BRCM CET, BAHAL

LAB MANUAL

Neural Network Lab (LC-CSE-421G)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Check list for Lab Manual

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Department of Computer Science & Engineering

Vision and Mission of the Department

Vision

To be a Model in Quality Education for producing highly talented and globally recognizable students with sound ethics, latest knowledge, and innovative ideas in Computer Science & Engineering.

MISSION

To be a Model in Quality Education by

M1: Imparting good sound theoretical basis and wide-ranging practical experience to the Students for fulfilling the upcoming needs of the Society in the various fields of Computer Science & Engineering.

M2: Offering the Students an overall background suitable for making a Successful career in Industry/Research/Higher Education in India and abroad.

M3: Providing opportunity to the Students for Learning beyond Curriculum and improving Communication Skills.

M4: Engaging Students in Learning, Understanding and Applying Novel Ideas.

Course: NEURAL NETWORKS USING MATLAB

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To **Understand** basic neuron models and learning algorithms by using Matlab's neural network toolbox	L2 (Understand)
CO2	To **Describe** about different activation function (transfer function).	L2 (Understand)
CO3	To **Analyze** how weights & bias values affect the output of neuron.	L4 (Analyze)
CO4	To **Identify** how weights & bias values are able to represent a decision boundary in the feature space.	L4 (Analyze)
CO5	To **Conceptualize** about perceptron learning rule works for linearly separable problems.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	1	2
CO2	3	2	1		2							1	2	2
CO3	2	3	1		2							1	2	2
CO4	2	3	1		2							1	2	3
CO5	2	3	1		2							1	2	1

Guidelines for the Students:

1. Students should be regular and come prepared for the lab practice.
2. In case a student misses a class, it is his/her responsibility to complete that missed experiment(s).
3. Students should bring the observation book, lab journal and lab manual. Prescribed textbook and class notes can be kept ready for reference if required.
4. They should implement the given Program individually.
5. While conducting the experiments students should see that their programs would meet the following criteria:
   - Programs should be interactive with appropriate prompt messages, error messages if any, and descriptive messages for outputs.
   - Programs should perform input validation (Data type, range error, etc.) and give appropriate error messages and suggest corrective actions.
   - Comments should be used to give the statement of the problem and every function should indicate the purpose of the function, inputs and outputs
   - Statements within the program should be properly indented
   - Use meaningful names for variables and functions.
   - Make use of Constants and type definitions wherever needed.
6. Once the experiment(s) get executed, they should show the program and results to the instructors and copy the same in their observation book.
7. Questions for lab tests and exam need not necessarily be limited to the questions in the manual, but could involve some variations and / or combinations of the questions.

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S No.	AIM OF EXPERIMENT
1.	To study about MATLAB.
2.	Write a program to perform the basics matrix operations.
3.	WAP to plot the Straight line.
4.	WAP to plot the Sine curve.
5.	How the weight & bias value effects the output of neurons.
6.	How the choice of activation function effect the output of neuron experiment with the following function purelin(n), bimary threshold(hardlim(n) haradlims(n)) ,Tansig(n) logsig(n)
7.	How the weight and biased value are able to represent a decision boundary in the feature space.
8.	How the Perceptron Learning rule works for Linearly Separable Problem.
9.	How the Perceptron Learning rule works for Non-Linearly Separable Problem.
10.	Write a program to draw a graph with multiple curve.

PRACTICAL-1

Aim- 1. Introduction to MATLAB

2. How to install MATLAB

Introduction:-

MATLAB (matrix laboratory) is a fourth-generation high-level programming language and interactive environment for numerical computation, visualization and programming. MATLAB is developed by MathWorks.

It allows matrix manipulations; plotting of functions and data; implementation of algorithms; creation of user interfaces; interfacing with programs written in other languages, including C, C++, Java, and FORTRAN; analyze data; develop algorithms; and create models and applications.

It has numerous built-in commands and math functions that help you in mathematical calculations, generating plots, and performing numerical methods.

MATLAB is a tool for technical computing, computation and visualization in an integrated environment, e.g.,

- Math and computation
- Algorithm development
- Data acquisition
- Modeling, simulation, and prototyping
- Data analysis, exploration, and visualization
- Scientific and engineering graphics
- Application development, including graphical user interface building

MATLAB is developed by The MathWorks. MATLAB is a short-term for MATrix LABoratory. MATLAB is in use world-wide by researchers and universities.

Features of MATLAB

Following are the basic features of MATLAB:

It is a high-level language for numerical computation, visualization and application development.

It also provides an interactive environment for iterative exploration, design and problem solving.

It provides vast library of mathematical functions for linear algebra, statistics, Fourier analysis, filtering, optimization, numerical integration and solving ordinary differential equations.

It provides built-in graphics for visualizing data and tools for creating custom plots.

MATLAB's programming interface gives development tools for improving code quality, maintainability, and maximizing performance.

It provides tools for building applications with custom graphical interfaces.

It provides functions for integrating MATLAB based algorithms with external applications and languages such as C, Java, .NET and Microsoft Excel.

