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COMPUTER SCIENCE

15. DATA MANIPULATION THROUGH SQL

Section – A

Choose the best answer   **(1 Mark)**

1. Which of the following is an organized collection of data?

   (A) Database   (B) DBMS   (C) Information   (D) Records

2. SQLite falls under which database system?

   (A) Flat file database system   **(B) Relational Database system**

   (C) Hierarchical database system   (D) Object oriented Database system

3. Which of the following is a control structure used to traverse and fetch the records of the database?

   (A) Pointer   (B) Key   **(C) Cursor**   (D) Insertion point

4. Any changes made in the values of the record should be saved by the command

   (A) Save   (B) Save As   **(C) Commit**   (D) Oblige

5. Which of the following executes the SQL command to perform some action?

   (A) Execute()   (B) Key()   (C) Cursor()   (D) run()

6. Which of the following function retrieves the average of a selected column of rows in a table?

   (A) Add()   (B) SUM()   **(C) AVG()**   (D) AVERAGE()

7. The function that returns the largest value of the selected column is

   (A) MAX()   (B) LARGE()   (C) HIGH()   (D) MAXIMUM()

8. Which of the following is called the master table?

   (A) sqlite_master   (B) sql_master   (C) main_master   (D) master_main

9. The most commonly used statement in SQL is

   (A) cursor   **(B) select**   (C) execute   (D) commit

10. Which of the following clause avoide the duplicate?

   (A) Distinct   (B) Remove   (C) Where   (D) GroupBy

Answer the following questions   **(2 Marks)**

1. Mention the users who uses the Database.

- Users of database can be human users, other programs or applications

2. Which method is used to connect a database? Give an example.

- Create a connection using **connect () method** and pass the name of the database File.

- **Example:**

        import sqlite3

        # connecting to the database

        connection = sqlite3.connect ("Academy.db")

        # cursor

        cursor = connection.cursor()

3. What is the advantage of declaring a column as "INTEGER PRIMARY KEY"

- If a column of a table is declared to be an **INTEGER PRIMARY KEY**, then whenever a NULL will be used as an input for this column, the **NULL will be automatically converted into an integer** which will one larger than the highest value so far used in that column.

- If the table is empty, the value 1 will be used.

4. Write the command to populate record in a table. Give an example.

- To populate (add record) the table "INSERT" command is passed to SQLite. "execute" method executes the SQL command to perform some action.

- **Example:**

    sql_command = """INSERT INTO Student (Rollno, Sname, Grade, gender, Average, birth_date) VALUES (NULL, "Akshay", "B", "M","87.8", "2001-12-12");""" cursor.execute(sql_command)

5. Which method is used to fetch all rows from the database table?

- The **fetchall()** method is used to fetch all rows from the database table.

- **Example:**   result = cursor.fetchall()

Section-C

Answer the following questions **(3 Marks)**

1. What is SQLite?What is it advantage?

- SQLite is a simple relational database system, which saves its data in regular data files or even in the internal memory of the computer.

ADVANTAGES:

- SQLite is fast, rigorously tested, and flexible, making it easier to work.
- Python has a native library for SQLite.

2. Mention the difference between fetchone() and fetchmany()

fetchone()	fetchmany()
• The **fetchone**() method returns the next row of a query result set or None in case there is no row left	• The **fetchmany**() method returns the next number of rows (n) of the result set.
• Using while loop and fetchone() method we can display all the records from a table.	• Displaying specified number of records is done by using **fetchmany().**

3. What is the use of Where Clause. Give a python statement Using the where clause.

- The WHERE clause is used to extract only those records that fulfill a specified condition.

EXAMPLE: To display the different grades scored by male students from "student table"

import sqlite3

connection = sqlite3.connect("Academy.db")

cursor = connection.cursor()

cursor.execute("SELECT DISTINCT (Grade) FROM student where gender='M'")

result = cursor.fetchall()

print(*result,sep="\n")

OUTPUT:

('B',)

('A',)

('C',)

('D',)

4. Read the following details.Based on that write a python script to display department wise records.

  database name   **:- organization.db**
  Table name   **:- Employee**
  Columns in the table   **:- Eno, EmpName, Esal, Dept**

PYTHON SCRIPT:

```
import sqlite3
connection = sqlite3.connect("organization.db")
c=conn.execute("SELECT * FROM Employee GROUP BY Dept")
for row in c:
        print(row)
conn.close()
```

5. Read the following details.Based on that write a python script to display records in desending order of Eno.

  database name :- organization.db
  Table name   **:- Employee**
  Columns in the table :- Eno, EmpName, Esal, Dept

PYTHON SCRIPT:

```
import sqlite3

connection = sqlite3.connect("organization.db")

cursor=connection.cursor()

cursor.execute("SELECT * FROM Employee ORDER BY Eno DESC")

result=cursor.fetchall()

print(result)
```

Section - D

Answer the following questions: **(5 Marks)**

1. Write in brief about SQLite and the steps used to use it.

- SQLite is a simple relational database system, which saves its data in regular data files or even in the internal memory of the computer.

