $y(t)$

$$\text{eqn1} = \text{diff}(y, t) - x * x == \text{exp}(-2 * t);$$

$$\text{eqn2} = \text{diff}(x, t) + y * \text{exp}(-t);$$

$$\text{eqn3} = [\text{eqn1}, \text{eqn2}]$$

$$\text{cond} = (0) == 0, y(0) == 0;$$

$$\text{Ans} = \text{dsolve}(\text{eqn3}, \text{cond})$$

$$x_{\text{sol}}(t) = \text{Ans} * x$$

$$y_{\text{sol}}(t) = \text{Ans} * y$$



ii. Visualizing the solution on graph separately Contour work.

• `fplot(xsol)`

`fplot(ysol)`

`grid on`

`legend('xsol', 'location', 'best')`

`legend('ysol', 'location', 'best')`

iii. Visualizing the solution on graphs together Contour

`fplot(xsol)`

`hold on`

`fplot(ysol)`

`grid on`

`legend('xsol', 'ysol', 'location', 'best')`

Question 4C

Command window

`clc`

`clear`

`close all`

Syms `t s w x k a`

$$x = k * \exp(-a * t) * \sin(s * w * t) + \cos(3 * w * t)$$

`F = laplace(x, t, s)`

`Simplify(F)`

`pretty(ans)`

ii) Command window

`clc`

`clear`

`close all`



Syms t s

$$Fz = \text{pi} * / [(s^2) + 15 * \text{pi} * s + 24 * (\text{pi}^3)]$$

ilaplace (F)

simplify (ans)

pretty (ans)