Uses of MATLAB

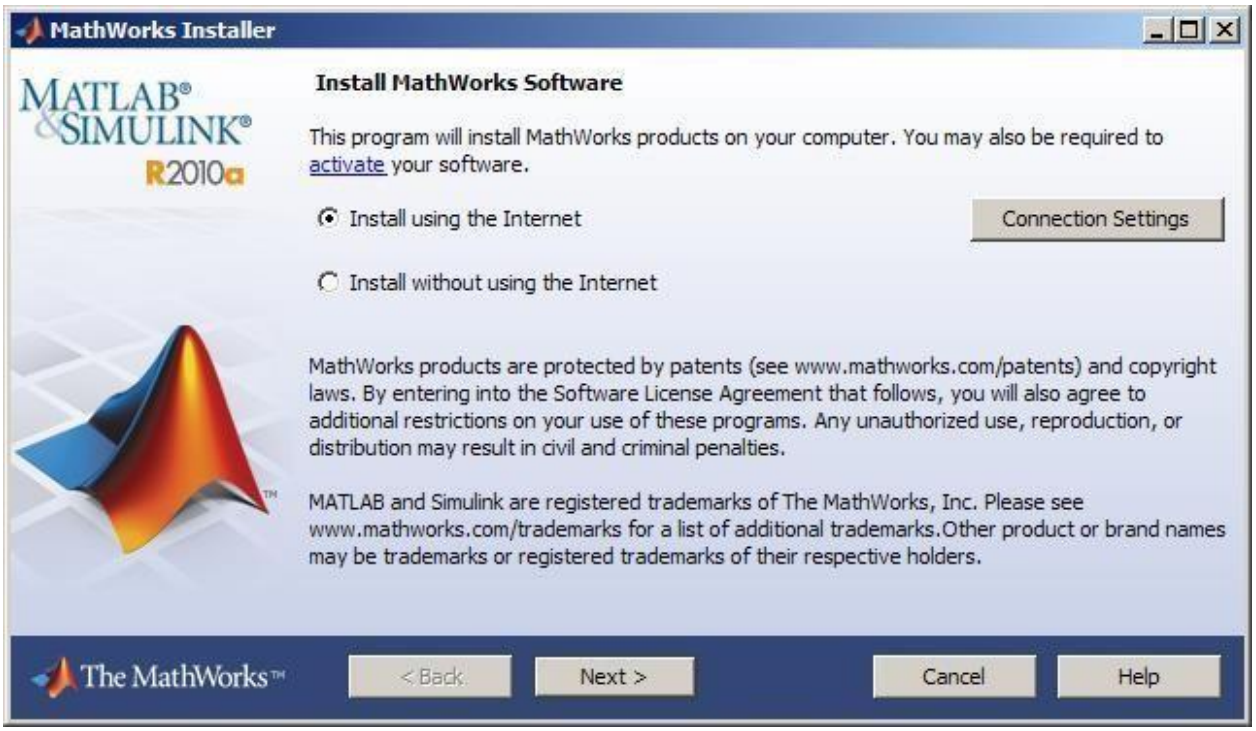
MATLAB is widely used as a computational tool in science and engineering encompassing the fields of physics, chemistry, math and all engineering streams. It is used in a range of applications including: •signal processing and Communications

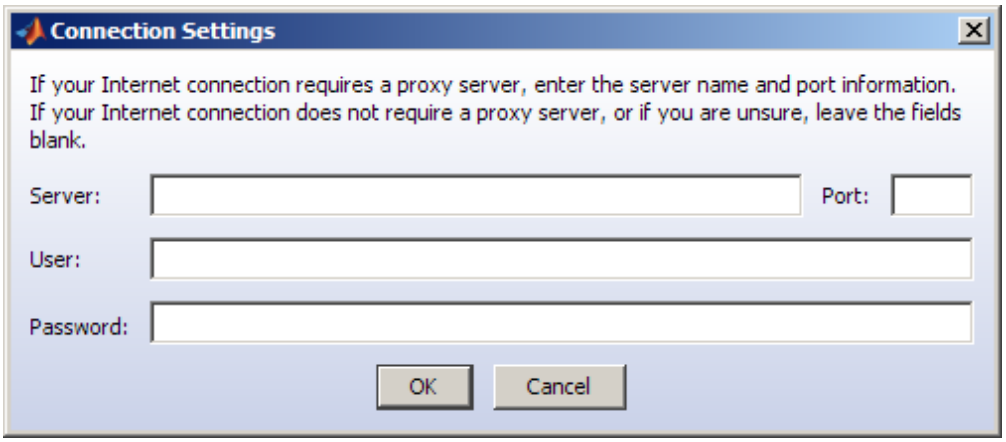
- image and video Processing
- control systems
- test and measurement
- computational finance
- computational biolog

Installing to MATLAB :-

“Step 1: Prepare to Install”

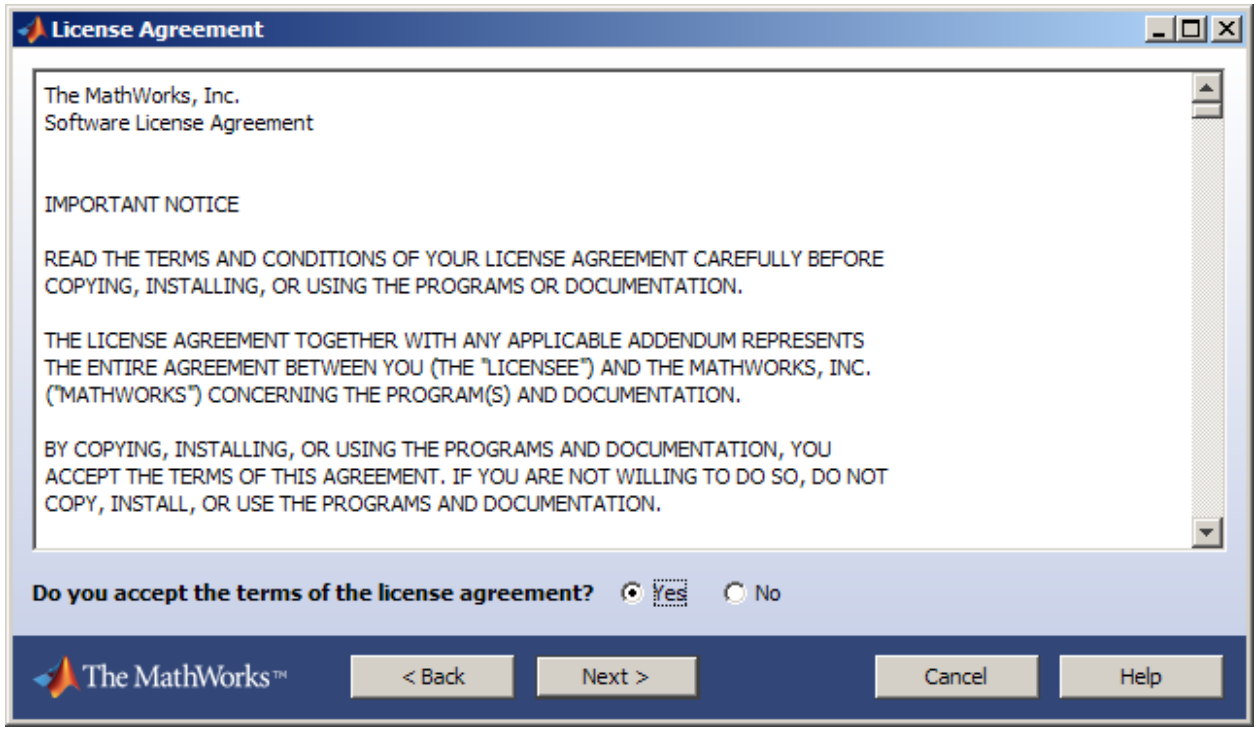
“Step 2: Start the Installer”





