AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

AMITY UNIVERSITY

---------- UTTAR PRADESH----------

BASIC SIMULATION LAB

LAB MANUAL

Made By:
Nikhita Wadhawan
4MAE1
13102

S.No	Category of Assignment	Code	Experiment No.	Name of Experiment	Date of Allotment of experiment	Date of Evaluation	Max. Marks	Marks obtained	Signature of Faculty
1.	Mandatory Experiment*	LR (10)	1	Creating a One-Dimensional Array (Row / Column Vector) ; Creating a Two-Dimensional Array (Matrix of given size) and (A). Performing Arithmetic Operations - Addition, Subtraction, Multiplication and Exponentiation. (B). Performing Matrix operations - Inverse, Transpose, Rank.	17/12/2014	24/12/2014	1		
2.			2	Performing Matrix Manipulations - Concatenating, Indexing, Sorting, Shifting, Reshaping, Resizing and Flipping about a Vertical Axis / Horizontal Axis; Creating Arrays X & Y of given size (1 x N) and Performing (A). Relational Operations - >, <, ==, <=, >=, ~= (B). Logical Operations - ~, &, |, XOR	24/12/14	07/01/15	1		
3.			3	Generating a set of Commands on a given Vector (Example: X = [1 8	07/01/15	14/01/15	1		

				3 9 0 1]) to (A). Add up the values of the elements (Check with sum) (B). Compute the Running Sum (Check with sum), where Running Sum for element j = the sum of the elements from 1 to j, inclusive. Also, Generating a Random Sequence using rand() / randn() functions and plotting them.					
4.			4	Evaluating a given expression and rounding it to the nearest integer value using Round, Floor, Ceil and Fix functions; Also, generating and Plots of (A) Trigonometric Functions - sin(t),cos(t), tan(t), sec(t), cosec(t) and cot(t) for a given duration, 't'. (B) Logarithmic and other Functions - log(A), log10(A), Square root of A, Real nth root of A.	**21/01/15**	**28/01/15**	**1**		
5.			5	Creating a vector X with elements, Xn = (-1)n+1/(2n-1) and Adding up 100 elements of the vector, X; And, plotting the	**04/02/15**	**11/02/15**	**1**		

				functions, x, x3, ex, exp(x2) over the interval 0 < x < 4 (by choosing appropriate mesh values for x to obtain smooth curves), on A Rectangular Plot					
6.			6	Generating a Sinusoidal Signal of a given frequency (say, 100Hz) and Plotting with Graphical Enhancements - Titling, Labeling, Adding Text, Adding Legends, Adding New Plots to Existing Plot, Printing Text in Greek Letters, Plotting as Multiple and Subplot.	**11/02/15**	**18/01/15**	**1**		
7.			7	Solving First Order Ordinary Differential Equation using Built-in Functions.	**04/03/15**	**11/03/15**	**1**		
8.			8	Writing brief Scripts starting each Script with a request for input (using input) to Evaluate the function h(T) using if-else statement, where h(T) = (T - 10) for 0 < T < 100 = (0.45 T + 900) for T > 100. Exercise : Testing the Scripts	**11/03/15**	**18/03/15**	**1**		

				written using A). T = 5, h = -5 and B). T = 110, h =949.5 Also, Creating a Graphical User Interface (GUI) and calling back the script from GUI.					
9.			9	Generating a Square Wave from sum of Sine Waves of certain Amplitude and Frequencies.	18/03/15	25/03/15	1		
10.			10	Basic 2D and 3D plots: parametric space curve. polygons with vertices. 3D contour lines, pie and bar ch.	25/03/15	01/04/15	1		
11.	Viva	Viva (5)			08/04/15		5		

EXPERIMENT – 1 (A)

AIM:

Creating a One-Dimensional Array (Row / Column Vector) ; Creating a Two-Dimensional Array (Matrix of given size)

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> % One Dimensional Array
>> A=[10 20 30 40 50]
A =
    10    20    30    40    50

>> % Two Dimensional Array
>> B=[10 20 30;40 50 60;70 80 90]
B =
    10    20    30
    40    50    60
    70    80    90
```

DISCUSSION:

Creating a matrix:

In MATLAB we use the matrix constructor operator [ ] or with the colon operator (first:step:last).

Creating one dimensional matrix:

Simply enter elements separated by comma or space .

row = $[E_1, E_2, \ldots, E_m]$

Creating two dimensional matrix:

To start a new row, terminate the current row with a semicolon:

$A = [row_1; row_2; ...; row_n]$

RESULT:

One-Dimensional and Two-Dimensional Matrix were successfully created.

CONCLUSION:

One Dimensional and two dimensional matrices were created using constructor operator [ ] and colon operator (first:step:last).

EXPERIMENT – 1 (B)

AIM:

Performing Arithmetic Operations - Addition, Subtraction, Multiplication and Exponentiation.

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> A=[10 30 50;20 40 60;70 90 110]
A =
    10    30    50
    20    40    60
    70    90   110
>> B=[20 40 60;30 50 70;80 100 120]
B =
    20    40    60
    30    50    70
    80   100   120
```

```
>> % Addition
>> C=A+B
C =
    30    70   110
    50    90   130
   150   190   230
```

```
>> % Subtraction
>> C=A-B
```

```
C =
   -10   -10   -10
   -10   -10   -10
   -10   -10   -10
```

```
>> % Multiplication
>> C=A*B
C =
        5100        6900        8700
        6400        8800       11200
       12900       18300       23700
```

```
>> % Exponentiation
>> C=exp(A)
C =
  1.0e+047 *
    0.0000    0.0000    0.0000
    0.0000    0.0000    0.0000
    0.0000    0.0000    5.9210
```

DISCUSSION:

Matrix Addition (+):

A+B adds A and B. A and B must have the same dimensions, unless one is scalar.

Matrix Subtraction (-):

A-B subtracts B from A. A and B must have the same dimensions, unless one is scalar.

Matrix Multiplication (*):

A*B is the linear algebraic product of A and B. The number of columns of A must equal the number of rows of B, unless one is a scalar.

Exponentiation:

Y = exp(X)

It returns the exponential for each element of X.

RESULT:

Two-Dimensional Matrix were created and Arithmetic Operations: +, -, *, exp() were successfully performed on them.

CONCLUSION:

Various Arithmetic Operations were successfully operated and results were obtained.

EXPERIMENT – 1 (C)

AIM:

Performing Matrix operations - Inverse, Transpose, Rank.

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> A=[50 20 30;10 90 40;100 70 80]
A =
    50    20    30
    10    90    40
   100    70    80

>> % Inverse
>> B=inv(A)
B =
    0.1257    0.0143   -0.0543
    0.0914    0.0286   -0.0486
   -0.2371   -0.0429    0.1229

>> % Transpose
>> B=transpose(A)
B =
    50    10   100
    20    90    70
    30    40    80

>> % Rank
```

```
>> B=rank(A)
B =
    3
```

DISCUSSION:

Inverse Operation:

Y = inv(X) returns the inverse of the square matrix X.

Transpose Operation:

B = transpose (A) returns the transpose of the matrix.

Rank Operation:

k = rank (A)

The rank function provides an estimate of the number of linearly independent rows or columns of a full matrix.

RESULT:

Two-Dimensional Matrix is created and matrix operations: inverse, Transpose and Rank were performed on it.

CONCLUSION:

Various Matrix Operations were successfully operated and results were obtained.

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P)

Programme	Btech MAE	Course Name	Basic Simulation
Course Code	ES204	Semester	4
Student Name	NIKHITA WADHAWAN	Enrollment No.	A2305413102

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

EXPERIMENT – 2 (A)

AIM:

Performing Matrix Manipulations - Concatenating, Indexing, Sorting, Shifting, Reshaping, Resizing and Flipping about a Vertical Axis / Horizontal Axis.

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> A=[70 50 30;10 100 90;40 60 20]
A =
    70    50    30
    10   100    90
    40    60    20
>> B=[20 100 70;40 30 50;10 90 60]
B =
    20   100    70
    40    30    50
    10    90    60

>> % Concatenation
>> % 1) Horizontal Concatenation
>> horzcat(A,B)
ans =
    70    50    30    20   100    70
    10   100    90    40    30    50
    40    60    20    10    90    60

>> % 2) Vertical Concatenation
```

```
>> vertcat(A,B)
ans =
   70    50    30
   10   100    90
   40    60    20
   20   100    70
   40    30    50
   10    90    60
```

>> % Indexing

```
>> A(:,2)
ans =
    50
   100
    60
>> A(1,:)
ans =
    70    50    30
>> A(2,2)
ans =
   100
```

>> % Sorting

```
>> sort(A)
ans =
    10    50    20
    40    60    30
```

```
    70   100    90
>> sortrows(A)
ans =
    10   100    90
    40    60    20
    70    50    30
>> sort(sort(A,2),1)
ans =
    10    40    60
    20    50    70
    30    90   100
```

>> % Shifting

```
>> circshift(A,2)
ans =
    10   100    90
    40    60    20
    70    50    30
>> circshift(A,[2,-1])
ans =
   100    90    10
    60    20    40
    50    30    70
```

>> % Reshaping

```
>> A=[20 60 30 40 50; 10 40 80 30 70; 80 60 10 70 90]
A =
```

```
   20   60   30   40   50
   10   40   80   30   70
   80   60   10   70   90
>> reshape(A,5,3,[])
ans =
   20   60   30
   10   30   70
   80   80   50
   60   10   70
   40   40   90
```

>> % Flipping

>> % Flipping Matrix about Vertical Axis

```
>> fliplr(A)
ans =
   30   50   70
   90  100   10
   20   60   40
```

>> % Flipping Matrix about Horizontal Axis

```
>> flipud(A)
ans =
   40   60   20
   10  100   90
   70   50   30
```

DISCUSSION:

Concatenation: It is the process of joining one or more matrices to make a new matrix using horzcat (Horizontally concatenate matrices) or vertcat (Vertically concatenate matrices).

Indexing: To reference a particular element in a matrix, specify its row and column number using the following syntax: A (row, column).

Sorting: The sort function sorts matrix elements along a specified dimension. Syntax for the function is: sort (matrix, dimension,'mode').

Shifting: The circshift function shifts the elements of a matrix in a circular manner along one or more dimensions. Rows or columns that are shifted out of the matrix circulate back into the opposite end.

Flipping: B = fliplr(A) returns A with columns flipped in the left-right direction and B = flipud(A) returns A with rows flipped in the up-down direction.

RESULT:

Matrices were created and Matrix manipulations (Concatenating, Indexing, Sorting, Shifting, Reshaping, Resizing and Flipping) were performed on them.

CONCLUSION:

Various Matrix manipulations were successfully operated and results were obtained.

EXPERIMENT – 2 (B)

AIM:

Creating Arrays X & Y of given size (1 x N) and Performing Relational Operations - >, <, ==, <=, >=, ~=

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> A=[10 30;50 70]
A =
    10    30
    50    70
>> B=[80 60;40 20]
B =
    80    60
    40    20

>> % Equal To
>> eq(A,B)
ans =
     0     0
     0     0

>> % Less Than
>> lt(A,B)
ans =
     1     1
     0     0
```

>> % Greater Than

>> gt(A,B)

ans =

0 0

1 1

>> % Less Than Equal To

>> le(A,B)

ans =

1 1

0 0

>> % Greater Than Equal To

>> ge(A,B)

ans =

0 0

1 1

>> % Not Equal To

>> ne(A,B)

ans =

1 1

1 1

DISCUSSION:

Relational Operations:

Test for equality/greater than or equal/ greater than/ less than or equal/ less than/ inequality is performed using eq/ ge/ gt/ le/ lt/ ne respectively.

The relational operators are <, >, <=, >=, ==, and ~=. Relational operators perform element-by-element comparisons between two arrays. They return a logical array of the same size, with elements set to logical 1 (true) where the relation is true, and elements set to logical 0 (false) where it is not.

RESULT:

Matrices were created and Relational Operations (>, <, ==, <=, >=, ~=) were performed on them.

CONCLUSION:

Various Matrix Relational Operations were successfully operated and results were obtained.

EXPERIMENT – 2 (C)

AIM:

Creating Arrays X & Y of given size (1 x N) and Performing Logical Operations - ~, &, |, XOR

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> A=[1 0 1 0 1]
A =
     1     0     1     0     1
>> B=[1 0 0 0 1]
B =
     1     0     0     0     1
>> % NOT
>> ~A
ans =
     0     1     0     1     0
>> ~B
ans =
     0     1     1     1     0
>> % AND
>> A&B
ans =
     1     0     0     0     1
>> % OR
>> A|B
ans =
```

```
     1     0     1     0     1
>> % XOR
>> xor(A,B)
ans =
     0     0     1     0     0
```

DISCUSSION:

Logical Operations:
The symbols &, |, ~, xor are the logical array operators AND, OR, NOT and exclusive OR. Logical operations return a logical array with elements set to 1 (true) or 0 (false), as appropriate.

Logical AND (&):
expr1 & expr2 represents a logical AND operation between values, arrays, or expressions expr1 and expr2. In an AND operation, if expr1 is true *and* expr2 is true, then the AND of those inputs is true. If either expression is false, the result is false.

Logical OR (|):
expr1 | expr2 represents a logical OR operation between values, arrays, or expressions expr1 and expr2. In an OR operation, if expr1 is true *or* expr2 is true, then the OR of those inputs is true. If both expressions are false, the result is false.

Logical NOT (~):
~expr represents a logical NOT operation applied to expression expr. In a NOT operation, if expr is false, then the result of the operation is true. If expr is true, the result is false.

Exclusive OR (xor):
C = xor (A, B) performs an exclusive OR operation on the corresponding elements of arrays A and B. The resulting element C(i,j,...) is logical true (1) if A(i,j,...) or B(i,j,...), but not both, is nonzero.

RESULT:

Matrices were created and Logical Operations (~, &, |, XOR) were performed on them.

CONCLUSION:

Various Logical Operations were successfully operated and results were obtained.

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P)

Programme	Btech MAE	Course Name	Basic Simulation
Course Code	ES204	Semester	4
Student Name	NIKHITA WADHAWAN	Enrollment No.	A2305413102

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

EXPERIMENT – 3 (A)

AIM:

Generating a set of Commands on a given Vector (Example: X = [1 8 3 9 0 1]) to add up the values of the elements (Check with sum)

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> X=[1 3 5 7 9 2 4 6 8 10]
X =
    1    3    5    7    9    2    4    6    8   10
```

```
>> % SUM
>> Y=sum(X)
Y =
   55
```

```
>> % Sum of some elements
>> Y=sum(X(3:7))
Y =
   27
```

```
>> % Cumulative Sum
>> Z=cumsum(X)
Z =
    1    4    9   16   25   27   31   37   45   55
```

DISCUSSION:

Sum of all/specific elements of a vector were calculated using sum ().

sum (A) returns the sum of all the elements of the vector.

sum (A(i:j)) returns sum of ith to jth elements of the vector.

RESULT:

Matrices was created and sum of all as well as specific elements was calculated using sum ().

CONCLUSION:

Vector was created and sum of all as well as specific elements was successfully calculated.

EXPERIMENT – 3 (B)

AIM:

Generating a set of Commands on a given Vector (Example: X = [1 8 3 9 0 1]) to compute the Running Sum (Check with sum), where Running Sum for element j = the sum of the elements from 1 to j, inclusive.

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> X=[1 3 5 7 9 2 4 6 8 10]
X =
    1    3    5    7    9    2    4    6    8   10
>> Len=length(X)
Len =
   10
>> Sum=0
Sum =
    0

>> for i=1:Len
     Sum=Sum+X(i)
   end
Sum =
    1
Sum =
    4
Sum =
    9
Sum =
```

```
    16
Sum =
    25
Sum =
    27
Sum =
    31
Sum =
    37
Sum =
    45
Sum =
    55
```

DISCUSSION:

For loop is used here to calculate the running sum of all elements of the vector. If the matrix is of two dimensions then we have to use two For loops.

