**THEORY OF EACH FOD EXPERIMENT LAB FILE**

**Exp 1:**

Anaconda Python is a free, open-source platform of the Python and R programming that allows you to write and execute code in them. It is by continuum.io, a company that specializes in Python development. The Anaconda platform is the most popular way to learn and use Python for scientific computing, data science, and machine learning.It aims to simplify package management and deployment. Package versions in Anaconda are managed by the package management system, conda, which analyses the current environment before executing an installation to avoid disrupting other frameworks and packages. Anaconda Python is the perfect platform for beginners who want to learn Python. It's easy to install, and you can get started quickly with the included Jupyter Notebook. Plus, Anaconda Python has many features and libraries that you can use for your projects.

The Jupyter Notebook application allows you to create and edit documents that display the input and output of a Python or R language script. Once saved, you can share these files with others. Python and R language are included by default, but with customization, Notebook can run several other kernel environments. Jupyter Notebooks provide a web-based interface for creating and sharing computational documents. You can seamlessly mix executable code, documentation, and instructions in one portable document.

[Anaconda Notebooks](https://anaconda.cloud/anaconda-tools) lets you skip setup and installation and get straight to learning and writing code. Powered by PythonAnywhere, Anaconda Notebooks is a hosted JupyterLab service that enables you to run JupyterLab notebooks reliably online.

**Learning Outcome:** I learnt installation of Python and Python IDEs for data science (Spyder-Anaconda, Jupyter Notebook etc.), configured and tested them.

**Exp 2:**

**Algorithm:**

1. Create an empty list l1.
2. Append elements (i\*i for sqaure) to it by the use of for loop.
3. Print the final answer list by use of list slicing(l1[5:31]).

**Learning Outcome:** I learnt to work on lists and apply loops (for loop) on the list to generate the required output along with use of list slicing.

**Exp 3(a):**

**Algorithm:**

1. In for loop use the simple condition x[::-1] to reverse and hence print the string
2. In while loop, check index>=0, when true, concatenate the elements of the original string to the rev\_str and do index=index-1.

**Learning Outcome:** I learnt to work on strings and apply loops (for and while loop) on the string to generate the required output along with use of string indexing.

**Exp 3(b):**

**Algorithm:**

1. Check if the number entered is less than zero, then print invalid input.
2. If not, while x!=0, make sum=sum+(x%10) and x=x//10.
3. The above statements use floor division and remainder (modulus) operations to extract every number from the original number and hence add them to get the result.

**Learning Outcome:** I learnt to work on integers and apply mathematical operations to extract every number from the original input to generate the required output.

**Exp 3(c):**

**Algorithm:**

1. Use a simple while loop and keep multiplying the number starting from the original input and reducing one from the number in each iteration

**Learning Outcome:** I learnt to work on integers and apply mathematical operations to find the factorial of the original input to generate the required output.

**Exp 3(d):**

**Algorithm:**

1. Initialise first and second variables as 0 and 1 respectively.
2. Use a for loop from 0 to x-2 and add first + second to generate the numbers ahead in the series.
3. Perform swapping operation in the loop to get the desired output.

**Learning Outcome:** I learnt to work on integers and apply mathematical operations to generate the Fibonacci series using swapping.

**Exp 3(e):**

**Algorithm:**

1. Input the number of rows the user wants for the triangle.
2. Use a for loop from 1 to n+1, print a blank space n times and the asterisk symbol (\*) i times.

**Learning Outcome:** I learnt to work on integers and apply loops to generate an equilateral triangle of required size.

**Exp 4:**

**Algorithm:**

1. Input the numbers from the user and check the conditions using if, elif and else statements.

**Learning Outcome:** I learnt to work on integers and apply loops to find the greatest number among the three inputs.

**Exp 5:**

**Algorithm:**

1. Open a text file in write mode to create at the time of opening and write into it.
2. Close and open the same file again in read mode to read and display its contents.

**Learning Outcome:** I learnt to work on text files and apply file handling to generate the required output.

**Exp 6:**

**Algorithm:**

1. Write a basic program for division on two number in try block.
2. In the except block write the name of the error that may occur in the program above to counter it and execute the except block instead of showing that error to the user.

**Learning Outcome:** I learnt to apply the try and except conditions and counter any exception that may occur while execution of the program.

**Exp 7:**

**Algorithm:**

1. The random library contains various useful functions that can be used effectively to produce the required outputs.
2. Create multiple lists that contain the important details covering the story such as the characters, plot, time, setting and work the characters are doing, in the form of strings.
3. Use random.choice() function on each list and join/concatenate the generated string outputs by using the plus(+) operator.

**Learning Outcome:** I learnt to use the random library and its choice () function to apply on various lists and generate the required random story output.

**Exp 8:**

**Algorithm:**

1. The NumPy Library in python has various function that can be applied on numeric data to uncover important facts and figures.
2. Various function like array(), sum(), amax(), average() and transpose(), have been used to perform the required operations on the data and print their respective outputs.
3. The sum() function returns the sum for all the array elements and generates row-wise/column-wise sum based on the axis provided.
4. The amax() function finds the maximum value in the entire array and the average() function helps to find the mean of all elements in the array.
5. Lastly, transpose() was used to find the array’s transpose. To filter elements greater than 25 in the array, we used simple Boolean mask expression of [arr>25] that returns Boolean answers (True/False) which if prefixed with arr returns the array values.

**Exp 9:**

**Algorithm:**

1. We used faker library in python in to generate random names, country and email-id’s for 5 records, adding them to list.
2. Make that list a pandas dataframe and provide a column heading to each column.
3. Lastly import this dataframe as a .CSV file.

**Exp 10:**

**Algorithm:**

1. We assume to have records of 10 students with their marks in Python, Java and C language.
2. We perform operations using the Pandas library and use the describe() function to find the mean, standard deviation, minimum and maximum marks along with 1st quantile 3rd quantile in each marks category.
3. Lastly plot a histogram plot for each subject using the matplotlib library.

**Exp 11:**

**Algorithm:**

1. Linear regression is a data analysis technique that predicts the value of unknown data by using another related and known data value. It mathematically models the unknown or dependent variable and the known or independent variable as a linear equation.
2. The train\_test() is used to split arrays or matrices into random train and test subsets and then fit the data into the in-built LinearRegression function. Use predict() to predict values of Y from X and find their mean\_absolute\_error.
3. Lastly perform a r2\_score to find value of R-squared [R2 - (coefficient of determination) regression score function], and print all values with a graph using matplotlib.

**Exp 12:**

**Algorithm:**

1. We create a simple recommender system using an item-item collaborative filtering, by creating a simple data set containing ratings for different movies by users.
2. Convert that data into a pandas dataframe and form a function to find the recommendations list by collecting high-rated movies the user hasn’t seen yet. Drop any duplicate values and return the list.
3. Print the list to find the recommended movies for user1.

**Exp 13: Mini Project**

**Algorithm:**

1. Analysing the Titanic dataset involves identifying which factors, such as age, gender, and class, influenced passenger survival rates. The process begins with importing the necessary libraries for data exploration, examining distributions and relationships to understand potential survival determinants.
2. Data cleaning is the next step that follows, handling missing or erroneous entries, especially in columns like Age and Cabin.
3. The cleaned and processed data undergoes Feature engineering creates or modifies features, such as grouping ages or encoding categorical data (like Sex and Embarked), making the data more suitable for modelling.
4. Finally, machine learning model—Random Forest (Supervised Machine Learning) in this case—predicts survival based on these features using a confusion matrix presented in the form of a heatmap. This approach reveals key survival patterns and informs data-driven decisions.