

**Aim**

To understand the SCILAB environment, basic features and to perform simple arithmetic operations and built-in operations using SCILAB

**Overview of SCILAB**

1. What does SCILAB stands for? What do you mean by SCILAB?

SCILAB stands for Scientific Laboratory. It is scientific software which is used for numerical computations and it provides a powerful open computing environment for engineering and scientific applications.

2. Write the development of SCILAB. Who has developed?

SCILAB was first developed in 1990 by researchers from INRIA (French National Institute for Research in Computer Science and Control) and ENPC (National School of Bridges and Roads). It is now maintained and developed by Scilab Consortium since its creation in May 2003 and was integrated into Digiteo Foundation in July 2008.

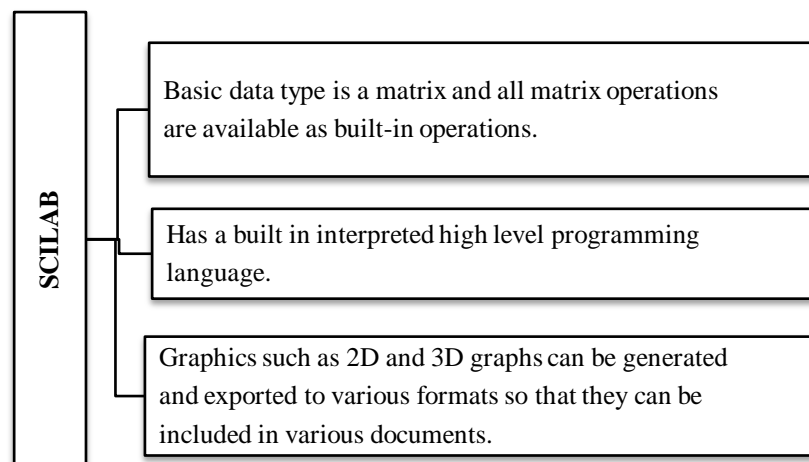
3. What is the current version of SCILAB that we are using in our lab?

The current version of SCILAB that is being used in our laboratory is version 5.2.2.

4. Write about the basic features (or capabilities) of SCILAB? The basic features of SCILAB include the following:

- The provision of all basic operations on matrices through built-in functions.
- The capacity of performing interactive calculations as well as automation of computations through programming
- It has the ability to plot 2D and 3D graphs which help in visualizing the data we work with.
- Numerous toolboxes are available for various specialized applications.

- SCILAB is also compatible with MATLAB. Hence, all available MATLAB M-files can be directly used in SCILAB with the help of the MATLAB to SCILAB translator.
- SCICOS, a hybrid dynamic systems modeler and simulator for SCILAB, simplifies simulations.
- The greatest features of SCILAB are that it is multiplatform and is free.
- SCILAB includes hundreds of mathematical functions
- It is also equipped with the possibility to add interactively functions from various languages (C, FORTRAN).
- It has sophisticated data structures (including lists, polynomials, rational functions, and linear systems), an interpreter and a high level programming language.
- The user can define new data types and operations on these data types by using overloading.



5. Name the different Operating Systems or the platforms where SCILAB can run.

The different operating systems that SCILAB can run in are: Windows, Linux and MacOS X.

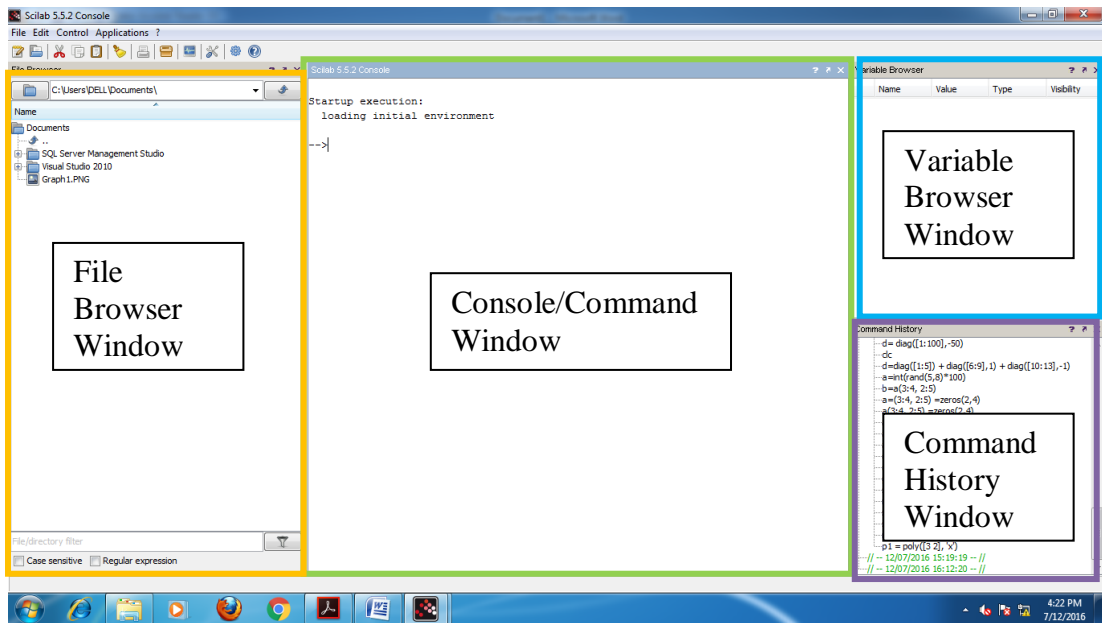
6. Where do you get the SCILAB for your Operating System? Provide the web link address.