RESULT:

Vector was created and its running sum was calculated using for loops.

CONCLUSION:

Running sum of a matrix was successfully calculated.

EXPERIMENT – 3 (C)

AIM:

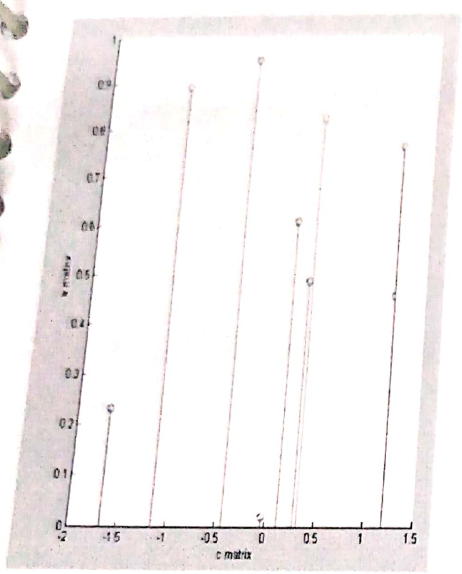
Generating a Random Sequence using rand() / randn() functions and plotting them.

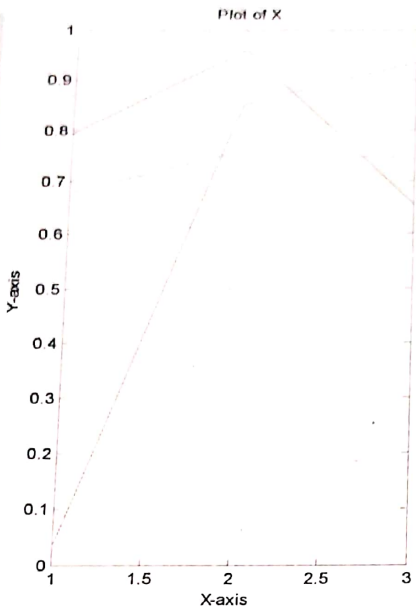
SOFTWARE USED: MATLAB 7.12.0 (R2011a)

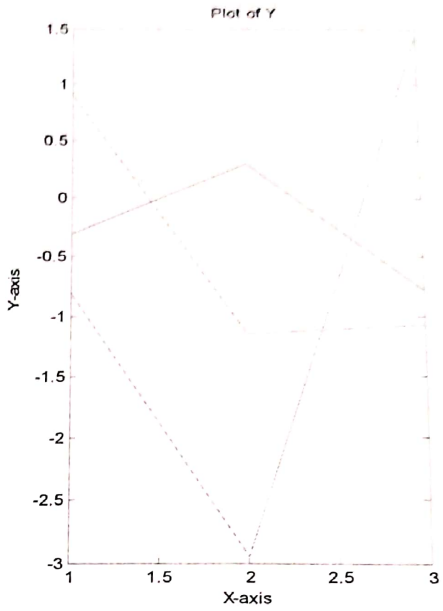
PROCEDURE:

```
>> X=rand(3)
X =
    0.7922    0.0357    0.6787
    0.9595    0.8491    0.7577
    0.6557    0.9340    0.7431

>> Y=randn(3)
Y =
   -0.3034    0.8884   -0.8095
    0.2939   -1.1471   -2.9443
   -0.7873   -1.0689    1.4384

>> subplot(1,2,1)
>> plot(X)
>> title('Plot of X')
>> xlabel('X-axis')
>> ylabel('Y-axis')
>> subplot(1,2,2)
>> plot(Y)
>> title('Plot of Y')
>> xlabel('X-axis')
```

```
>> ylabel('Y-axis')
```







DISCUSSION:

Generating Random Sequence:

r = randn (n) returns an n-by-n matrix containing pseudorandom values drawn from the standard normal distribution while r = rand(n) returns an n-by-n matrix containing pseudorandom values drawn from the standard uniform distribution on the open interval (0,1).

Plotting using plot ():

Plot (Y) plots the columns of Y versus the index of each value when Y is a real number and plot(X1,Y1,...,Xn,Yn) plots each vector Yn versus vector Xn on the same axes. Functions xlabel and ylabel were used to label x and y axis.

Plotting using stem ():

It plots discrete sequence data. Stem (X, Y) plots X versus the columns of Y. X and Y must be vectors or matrices of the same size.

Subplot ():

Subplot divides the current figure into rectangular panes that are numbered row-wise. h = subplot (m,n,p) or subplot (mnp) breaks the figure window into an m-by-n matrix of small axes, selects the pth axes object for the current plot, and returns the axes handle.

RESULT:

Random sequence was generated using rand () and randn (). And plotting was done using plot, subplot and stem functions.

CONCLUSION:

Functions rand, randn, plot, subplot and stem were successfully performed.

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P)

Programme	Btech MAE	Course Name	Basic Simulation
Course Code	ES204	Semester	4
Student Name	NIKHITA WADHAWAN	Enrollment No.	A2305413102

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

EXPERIMENT – 4 (A)

AIM:

Evaluating a given expression and rounding it to the nearest integer value using Round, Floor, Ceil and Fix functions.

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> % Round
>> round(-99.97855)
ans =
 -100
>> round(99.97855)
ans =
  100

>> % Ceil
>> ceil(99.97855)
ans =
  100
>> ceil(-99.97855)
ans =
 -99

>> % Floor
>> floor(99.97855)
ans =
  99
>> floor(-99.97855)
```

```
ans =
 -100

>> % Fix
>> fix(50.55555)
ans =
   50
>> fix(-50.55555)
ans =
  -50
```

DISCUSSION:

Rounding:
Y = round(X) rounds the elements of X to the nearest integers. Positive elements with a fractional part of 0.5 round up to the nearest positive integer. Negative elements with a fractional part of -0.5 round down to the nearest negative integer.

Flooring:
B = floor (A) rounds the elements of A to the nearest integers less than or equal to A.

Fixing:
B = fix (A) rounds the elements of A toward zero.

Ceiling:
B = ceil (A) rounds the elements of A to the nearest integers greater than or equal to A.

RESULT:

Matrices were created and different rounding functions (round, floor, fix, ceil) were applied on them and results were obtained

CONCLUSION:

Various rounding functions were successfully implemented.

EXPERIMENT – 4 (B)

AIM:

Generating and Plots of Trigonometric Functions - sin(t),cos(t), tan(t), sec(t), cosec(t) and cot(t) for a given duration, 't'.

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

>> % Generating and Plotting Trignometric functions

```
>> t=-pi:0.1:pi

t =

 Columns 1 through 9
 -3.1416  -3.0416  -2.9416  -2.8416  -2.7416  -2.6416  -2.5416  -2.4416  -2.3416
 Columns 10 through 18
 -2.2416  -2.1416  -2.0416  -1.9416  -1.8416  -1.7416  -1.6416  -1.5416  -1.4416
 Columns 19 through 27
 -1.3416  -1.2416  -1.1416  -1.0416  -0.9416  -0.8416  -0.7416  -0.6416  -0.5416
 Columns 28 through 36
 -0.4416  -0.3416  -0.2416  -0.1416  -0.0416   0.0584   0.1584   0.2584   0.3584
 Columns 37 through 45
  0.4584   0.5584   0.6584   0.7584   0.8584   0.9584   1.0584   1.1584   1.2584
 Columns 46 through 54
  1.3584   1.4584   1.5584   1.6584   1.7584   1.8584   1.9584   2.0584   2.1584
 Columns 55 through 63
  2.2584   2.3584   2.4584   2.5584   2.6584   2.7584   2.8584   2.9584   3.0584
```

>> % Generating and Plotting sin (t)

```
>> X=sin(t)

X =

 Columns 1 through 9
 -0.0000  -0.0998  -0.1987  -0.2955  -0.3894  -0.4794  -0.5646  -0.6442  -0.7174
 Columns 10 through 18
 -0.7833  -0.8415  -0.8912  -0.9320  -0.9636  -0.9854  -0.9975  -0.9996  -0.9917
 Columns 19 through 27
 -0.9738  -0.9463  -0.9093  -0.8632  -0.8085  -0.7457  -0.6755  -0.5985  -0.5155
 Columns 28 through 36
 -0.4274  -0.3350  -0.2392  -0.1411  -0.0416   0.0584   0.1577   0.2555   0.3508
```

```
Columns 37 through 45
  0.4425   0.5298   0.6119   0.6878   0.7568   0.8183   0.8716   0.9162   0.9516
Columns 46 through 54
  0.9775   0.9937   0.9999   0.9962   0.9825   0.9589   0.9258   0.8835   0.8323
Columns 55 through 63
  0.7728   0.7055   0.6313   0.5507   0.4646   0.3739   0.2794   0.1822   0.0831
```

```
>> subplot(1,2,1)
>> plot(t,X)
>> xlabel('t')
>> ylabel('sin(t)')
>> title('Sin(t)')
>> subplot(1,2,2)
>> stem(t,X)
>> xlabel('t')
>> ylabel('sin(t)')
>> title('Sin(t)')
```

>> % Generating and Plotting cos(t)

```
>> X=cos(t)

X =

Columns 1 through 9
  -1.0000  -0.9950  -0.9801  -0.9553  -0.9211  -0.8776  -0.8253  -0.7648  -0.6967
Columns 10 through 18
  -0.6216  -0.5403  -0.4536  -0.3624  -0.2675  -0.1700  -0.0707   0.0292   0.1288
Columns 19 through 27
   0.2272   0.3233   0.4161   0.5048   0.5885   0.6663   0.7374   0.8011   0.8569
Columns 28 through 36
   0.9041   0.9422   0.9710   0.9900   0.9991   0.9983   0.9875   0.9668   0.9365
Columns 37 through 45
   0.8968   0.8481   0.7910   0.7259   0.6536   0.5748   0.4903   0.4008   0.3073
Columns 46 through 54
   0.2108   0.1122   0.0124  -0.0875  -0.1865  -0.2837  -0.3780  -0.4685  -0.5544
Columns 55 through 63
  -0.6347  -0.7087  -0.7756  -0.8347  -0.8855  -0.9275  -0.9602  -0.9833  -0.9965
```

```
>> subplot(1,2,1)
>> plot(t,X)
>> xlabel('t')
>> ylabel('cos(t)')
```

```
>> title('Cos(t)')
>> subplot(1,2,2)
>> stem(t,X)
>> xlabel('t')
>> ylabel('cos(t)')
>> title('Cos(t)')
```

>> % Generating and Plotting tan(t)

```
>> t=(-pi/2)+0.05:0.05:(pi/2)-0.05

t =

  Columns 1 through 9
   -1.5208   -1.4708   -1.4208   -1.3708   -1.3208   -1.2708   -1.2208   -1.1708   -1.1208
  Columns 10 through 18
   -1.0708   -1.0208   -0.9708   -0.9208   -0.8708   -0.8208   -0.7708   -0.7208   -0.6708
  Columns 19 through 27
   -0.6208   -0.5708   -0.5208   -0.4708   -0.4208   -0.3708   -0.3208   -0.2708   -0.2208
  Columns 28 through 36
   -0.1708   -0.1208   -0.0708   -0.0208    0.0292    0.0792    0.1292    0.1792    0.2292
  Columns 37 through 45
    0.2792    0.3292    0.3792    0.4292    0.4792    0.5292    0.5792    0.6292    0.6792
  Columns 46 through 54
    0.7292    0.7792    0.8292    0.8792    0.9292    0.9792    1.0292    1.0792    1.1292
  Columns 55 through 61
    1.1792    1.2292    1.2792    1.3292    1.3792    1.4292    1.4792

>> X=tan(t)

X =

  Columns 1 through 9
  -19.9833   -9.9666   -6.6166   -4.9332   -3.9163   -3.2327   -2.7395   -2.3652   -2.0702
  Columns 10 through 18
   -1.8305   -1.6310   -1.4617   -1.3154   -1.1872   -1.0734   -0.9712   -0.8785   -0.7936
  Columns 19 through 27
```

```
  -0.7151   -0.6421   -0.5736   -0.5090   -0.4475   -0.3888   -0.3323   -0.2776   -0.2245
 Columns 28 through 36
  -0.1725   -0.1214   -0.0709   -0.0208    0.0292    0.0794    0.1299    0.1811    0.2333
 Columns 37 through 45
   0.2867    0.3416    0.3985    0.4577    0.5196    0.5848    0.6540    0.7279    0.8073
 Columns 46 through 54
   0.8935    0.9877    1.0917    1.2077    1.3386    1.4884    1.6622    1.8676    2.1154
 Columns 55 through 61
   2.4218    2.8127    3.3317    4.0584    5.1554    7.0153   10.8874

>> subplot(1,2,1)
>> plot(t,X)
>> xlabel('t')
>> ylabel('tan(t)')
>> title('Tan(t)')
>> subplot(1,2,2)
>> stem(t,X)
>> xlabel('t')
>> ylabel('tan(t)')
>> title('Tan(t)')
```

```
>> % Generating and Plotting asin(t)

>> t=-1:0.02:1

t =

 Columns 1 through 9
  -1.0000   -0.9800   -0.9600   -0.9400   -0.9200   -0.9000   -0.8800   -0.8600   -0.8400
 Columns 10 through 18
```

-0.8200 -0.8000 -0.7800 -0.7600 -0.7400 -0.7200 -0.7000 -0.6800 -0.6600

Columns 19 through 27

-0.6400 -0.6200 -0.6000 -0.5800 -0.5600 -0.5400 -0.5200 -0.5000 -0.4800

Columns 28 through 36

-0.4600 -0.4400 -0.4200 -0.4000 -0.3800 -0.3600 -0.3400 -0.3200 -0.3000

Columns 37 through 45

-0.2800 -0.2600 -0.2400 -0.2200 -0.2000 -0.1800 -0.1600 -0.1400 -0.1200

Columns 46 through 54

-0.1000 -0.0800 -0.0600 -0.0400 -0.0200 0 0.0200 0.0400 0.0600

Columns 55 through 63

0.0800 0.1000 0.1200 0.1400 0.1600 0.1800 0.2000 0.2200 0.2400

Columns 64 through 72

0.2600 0.2800 0.3000 0.3200 0.3400 0.3600 0.3800 0.4000 0.4200

Columns 73 through 81

0.4400 0.4600 0.4800 0.5000 0.5200 0.5400 0.5600 0.5800 0.6000

Columns 82 through 90

0.6200 0.6400 0.6600 0.6800 0.7000 0.7200 0.7400 0.7600 0.7800

Columns 91 through 99

0.8000 0.8200 0.8400 0.8600 0.8800 0.9000 0.9200 0.9400 0.9600

Columns 100 through 101

0.9800 1.0000

>> X=asin(t)

X =

Columns 1 through 9

-1.5708 -1.3705 -1.2870 -1.2226 -1.1681 -1.1198 -1.0759 -1.0353 -0.9973

Columns 10 through 18

-0.9614 -0.9273 -0.8947 -0.8633 -0.8331 -0.8038 -0.7754 -0.7478 -0.7208

Columns 19 through 27

-0.6945 -0.6687 -0.6435 -0.6187 -0.5944 -0.5704 -0.5469 -0.5236 -0.5007

Columns 28 through 36

-0.4780 -0.4556 -0.4334 -0.4115 -0.3898 -0.3683 -0.3469 -0.3257 -0.3047

Columns 37 through 45

-0.2838 -0.2630 -0.2424 -0.2218 -0.2014 -0.1810 -0.1607 -0.1405 -0.1203

Columns 46 through 54

-0.1002 -0.0801 -0.0600 -0.0400 -0.0200 0 0.0200 0.0400 0.0600

Columns 55 through 63

0.0801 0.1002 0.1203 0.1405 0.1607 0.1810 0.2014 0.2218 0.2424

Columns 64 through 72

0.2630 0.2838 0.3047 0.3257 0.3469 0.3683 0.3898 0.4115 0.4334

Columns 73 through 81

0.4556 0.4780 0.5007 0.5236 0.5469 0.5704 0.5944 0.6187 0.6435

Columns 82 through 90

0.6687 0.6945 0.7208 0.7478 0.7754 0.8038 0.8331 0.8633 0.8947

