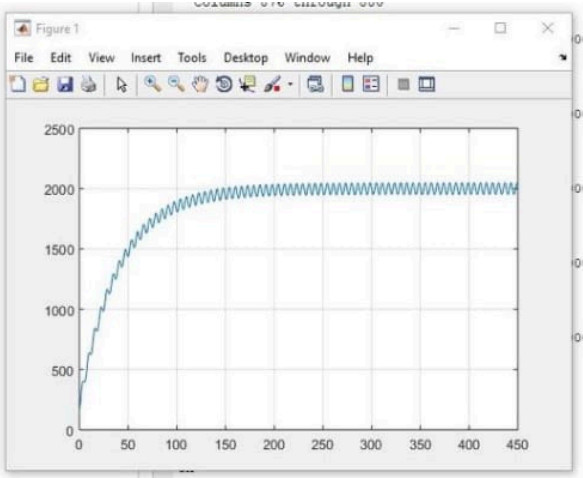
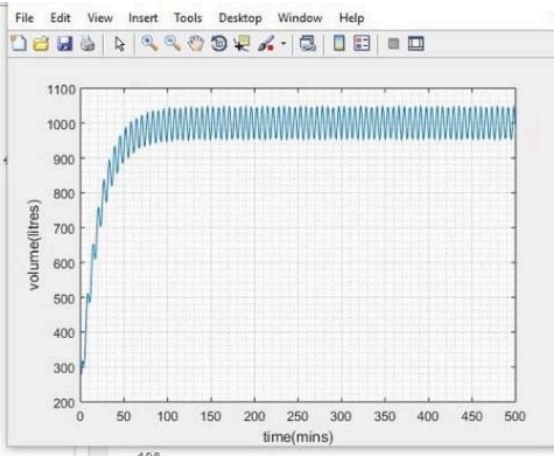
```
commandwindow
clear
clc
close all
syms m t
ans=dsolve('Dm+0.025*m=50+50*sin(t)','m(0)=150')
t=0:0.5:450
tn=subs(ans,t)
plot(t,tn)
grid on
```




```
[ 150, 2000 - (2000*1601^(1/2)*cos(atan(1/40) + 1/2)
```

```
commandwindow
clear
clc
close all
syms t
values=[]
t=1:1:500
mean=1000-((exp(-0.05*t))*800)
y=1000+(50/1.0025)*sin(t)+(2.5/1.0025)*cos(t)-((exp(-0.05*t))*802.4

if rem(t,2) ==0
    values=[values,mean]
else
    values=[values,y]
end
excelvalues=transpose(values)
mins=transpose(t)
plot(t,values)
grid on
grid minor
xlabel ('time(mins)')
ylabel('volume(litres)')
xlswrite('odevbesdata.xlsx',{'t(min)'},'veriler','A1')
xlswrite('odevbesdata.xlsx',mins,'veriler','A2')
xlswrite('odevbesdata.xlsx',{'V(Litre)'},'veriler','B1')
xlswrite('odevbesdata.xlsx',excelvalues,'veriler','B2')
```



498

t(min)	V(Litre)
1	279.9639
2	318.1907
3	313.8601
4	303.601
5	327.9009
6	393.9593
7	469.1423
8	511.0566
9	506.5922
10	484.0395
11	487.1398
12	534.9268
13	604.2824
14	651.2431
15	651.4694
16	622.6706
17	608.3676
18	637.9229
19	699.585
20	751.3315
21	759.541
22	729.9392
23	702.3679
24	714.1865
25	765.9535
26	820.9421
27	838.9333
28	813.2194
29	776.7953

Aigbanogg Emmanuel
18/Eng06/005
Mechanical Engineering

i) Accoloration of salt in the systemz Input rate of salt - output rate of salt

y= amount of salt present in the tank at any time

∴ rate of change of y = $\frac{dy}{dt}$ = $y_{in} - y_{out}$

5 gallon of brine enters the tank per minute

one gallon = $(1 + \sin t)$ lb of salt at $t = 1$

$1 + \sin(1) = 1.02$lb

∴ $= 50 \times 1.02 = 51$ lb/min

$\frac{30}{1200} = 0.025 = 2.5\%$ of salt present

$y_{out} = 2.5\%$ of y

a) $\frac{dy}{dt} = 51 - 2.5\%$ of y

b) $\frac{dy}{dt} = 51 - 0.025y$

$\frac{dy}{dt} = -0.025\left(\frac{-0.025y + 51}{-0.025}\right)$

$\frac{dy}{dt} = -0.02(y - 2040)$

$\frac{dy}{y - 2040} = -0.025dt$

$\int \frac{dy}{(y-2040)} = \int -0.025dt$

∴ $\ln(y - 2040) = -0.025t + C$

$y - 2040 = e^{-0.025t + C}$

$y - 2040 = e^{-0.025t} e^{C}$

∴ $y = y_0 e^{-0.025t} + 2040$ $\quad y_0, y - 2040 = y_0 e^{-0.025t}$

recall when $t = 1$, $y = 1606$

Chemical Engineering

1) Acceleration of salt in the system = input rate of salt - output rate of salt

y = amount of salt present in the tank at any time

$\therefore$ rate of change of $y = \frac{dy}{dt} = y_{in} - y_{out}$

5 gallon of brine enter the tank per minute

one gallon = $(1 + \sin t)$ lb of salt at $t = 1$

$1 + \sin(1) = 1.02$ lb

$\therefore \; = 50 \times 1.02 = 51$ lb/min

$\frac{30}{1200} = 0.025 = 2.5\%$ of salt present

$y_{out} = 2.5\%$ of y

a) $\frac{dy}{dt} = 51 - 2.5\%$ of y

b) $\frac{dy}{dt} = 51 - 0.025y$

$\frac{dy}{dt} = -0.025\left(\frac{-0.025y + 51}{-0.025}\right)$

$\frac{dy}{dt} = -0.02(y - 2040)$

$\frac{dy}{y - 2040} = -0.025\,dt$

$\int \frac{dy}{(y-2040)} = \int -0.025\,dt$

$\therefore \ln(y - 2040) = -0.025t + c$

$y - 2040 = e^{-0.025t + c}$

$y - 2040 = e^{-0.025} e^{c}$

$\therefore y = y_0 e^{-0.025t} + 2040$, $y - 2040 = y_0 e^{-0.025t}$

recall when $t = 1$, $y = 150$ lb

$150 = y_0 e^{-0.025t} + 2040$

$150 - 2040 = y_0$

$y_0 = -1890$

$y = 2040 - 1890 e^{-0.025t}$