- It is designed to be embedded in applications, instead of using a separate database server program such as MySQLor Oracle.

ADVANTAGES:

- SQLite is fast, rigorously tested, and fl exible, making it easier to work.

- Python has a native library for SQLite.

Steps To Use SQLite:

Step 1: import sqlite3

Step 2: Create a connection using connect () method and pass the name of the database File

- Connecting to a database in step2 means passing the name of the database to be accessed.

- If the database already exists the connection will open the same.

- Otherwise, Python will open a new database file with the specified name.

Step 3: Set the cursor object cursor = connection. cursor ()

- Cursor is a control structure used to traverse and fetch the records of the database.

- Cursor has a major role in working with Python.

- All the commands will be executed using cursor object only.

- To create a table in the database, create an object and write the SQL command in it.

Example:- sql_comm = "SQL statement"

- For executing the command use the cursor method and pass the required sql command as a parameter.

- Many number of commands can be stored in the sql_comm and can be executed one after other.

- Any changes made in the values of the record should be saved by the commend **"Commit"** before closing the "Table connection".

2. Write the Python script to display all the records of the following table using fetchmany()

Icode	ItemName	Rate
1003	Scanner	10500
1004	Speaker	3000
1005	Printer	8000
1008	Monitor	15000
1010	Mouse	700

PYTHON SCRIPT:

```
import sqlite3

connection = sqlite3.connect("Materials.db")

cursor=connection.cursor()

cursor.execute("SELECT * FROM Materials")

print("Displaying All The Records")

result=cursor.fetchmany(5)

print(result, Sep= "\n")
```

OUTPUT:

Displaying All The Records

(1003,   'Scanner',   10500)

(1004,   'Speaker',   3000)

(1005,   'Printer',   8000)

(1008,   'Monitor',   15000)

(1010,   'Mouse',   700)

3. What is the use of HAVING clause. Give an example python script

- Having clause is used to filter data based on the group functions.

- This is similar to WHERE condition but can be used only with group functions.

- Group functions cannot be used in WHERE Clause but can be used in HAVING clause.

- **Example:**

```
import sqlite3

connection = sqlite3.connect("Academy.db")

cursor = connection.cursor()

cursor.execute("SELECT  GENDER,COUNT(GENDER) FROM Student  GROUP  BY  GENDER
HAVING COUNT(GENDER)>3")

result = cursor.fetchall()

co = [i[0] for i in cursor.description]

print(co)

print(result)
```

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['gender', 'COUNT(GENDER)']

[('M', 5)]

4. Write a Python script to create a table called ITEM with following specification.

  Add one record to the table.

  Name of the database :- ABC

  Name of the table :- Item

  Column name and specification :-

Icode :-	integer and act as primary key
Item Name :-	Item Name :-
Rate :-	Integer
Record to be added :-	1008, Monitor,15000

PYTHON SCRIPT:

import sqlite3

connection = sqlite3.connect("ABC.db")

cursor=connection.cursor()

sql_command – """ CREATE TABLE Item(

Icode INTEGER PRIMARY KEY,

ItemName VARCHAR(25),

Rate INTEGER) ; """

cursor.execute(sql_command)

sql_command = """ INSERT INTO Item(Icode, ItemName, Rate) VALUES (1008, 'Monitor', 15000);
"""

cursor.execute(sql_command)

connection.commit()

connection.close()

print("TABLE CREATED")

OUTPUT:

TABLE CREATED

5. Consider the following table Supplier and item .Write a python script for (i) to (ii)

SUPPLIER				
Suppno	Name	City	Icode	SuppQty
S001	Prasad	Delhi	1008	100
S002	Anu	Bangalore	1010	200
S003	Shahid	Bangalore	1008	175
S004	Akila	Hydrabad	1005	195
S005	Girish	Hydrabad	1003	25
S006	Shylaja	Chennai	1008	180
S007	Lavanya	Mumbai	1005	325

PYTHON SCRIPT:

i) Display Name, City and Itemname of suppliers who do not reside in Delhi.

import sqlite3

connection = sqlite3.connect("ABC.db")

cursor.execute("SELECT Supplier.Name, Supplier.City,Item.ItemName FROM Supplier,Item