```
Columns 91 through 99
  0.9273   0.9614   0.9973   1.0353   1.0759   1.1198   1.1681   1.2226   1.2870
Columns 100 through 101
  1.3705   1.5708

>> subplot(1,2,1)
>> plot(t,X)
>> xlabel('t')
>> ylabel('asin(t)')
>> title('Cosec(t)')
>> subplot(1,2,2)
>> stem(t,X)
>> xlabel('t')
>> ylabel('asin(t)')
>> title('Cosec(t)')
```

>> % Generating and Plotting acos(t)

```
>> X=acos(t)

X =

Columns 1 through 9
  3.1416   2.9413   2.8578   2.7934   2.7389   2.6906   2.6467   2.6061   2.5681
Columns 10 through 18
  2.5322   2.4981   2.4655   2.4341   2.4039   2.3746   2.3462   2.3186   2.2916
Columns 19 through 27
  2.2653   2.2395   2.2143   2.1895   2.1652   2.1412   2.1176   2.0944   2.0715
Columns 28 through 36
  2.0488   2.0264   2.0042   1.9823   1.9606   1.9391   1.9177   1.8965   1.8755
Columns 37 through 45
  1.8546   1.8338   1.8132   1.7926   1.7722   1.7518   1.7315   1.7113   1.6911
Columns 46 through 54
  1.6710   1.6509   1.6308   1.6108   1.5908   1.5708   1.5508   1.5308   1.5108
Columns 55 through 63
  1.4907   1.4706   1.4505   1.4303   1.4101   1.3898   1.3694   1.3490   1.3284
Columns 64 through 72
  1.3078   1.2870   1.2661   1.2451   1.2239   1.2025   1.1810   1.1593   1.1374
Columns 73 through 81
  1.1152   1.0928   1.0701   1.0472   1.0239   1.0004   0.9764   0.9521   0.9273
Columns 82 through 90
  0.9021   0.8763   0.8500   0.8230   0.7954   0.7670   0.7377   0.7075   0.6761
Columns 91 through 99
  0.6435   0.6094   0.5735   0.5355   0.4949   0.4510   0.4027   0.3482   0.2838
```

```
Columns 100 through 101
  0.2003         0

>> subplot(1,2,1)
>> plot(t,X)
>> xlabel('t')
>> ylabel('acos(t)')
>> title('Sec(t)')
>> subplot(1,2,2)
>> stem(t,X)
>> xlabel('t')
>> ylabel('acos(t)')
>> title('Sec(t)')
```

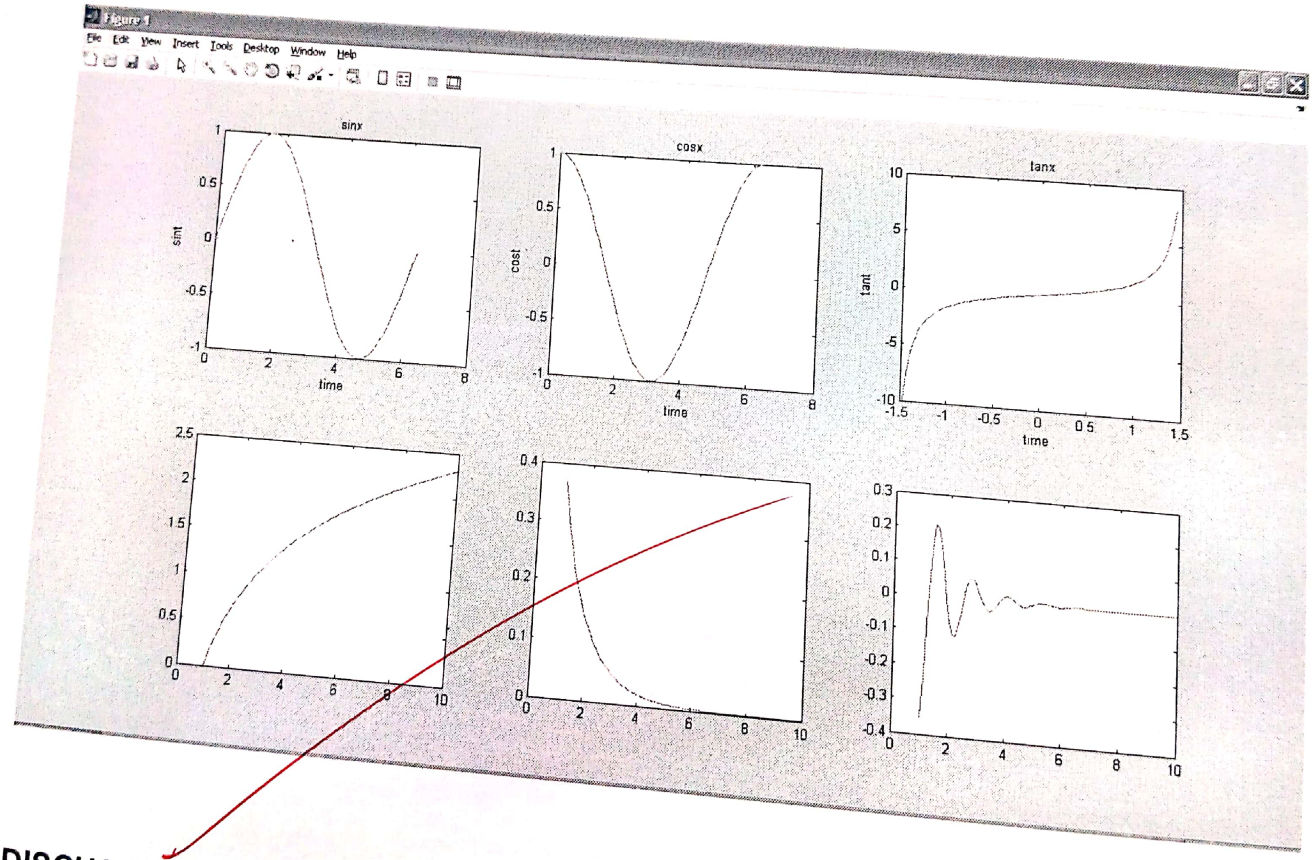
```
>> % Generating and Plotting atan(t)
>> t=-5:0.1:5

t =

Columns 1 through 9
-5.0000   -4.9000   -4.8000   -4.7000   -4.6000   -4.5000   -4.4000   -4.3000   -4.2000
```

```
Columns 10 through 18
-4.1000  -4.0000  -3.9000  -3.8000  -3.7000  -3.6000  -3.5000  -3.4000  -3.3000
Columns 19 through 27
-3.2000  -3.1000  -3.0000  -2.9000  -2.8000  -2.7000  -2.6000  -2.5000  -2.4000
Columns 28 through 36
-2.3000  -2.2000  -2.1000  -2.0000  -1.9000  -1.8000  -1.7000  -1.6000  -1.5000
Columns 37 through 45
-1.4000  -1.3000  -1.2000  -1.1000  -1.0000  -0.9000  -0.8000  -0.7000  -0.6000
Columns 46 through 54
-0.5000  -0.4000  -0.3000  -0.2000  -0.1000        0   0.1000   0.2000   0.3000
Columns 55 through 63
 0.4000   0.5000   0.6000   0.7000   0.8000   0.9000   1.0000   1.1000   1.2000
Columns 64 through 72
 1.3000   1.4000   1.5000   1.6000   1.7000   1.8000   1.9000   2.0000   2.1000
Columns 73 through 81
 2.2000   2.3000   2.4000   2.5000   2.6000   2.7000   2.8000   2.9000   3.0000
Columns 82 through 90
 3.1000   3.2000   3.3000   3.4000   3.5000   3.6000   3.7000   3.8000   3.9000
Columns 91 through 99
 4.0000   4.1000   4.2000   4.3000   4.4000   4.5000   4.6000   4.7000   4.8000
Columns 100 through 101
 4.9000   5.0000

>> X=atan(t)

X =

Columns 1 through 9
-1.3734  -1.3695  -1.3654  -1.3612  -1.3567  -1.3521  -1.3473  -1.3423  -1.3371
Columns 10 through 18
-1.3316  -1.3258  -1.3198  -1.3135  -1.3068  -1.2998  -1.2925  -1.2847  -1.2766
Columns 19 through 27
-1.2679  -1.2588  -1.2490  -1.2387  -1.2278  -1.2161  -1.2036  -1.1903  -1.1760
Columns 28 through 36
-1.1607  -1.1442  -1.1264  -1.1071  -1.0863  -1.0637  -1.0391  -1.0122  -0.9828
Columns 37 through 45
-0.9505  -0.9151  -0.8761  -0.8330  -0.7854  -0.7328  -0.6747  -0.6107  -0.5404
Columns 46 through 54
-0.4636  -0.3805  -0.2915  -0.1974  -0.0997        0   0.0997   0.1974   0.2915
Columns 55 through 63
 0.3805   0.4636   0.5404   0.6107   0.6747   0.7328   0.7854   0.8330   0.8761
Columns 64 through 72
 0.9151   0.9505   0.9828   1.0122   1.0391   1.0637   1.0863   1.1071   1.1264
Columns 73 through 81
 1.1442   1.1607   1.1760   1.1903   1.2036   1.2161   1.2278   1.2387   1.2490
Columns 82 through 90
```

```
    1.2588    1.2679    1.2766    1.2847    1.2925    1.2998    1.3068    1.3135    1.3198
  Columns 91 through 99
    1.3258    1.3316    1.3371    1.3423    1.3473    1.3521    1.3567    1.3612    1.3654
  Columns 100 through 101
    1.3695    1.3734
```

```
>> subplot(1,2,1)
>> plot(t,X)
>> xlabel('t')
>> ylabel('atan(t)')
>> title('Cot(t)')
>> subplot(1,2,2)
>> stem(t,X)
>> xlabel('t')
>> ylabel('atan(t)')
>> title('Cot(t)')
```

PLOTS:



DISCUSSION:

Trignometric Functions:

Y = sin(X) returns the circular sine of the elements of X/sine of argument in radians. Similarly cos, tan, acos, asin, atan perform.

Plotting using plot ():

Plot (Y) plots the columns of Y versus the index of each value when Y is a real number and plot(X1,Y1,...,Xn,Yn) plots each vector Yn versus vector Xn on the same axes. Functions xlabel and ylabel were used to label x and y axis.

Plotting using stem ():

It plots discrete sequence data. Stem (X,Y) plots X versus the columns of Y. X and Y must be vectors or matrices of the same size.

Subplot ():

Subplot divides the current figure into rectangular panes that are numbered rowwise. h = subplot (m,n,p) or subplot (mnp) breaks the figure window into an m-by-n matrix of small axes, selects the pth axes object for the current plot, and returns the axes handle.

RESULT:

Matrices were created and trigonometric functions (sin(t), cos(t), tan(t), acos(t), asin(t), atan (t)) were generated and plotted. And plotting was done using plot, subplot and stem functions.

CONCLUSION:

Various trigonometric functions were generated and plotted.

EXPERIMENT – 4 (C)

AIM:

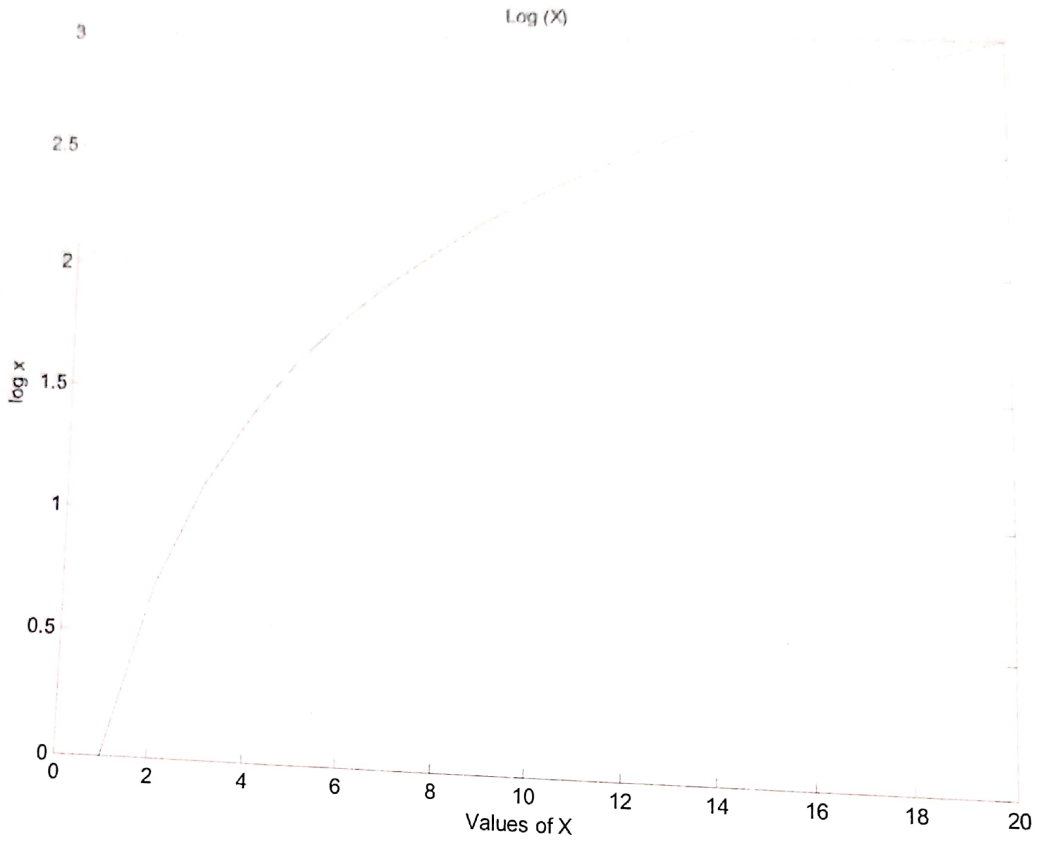
Generating and Plots of Logarithmic and other Functions – log(A), $\log_{10}$(A), Square root of A, Real n^{th} root of A.

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>> X=1:1:20
X =
  Columns 1 through 15
    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
  Columns 16 through 20
   16   17   18   19   20

>> % Log(X)
>> Y=log(X)
Y =
  Columns 1 through 9
         0    0.6931    1.0986    1.3863    1.6094    1.7918    1.9459    2.0794    2.1972
  Columns 10 through 18
    2.3026    2.3979    2.4849    2.5649    2.6391    2.7081    2.7726    2.8332    2.8904
  Columns 19 through 20
    2.9444    2.9957
>> plot(X,Y)
title('Log (X)')
xlabel('Values of X ')
```

ylabel('log x')



>> % Log10(X)

>> Y=log10(X)

