LABORATORY MANUAL

SIMULATION PRACTICE ON MATLAB

BRANCH- ELECTRICAL ENGINEERING

SEMESTER- 4TH

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LIST OF EXPERIMENT

1. FUNCTION AND OPERATIONS USING VARIABLES AND ARRAYS TO LEARN ARITHMATIC OPERATION.

2. FUNCTION AND OPERATIONS USING VARIABLES AND ARRAYS TO LEARN RELATIONAL AND OPERATORS.

3. FUNCTION AND OPERATIONS USING VARIABLES AND ARRAYAS TO LEARN TRIGONOMETRIC AND MANPULATION.

4. MATRIX FORMATION AND ITS MANIPULATIONS.

5. USE OF LINESPACE COMMAND TO CREATE VECTORS, ADD AND SUBTRACT VECTORS.

6. GENERATION OF THE SINE AND SQURE ROOT FUNCTIONS WITH VECTOR ARGUMENTS.

7. PLOTTING AND LABELLING OF TWO DIMENTIONAL FUNCTION LIKE sin (t), cos(t), tan(t), sec(t) FOR A GIVEN DURATION.

8. TO WRITE PROGRAM OF REPRESENTATION OF BASIC CONTINOUS SIGNAL.

9. USE OF COMON USED BLOCK OPERATION BLOCK AND DISPLAY FROM MATLAB AND SIMULINK LIBRARY.

10.VERIFICATION OF THEVINISH THEROM USING MATLAB SIMULINK.

11.SIMULATION OF SINGEL PHASE HALF WAVE PHASE CONTROLLED CONVERTER WITH R AND R-L LOAD ON MATLAB.

12. SIMULATION OF SINGEL PHASE HALF WAVE AND FULL WAVE DIODE RECTIFIER WITH R AND R-L LAOD ON MATLAB

[Experiment no:- 1]

Aim of the experiment:-Functions and operations using variables and arrays to learn arithmetic operator.

Equipments required:-

- Personal computer
- Operating system windows 8
- MATLAB Software – version R2007b

Theory:-

Matrix is a rectangular array of real or complex numbers.

Matrices with only one row or with only one column are called row and column vectors respectively. A matrix having only one element is called scalar.

A scalar is a (1*1)matrix containing a ingle element only . A column vector is a (m*1) matrix that has m no of rows but a single column only. A row vector is a (1*n) matrix which has n no of columns and has only one row.

Assigning data to elements of a vector/scalar :

Row vector:-

```
>>q=[1 2 4]
q=
   1 2 4
>>q=[1,2,4]
q=
 1
 2
 4
```

entering data in matrix:

```
>>a=[1 10 20;2 5 6;7 8 9]
a=
    1   10   20
      2    5    6
    7    8    9
```

Matrix and array operations:-

Arithmetic operations on matrices:-

+.....addition
-.....subtraction
*.....multiplication
/.....right division

^.....expenentiation
\.....left division

Arithmetic operations on array:-

Arithmetic operations on arrays are done on element by element basis. For these operations to Work,the no. of rows and columns in both arrays must be same.

+.....addition
-.....subtraction
*.....multiplication
/.....right division
^.....expenentiation
\.....left division

MATLAB PROGRAMMING

```
>>a=[5 10; 15 20]
a=
   5   10
  15   20
>>b=[2  4; 6 8]
b=
     2    4
     6    8
```

Addition

```
>>c=a+b
c=
    7   14
   21   28
```

Subtraction

```
>>c=a-b
c=
     3    16
     9    12
```

Multiplication

```
>>c=a*b
c=
    70    100
   150   220
```

Exponentiation

```
>>c=a^2
c=
   175   250
   375   550
```

Right division

```
>>c=a/b
c=
  2.5000    0
    0       2.5000
>>a=[2  6;3  4]
```

```
a=
   2   6
    4   4
    >>b=[1   7;-2  8]
    b=
    1   7
    -2   8
```

Array multiplication

```
>>c=a*b
c=
    2   42
    -6   32
```

Array division

```
>>c=a^2
c=
    3   36
    9   16
```

Conclusion:-

Discussion questions:-

(1). Obtain results of the given MATLAB expressions:-

The variables x,y,z have values equal to 2.5 , 0.5, 2 respectively

(a). Evaluate x+y+z, x*y*z, x/y, x^y, x^z

(2). List major components of the MATLAB environment ?

(3). What is the difference between 'clc' and 'clear' command ?

[EXPERIMENT NO:-2]

AIM OF THE EXPERIMENT:-

Functions and operations using variables and arrays to learn relational and logical operators

EQUIPMENTS REQUIRED:-

- Personal computer
- Operating system windows 8
- MATLAB Software – version R2007b

THEORY:-

The six relational operators which are used with arrays and matrices are:

<.....less than

<=.....less than or equal to

>.....greater than

>=.....greater than or equal to

==..... equal to

~=.....not equal to

The result of relational operation is either true, indicated by value 1 or is false indicated by the value 0.

Logical operators perform element to element logical operations on the corresponding elements of arrays haing equal dimensions. These operators always operate element by element. For vectors and matrices the corresponding operand matrices must be the same size. If the condition is true result is 1 and it is 0 if condition is false

Logical operator symbol	**Description and syntax**	**Details**
&	Logical AND (x&y)	Return 1 for element locations that are nonzero in both arrays (true) and zero for all other locations.
/	Logical OR (x/y)	Returns 1 for the element location that is non zero (true) in any one array or in both the arrays and zero for other locations
~	Logical complement(NOT) (~x,~y)	Complements every element of the given array i.e one and zero elements are interchanged
XOR	Logical exclusive OR –XOR(X,Y)	Return 1 for element locations that are non zero in

		only one arrays and return 0 for other locations.

