

APPLIED PYTHON PROGRAMMING LAB
Electronics and Communication Engineering

I Year B.Tech. I Sem

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LIST OF EXPERIMENTS:

Cycle - 1

1. Downloading and Installing Python and Modules
 - a) Python 3 on Linux
Follow the instructions given in the URL
<https://docs.python-guide.org/starting/install3/linux/>
 - b) Python 3 on Windows
Follow the instructions given in the URL
<https://docs.python.org/3/using/windows.html> (Please remember that Windows installation of Python is harder!)
 - c) pip3 on Windows and Linux
Install the Python package installer by following the instructions given in the URL <https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/>
 - d) Installing numpy and scipy
You can install any python3 package using the command `pip3 install <packagename>`
 - e) Installing jupyterlab
Install from pip using the command `pip install jupyterlab`
2. Introduction to Python3
 - a) Printing your biodata on the screen
 - b) Printing all the primes less than a given number
 - c) Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum of all its factors (excluding the number itself) is equal to the number itself
3. Defining and Using Functions
 - a) Write a function to read data from a file and display it on the screen
 - b) Define a Boolean function *is palindrome*(<input>)
 - c) Write a function *collatz(x)* which does the following: if x is odd, $x = 3x + 1$; if x is even, then $x = x/2$. Return the number of steps it takes for $x = 1$
 - d) Write a function $N(m, s) = \exp(-(x-m)^2/(2s^2))/\sqrt{2\pi}s$ that computes the Normal distribution
4. The package numpy
 - a) Creating a matrix of given order $m \times n$ containing *random numbers* in the range 1 to 99999
 - b) Write a program that adds, subtracts and multiplies two matrices.
Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
 - c) Write a program to solve a system of n linear equations in n variables using matrix inverse
5. The package scipy and pyplot
 - a) Finding if two sets of data have the same *mean* value
 - b) Plotting data read from a file
 - c) Fitting a function through a set a data points using *polyfit* function

- d) Plotting a histogram of a given data set
- 6. The strings package
 - a) Read text from a file and print the number of lines, words and characters
 - b) Read text from a file and return a list of all n letter words beginning with a vowel
 - c) Finding a secret message hidden in a paragraph of text
 - d) Plot a histogram of words according to their length from text read from a file

Cycle -2

- 7. Installing OS on Raspberry Pi
 - a) Installation using PiImager
 - b) Installation using image file
 - Downloading an Image
 - Writing the image to an SD card
 - using Linux
 - using Windows
 - Booting up

Follow the instructions given in the URL

<https://www.raspberrypi.com/documentation/computers/getting-started.html>

- 8. Accessing GPIO pins using Python
 - a) Installing GPIO Zero library.
First, update your repositories list:
`sudo apt update`
Then install the package for Python 3:
`sudo apt install python3-gpiozero`
 - b) Blinking an LED connected to one of the GPIO pin
 - c) Adjusting the brightness of an LED
 - d) Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.
- 9. Collecting Sensor Data
 - a) DHT Sensor interface
 - Connect the terminals of DHT GPIO pins of Raspberry Pi.
 - Import the DHT library using `import Adafruit_DHT`
 - Read sensor data and display it on screen.