Y =

Columns 1 through 9

0 0.3010 0.4771 0.6021 0.6990 0.7782 0.8451 0.9031 0.9542

Columns 10 through 18

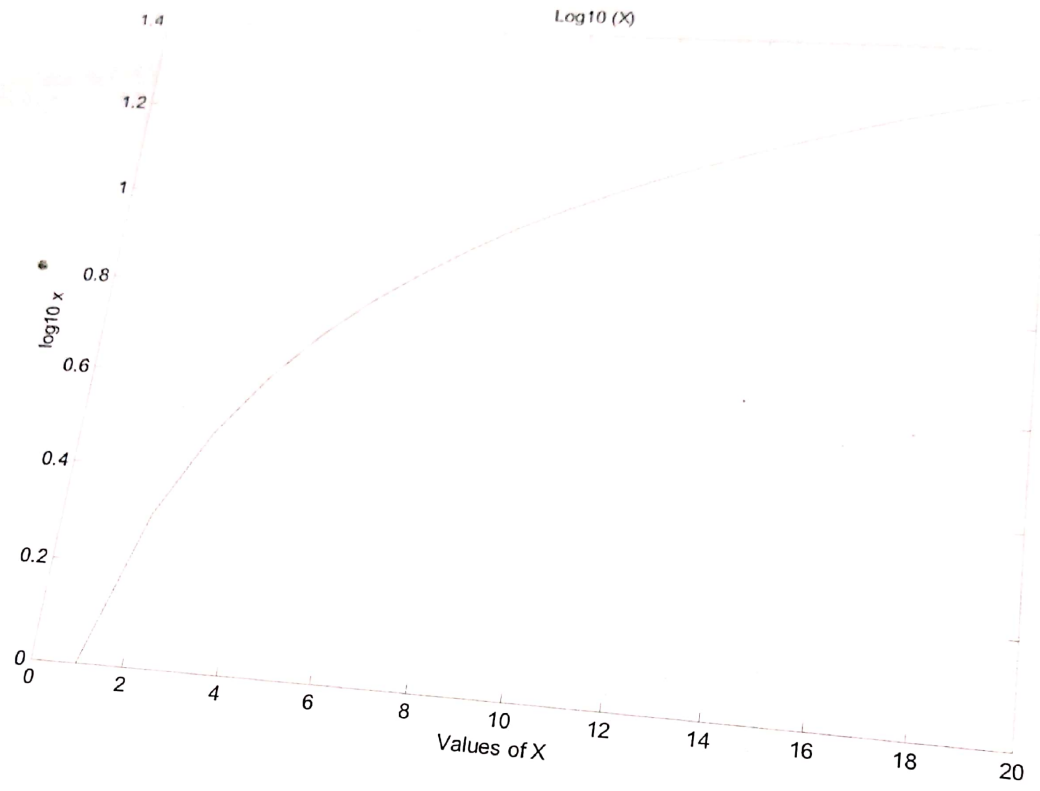
1.0000 1.0414 1.0792 1.1139 1.1461 1.1761 1.2041 1.2304 1.2553

Columns 19 through 20

1.2788 1.3010

>> plot(X,Y)

```
title('Log10 (X)')
xlabel('Values of X ')
ylabel('log10 x')
```

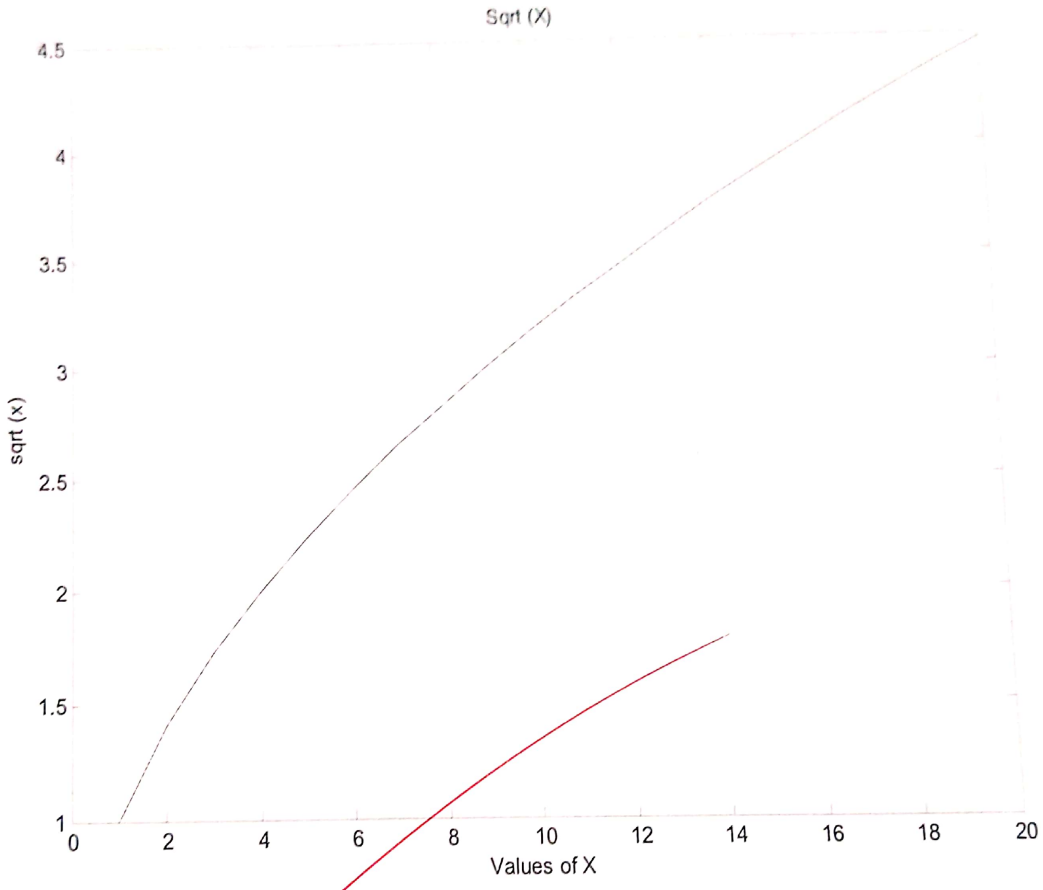



```
>> % Sqrt(X)
>> Y=sqrt(X)
Y =

Columns 1 through 9

   1.0000   1.4142   1.7321   2.0000   2.2361   2.4495   2.6458   2.8284   3.0000

Columns 10 through 18

   3.1623   3.3166   3.4641   3.6056   3.7417   3.8730   4.0000   4.1231   4.2426
```

Columns 19 through 20

4.3589 4.4721

```
>> plot(X,Y)
title('Sqrt (X)')
xlabel('Values of X ')
ylabel('sqrt (x)')
```



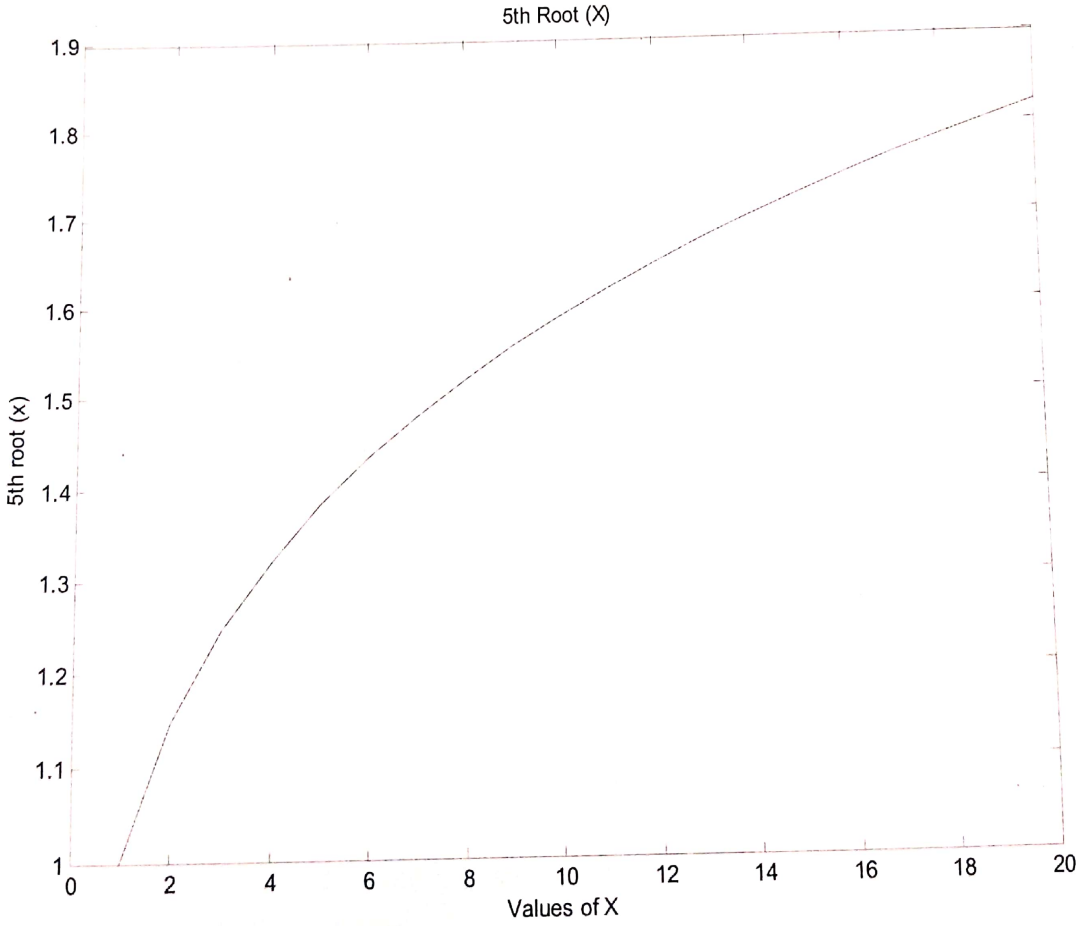
>> % nthroot(X)

>> Y=nthroot(X,5)

Y =

Columns 1 through 9

```
    1.0000    1.1487    1.2457    1.3195    1.3797    1.4310    1.4758    1.5157    1.5518

  Columns 10 through 18

    1.5849    1.6154    1.6438    1.6703    1.6952    1.7188    1.7411    1.7623    1.7826

  Columns 19 through 20

    1.8020    1.8206

>> plot(X,Y)
title('5th Root (X)')
xlabel('Values of X ')
ylabel('5th root (x)')
```



DISCUSSION:

Logarithmic Functions:

Y = log(X) returns the natural logarithm of the elements of X.

Y = log10(X) returns the base 10 logarithm of the elements of X.

Square root:

B = sqrt(X) returns the square root of each element of the array X.

Real n^{th} root of A:

y = nthroot(X, n) returns the real nth root of the elements of X. Both X and n must be real and n must be a scalar. If X has negative entries, n must be an odd integer.

RESULT:

Matrix was created and Logarithmic Functions (log and log10) along with other functions (sqrt and nthroot) were implemented and results were obtained.And plotting was done using plot, subplot and stem functions.

CONCLUSION:

Various Logarithmic and other functions were successfully implemented and plotted.

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P)

Programme	Btech MAE	Course Name	Basic Simulation
Course Code	ES204	Semester	4
Student Name	NIKHITA WADHAWAN	Enrollment No.	A2305413102

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

EXPERIMENT - 5

AIM:

Creating a vector X with elements, $Xn = (-1)^{n+1}/(2n-1)$ and Adding up 100 elements of the vector, X; And, plotting the functions, x, x^4, e^x, $\exp(x^2)$ over the interval $0 < x < 4$ (by choosing appropriate mesh values for x to obtain smooth curves), on A Rectangular Plot

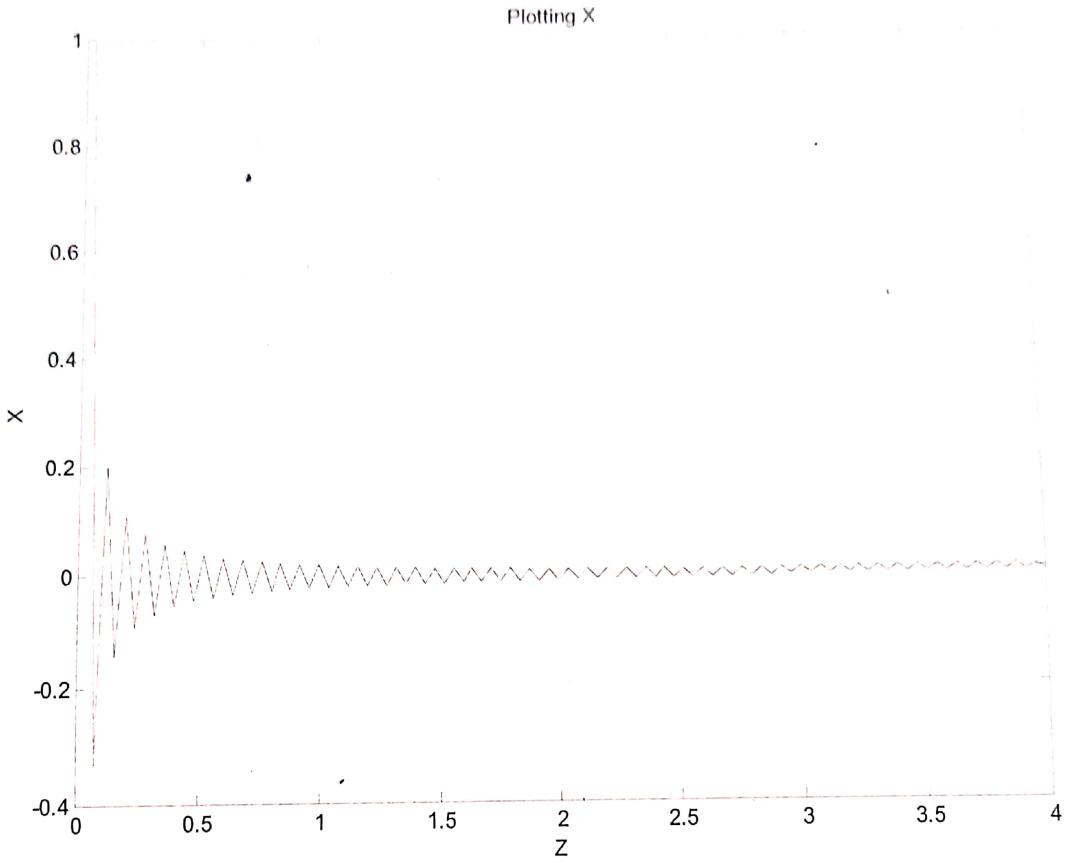
SOFTWARE USED: MATLAB 7.12.0(R2011a)