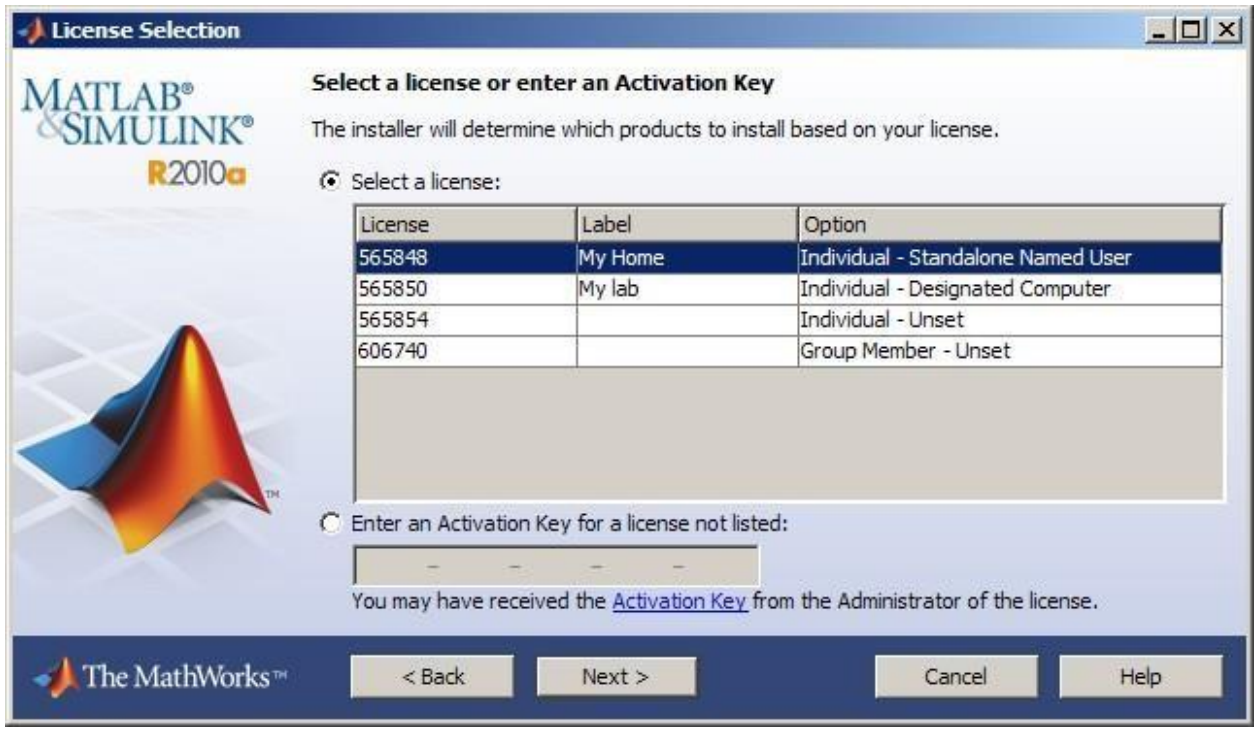
“

Step 3: Review the Software License Agreement”

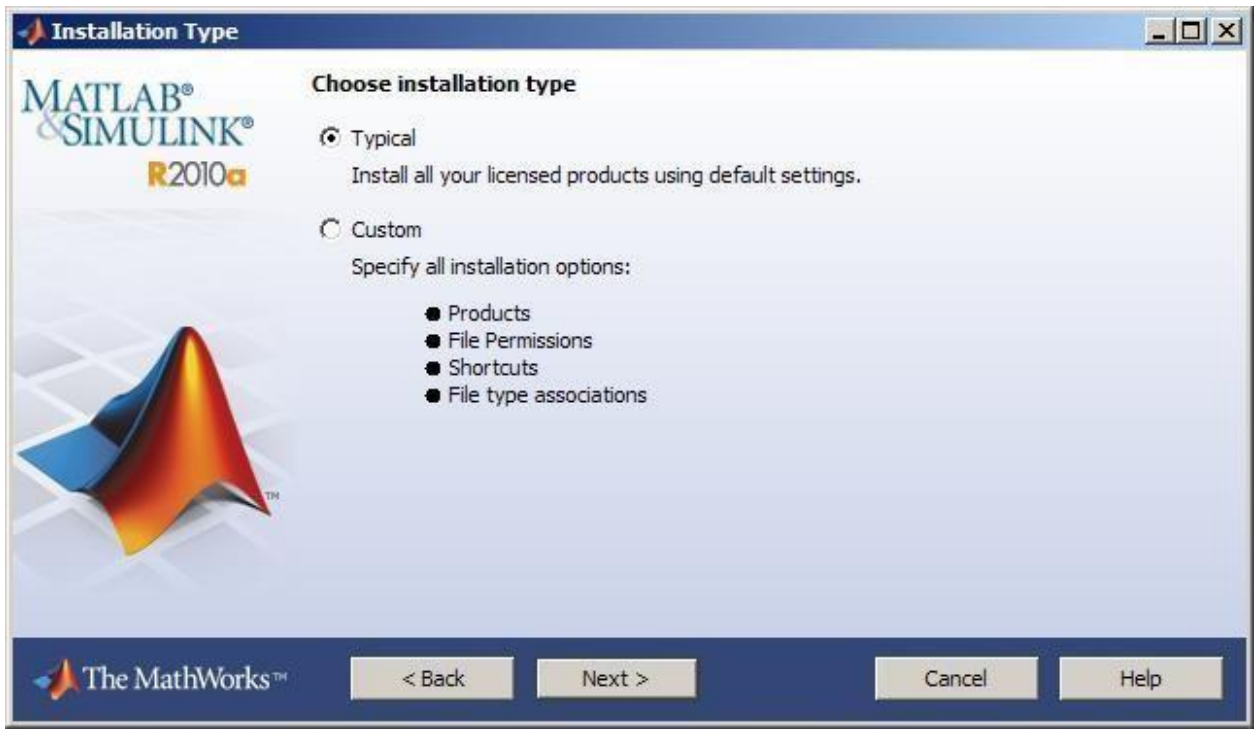


“Step 4: Log In to Your MathWorks Account”

