DELHI TECHNOLOGICAL UNIVERSITY

SCIENTIFIC COMPUTING (MC-204)
PRACTICAL FILE

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EXPERIMENT 7

AIM

Solve the system of differential equations by ODE45 solver.

SOURCE CODE

1. ode45 for one equation

```
clear all;
close all;

%the function, value of function, span of variable
odefun = @(t,y) -2*y + 2*sin(2*t);
y0 = -10:10;
tspan = [-10 0];

%applying the function
[t,y] = ode45(odefun,tspan,y0);

%plotting the values
plot(t,y)
grid on
xlabel('t')
ylabel('y')
title('Solutions of y'' = -2y + 2sin(2t), y(0) = -10,-
9,9,10','interpreter','latex')
```

2. ode45 for a System of Equations

```
clear all;
close all;

%function values and span
t0 =0;
tfinal = 20;
p0 = [30; 40];

%applying the function
[t,p] = ode45(@lotkaODE,[t0 tfinal],p0);

%plotting the graph
```
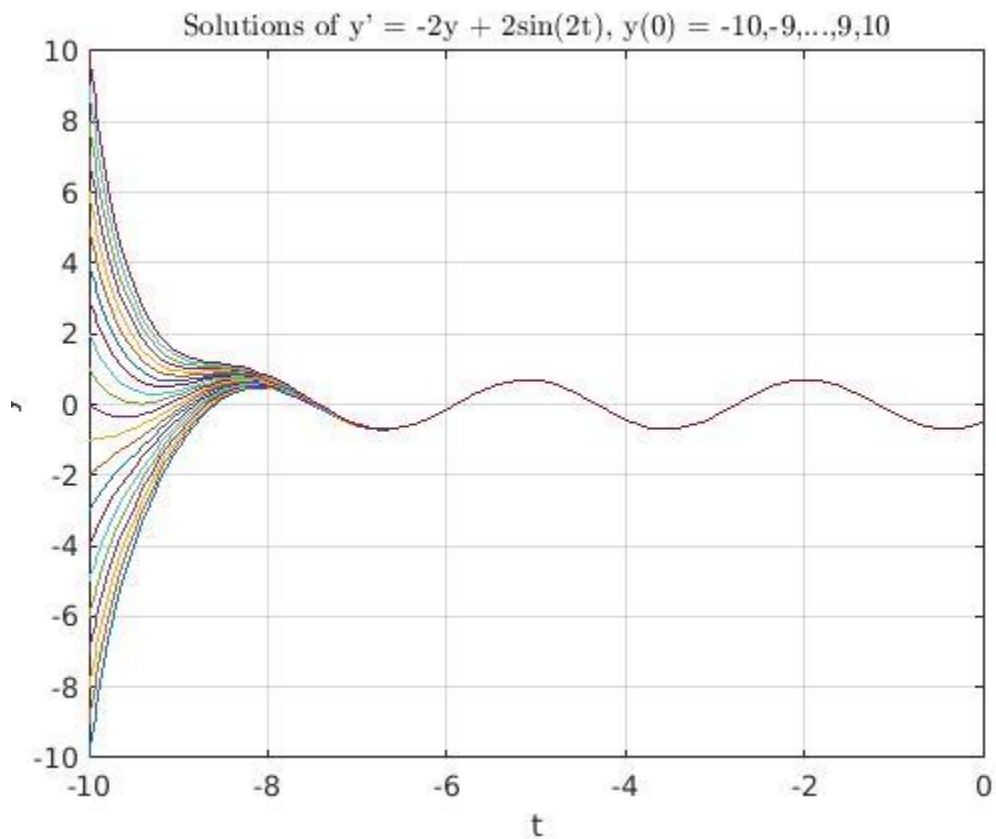
```
plot(t,p)
title(' Values of x and y over t')
xlabel('t')
ylabel('Values of x and y')
legend('x','y')

%the ode system of equations
function dpdt = lotkaODE(t,p)
% LOTKA Lotka-Volterra Equations
delta = 0.02;
beta = 0.01;
dpdt = [p(1) .* (1 - beta*p(2));p(2) .* (-1 + delta*p(1))];
end
```

OUTPUT

1. *ode45 for one equation*

Solutions of y' = -2y + 2sin(2t), y(0) = -10,-9,...,9,10

2. ode45 for a System of Equations

Values of x and y over t