PROCEDURE:

```
>> % Creating Vector X

>> for n=1:100
X(n)=((-1)^(n+1))/(2*n-1)
end

X =

 Columns 1 through 9
   1.0000   -0.3333    0.2000   -0.1429    0.1111   -0.0909    0.0769   -0.0667    0.0588
 Columns 10 through 18
  -0.0526    0.0476   -0.0435    0.0400   -0.0370    0.0345   -0.0323    0.0303   -0.0286
 Columns 19 through 27
   0.0270   -0.0256    0.0244   -0.0233    0.0222   -0.0213    0.0204   -0.0196    0.0189
 Columns 28 through 36
  -0.0182    0.0175   -0.0169    0.0164   -0.0159    0.0154   -0.0149    0.0145   -0.0141
 Columns 37 through 45
   0.0137   -0.0133    0.0130   -0.0127    0.0123   -0.0120    0.0118   -0.0115    0.0112
 Columns 46 through 54
  -0.0110    0.0108   -0.0105    0.0103   -0.0101    0.0099   -0.0097    0.0095   -0.0093
 Columns 55 through 63
   0.0092   -0.0090    0.0088   -0.0087    0.0085   -0.0084    0.0083   -0.0081    0.0080
 Columns 64 through 72
  -0.0079    0.0078   -0.0076    0.0075   -0.0074    0.0073   -0.0072    0.0071   -0.0070
 Columns 73 through 81
   0.0069   -0.0068    0.0067   -0.0066    0.0065   -0.0065    0.0064   -0.0063    0.0062
 Columns 82 through 90
  -0.0061    0.0061   -0.0060    0.0059   -0.0058    0.0058   -0.0057    0.0056   -0.0056
 Columns 91 through 99
   0.0055   -0.0055    0.0054   -0.0053    0.0053   -0.0052    0.0052   -0.0051    0.0051
 Column 100
  -0.0050
>> % Adding elements of vector X
```

```
>> Y=sum(X(n))

Y =

  -0.0050

>> % Creating interval vector Z

>> Z=0.04:0.04:4

Z =

 Columns 1 through 9
   0.0400   0.0800   0.1200   0.1600   0.2000   0.2400   0.2800   0.3200   0.3600
 Columns 10 through 18
   0.4000   0.4400   0.4800   0.5200   0.5600   0.6000   0.6400   0.6800   0.7200
 Columns 19 through 27
   0.7600   0.8000   0.8400   0.8800   0.9200   0.9600   1.0000   1.0400   1.0800
 Columns 28 through 36
   1.1200   1.1600   1.2000   1.2400   1.2800   1.3200   1.3600   1.4000   1.4400
 Columns 37 through 45
   1.4800   1.5200   1.5600   1.6000   1.6400   1.6800   1.7200   1.7600   1.8000
 Columns 46 through 54
   1.8400   1.8800   1.9200   1.9600   2.0000   2.0400   2.0800   2.1200   2.1600
 Columns 55 through 63
   2.2000   2.2400   2.2800   2.3200   2.3600   2.4000   2.4400   2.4800   2.5200
 Columns 64 through 72
   2.5600   2.6000   2.6400   2.6800   2.7200   2.7600   2.8000   2.8400   2.8800
 Columns 73 through 81
   2.9200   2.9600   3.0000   3.0400   3.0800   3.1200   3.1600   3.2000   3.2400
 Columns 82 through 90
   3.2800   3.3200   3.3600   3.4000   3.4400   3.4800   3.5200   3.5600   3.6000
 Columns 91 through 99
   3.6400   3.6800   3.7200   3.7600   3.8000   3.8400   3.8800   3.9200   3.9600
 Column 100
   4.0000

>> % Plotting Functions

>> % Plotting X

>> plot(Z,X)
>> xlabel('Z')
>> ylabel('X')
```

>> title('Plotting X')



>> % Plotting X^3

>> A=X.^3

A =

Columns 1 through 9

1.0000	-0.0370	0.0080	-0.0029	0.0014	-0.0008	0.0005	-0.0003	0.0002

Columns 10 through 18

-0.0001	0.0001	-0.0001	0.0001	-0.0001	0.0000	-0.0000	0.0000	-0.0000

Columns 19 through 27

0.0000	-0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000

Columns 28 through 36

-0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000	-0.0000

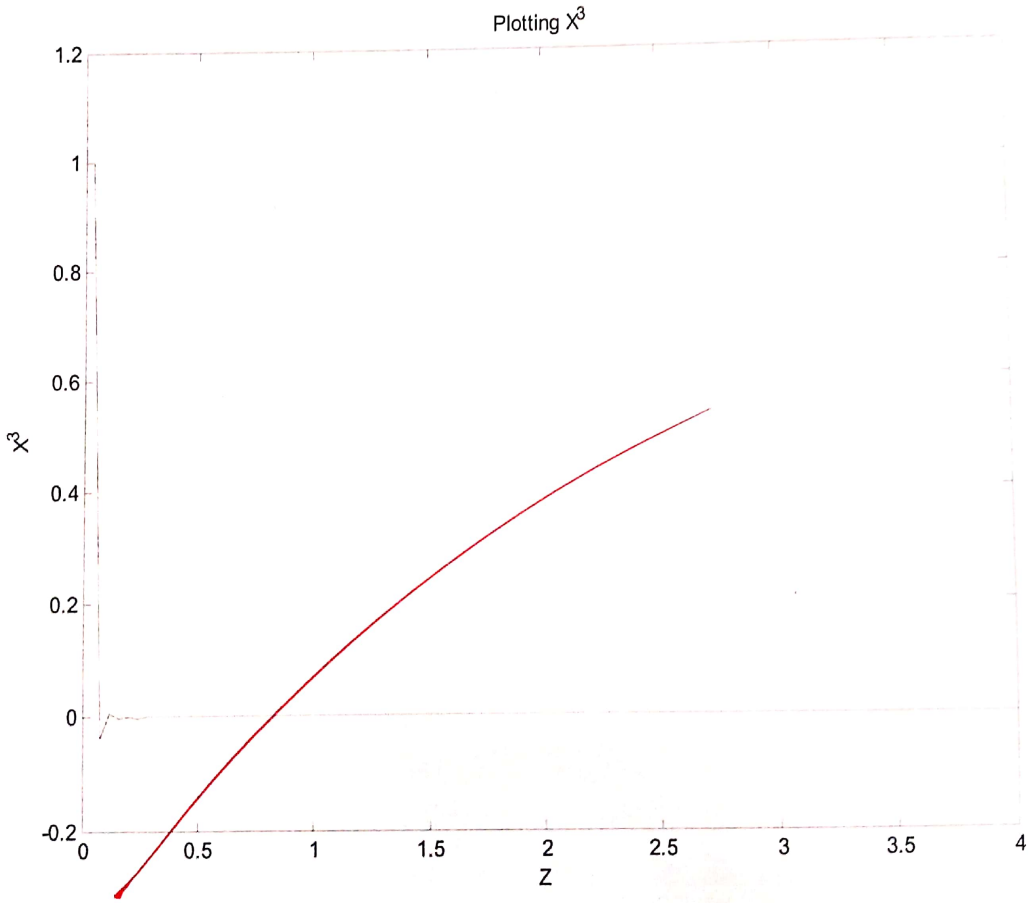
Columns 37 through 45

0.0000	-0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000

Columns 46 through 54

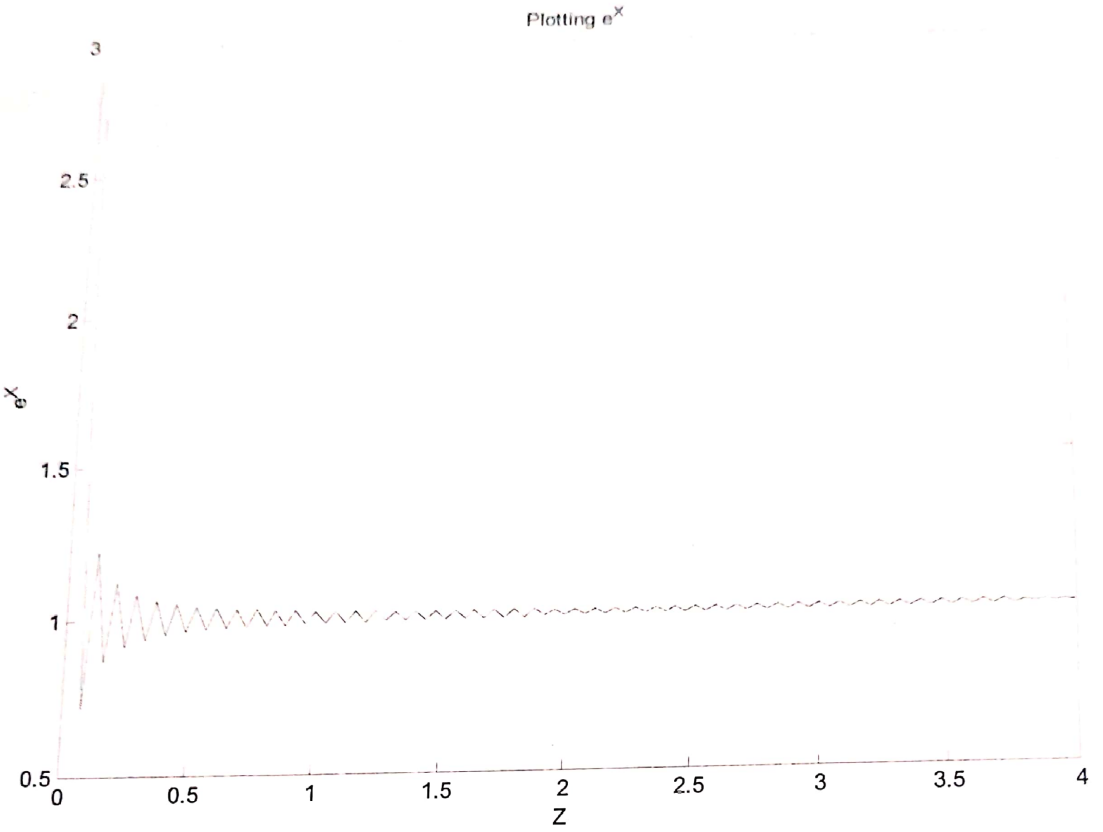
```
  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000
Columns 55 through 63
   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000
Columns 64 through 72
  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000
Columns 73 through 81
   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000
Columns 82 through 90
  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000
Columns 91 through 99
   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000  -0.0000   0.0000
Column 100
  -0.0000
```

```
>> plot(Z,A)
>> xlabel('Z')
>> ylabel('X^3')
>> title('Plotting X^3')
```



>> % Plotting e^X

```
>> A=exp(X)

A =

 Columns 1 through 9
   2.7183   0.7165   1.2214   0.8669   1.1175   0.9131   1.0800   0.9355   1.0606
 Columns 10 through 18
   0.9487   1.0488   0.9575   1.0408   0.9636   1.0351   0.9683   1.0308   0.9718
 Columns 19 through 27
   1.0274   0.9747   1.0247   0.9770   1.0225   0.9789   1.0206   0.9806   1.0190
 Columns 28 through 36
   0.9820   1.0177   0.9832   1.0165   0.9843   1.0155   0.9852   1.0146   0.9860
 Columns 37 through 45
   1.0138   0.9868   1.0131   0.9874   1.0124   0.9880   1.0118   0.9886   1.0113
 Columns 46 through 54
   0.9891   1.0108   0.9895   1.0104   0.9899   1.0100   0.9903   1.0096   0.9907
 Columns 55 through 63
   1.0092   0.9910   1.0089   0.9913   1.0086   0.9916   1.0083   0.9919   1.0080
 Columns 64 through 72
   0.9922   1.0078   0.9924   1.0075   0.9926   1.0073   0.9928   1.0071   0.9930
 Columns 73 through 81
   1.0069   0.9932   1.0067   0.9934   1.0066   0.9936   1.0064   0.9937   1.0062
 Columns 82 through 90
   0.9939   1.0061   0.9940   1.0059   0.9942   1.0058   0.9943   1.0057   0.9944
 Columns 91 through 99
   1.0055   0.9946   1.0054   0.9947   1.0053   0.9948   1.0052   0.9949   1.0051
 Column 100
   0.9950

>> plot(Z,A)
>> xlabel('Z')
>> ylabel('e^X')
>> title('Plotting e^X')
```



>> % Plotting e^(X^2)

>> A=exp(X.^2)

A =

Columns 1 through 9

2.7183 1.1175 1.0408 1.0206 1.0124 1.0083 1.0059 1.0045 1.0035

Columns 10 through 18

1.0028 1.0023 1.0019 1.0016 1.0014 1.0012 1.0010 1.0009 1.0008

Columns 19 through 27

1.0007 1.0007 1.0006 1.0005 1.0005 1.0005 1.0004 1.0004 1.0004

Columns 28 through 36

1.0003 1.0003 1.0003 1.0003 1.0003 1.0002 1.0002 1.0002 1.0002

Columns 37 through 45

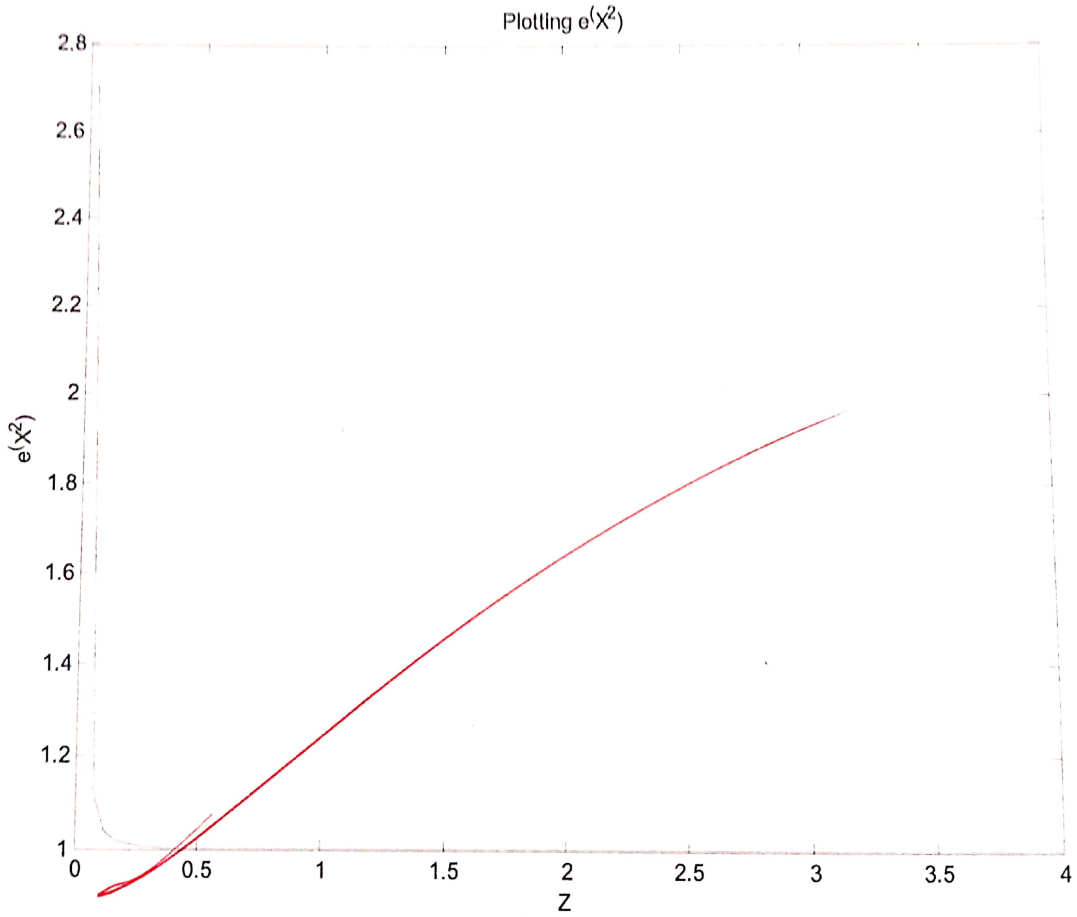
1.0002 1.0002 1.0002 1.0002 1.0002 1.0001 1.0001 1.0001 1.0001

Columns 46 through 54

1.0001 1.0001 1.0001 1.0001 1.0001 1.0001 1.0001 1.0001 1.0001

```
Columns 55 through 63
   1.0001   1.0001   1.0001   1.0001   1.0001   1.0001   1.0001   1.0001   1.0001
Columns 64 through 72
   1.0001   1.0001   1.0001   1.0001   1.0001   1.0001   1.0001   1.0001   1.0000
Columns 73 through 81
   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000
Columns 82 through 90
   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000
Columns 91 through 99
   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000   1.0000
Column 100
   1.0000
```

```
>> plot(Z,A)
>> xlabel('Z')
>> ylabel('e^(X^2)')
>> title('Plotting e^(X^2)')
```



DISCUSSION:

The vector was constructed using for loop and the given formula. And sum of all elements was calculated using sum ().Then functions x, x^3, e^x, $\exp(x^2)$ were plotted over the interval $0 < x < 4$ using plot().

RESULT:

Vector x was created and subsequently x, x^3, e^x, $\exp(x^2)$ were plotted over the interval $0 < x < 4$.

CONCLUSION:

Several functions (x, x^3, e^x, $\exp(x^2)$) were successfully plotted for a vector X.