MATLAB PROGRAMMING

Relational operators

```
>>x=[2  3  4]
x=
   2   3   4
>>y=[1   0   5]
y=
    1   0   5
>>k=x<y
k=
   0   0   1
>>k=x=<=y
k=
   0   0   1
>>k=x>y
k=
   1   1   0
>>k=x>=y
k=
   1   1   0
>>k=x==y
k=
   0   0   0
>>k=x~=y
k=
   1   1   1
```

Logical operators

```
>>x=[2  3  4];
>>y=[2  5  1];
>>x&y
ans =
       1   1   1
>>m=x|y
m=
    1   1   1
>>m=~x
m =
    0   0   0
>>m=xor(x,y)
m =
    0   0   0
```

CONCLUSION:-

DISCUSSION QUESTIONS:-

(1). If X=[0 5 3 7] y=[0 2 8 7] and z=[0 2 5 7] determine the value of each of the following logical expressions.

(a). x>y & X<z

(b). $x<y \ \& \ x>z$

(c). $x==y \ / \ y.x$

[EXPERIMENT NO :- 3]

AIM OF THE EXPERIMENT:-

Functions and operations using variables and arrays to learn trigonometric and exponential manipulations.

EQUIPMENTS REQUIRED:-

- Personal computer
- Operating system windows 8
- MATLAB Software – version R2007B

THEORY:-

Command/function	Description
Sin	Returns sine of an angle
Sind	Return sine of an angle given in degree
Cos	Return cosine of an angle
Cosd	Return cosine of an angle given in degree
Tan	Return tangent of an angle
Tand	Return tangent of an angle given in degree
acos	Inverse cosine ; result in radians
aosd	Inverse cosine ; result in degrees
acosh	Inverse hyperbolic cosine

Exp……..Exponential

Syntax

Y = exp(x)

Description

The exp function is an elementary function that operates element-wise on arrays. Its domain includes complex numbers.

Y =exp9X0 returns the exponential for each element of X.

MATLAB PROGRAMMIMG

(i)Evaluate the **trigonometric functions** for theta=30deg, 120 deg, 210 deg, 300deg.

```
>>x=90
x=
    90
>> sin(x)
ans =
  0.8940
>>sind(x)
ans=
```

```
        1
>>cos(x)
ans=
   -0.4481
>>acos(x)
ans=
        0+5.1929i
>>acosh(x)
ans=
   5.1929
```

(ii)**Exponential**

Evaluate $u=xe^{-10t}$

```
>>x=0.5
x=
   0.5000
>>t=2
t=
   2
>> u=x*exp(-10*2)
u=
1.306e-009
```

CONCLUSION:-

DISCUSSION QUESTIONS:-

(1). Calculate the following quantities

e^3, ln e^3, $\log_{10}(e^3)$, $\log_{10}(10^5)$

(2). Calculate the following quantities.

(a). Sin ($\pi/6$), Cos π, Tan$\pi/2$,

```
(sin(Pi/6))^2 + (cos(Pi/6))^2
```

(b) $Y= \cosh^2x - \sinh^2x$ with $x=32\pi$

(C) sin, sind, asind, sinb, asinh
cos, cosd, acosd, cosh, acosh
tan, tand, atand, tanhh, atanh

For θ value 30, 120, 210, 300 deg

[EXPERIMENT NO:-4]

AIM OF THE EXPERIMENT:-

Matrix formation and its manipulation.

EQUIPMENTS REQUIRED:-

- Personal computer
- Operating system windows 8
- MATLAB Software – version R2007b

THEORY:-

Reshaping the matrix as a differently sized matrix:

If a given matrix A is a (pXq) matrix it can be reshaped into a new (mXn) matrix , B as long as total elements of the two matrices are same i.e p*q=m*n . The reshaping command is B= reshape (A, m, n)

Appending a row/column to a matrix:

Sometimes it is required that a column or a row to be added to a given matrix . A column can be appended by using the following command;

A=[A ; y]

This will append the row vector y to the rows of existing matrix A.

Deleting a row/column of a matrix :

Rows and columns of a matrix can be deleted by setting the corresponding row or column vector

Equal to a null vector i.e. a pair of empty square brackets[], without any element within the brackets.

Concatenation of matrices:

Concatenation is a method of combining or joining small matrices together to make larger or bigger matrices. The pair of square brackets[ ] is a concatenation operator.

MATLAB PROGRAMMING

Reshaping:

```
>>m=[1 2 3; 4 5 6; 6 7 8; 10 11 12]
m=
    1  2  3
    4  5  6
    6  7  8
    10  11  12
>>m=reshape(m,6,2)
m=
    1   7
    4   11
    6   3
```

```
    10   6
    2    8
    5    12
>>m=reshape(m,3,4)
m=
    1   10   7   6
    4    2   11   8
    6    5   3   12
>>x=m(:)
x=
   1
   4
   6
   10
   2
   5
   7
   11
   3
   6
   8
   12
```

Appending new column

```
>>c=[1 3 5; 2 4 7; 3 5 8]
c=
   1   3   5
   2   4   7
   3   5   8
>>d=[3 1 5; 7 2 4; 8 3 5]
d=
    3   1   5
    7   2   4
    8   3   5
>>k=[c d]
k=
    1   3   5   3   1   5
    2   4   7   7   2   4
    3   5   8   8   3   5
```

Appending new row

```
>>k=[c;d]
k=
    1   3   5
    2   4   7
    3   5   8
    3   1   5
```

```
   7  2  4
   8  3  5
```