WHERE Supplier.Icode = Item.Icode AND Supplier.City NOT In Delhi ")

s = [i[0] for I in cursor.description]

print(s)

result = cursor.fetchall()

for r in result:

print r

OUTPUT:
['Name',   'City',   'ItemName']
['Anu',   'Bangalore', 'Scanner']
['Shahid',   'Bangalore', 'Speaker']
['Akila',   'Hydrabad', 'Printer']
['Girish',   'Hydrabad', 'Monitor']
['Shylaja',   'Chennai',   'Mouse']
['Lavanya', 'Mumbai',   'CPU']

ii) Increment the SuppQty of Akila by 40

import sqlite3

connection = sqlite3.connect("ABC.db")

cursor.execute("UPDATE Supplier ST SuppQty = SuppQty +40 WHERE Name = 'Akila' ")

cursor.commit()

result = cursor.fetchall()

print (result)

connection.close()

OUTPUT:

(S004, 'Akila', 'Hydrabad', 1005, 235)

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16. DATA VISUALIZATION USING PYPLOT: LINE CHART, PIE CHART AND BAR CHART

Section – A

Choose the best answer   **(1 Mark)**

1. Which is a python package used for 2D graphics?

a. matplotlib.pyplot   b. matplotlib.pip   c. matplotlib.numpy   d. matplotlib.plt

2. Identify the package manager for Python packages, or modules.

 a. Matplotlib   **b. PIP**   c. plt.show()   d. python package

3.   Read the following code: Identify the purpose of this code and choose the right option from the following.

C:\Users\YourName\AppData\Local\Programs\Python\Python36-32\Scripts>pip – version

a. Check if PIP is Installed   b. Install PIP   c. Download a Package   **d. Check PIP version**

4.   Read the following code: Identify the purpose of this code and choose the right option from the following.   C:\Users\Your Name\AppData\Local\Programs\Python\Python36-32\Scripts>pip list

a. List installed packages   b. list command   c. Install PIP   d. packages installed
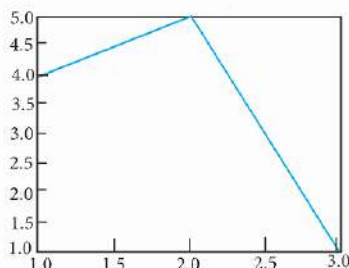
5. To install matplotlib, the following function will be typed in your command prompt.

   What does "-U"represents?

   Python –m pip install –U pip

a. downloading pip to the latest version   **b. upgrading pip to the latest version**

c. removing pip   d. upgrading matplotlib to the latest version

6. Observe the output figure. Identify the coding for obtaining this output.

a. import matplotlib.pyplot as plt   b. import matplotlib.pyplot as plt

plt.plot([1,2,3],[4,5,1])   plt.plot([1,2],[4,5])

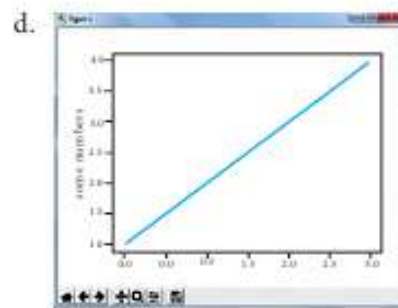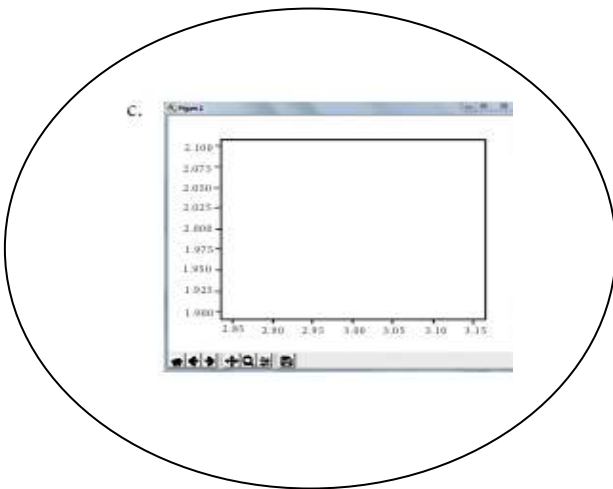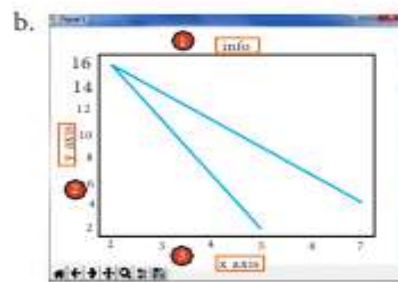**plt.show()**   plt.show()