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P)

Programme	Btech MAE	Course Name	Basic Simulation
Course Code	ES204	Semester	4
Student Name	NIKHITA WADHAWAN	Enrollment No.	A2305413102

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

EXPERIMENT - 6

AIM:

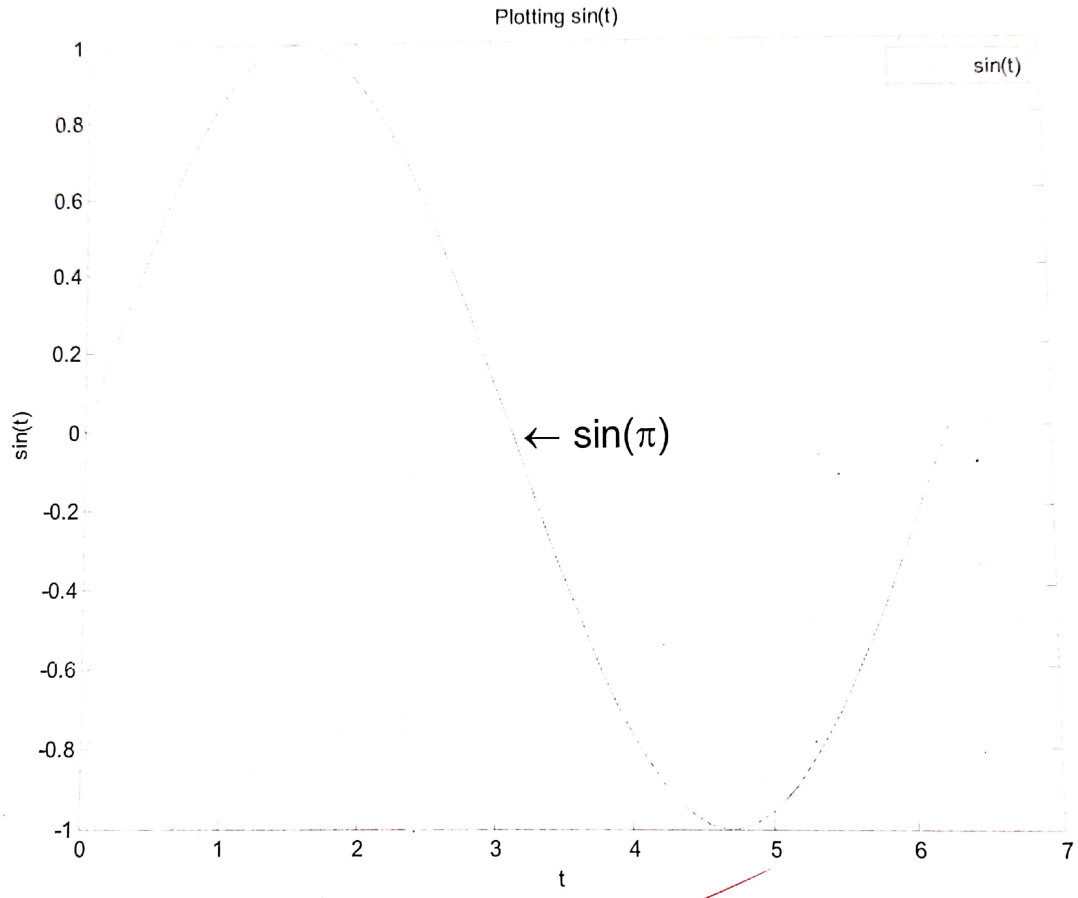
Generating a Sinusoidal Signal of a given frequency (say, 100Hz) and Plotting with Graphical Enhancements: Titling, Labeling, Adding Text, Adding Legends, Adding New Plots to Existing Plot, Printing Text in Greek Letters, Plotting as Multiple and Subplot.

SOFTWARE USED: MATLAB 7.12.0(R2011a)

PROCEDURE:

```
>> % Generating parameter t

>> t=0:0.05*pi:2*pi

t =

 Columns 1 through 9
      0    0.1571    0.3142    0.4712    0.6283    0.7854    0.9425    1.0996    1.2566
 Columns 10 through 18
  1.4137    1.5708    1.7279    1.8850    2.0420    2.1991    2.3562    2.5133    2.6704
 Columns 19 through 27
  2.8274    2.9845    3.1416    3.2987    3.4558    3.6128    3.7699    3.9270    4.0841
 Columns 28 through 36
  4.2412    4.3982    4.5553    4.7124    4.8695    5.0265    5.1836    5.3407    5.4978
 Columns 37 through 41
  5.6549    5.8119    5.9690    6.1261    6.2832

>> % Generating sin(t)

>> X=sin(t)

X =

 Columns 1 through 9
      0    0.1564    0.3090    0.4540    0.5878    0.7071    0.8090    0.8910    0.9511
 Columns 10 through 18
  0.9877    1.0000    0.9877    0.9511    0.8910    0.8090    0.7071    0.5878    0.4540
 Columns 19 through 27
  0.3090    0.1564    0.0000   -0.1564   -0.3090   -0.4540   -0.5878   -0.7071   -0.8090
 Columns 28 through 36
 -0.8910   -0.9511   -0.9877   -1.0000   -0.9877   -0.9511   -0.8910   -0.8090   -0.7071
 Columns 37 through 41

>> % Plotting with graphical enhancements
```

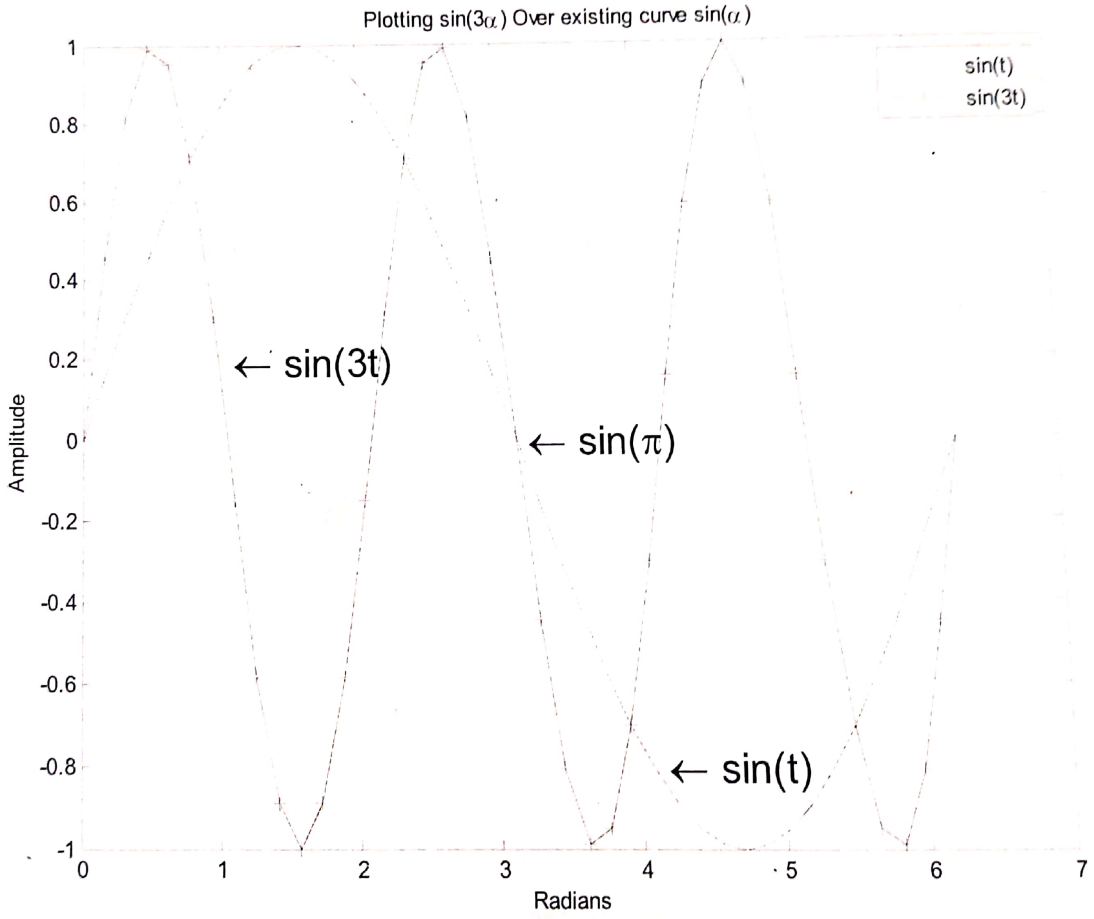
```
>> % Plotting sin(t) (With Titling, Labeling, Adding Text and Legends)

>> plot(t,X,'R-')
>> xlabel('t')
>> ylabel('sin(t)')
>> title('Plotting sin(t)')
>> legend('sin(t)')
>> text(pi,0,' \leftarrow sin(\pi)','FontSize',18)
```




```
>> % Adding new plots to existing plots,Printing Text in Greek Letters
>> % Adding sin(3*t) to sin(t)

>> hold on
>> Y=sin(3*t)
Y =
  Columns 1 through 9
        0    0.4540    0.8090    0.9877    0.9511    0.7071    0.3090   -0.1564   -0.5878
  Columns 10 through 18
```

```
  -0.8910   -1.0000   -0.8910   -0.5878   -0.1564    0.3090    0.7071    0.9511    0.9877
Columns 19 through 27
   0.8090    0.4540    0.0000   -0.4540   -0.8090   -0.9877   -0.9511   -0.7071   -0.3090
Columns 28 through 36
   0.1564    0.5878    0.8910    1.0000    0.8910    0.5878    0.1564   -0.3090   -0.7071
Columns 37 through 41
  -0.9511   -0.9877   -0.8090   -0.4540   -0.0000
```

```
>> plot(t,Y,'B +-')
>> xlabel('Radians')
>> ylabel('Amplitude')
>> legend('sin(t)','sin(3t)')
>> title('Plotting sin(3{\alpha}) Over existing curve sin({\alpha})')
>> text(4.1,-0.8,' \leftarrow sin(t)','FontSize',18)
>> text(1,0.2,' \leftarrow sin(3t)','FontSize',18)
```



DISCUSSION:

Generating and plotting a Sinusoidal Signal: Input parameter t was generated using colon operator (start:step:stop).Sinusoidal Signal was generated using sin() and plotted using plot().

Plotting with Graphical Enhancements:

Titling: title('string') outputs the string at the top and in the center of the current axes.

Labeling: xlabel('string') labels the *x*-axis of the current axes.
ylabel('string') labels the *y*-axis of the current axes.

Adding Text: text(x,y,z,'string','PropertyName',PropertyValue..): adds the string in quotes to the location defined by the coordinates and uses the values for the specified text properties.

Adding Legends: legend('string1','string2',..): displays a legend in the current axes using the specified strings to label each set of data.

Adding New Plots to Existing Plot: hold on: It retains the current plot and certain axes properties so that subsequent graphing commands add to the existing graph.

Printing Text in Greek Letters: You can define text that includes symbols and Greek letters using the text function, assigning the character sequence to the String property of text objects. You can also include these character sequences in the string arguments of the title, xlabel, ylabel, and zlabel functions. Example: xlabel('Time \musec.') displays Time μsec on graph.

RESULT:

Sinusoidal Signals were successfully generated and Plotted and several Graphical Enhancements like Titling, Labeling, Adding Text, Adding Legends, Adding New Plots to Existing Plot, Printing Text in Greek Letters were successfully performed.

CONCLUSION:

Sinusoidal Signal were successfully generated and plotted with several graphical enhancements.

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P)

Programme	Btech MAE	Course Name	Basic Simulation
Course Code	ES204	Semester	4
Student Name	NIKHITA WADHAWAN	Enrollment No.	A2305413162

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

EXPERIMENT - 7

AIM:

Generating a Square Wave from sum of Sine Waves of certain Amplitude and Frequencies.

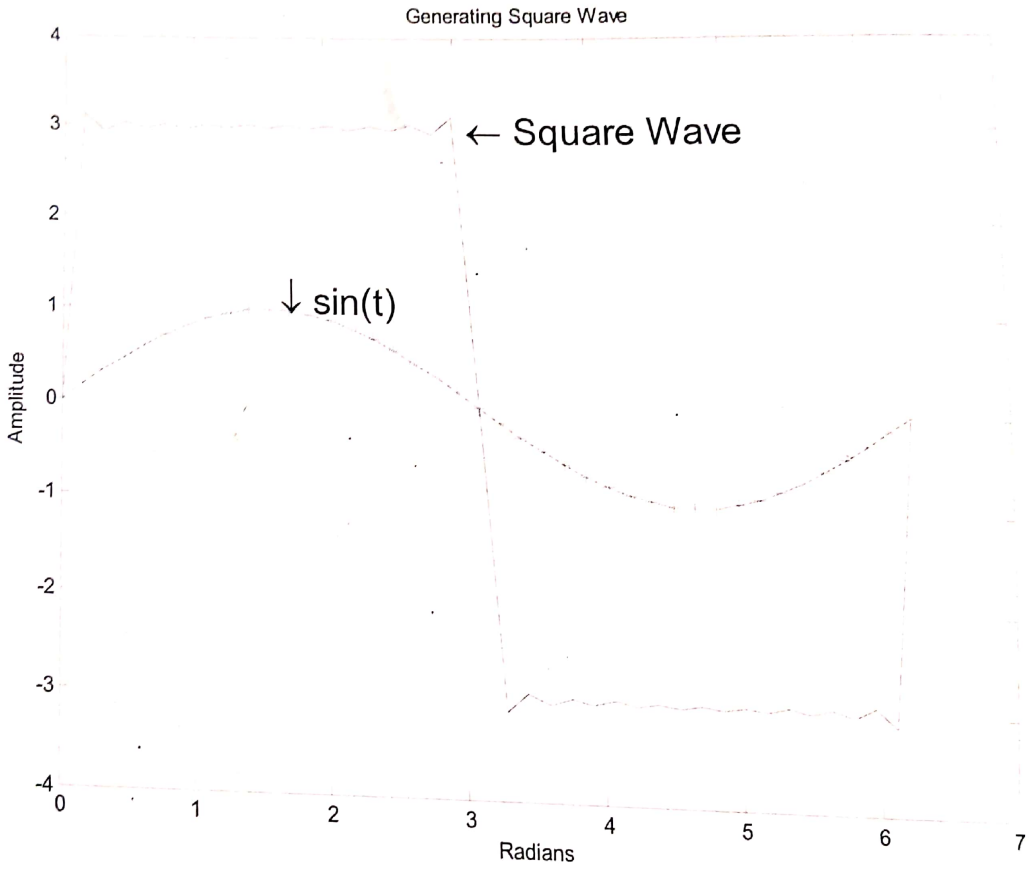
SOFTWARE USED: MATLAB 7.12.0(R2011a)