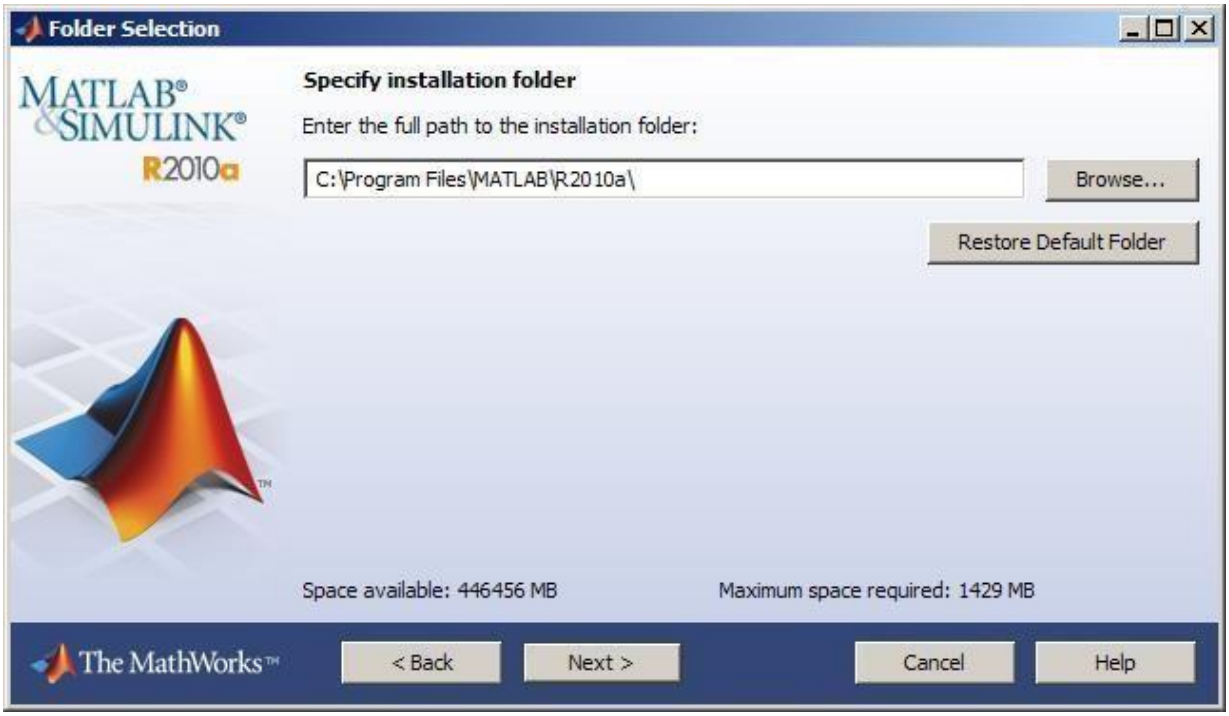
“Step 5: Select the License You Want to Install”



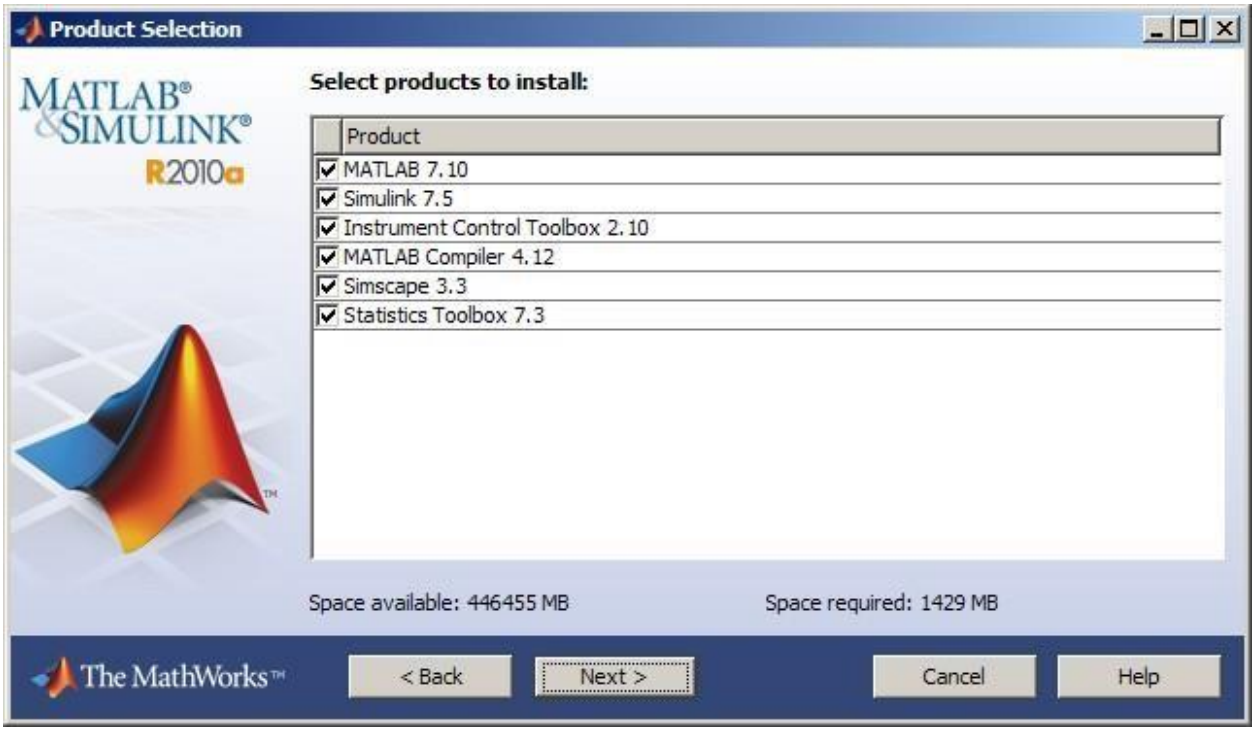
“Step 6: Choose the Installation Type”