Deleting row

```
>>a=[1 5 8 9;7 9 5 1;8 2 2 4]
a=
   1  5  8  9
   4  8  9  5
   7  9  5  1
   8  2  2  4
>>a(1,:)=[]
a=
   4  8  9  5
   7  9  5  1
   8  2  2  4

>>a=(2:3,:)=[]
a=
   4  8  9  5
```

Deleting column

```
>>g=[6 7 1;8 9 2]
g=
   6  7  1
   8  9  2
>>g(:,2:3)=[]
g=
   6
   8
```

Concatenation

```
>>a=[1 2; 3 4]
a=
   1  2
   3  4
>>b=[a  a+12;a+24 a+10]
b=
   1  2  13  14
   3  4  15  16
  25 26  11  12
  27 28  13  14
```

CONCLUSION:-

DISCUSSION QUESTIONS:-

Given A= $\begin{bmatrix} 2 & -4 & 6 & -8 \\ 1 & 3 & 5 & 7 \\ 2 & 12 & 30 & 56 \end{bmatrix}$

Write MATLAB statements to obtain

(i). All the elements of all rows but first column.

(ii). All the elements of first row but all columns.

(iii). Elements of second row and row.

[EXPERIMENT NO:-5]

AIM OF THE EXPERIMENT:-

VECTOR MANIPULATION – use of linespace command to create vectors, add and subtract vectors.

EQUIPMENT REQUIRED:-

- Personal computer
- Operating system windows 8
- MATLAB Software- version R2007b

THEORY:-

Linespace

Generate linearly spaced vectors.

Syntax

Y = linespace(a,b)

Y = linespace(a,b,n)

Description

The linespace function generates linearly spaced vector. It is similar to the colon operator":", but gives direct control over the number of points.

Y = linespace(a,b) generates a row vector y of 100 points linearly spaced between and including a and b.

Y = linespace(a,b,n) generates a row vector y of n points linearly spaced between and including a and b.

When executed, produces a vector having 5 equally spaced elements between the limits 0 and 10 given as follows a = [0 2 5 7.5 10.0]

MATLAB PROGRAMMING:-

DISCUSSION QUESTION:-

(i). Obtain the following products a) AB b) A^TA Where $A = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$, $B = [6\ 1\ 0]$

(ii). Find determinants and inverse of each matrices,

$$A = \begin{bmatrix} 2 & 4 \\ 8 & -1 \end{bmatrix} \qquad B = \begin{bmatrix} 3 & 0 & -2 \\ -1 & 1 & 2 \\ 0 & 1 & -2 \end{bmatrix}$$

[EXPERIMENT NO:-6]

AIM OF THE EXPERIMENT:-

Generation of the sin wave use of and square root functions with vector arguments. in MATLAB.

EQUIPMENTS REQUIRED:-

- Personal Computer
- Operating system windows 8
- MATLAB Software – version R2007b

THEORY:-

Sin

Sin of argument in radians

Syntax

Y = sin(x)

Description

example

y = sin(x) returns the sine of the elements of X. The sin function operates element-wise on arrays. The function accepts both real and complex inputs. For real values of X in the interval [-int, int], sin returns real values in the interval [-1,1]. For complex values of X , sin returns complex values . All angles are in radians.

Sqrt

Square root

Syntax

b = sqrt(X)

Desription

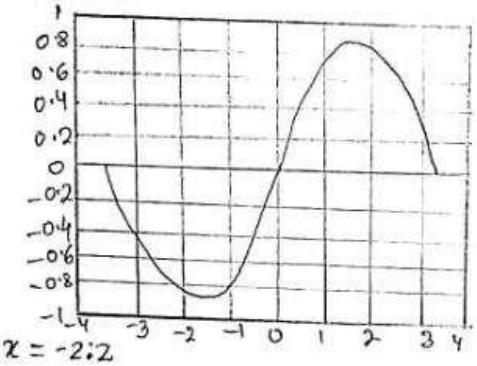
Example

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

MATLAB PROGRAMMING:-

Plot the sine function over the domain $-x \leq x \leq x$

```
x= -pi:0.001:pi;      % take -pi:0.1:pi
plot(x,sin(x)), grid on
```




```
>> x = -2:2
x =
    -2    -1     0     1     2
>> y = sqrt(x)
y =
  0 + 1.4142i   0 + 1.0000i        0        1.0000        1.4142
```

CONCLUSION :-

DISCUSSION QUESTION :-

Q.1. Compute the following anithmatic quantities

i) $\frac{3(\sqrt{5}-1)}{(\sqrt{5}+1)^2}$

ii) $x = t\sin t$ where t = vector element from 1 to 10.

iii) $z = \frac{(\sin t)^2}{t^2}$

```
>>x=2:2
x=
   -2  -1  0  1  2
>>y=sqrt(x)
y=
   0+1.4142i      0+1.0000i      0          1.0000
```

CONCLUSION

DISCUSSION QUESTION:-

Q1.complete the following arithmetic quantitick

i.

ii. x= t sint
where t= vector element from 1 to 10

iii. z=

EXPERIMENT- 7

Aim of the Experiment:-

Plotting and labeling of two – dimensional functions like sin(t), cos(t), tan(t), sec(t) etc for a given duration.

Equipments Required:-

a) Operating System Window 10
b) MATLAB software version R2007
c) Personal Computer

Theory:-

Two – dimensional Plots

To draw a two – dimensional plot in MATLAB, the plot command is used. The syntax is given as follows:

```
plot(x,y)
```

where,

x is a vector containing the x – coordinates of the plot and

y is a vector containing the y – coordinates of the plot.