SCILAB for the operating system can be obtained from the official site : **scilab.org**

The link for this is <https://www.scilab.org/download/latest>

7. Name the different types of windows or workspace that appear when you launch the SCILAB?

The different types of windows or work spaces that appear when you launch SCILAB are: *Console, Variable Browser, Command History and File Browser.*



**Console :**

The user types the command in the Console and can analyze the results. This process is continued until the final result is computed. We can edit commands using the arrow keys on the keyboard.

**File Browser:**

All the files saved in previous sessions can be accessed through the File Browser.

The file browser also has the following options for each file when it is right-clicked:

- Open with SciNotes
- Execute in Scilab
- Open with Xcos
- Load in Scilab
- Open with default application

**Variable Browser:**

The Variable Browser is a window that shows all the user variables in the current environment. The list is simple and comprehensive. It can also be sorted by

columns. It can be customized to show all or some of the variables using the available filters and the user can add or exclude variable names from it.

Command History:

The Command History is the window that lists all the commands that were input by the user during all the previous SCILAB sessions. The commands are refreshed by real time.

Right clicking a command will give the following:

- Copy
- Cut
- Evaluate Selection
- Edit in SciNotes
- Delete
- Clear History

8. If you do not save all your SCILAB files in the default directory or folder, then the following issues may arise? The issues are:
  - a. Not being in the right directory  
If the files are not saved in the right directory, then it will not be possible to access them again when we want to open them in the current directory.
  - b. Not saving the files in the current directory.  
If the files are not saved in the current directory and are instead saved in another directory, then this new directory might not have the read and write permissions, and we will not be able to edit the file.
  - c. Not overwriting an existing file while editing.  
If the existing file is not overwritten, then the edits to the file will not be saved and the file will revert back to its original state inside the directory.
  
9. Though the computations inside the SCILAB are performed using double precision, the appearance of floating point numbers (13.45678999) on screen is controlled by output format (i.e format command). Tabulate the different output format for the value of  $10\pi$ ?

S. No.	Command	Display
1.	-->x=10*%pi	x = 31.415927
2.	-->format('v',10);x	x = 31.415927
3.	-->format(20);x	x = 31.4159265358979312
4.	-->format('e',10);x	x = 3.142D+01

10. Prepare a tabular column for the arithmetic operators such as addition, subtraction, multiplication, division and exponentiation.

S. No.	Operations	Operators Used
1.	Addition	+
2.	Subtraction	-
3.	Multiplication	*, .*
4.	Division	/, ./
5.	Exponentiation	^, **, .^

11. What is the default variable that a SCILAB considers to store the user assigned value in console environment?

The default variable that a SCILAB considers to store the user defined variable in the console environment is `ans`

12. How do you assign the values to the variable in console environment of SCILAB?

A character followed by *equal sign* (=) is used to assign values to the variables in SCILAB. e.g. -->x=3

x =  
3.

13. Name the in-built operator that can suppress the output of the user assigned variables?

A semicolon (;) is the operator that can suppress the output of the user assigned variable. When this operator is used at the end of an instruction, the result is not displayed.

14. Write the command that is used to exit the SCILAB?

The command used to exit SCILAB is `exit`.

15. Compute the following capture the screen shots and store it in a windows file.

a) Arithmetic Operations

- Evaluate :  $\frac{2^5}{2^5 - 1}$

```
-->(2^5)/((2^5)-1)
```

```
ans =
```

```
1.0322581
```

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

```
-->3*((sqrt(5)-1)/(sqrt(5)+1)^2)-1
```

```
ans =
```

```
- 0.6458980
```

- Determine Area =  $\pi r^2$ ; with  $r = \pi^{1/3} - 1$

```
-->3*((sqrt(5)-1)/(sqrt(5)+1)^2)-1
```

```
ans =
```

```
- 0.6458980
```

```
-->r=(%pi)^(1/3)-1
```

```
r =
```

```
0.4645919
```

```
-->area=%pi*(r^2)
```

```
area =
```

```
0.6780990
```

b) Exponential and Logarithms

Calculate the following quantities using the SCILAB

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

```
-->%e^3
```

```
ans =
```

```
20.085537
```

```
-->log(%e^3)
```

```
ans =
```

```
3.
```

```
-->log10(%e^3)
```

```
ans =
```

```

1.3028834
-->log10(10^5)
ans =
5.

```

- $e^{\pi\sqrt{163}}$ 

```

-->%e^(%pi*sqrt(163))
ans =
2.625D+17

```

- Solve  $3^x = 17$ 

```

-->x=log10(17)/log10(3)
x =
2.5789019

```

c) Evaluate the following trigonometric functions

- $\sin\frac{\pi}{6}, \cos\pi, \text{ and } \tan\frac{\pi}{2}$

```

-->sin(%pi/6)
ans =
0.5
-->cos(%pi)
ans =
- 1.

```

- $\sin^2\frac{\pi}{6} + \cos^2\frac{\pi}{6}$

```

-->sin(%pi/6)^2+cos(%pi/6)^2
ans =
1.

```

- $y = \cosh^2 x - \sinh^2 x$  with  $x = 32\pi$

```

-->x=32*%pi
x =
100.53096

```

```

-->y=cosh(x)^2-sinh(x)^2
y =
0.

```

**Result**

Thus we learned the basic features, simple arithmetic operations using SCILAB.