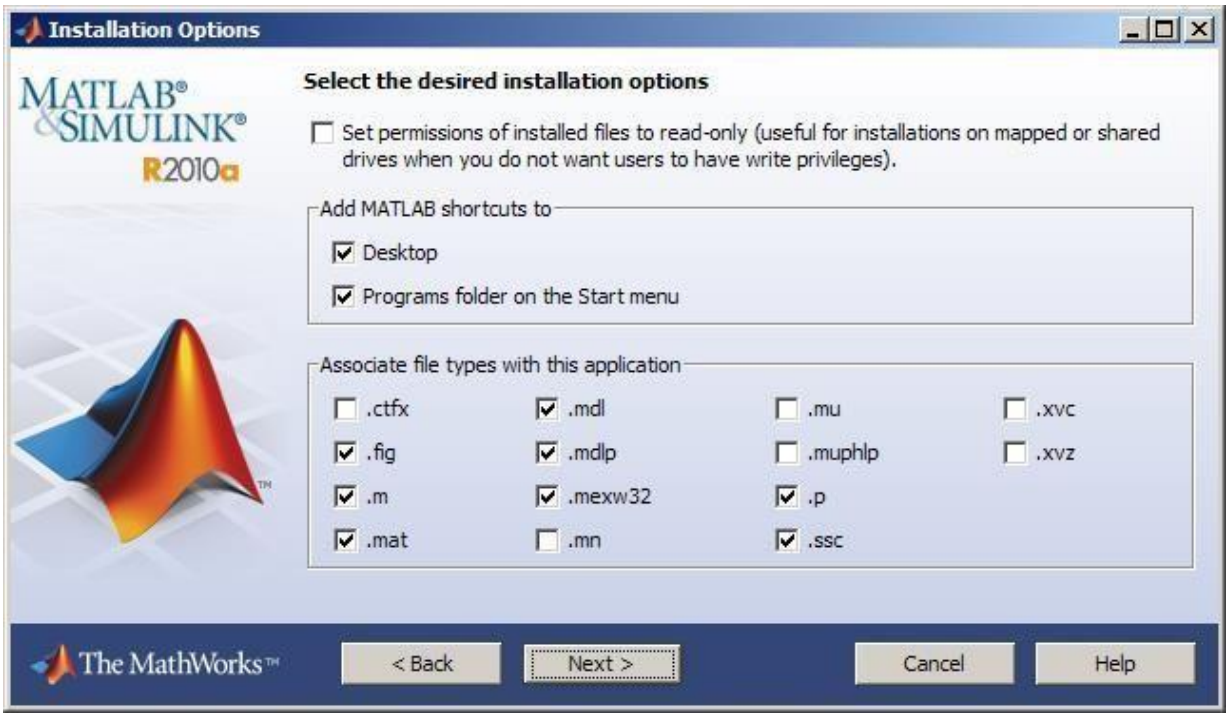
“Step 7: Specify the Installation Folder”



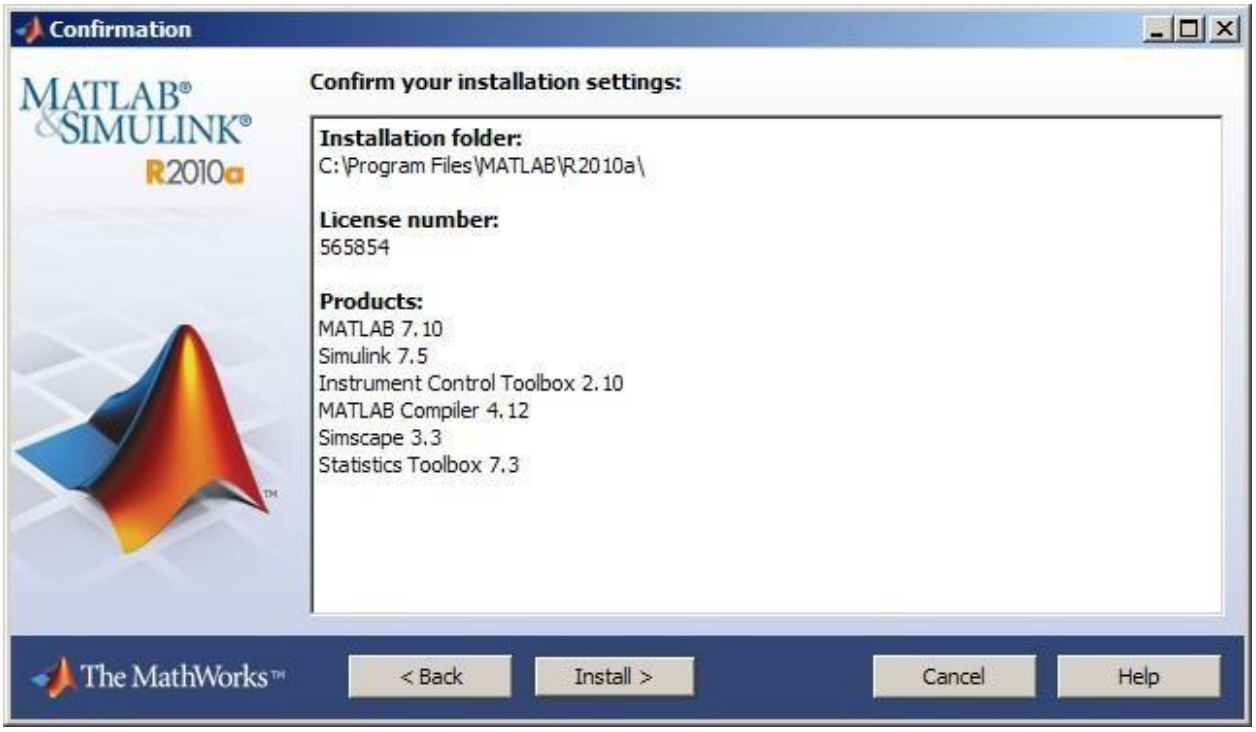
“Step 8: Specify Products to Install (Custom Only)”