Printing Labels

To make the plot more understandable, the two axis are labeled and a title is provided above the top of the plot by using the following commands.

```
xlabel('string')          %Statement 1
ylabel('string')          %Statement 2
title('string')           %Statement
```

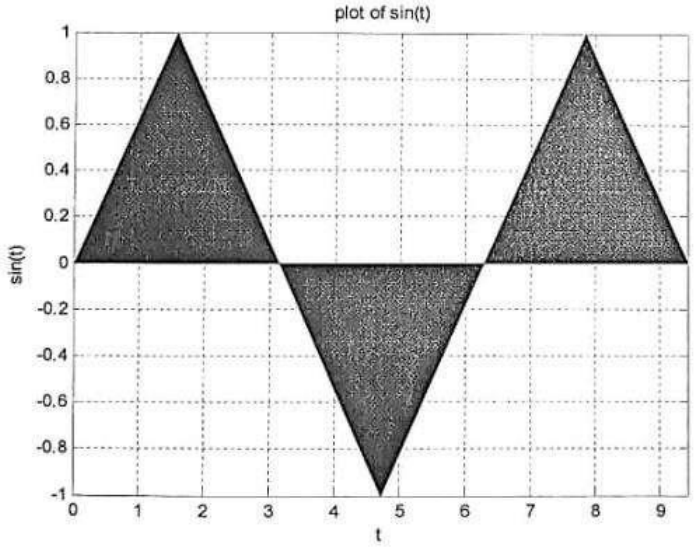
Statement 1 uses the command xlabel to print label on the x – axis. The label to be printed is enclosed in single quotes. Similarly, Statement 2 uses the command ylabel to print the label along y – axis. The command title in Statement 3 is used to provide a title above the top of the graph.

Grid

To give better illustration of the coordinates on the plot, a grid is used. The command grid is used to show the grid lines on the plot. The grid on the plot can be added or removed by using the on and off with the grid command. When grid command without any argument is used alternatively, it toggles the grid drawn. By default, MATLAB starts with grid off.

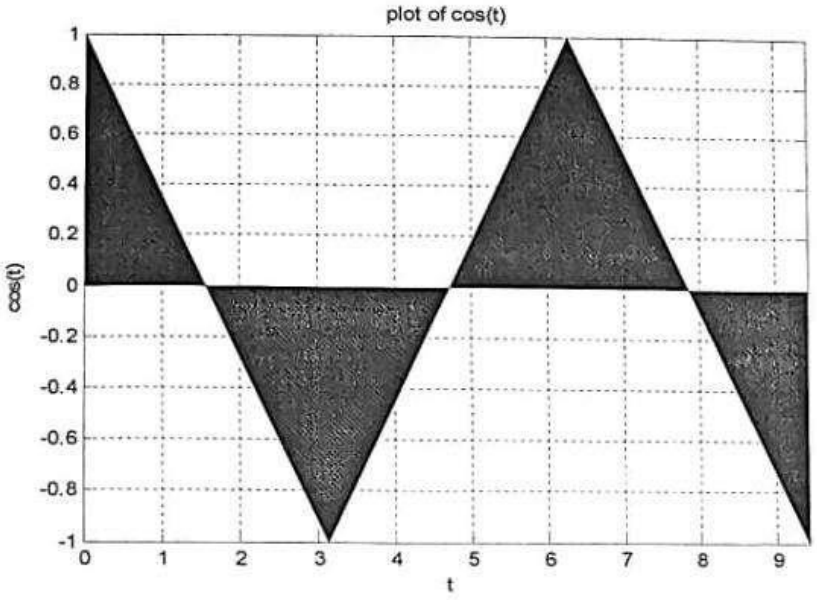
MATLAB experiment:-

```
>> t=0:pi/2:3*pi;
>> y=sin(t);
>> plot(t,y);
>> area(t,y);
>> grid on;
>>xlabel('t');
>>ylabel('sin(t)');
>> title('plot of sin(t)');
```

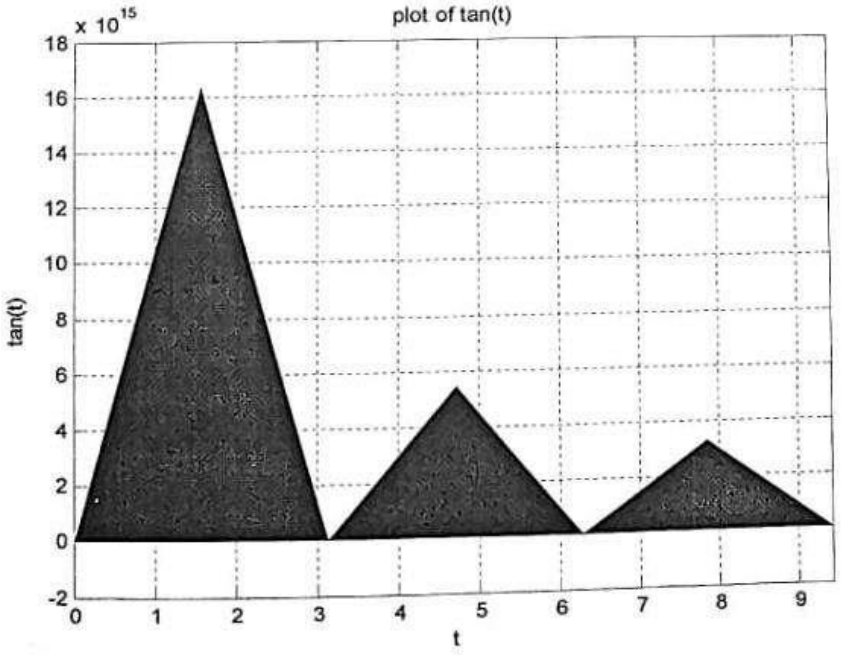



```
>> t=0:pi/2:3*pi;
>> y=cos(t);
>> plot(t,y);
>> area(t,y);
>> grid on;
>>xlabel('t');
```

