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18/ENG02/006
Computer Engineering
ENG 281 - QUIZ

Question ①

$T_{initial} = 10^\circ C$ $T = 20^\circ C$ at 5 mins

$T_{actual} = 25^\circ C$

$$\frac{dT}{dt} \propto (T - T_A)$$

$$dT/dt = K(T - T_A)$$

$$\frac{dT}{dt} = K(T - 25)$$

Collecting like terms

$$\frac{dT}{(T-25)} = K\,dt$$

Integrating both sides

$$\ln(T-25) = tK + C$$

$$\therefore T - 25 = e^{tK+C} \quad \text{where } e^K = A$$

$$T - 25 = e^{tK} \cdot e^C$$

$$T - 25 = Ae^{tK}$$

$$T = Ae^{tK} - 25$$

at initial conditions $t = 0$ $T = 10^\circ C$

$$10 = Ae^0 - 25$$

$$A = 35$$

$$T = 35e^{tK} - 25$$

$T = 20^\circ C$ $t = 5$ mins

$$20^\circ = 35e^{5K} - 25$$

$$45 = 35e^{5K}$$

$$e^{5K} = 45/35$$

$$5K = \ln(45/35)$$

$$K = \frac{0.251}{5} \qquad K = 0.05$$

$$T = 35e^{0.05t} - 25$$

$T = 24.9$ at $t = ?$

$24.9 = 35e^{0.05t} - 25$

$49.9 = 35e^{0.05t}$

$e^{0.05t} = 49.9/35$

$e^{0.05t} = \ln(1.426)$

$0.05t = 0.355$

$t = 7.1 \text{ mins}$

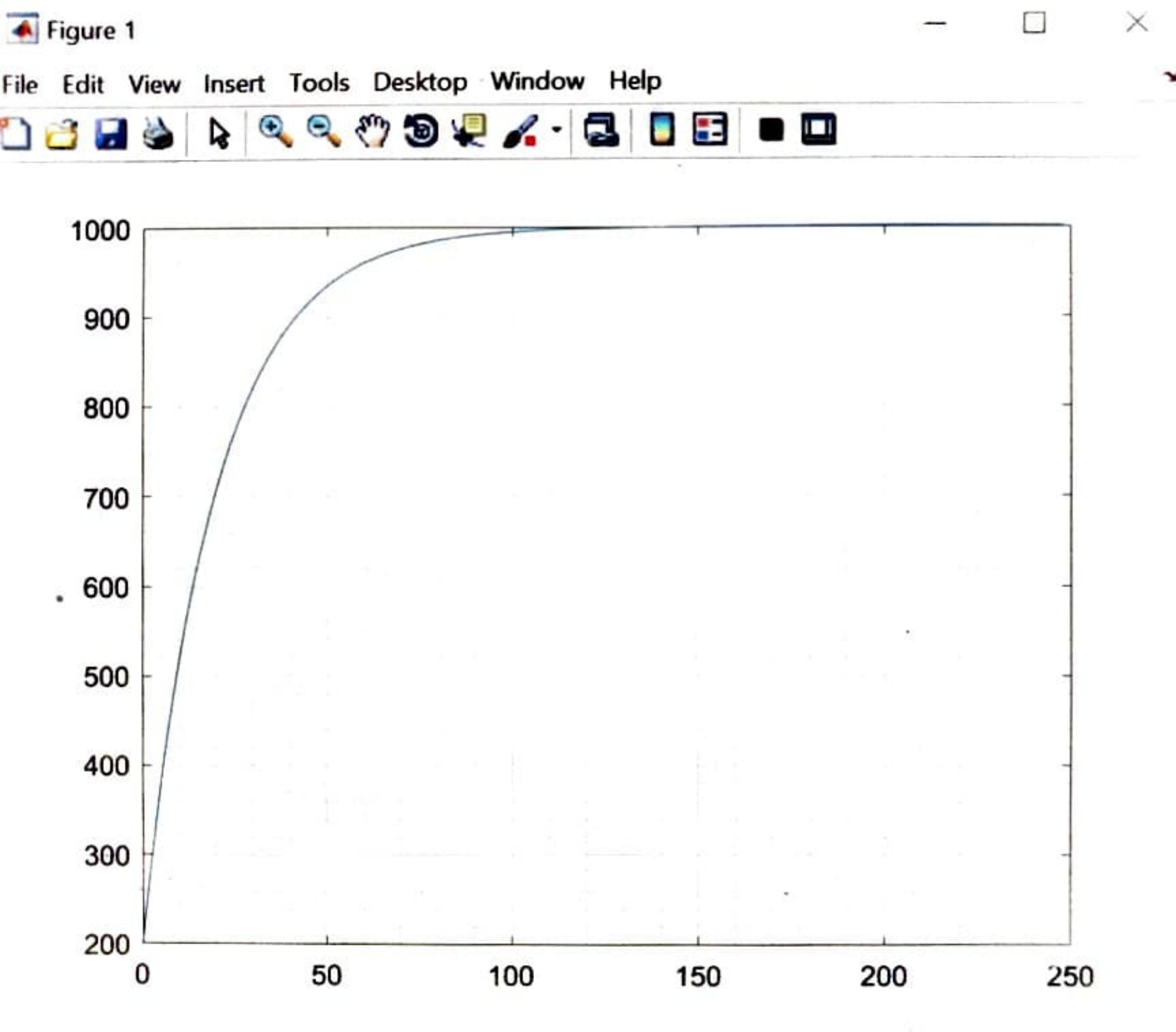
Figure 1
File Edit View Insert Tools Desktop Window Help
1000
900
800
700
600
500
400
300
200
0
50
100
150
200
250

```
commandwindow
clear
clc
close all
format short g
mdata=xlsread('onlinequizdata','fluiddata')
x=mdata(1:2:250,1)
y=mdata(1:2:250,2)
plot(x,y)
grid on
grid minor
```

mand Window

```
 86
 88
 90
 92
 94
 96
 98
100
102
```

script Ln 11 Col 11