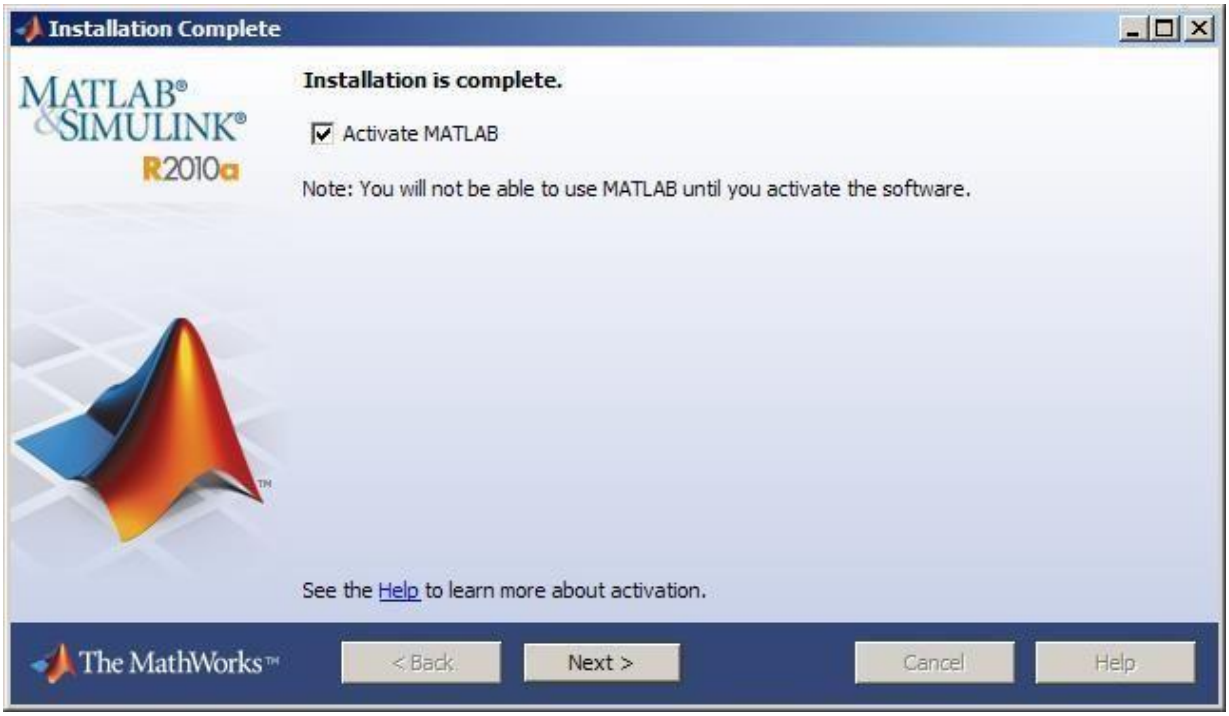
“Step 9: Specify Installation Options (Custom Only)”



“Step 10: Confirm Your Choices”



“Step 11: Complete the Installation”



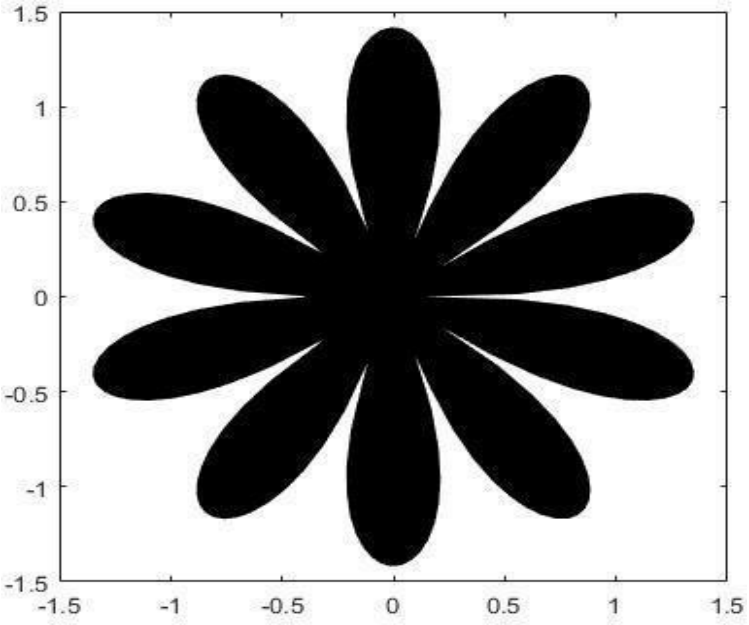
PRACTICAL-2

Aim-Write a program for fill 2-D Plot in MATLAB

PROGRAM:-

```
t = linespace(0,2*pi,200);
r =  sqrt(abs(2*sin(5*t)));
x = r.*cos(t);
y = r.*sin(t);
fill(x,y,'b'),
axis('square')
```

OUTPUT:-



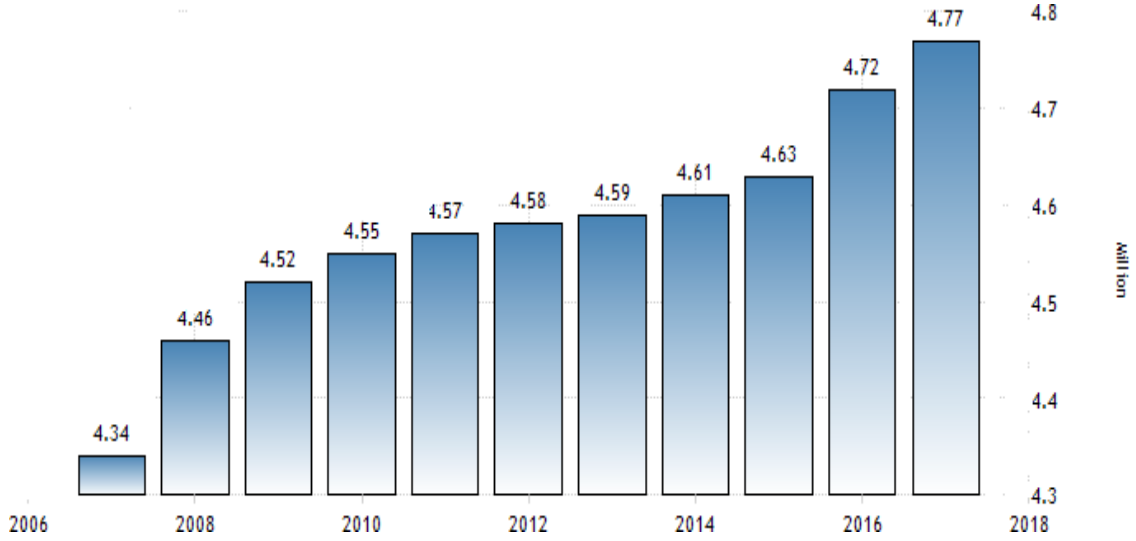
PRACTICAL-3

Aim –Write a program for Barplloting in MATLAB

PROGRAM:-

```
Cont=char('Asia','Europe','Africa','N. America','S. America');

pop=[3332;696;694;437;307];

barh(pop)

for i=1:5,

gtext(cont(i,:));

end
xlabel('Population in millions')

Title('World Population (2017)','fontsize',18)
```