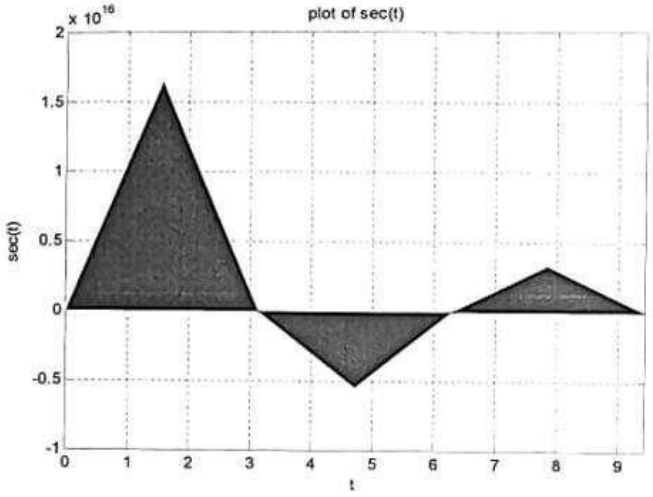
```
>>ylabel('cos(t)');
>> title('plot of cos(t)');
```




```
>> t=0:pi/2:3*pi;
>> y=tan(t);
>> plot(t,y);
>> area(t,y);
>> grid on;
>>xlabel('t');
>>ylabel('tan(t)');
>> title('plot of tan(t)');
```



```
>> t=0:pi/2:3*pi;
>> y=sec(t);
>> plot(t,y);
>> area(t,y);
>> grid on;
>>xlabel('t');
>>ylabel('sec(t)');
>> title('plot of sec(t)');
```



Conclusion:-

From the above experiment, we have successfully generated plots of trigonometric functions like sint, cost, tant, sect etc for a given duration.

DISCUSSION QUESTION :-

Q) Write a program to plot the curve for a function described by the equation $y = x^3 + 2x^2 - 5$, where x varies from -10 to 10.

```
x = -10 : 0.1 : 10
y = x^3 + 2x^2 - 5
plot (x, y);
axis ([-10  10  0  500]);
     x_min  x_max  y_min  y_max
```

[EXPERIMENT-8]

AIM OF EXPERIMENT –

To write program of representation of basic continous signals.

i. Unit step function.
ii. Unit ramp function.
iii. Unit impulse function.
iv. Exponential function.
v. Sine function.
vi. Cosine function.

```
>>x=[o:1:5];
>>y=ones(1,6);
>>plot(x,y);
>>grid on;
>>xlabel('time');
>>ylabel('u(t)');
>>title('unit step');

>>x=[-5:1:5];
>>y=[zeros(1,5),ones(1,1),zeros(1,5)];
>>plot(x,y);
>>grid on;
>>xlabel('time');
>>ylabel('s(t);
>>title('unit impulse');

>>x=[0:1:5];
>>y=x;
>>plot(x,y);
>>grid on;
>>xlabel('r(t)');
>>ylabel('r(t)');
>>title('unit ramp');

>>x=[0:2:5];
```

```
>>y=exp(x);
>>plot(x,y);
>>grid on;
>>xlabel('time');
>>ylabel('exp(x)');
>>title('exponential function');
```

```
>>x=[0:0.1:2*pi];
>>y=sin(x)|;
>>plot(x,y);
>>area(x,y);
>>grid on;
>>xlabel('sin(x)');
>>ylabel('sin(x)');
>>title(plot of sine function');
```

```
>>x=[0:0.1:2*pi];
>>y=cos(x);
>>plot(x,y);
>>area(x,y);
>>xlabel('time');
>>ylabel('cos(x)');
>>title('plot of cosine function');
>>grid on;
```

```
>>subplot(2,3,1);
>>x=[0:1:5];
>>y=ones(1,60;
>>plot(x,y);
>>grid on;
>>xlabel('time');
>>ylabel('u(t');
>>title('unit step');

>>subplot(2,3,2);
```

```
>>x=[-5,:1:5];
>>y=[zeros(1,5),ones(1,1),zeros(1,5)];
>>plot(x,y);
>>grid on;
>>xlabel('time');
>>ylabel('s(t)');
>>title('unit impulse');

>>subplot(2,3,3);
>>x=[0:01:2*pi];
>>y=sin(x);
>>plot(x,y);
>>grid on;
>>xlabel('time');
>>ylabel('sin(t)');
>>title('plot of sin');

>>subplot(2,3,4);
>>x=[0:2:5);
>>y=exp(x);
>>plot(x,y);
>>grid on;
>>xlabel('time');
>>ylabel('epotential');

>>subplot(2,3,5);
>>x=[0:1:5];
>>y=x;
>plot(x,y);
>>grid on;
>>xlabel('time');
>>ylabel('x(t)');
>>title('unit ramp');

>>subplot(2,3,6);
X=[0:01:2*pi];
>>y=cos(x);
>>plot(x,y);
>>grid on;
>>xlabel('time');
>>ylabel('cos(t)');
>>title('plot os cosine');
>>
```

DISCUSSION QUESTION:-

i. Divided the fig. window into A sub-windows and plot the follow function – (a) plot V_{rs}I Where, v=AI and I=1,2,3,4 on upper left sub-window.

ii. Plot y $V_{rs}$where, $y=x^2$(a parabolic plot) and x=1,2,3,4 on upper right sub-window.

iii. For t=0:2*pi in step of t=, plot sint V_{rs}t on lower left sub-window.

iv. For t=0::2pi, plot cost V_{rs} on lower right sub-window.