PROCEDURE:

```
>> % Defining Constant A
>> A=3
A =
     3

>> % Generating parameter t

>> t=0:0.05*pi:2*pi

t =
  Columns 1 through 9
         0    0.1571    0.3142    0.4712    0.6283    0.7854    0.9425    1.0996    1.2566
  Columns 10 through 18
    1.4137    1.5708    1.7279    1.8850    2.0420    2.1991    2.3562    2.5133    2.6704
  Columns 19 through 27
    2.8274    2.9845    3.1416    3.2987    3.4558    3.6128    3.7699    3.9270    4.0841
  Columns 28 through 36
    4.2412    4.3982    4.5553    4.7124    4.8695    5.0265    5.1836    5.3407    5.4978
  Columns 37 through 41
    5.6549    5.8119    5.9690    6.1261    6.2832

>> % Generating & Plotting Square wave using Fourier Series Expansion

>> sum=0

sum =

     0

>> for n=1:2:100
Y=(sin(n*t))/n
sum=sum+Y
end
Y =
  Columns 1 through 9
```

```
    0   0.0016  -0.0031   0.0046  -0.0059   0.0071  -0.0082   0.0090  -0.0096
  Columns 10 through 18
    0.0100  -0.0101   0.0100  -0.0096   0.0090  -0.0082   0.0071  -0.0059   0.0046
  Columns 19 through 27
   -0.0031   0.0016  -0.0000  -0.0016   0.0031  -0.0046   0.0059  -0.0071   0.0082
  Columns 28 through 36
   -0.0090   0.0096  -0.0100   0.0101  -0.0100   0.0096  -0.0090   0.0082  -0.0071
  Columns 37 through 41
    0.0059  -0.0046   0.0031  -0.0016   0.0000

sum =
  Columns 1 through 9
    0   0.8171   0.7692   0.7964   0.7769   0.7925   0.7792   0.7910   0.7801
  Columns 10 through 18
    0.7905   0.7804   0.7905   0.7801   0.7910   0.7792   0.7925   0.7769   0.7964
  Columns 19 through 27
    0.7692   0.8171   0.0000  -0.8171  -0.7692  -0.7964  -0.7769  -0.7925  -0.7792
  Columns 28 through 36
   -0.7910  -0.7801  -0.7905  -0.7804  -0.7905  -0.7801  -0.7910  -0.7792  -0.7925
  Columns 37 through 41
   -0.7769  -0.7964  -0.7692  -0.8171  -0.0000

>> C=(4*A*sum)/pi

C =
  Columns 1 through 9
    0   3.1211   2.9383   3.0420   2.9675   3.0270   2.9764   3.0214   2.9799
  Columns 10 through 18
    3.0193   2.9809   3.0193   2.9799   3.0214   2.9764   3.0270   2.9675   3.0420
  Columns 19 through 27
    2.9383   3.1211   0.0000  -3.1211  -2.9383  -3.0420  -2.9675  -3.0270  -2.9764
  Columns 28 through 36
   -3.0214  -2.9799  -3.0193  -2.9809  -3.0193  -2.9799  -3.0214  -2.9764  -3.0270
  Columns 37 through 41
   -2.9675  -3.0420  -2.9383  -3.1211  -0.0000
>> plot(t,C)

>> % Generating and Plotting sine wave over the existing curve

>> hold on
>> D=sin(t)
D =

  Columns 1 through 9
    0   0.1564   0.3090   0.4540   0.5878   0.7071   0.8090   0.8910   0.9511
```

```
  Columns 10 through 18
    0.9877    1.0000    0.9877    0.9511    0.8910    0.8090    0.7071    0.5878    0.4540
  Columns 19 through 27
    0.3090    0.1564    0.0000   -0.1564   -0.3090   -0.4540   -0.5878   -0.7071   -0.8090
  Columns 28 through 36
   -0.8910   -0.9511   -0.9877   -1.0000   -0.9877   -0.9511   -0.8910   -0.8090   -0.7071
  Columns 37 through 41
   -0.5878   -0.4540   -0.3090   -0.1564   -0.0000
>> plot(t,D,'R+-')
>> xlabel('Radians')
>> ylabel('Amplitude')
>> title('Generating Square Wave')
>> text(pi/2,1.125,' \downarrow sin(t)','FontSize',18)
>> text(3,3,' \leftarrow Square Wave','FontSize',18)
```



DISCUSSION:

Input parameter t was generated using colon operator (start:step:stop).

Generating Square Wave Using Fourier Series Expansion:

The Fourier series expansion for a square-wave is made up of a sum of odd harmonics. The more waves you add more smooth the square wave will become.

$X(t)= 4*A/ \pi [\sin(w*t) + (1/3)*\sin(3*w*t) + (1/5)*\sin(5*w*t) + ..]$

Adding New Plots to Existing Plot:

hold on: It retains the current plot and certain axes properties so that subsequent graphing commands add to the existing graph.

RESULT:

Square Wave was generated from sum of Sine Waves of certain Amplitude and Frequencies using Fourier Series Expansion.

CONCLUSION:

Square Wave was successfully generated and plotted.

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P)

Programme	Btech MAE	Course Name	Basic Simulation
Course Code	ES204	Semester	4
Student Name	[illegible]	Enrollment No.	A2305413102

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

EXPERIMENT – 7

AIM:

Solving First Order Ordinary Differential Equation using Built-in Functions.

Consider the following Ordinary Differential Equation:

$x(dy/dx) + 2y = x^3$

where, $dy/dx = (x^3-2y) / x$ $1<x<3$ and $y=4.2$

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

```
>>% Clearing Everything
>> clc;clear all;clf

>> % Creating an Ordinary Differential Equation
>> ode1 = @ (x,y) (x^3 - 2*y) / x

ode1 =

    @(x,y)(x^3-2*y)/x

>> [x,y] = ode45(ode1,[1:0.01:3],4.2)

x =

  1.0000   1.0100   1.0200   1.0300   1.0400   1.0500
  1.0600   1.0700   1.0800   1.0900   1.1000   1.1100
```

1.1200	1.1300	1.1400	1.1500	1.1600	1.1700
1.1800	1.1900	1.2000	1.2100	1.2200	1.2300
1.2400	1.2500	1.2600	1.2700	1.2800	1.2900
1.3000	1.3100	1.3200	1.3300	1.3400	1.3500
1.3600	1.3700	1.3800	1.3900	1.4000	1.4100
1.4200	1.4300	1.4400	1.4500	1.4600	1.4700
1.4800	1.4900	1.5000	1.5100	1.5200	1.5300
1.5400	1.5500	1.5600	1.5700	1.5800	1.5900
1.6000	1.6100	1.6200	1.6300	1.6400	1.6500
1.6600	1.6700	1.6800	1.6900	1.7000	1.7100
1.7200	1.7300	1.7400	1.7500	1.7600	1.7700
1.7800	1.7900	1.8000	1.8100	1.8200	1.8300
1.8400	1.8500	1.8600	1.8700	1.8800	1.8900
1.9000	1.9100	1.9200	1.9300	1.9400	1.9500
1.9600	1.9700	1.9800	1.9900	2.0000	2.0100
2.0200	2.0300	2.0400	2.0500	2.0600	2.0700
2.0800	2.0900	2.1000	2.1100	2.1200	2.1300
2.1400	2.1500	2.1600	2.1700	2.1800	2.1900
2.2000	2.2100	2.2200	2.2300	2.2400	2.2500
2.2600	2.2700	2.2800	2.2900	2.3000	2.3100
2.3200	2.3300	2.3400	2.3500	2.3600	2.3700
2.3800	2.3900	2.4000	2.4100	2.4200	2.4300
2.4400	2.4500	2.4600	2.4700	2.4800	2.4900
2.5000	2.5100	2.5200	2.5300	2.5400	2.5500
2.5600	2.5700	2.5800	2.5900	2.6000	2.6100
2.6200	2.6300	2.6400	2.6500	2.6600	2.6700
2.6800	2.6900	2.7000	2.7100	2.7200	2.7300

2.7400	2.7500	2.7600	2.7700	2.7800	2.7900
2.8000	2.8100	2.8200	2.8300	2.8400	2.8500
2.8600	2.8700	2.8800	2.8900	2.9000	2.9100
2.9200	2.9300	2.9400	2.9500	2.9600	2.9700
2.9800	2.9900	3.0000			

y =

4.2000	4.1272	4.0569	3.9889	3.9232	3.8596
3.7982	3.7388	3.6813	3.6257	3.5720	3.5200
3.4697	3.4211	3.3741	3.3287	3.2848	3.2424
3.2013	3.1617	3.1234	3.0864	3.0506	3.0161
2.9828	2.9506	2.9196	2.8897	2.8608	2.8330
2.8063	2.7805	2.7557	2.7318	2.7089	2.6869
2.6657	2.6454	2.6260	2.6074	2.5896	2.5726
2.5564	2.5409	2.5262	2.5122	2.4990	2.4864
2.4745	2.4633	2.4528	2.4429	2.4337	2.4251
2.4171	2.4097	2.4029	2.3968	2.3912	2.3862
2.3817	2.3778	2.3745	2.3717	2.3694	2.3677
2.3665	2.3658	2.3656	2.3659	2.3667	2.3680
2.3698	2.3720	2.3748	2.3780	2.3817	2.3858
2.3904	2.3955	2.4010	2.4069	2.4133	2.4201
2.4274	2.4351	2.4432	2.4517	2.4607	2.4700
2.4798	2.4900	2.5006	2.5117	2.5231	2.5349
2.5471	2.5598	2.5728	2.5862	2.6000	2.6142
2.6288	2.6437	2.6591	2.6748	2.6910	2.7075

2.7243	2.7416	2.7592	2.7772	2.7956	2.8144
2.8335	2.8530	2.8729	2.8931	2.9137	2.9347
2.9560	2.9778	2.9998	3.0223	3.0451	3.0682
3.0918	3.1157	3.1399	3.1646	3.1895	3.2149
3.2406	3.2667	3.2931	3.3199	3.3470	3.3745
3.4024	3.4307	3.4592	3.4882	3.5175	3.5472
3.5772	3.6076	3.6384	3.6695	3.7010	3.7328
3.7650	3.7976	3.8305	3.8638	3.8974	3.9314
3.9658	4.0005	4.0356	4.0711	4.1069	4.1431
4.1797	4.2166	4.2539	4.2915	4.3295	4.3679
4.4067	4.4458	4.4853	4.5252	4.5654	4.6060
4.6470	4.6883	4.7300	4.7721	4.8146	4.8574
4.9006	4.9442	4.9881	5.0325	5.0772	5.1223
5.1678	5.2136	5.2598	5.3064	5.3534	5.4008
5.4485	5.4967	5.5452	5.5941	5.6434	5.6931
5.7431	5.7936	5.8444			

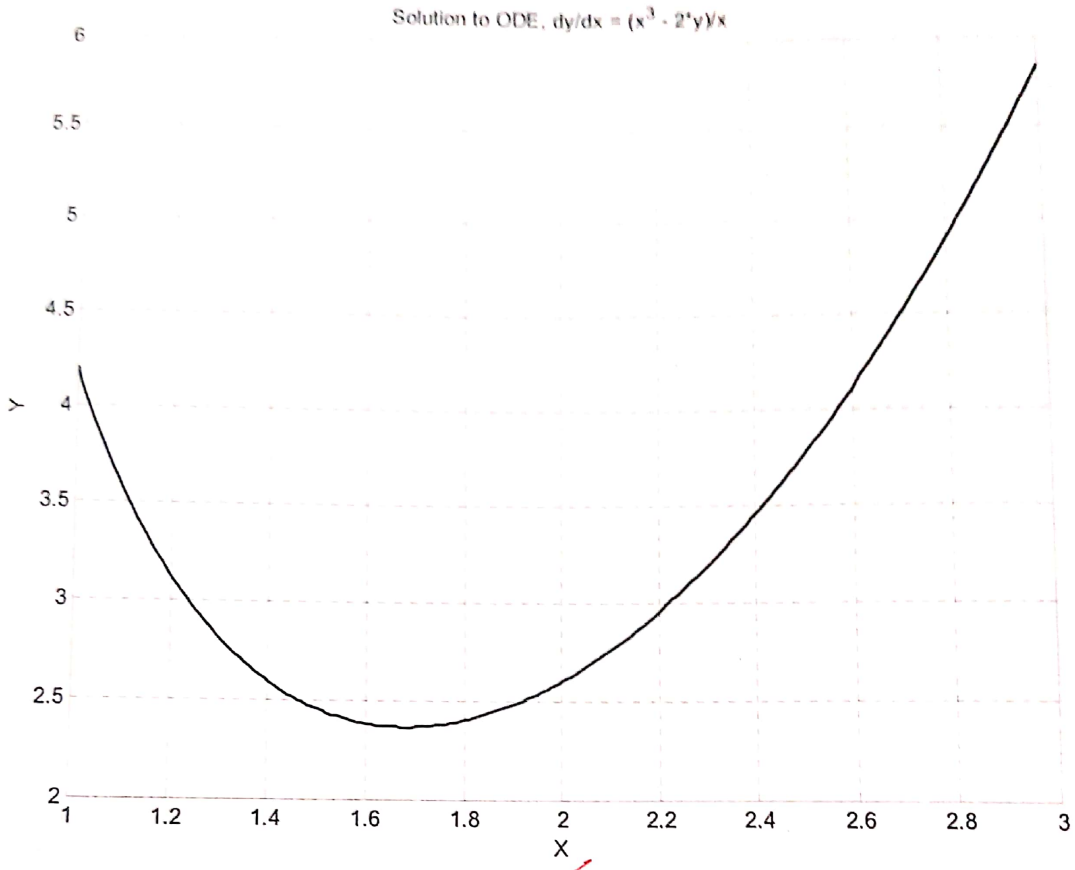
>>% Plotting the ordinary differential equation

```
>> plot(x,y,'linewidth',2)
>> xlabel('X'),ylabel('Y'),grid on
>> title('Solution to ODE, dy/dx = (x^3 - 2*y)/x')
```

DISCUSSION:

Ode45: ode45 is based on an explicit Runge-Kutta (4,5) formula, the Dormand-Prince pair. It is a one-step solver - in computing y(tn), it needs only the solution at the immediately preceding time point, y(tn-1).

RESULT:



CONCLUSION:

The solution to the ordinary differential equation using ode45 is calculated and plot is made on graph.

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P.)

Programme	Btech. MAE	Course Name	Basic Simulation
Course Code	ESXXX	Semester	4
Student Name	[illegible]	Enrollment No	A2305XXXXX

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

EXPERIMENT – 8

AIM:

Writing brief Scripts starting each Script with a request for input (using input) to Evaluate the function h(T) using if-else statement, where

$$h(T) = (T - 10) \quad , \text{for } 0 < T < 100$$

$$= (0.45\ T + 900), \text{for } T > 100.$$

Exercise: Testing the Scripts written using A). T = 5, h = -5 and B). T = 110, h =949.5

SOFTWARE USED: MATLAB 7.12.0 (R2011a)

PROCEDURE:

>> % The Script

```
H=0
T=input('Enter the value of T: ')
if(T==0)
   disp('Enter a value greater than 0')
else if(0<T && T<100)
   fprintf('For T = %d',T)
   H=(T-10)
else if(T>100)
   fprintf('For T = %d',T)
   H=((0.45*T)+900)
   end
   end
end
fprintf('H = %d',H)
```

DISCUSSION:

If-else statements: If expression1 evaluates as false and expression2 as true, MATLAB executes the one or more commands denoted here as statements2. A true expression has either a logical true or nonzero value.

RESULT:

H =

0

Enter the value of T: 5

T =

5

For T = 5
H =

-5

H = -5

H =

0

Enter the value of T: 110

T =

110

For T = 110
H =

949.5000

H = 9.495000e+002

CONCLUSION:

The experiment calculated value of T and H according to the given if-else condition.