OUTPUT:-



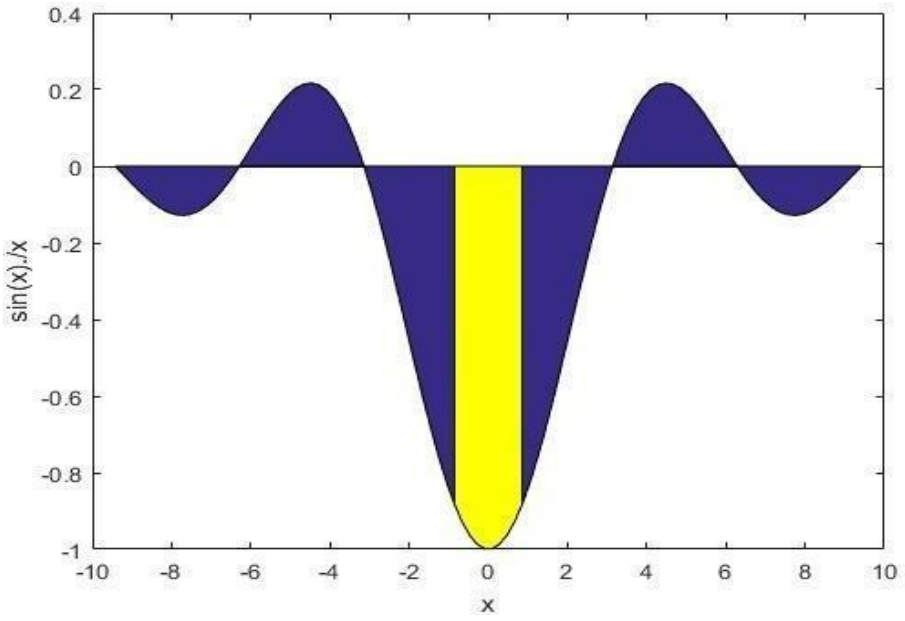
PRACTICAL-4

Aim – Write a program for Area plotting in MATLAB

PROGRAM-

```
x = linspace(-3*pi,3*pi,100);

y = -sin(x)./x;
area(x,y)
xlabel('x'), ylabel('sin(x)./x')
hold on
x1 = x(46:55); y1 = y(46:55);
area(x1,y1,'facecolor','y')
```

OUTPUT:-



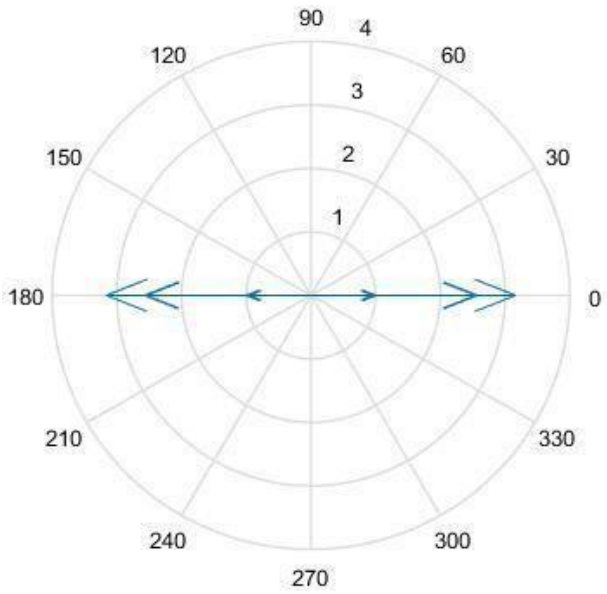
PRACTICAL-5

Aim – Write a program for plotting compass in MATLAB

PROGRAM:-

```
th = -pi:pi/5:pi;
zx = cos(th);
zy = sin(th);
z = zx + i*zy;
compass(z)
```

OUTPUT:-



PRACTICAL-6

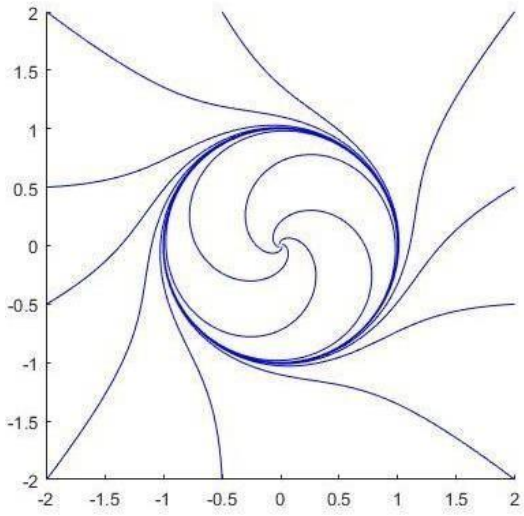
Aim – Write a program for 2-D Vector field

PROGRAM:-

Using streamline for 2-D Vector field

```
v = linspace(-2,2,50);
[X,Y] = meshgrid(v);
U = Y + X – X.*(X.^2 + Y.^2);
V = Y - X – Y.*(X.^2 + Y.^2);
x0 = [-2 -2 -2 -2 -.5 -.5 2 2 2 2 -.01 -.01 .01 .01];
y0 = [-2 -.5 .5 2 -2 2 -2 -.5 .5 2 -.01 .01 -.01 .01];
streamline(X,Y,U,V,x0,y0)
axis square
```