[EXPERIMENT-9]

AIM OF EXPERIMENT

Use of common used block operation block and display form MATLAB and simulink library.

```
>>n=[0  0  3];
>>d=[1  5  0];
>>sys=tf(n,d)
Transfer function:
   3
-------
s^2 +5s
>>n1=[0  0  5];
>>d1=[1  1  5];
>>n2=[0  2];
>>d2=[1  2];
>>[ns,ds]=series (n1,d1,n2,d2);
>>printsys(ns,ds)
num/den=
     10
------------------
s^3+3s^2+7s+20
------------------
s^3+3s^2+7s +10
>>[nf,df]=feedback (n1,d1,n2,d2);
>>printsys(nf,df)
num/den=
      5s+10
--------------------
s^3+3s^2+7s+20
>>n1=[5];
>>d1=[1];
>>sys=tf(n1,d1)
Transfer function:
5
>>sys=tf(n2,d2)
Transfer function:
10
>>[np,dp]=parallel(n1,d1,n2,d2);
>>printsys(np,dp);
num/den=
   15
---------
    1
>>n3=[0  0  1];
>>d3=[1  0  0];
>>sys=tf(n3,d3)
Transfer function:
 1
```

```
  ---
 s^2
 >>n3=[0  0  1];
 >>d3=[1  1  0];
 >>systf(n3,d3)
 Transfer function:
    1
 ------
 S^2+s
 >>[ns,ds]=series(np,dp,n3,d3);
 >>printsys(ns,ds)
 num/dum=
    15
 -------
 s^2+s
 >>n4=[1];
 >>d4=[1];
 >>[nf,df]=feedback(ns,ds,n4,d4);
 >>printsys(nf,df)
 num/den=
    15
 ---------
 S^2+s+15
 >>
```

DISCUSSION QUESTION:-

1) Find equivalent T.F of the block dia.

EXPERIMENT NO -10

AIM:

To verify Thevenin's theorem using digital simulation.

APARATUS:

S. No	SOFTWARE USED	DESK TOP QUANTITY
1	MATLAB	01

CIRCUIT DIAGRAMS:

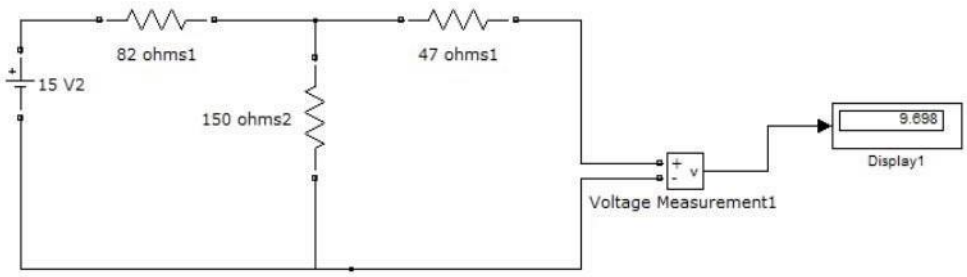


Fig 1 Measurement of V

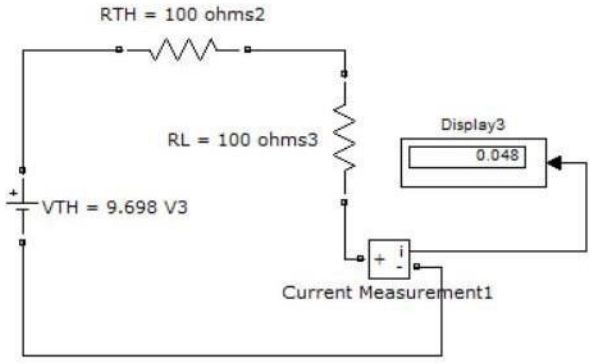


Fig 2 Measurment of I

PROCEDURE:

1. Make the connections as shown in the fig 1 diagram by using MATLAB Simulink.
2. Measure the open circuit voltage across the load terminals using voltage measurement.
3. Connect circuit fig 2 Thevenin's equivalent circuit in MATLAB and find the loadcurrent.

EXPERIMENT NO 11

Aim: Simulation of single phase half wave phase controlled converter with R and R-L loadon MATLAB.

Apparatus Required: MATLAB/SIMULINK installed on PC.

Theory:

The phase controlled rectifiers using SCRs are used to obtain controlled dc output voltages from thefixed ac mains input voltage. A single phase half wave controlled converter only has one SCR is employed in the circuit. The performance of the controlled rectifier very much depends upon the type and parameters of the output (load) circuit.

Procedure:

1. Make the connections as per circuit diagram with elements taken from the MATLAB library for both R & RL load.
2. Simulate them.
3. Observe the waveform carefully on scope.

Result:

Simulation of half wave controlled rectifier with R & RL load have been simulated.