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P)

Programme	Btech MAE	Course Name	Basic Simulation
Course Code	ES204	Semester	4
Student Name	[illegible]	Enrollment No.	A2305413[illegible]

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

EXPERIMENT - 9

AIM:

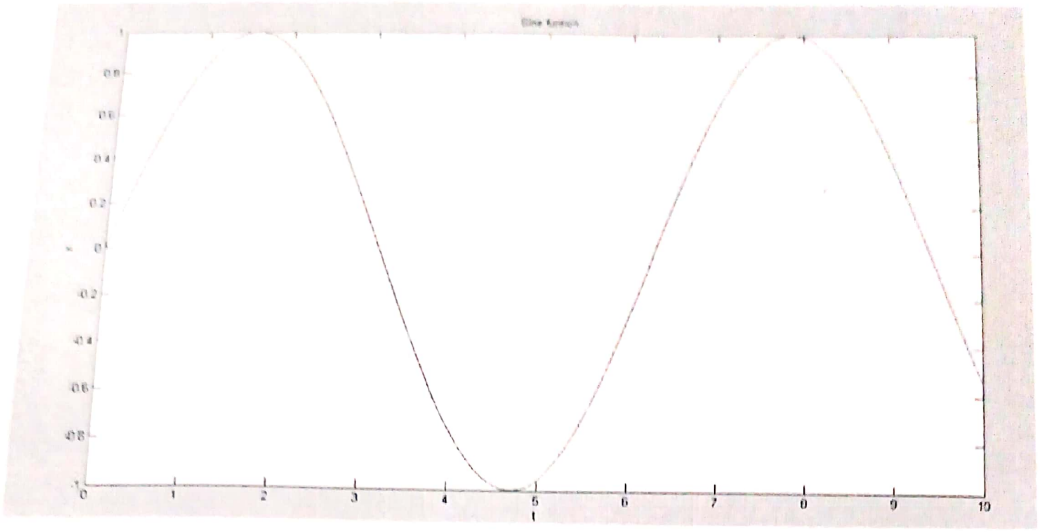
Generating a Square Wave from sum of Sine Waves of certain Amplitude and Frequencies.

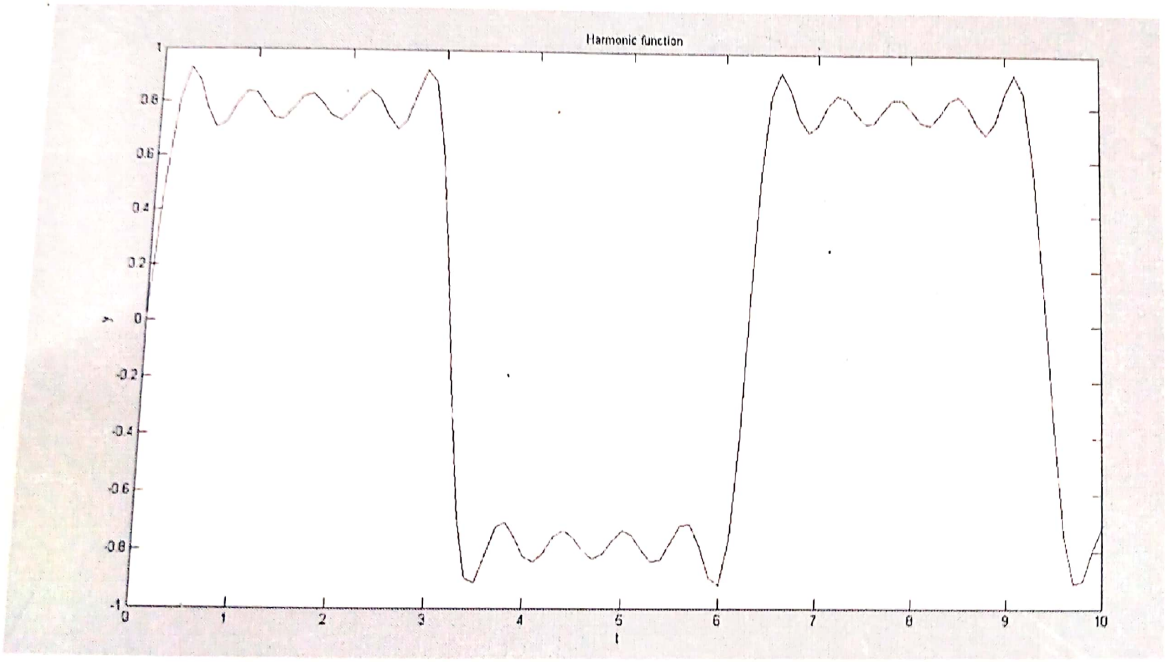
SOFTWARE USED: MATLAB 7.12.0(R2011a)

PROCEDURE:

```
>> % Defining Constant A
>> A=3
A =
    3

>> % Generating parameter t

>> t=0:0.05*pi:2*pi

t =
  Columns 1 through 9
         0    0.1571    0.3142    0.4712    0.6283    0.7854    0.9425    1.0996    1.2566
  Columns 10 through 18
    1.4137    1.5708    1.7279    1.8850    2.0420    2.1991    2.3562    2.5133    2.6704
  Columns 19 through 27
    2.8274    2.9845    3.1416    3.2987    3.4558    3.6128    3.7699    3.9270    4.0841
  Columns 28 through 36
    4.2412    4.3982    4.5553    4.7124    4.8695    5.0265    5.1836    5.3407    5.4978
  Columns 37 through 41
    5.6549    5.8119    5.9690    6.1261    6.2832

>> % Generating & Plotting Square wave using Fourier Series Expansion

>> sum=0

sum =

    0

>> for n=1:2:100
Y=(sin(n*t))/n
sum=sum+Y
end
```

PLOTS:





CONCLUSION: Generating a Square Wave from sum of Sine Waves of certain Amplitude and Frequencies

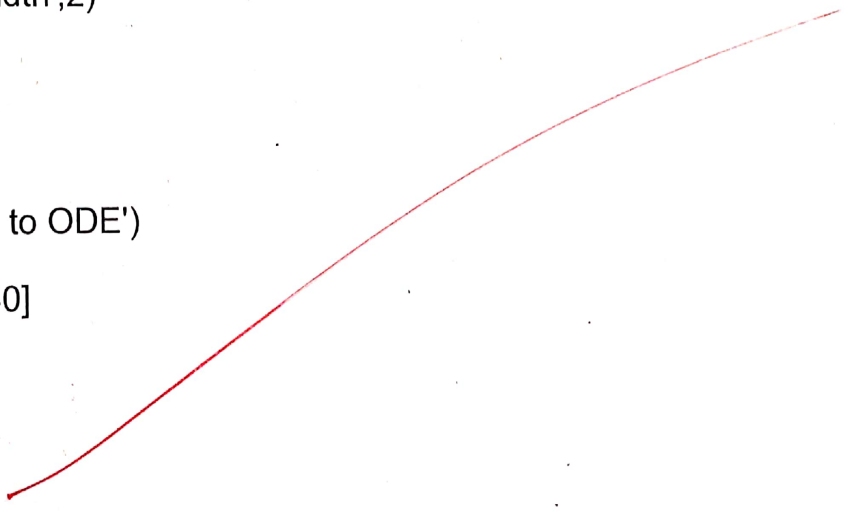
Experiment no : 10

Aim: Basic 2D and 3D plots: parametric space curve. polygons with vertices. 3D contour lines, pie and bar charts.

Software Used: Matlab R 7.0

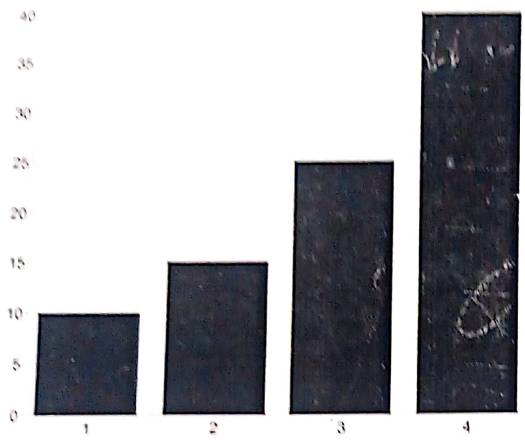
Procedure:

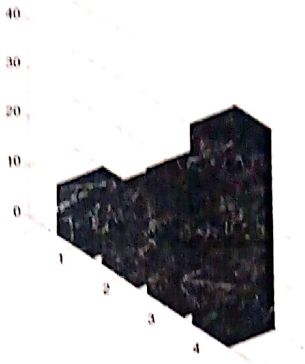
```
>> ode1=@(x,y)(x^3-2*y)/x

ode1 =

    @(x,y)(x^3-2*y)/x
>> [x,y]=ode45(ode1,[1:0.01:3],4.2)
>> plot(x,y)
>> plot(x,y,'linewidth',2)
>> xlabel('x')
>> ylabel('y')
>> Title('Solution to ODE')
>> x=[10,15,25,40]

x =

    10    15    25    40
>> bar(x)
>>bar3(x)
```

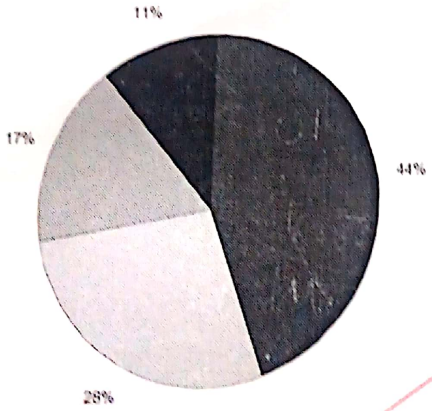


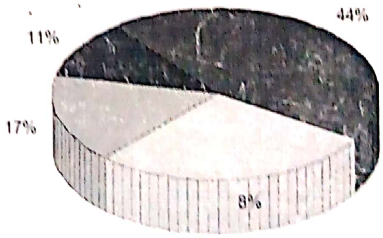
```
>> pie(x)
>>pie3(x)
```

Plots:









Discussion: Basic 2D and 3D plots have been plotted , bar and pie charts have also been plotted .

Internal Assessment(Mandatory Experiment) Sheet for Lab Experiment
Department of Mechanical & Automation Engg.
Amity University , Noida (U.P)

Programme	Btech MAE	Course Name	Basic Simulation
Course Code	ES204	Semester	4
Student Name	NIKHITA WADHAWAN.	Enrollment No.	A2305413102

Marking Criteria

Criteria	Total Marks	Marks Obtained	Comments
Concept	2		
Implementation	2		
Performance	2		
Total	6		

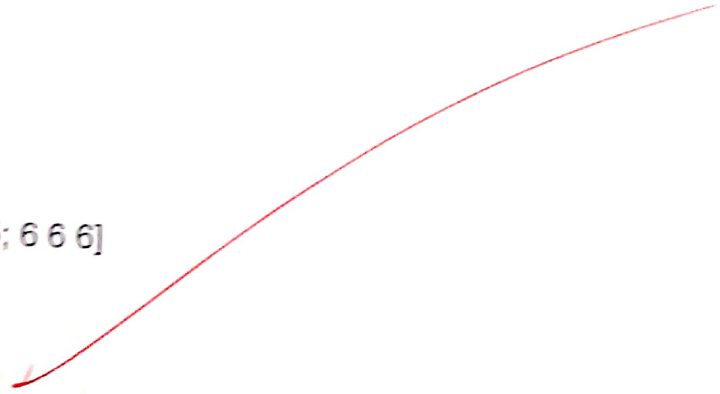
Experiment no : 10(b)

Aim: Basic 2D and 3D plots. parametric space curve. polygons with vertices. 3D contour lines. pie and bar charts.

Software Used; Matlab R 7.0

Procedure:

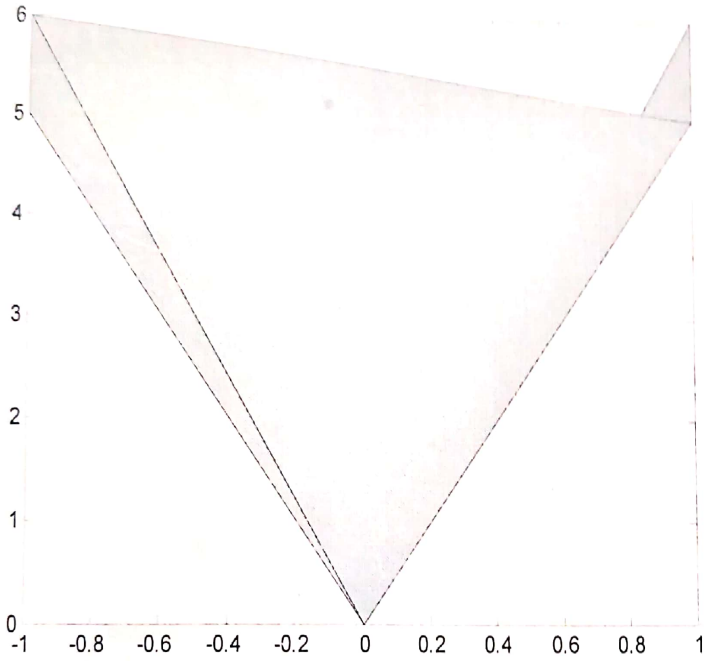
```
[ x=[0 0 0; 1 1 -1; 1 -1 -1]

x =

     0     0     0
     1     1    -1
     1    -1    -1

>> y=[0 0 0; 5 5 5; 6 6 6]

y =

     0     0     0
     5     5     5
     6     6     6
```

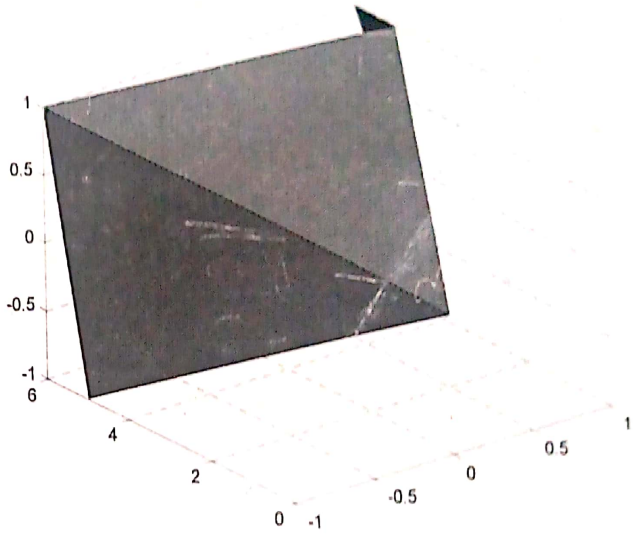


```
>> z=[0 0 0; 1 1 -1; 1 1 1]

z =

     0     0     0
     1     1    -1
     1     1     1

>> v=rand(3)

v =

    0.9501    0.4860    0.4565
    0.2311    0.8913    0.0185
    0.6068    0.7621    0.8214


>> fill(x,y,z)
>> figure(2)
>> fill3(x,y,z,v)
>> gridon
??? Undefined function or variable 'gridon'.

>> grid on
```

6139
6249

PLOT:



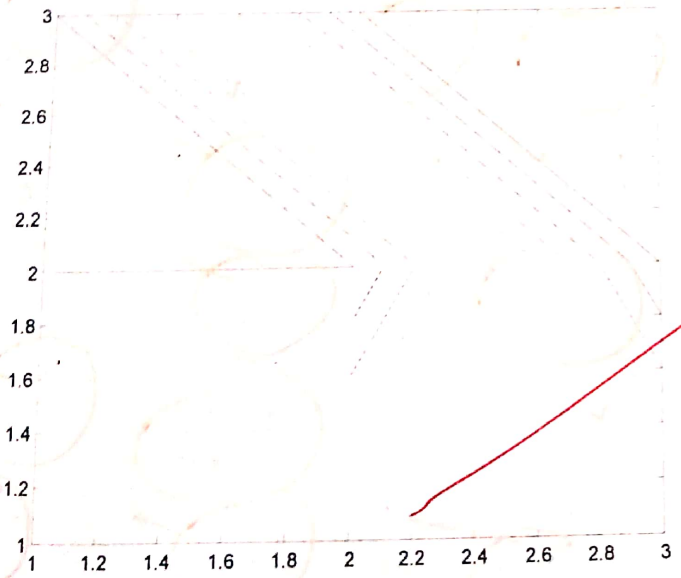


CONCLUSION:_Basic 2D and 3D plots have been plotted , bar and pie charts have also been plotted along with polygons

6 6 6

```
>> z=[0 0 0; 1 1 -1; 1 1 1]

z =

     0     0     0
     1     1    -1
     1     1     1

>> contour(x)
>> contour(x,y,z)
```

PLOTS:



CONCLUSION:_Basic 2D and 3D plots have been plotted , bar and pie charts have also been plotted along with polygons and contours.