OUTPUT:-



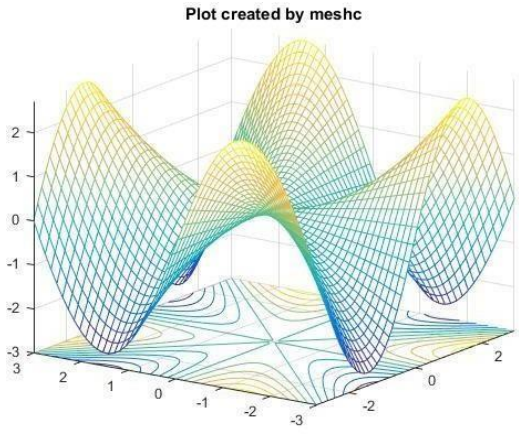
PRACTICAL-7

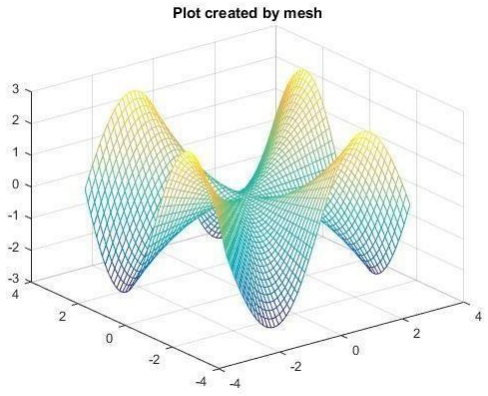
Aim – Write a program for 3-D Plot

PROGRAM:-

```
x = linspace(-3,3,50); y = x;

[X,Y] = meshgrid(x,y);
Z = X.*Y.*(X.^2-Y.^2)./(X.^2+Y.^2);
mesh(X, Y,Z)
title('Plot created by mesh')
figure(2)
meshc(X,Y,Z) , view(-55,20)
title (‘Plot created by meshc’)
```

OUTPUT:-





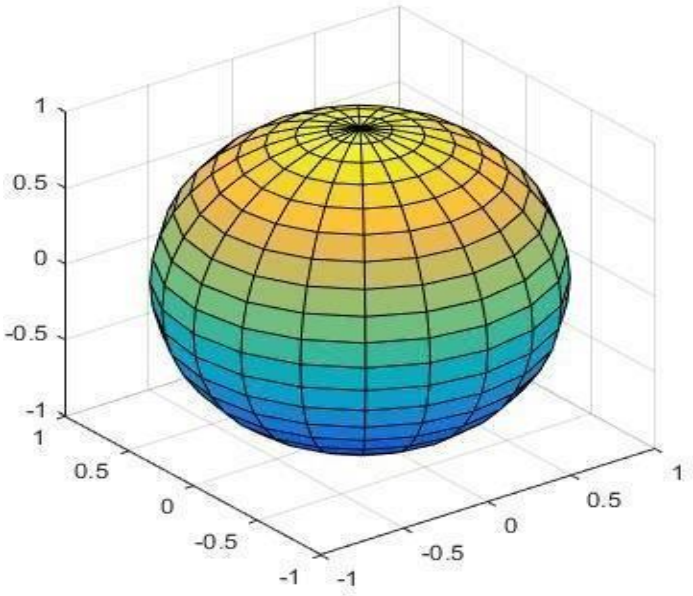
PRACTICAL-8

Aim – Write a program for Sphere

PROGRAM:-

```
sphere(20)

 axis('square')
 or
 [x,y,z] = sphere(20);
 surf(x,y,z)
 axis('square')
```

OUTPUT:-



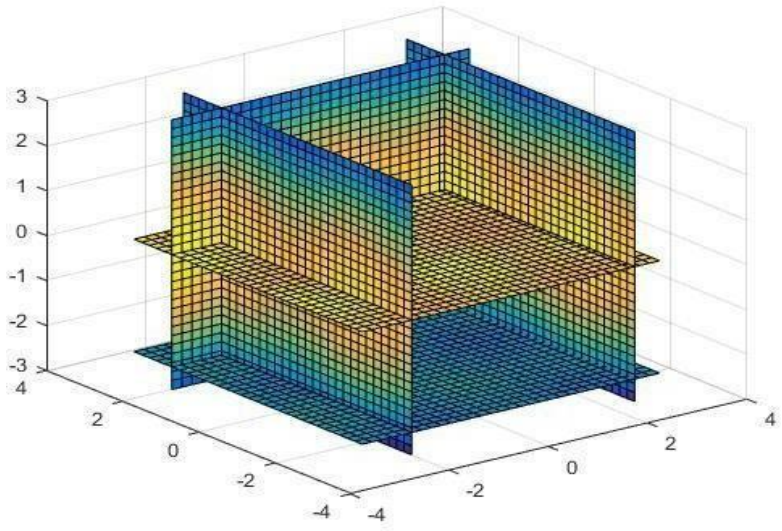
PRACTICAL-9

Aim – Write a program for Slice

PROGRAM:-

```
v = [-3:.2:3];
[x,y,z] = meshgrid(v,v,v);
f = (cos(x).^2 + sin(y).^2-z.^2);
xv = [-2 2.5]; yv = 2;
zv = [-2.5 0];
slice(x,y,z,f,xv,yv,zv);
```

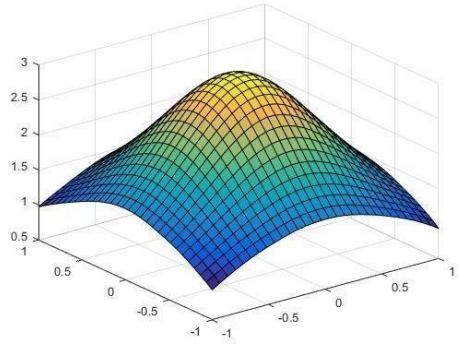
OUTPUT:-



PRACTICAL-10

Aim – Write a program for interpolated surface

PROGRAM:-

```
The interpolated surface
xv = 2*rand(1, 100)-1;
yv = 2*rand(1,100)-1;
zv = 3./(1 + xv.^2 + yv.^2);
scatter3(xv,yv,zv)

xi = linspace(-1,1,30);
yi = xi';

[Xi, Yi,Zi] = griddata(xv,yv,zv,xi,yi,'v4');

surf(Xi,Yi,Zi)
```

OUTPUT:-