Circuit Diagram:

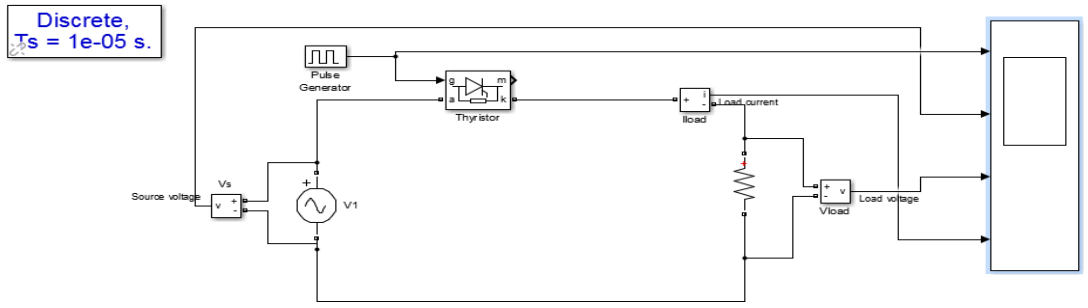
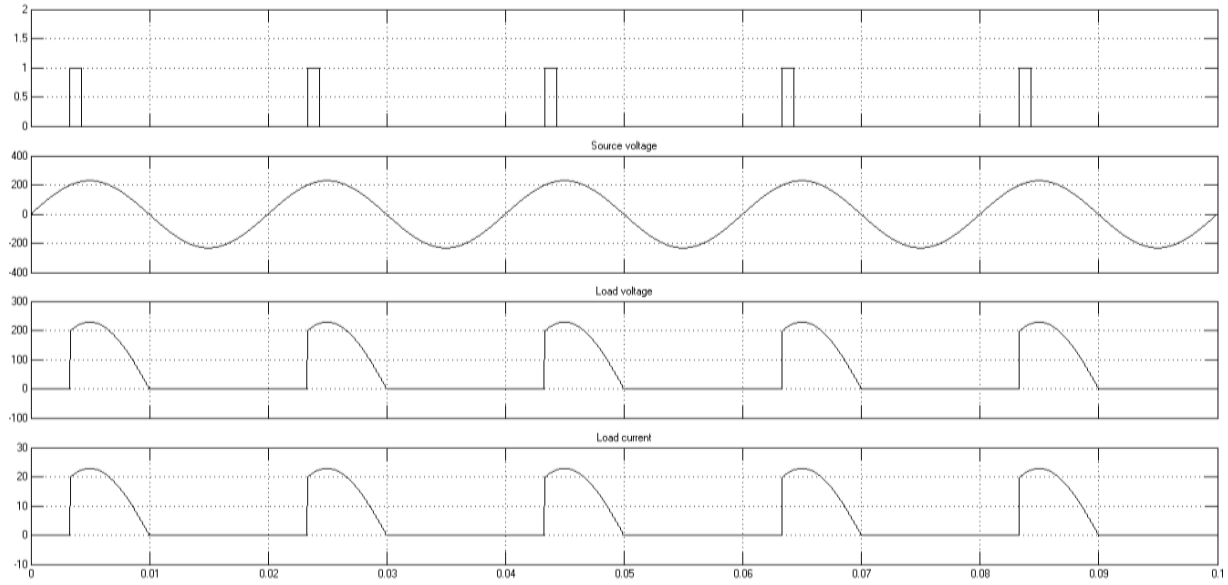


Figure 1 Simulink model of single phase half wave with R load



Wave forms of gate pulse, input voltage, output voltage and load current of single phase halfwave with R load with firing angle 60^0

EXPERIMENT NO 12

Aim:- . Simulation of single phase half wave and full wave diode rectifier with R and R-L load onMATLAB

Software used:- Matlab

Single phase full wave rectifier:-

Primary function of full wave diode rectifier simulation is to establish a dc level from a sinusoidal input voltage that has zero voltage. Single phase supply, is a fully controlled bridge- circuit .In the bridge circuit, diagonally opposite pairs of diodes are made to conduct, and are commutated,simultaneously.

During the first positive half-cycle, diodes D1 and D2 are forward biased and if they are triggered simultaneously, then current flows through the path L-D1-R-D2-N. Hence, in the positive cycle, diodes D1 and D2 are conducting.

During the negative half cycle of the a.c. input, diodes D3 and D4 are forward biased and if they aretriggered simultaneously, current flows through the path N-D3-R-D4-L. Diodes D1, D2 and D3, D4 are triggered at the same firing angle α in each positive and negative half-cycles of the supply voltage, respectively.

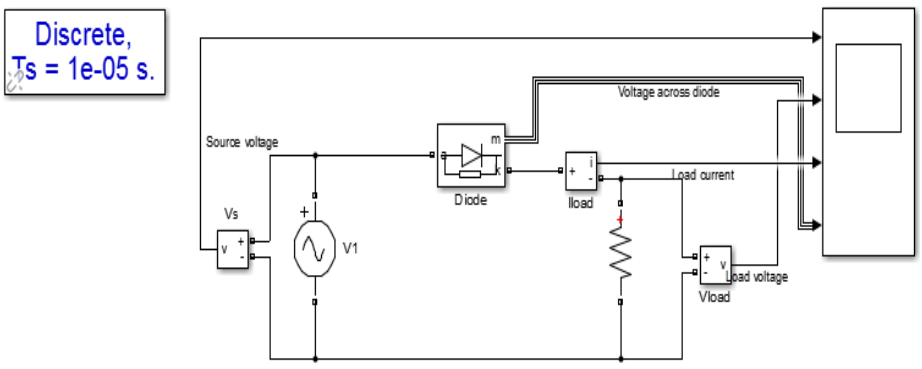
When the supply voltage falls to zero, the current also goes to zero. Hence, diodes D1 and D2 in positive half cycle and D3, D4 in negative half cycle turn off by natural commutation.

The related voltage and current waveforms for the circuit are shown in the figure given below the circuit diagram;

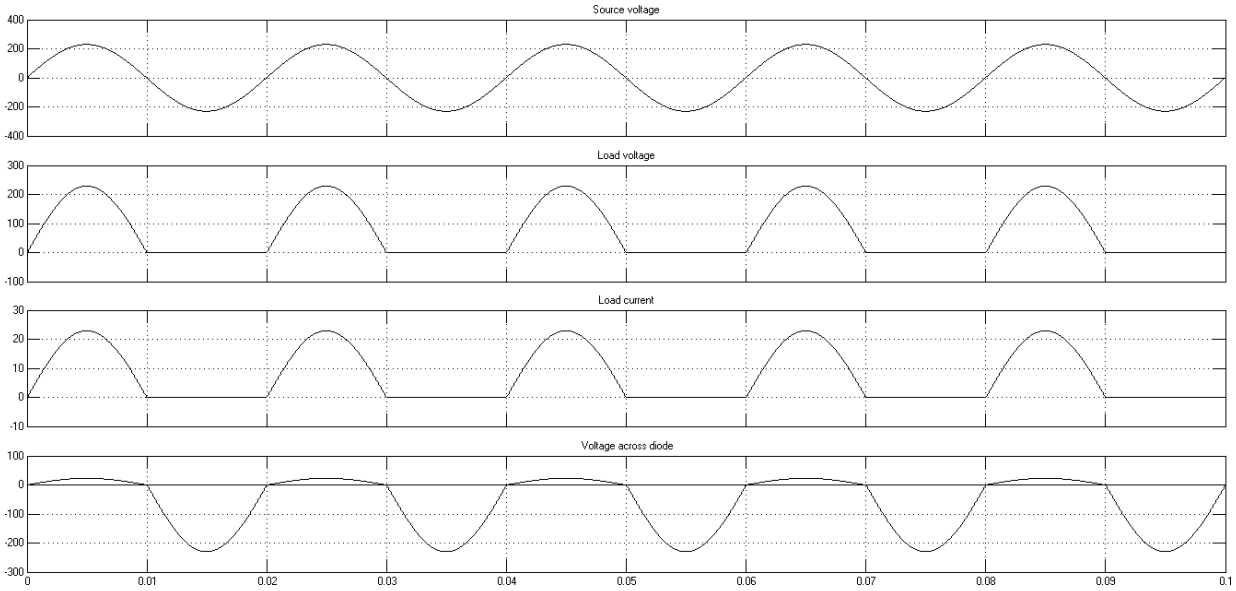
Procedure:-

1) Start the Matlab software.
2) Open a new simulation window by clicking on simulink button.
3) Window that appears in simulink library browser the window contains component that canbe plotted into simulink or design window.
4) Drag & drop the components from library.
5) Run the simulation.

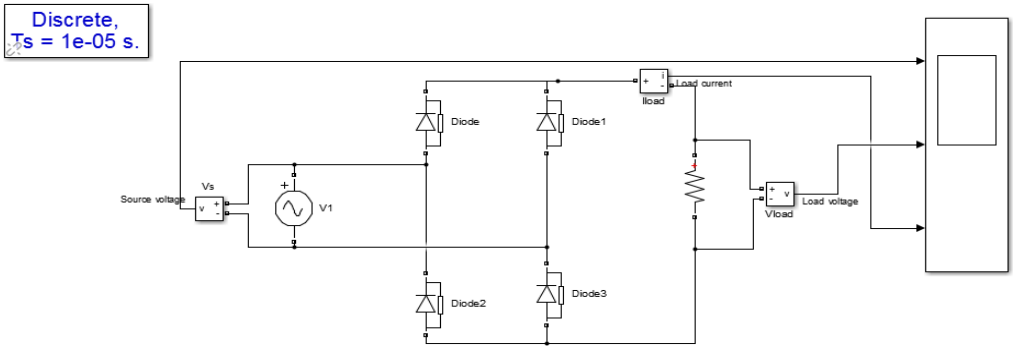
Figure:-



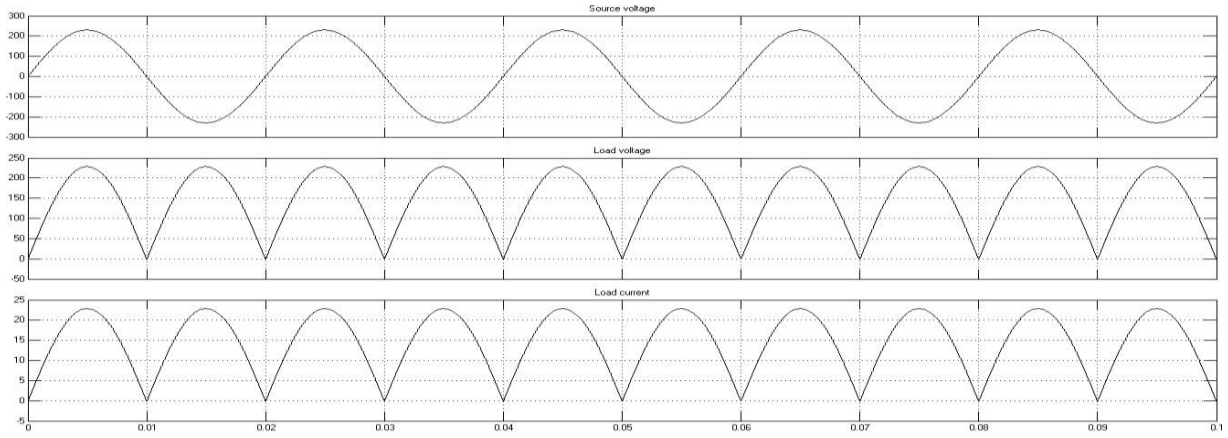
simulink model of half wave rectifier



wave forms of half wave rectifier in terms of input voltage ,load voltage ,load current andvoltage across diode



simulink model of Half wave rectifier



wave forms of half wave rectifier in terms of input voltage ,load voltage ,load current andvoltage across diode

Result:-

Single phase Half wave and full wave diode rectifier has been studied.

Precautions:-

1) Connections must be properly alone.
2)Don’t forget to drag powergui beside circuit diagram