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c. import matplotlib.pyplot as plt

  plt.plot([2,3],[5,1])

  plt.show()

d. import matplotlib.pyplot as plt

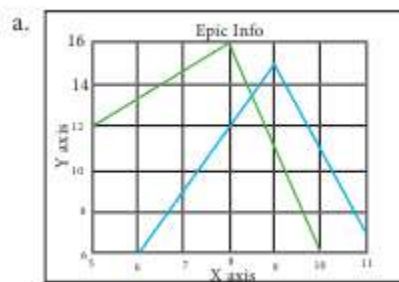 plt.plot([1,3],[4,1])

  plt.show()

7. Read the code:

 a. import matplotlib.pyplot as plt

 b. plt.plot(3,2)

 c. plt.show()

 Identify the output for the above coding.

a.

b.

c.

d.

8. Which key is used to run the module?

　　　a. F6　　　　　　　　　　b. F4　　　　　　　　　c. F3　　　　　　　**d. F5**

9. Identify the right type of chart using the following hints.

 Hint 1: This chart is often used to visualize a trend in data over intervals of time.

 Hint 2: The line in this type of chart is often drawn chronologically.

　　　a.   Line chart　　　　　　b. Bar chart　　　　　　　c. Pie chart　　　　d. Scatter plot

10. Read the statements given below. Identify the right option from the following for pie chart.

Statement A: To make a pie chart with Matplotlib, we can use the plt.pie() function.

Statement B: The autopct parameter allows us to display the percentage value using the Python string formatting.

a. Statement A is correct   b. Statement B is correct

<u>c. Both the statements are correct</u>   d. Both the statements are wrong

<u>Section-B</u>

<u>Answer the following questions</u>   **(2 Marks)**

1. Define: Data Visualization.
- Data Visualization is the graphical representation of information and data.
- The objective of Data Visualization is to communicate information visually to users using statistical graphics.

2. List the general types of data visualization.
- Charts
- Tables
- Graphs
- Maps
- Infographics
- Dashboards

3. List the types of Visualizations in Matplotlib.
- Line plot
- Scatter plot
- Histogram
- Box plot
- Bar chart and
- Pie chart

4. How will you install Matplotlib?
- **Matplotlib** can be installed using pip software.
- Pip is a management so譖ware for installing python packages.
- Importing Matplotlib using the command: **import matplotlib.pyplot as plt**
- Matplotlib can be imported in the workspace.

5. Write the difference between the following functions:
plt.plot([1,2,3,4]), plt.plot([1,2,3,4], [1,4,9,16]).

| plt.plot([1,2,3,4])	plt.plot([1,2,3,4], [1,4,9,16])
It refers y value as [1,2,3,4]	It refers x and y values as ([1,2,3,4], [1,4,9,16])
Indirectly it refers x values as [0,1,2,3] (0,1) (1,1) (2,3) (3,4)	Directly x and y values are given as (1,1) (2,4) (3,9) (4,16)

Section-C

Answer the following questions   **(3 Marks)**

1. Draw the output for the following data visualization plot.

```
import matplotlib.pyplot as plt
plt.bar([1,3,5,7,9],[5,2,7,8,2], label="Example one")
plt.bar([2,4,6,8,10],[8,6,2,5,6], label="Example two", color='g')
plt.legend()
plt.xlabel('bar number')
plt.ylabel('bar height')
plt.title('Epic Graph\nAnother Line! Whoa')
plt.show()
```

OUTPUT:
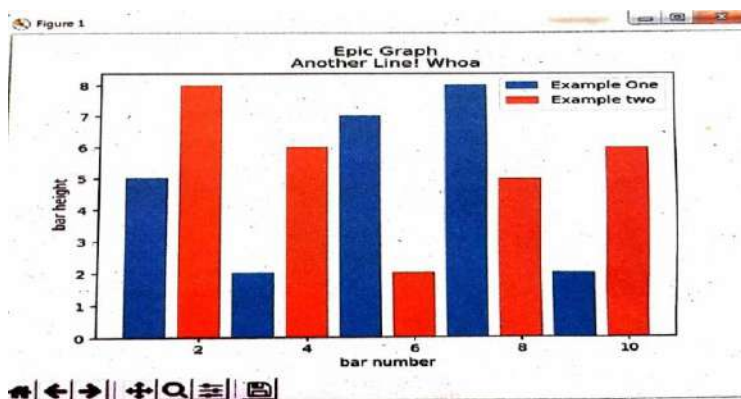
2. Write any three uses of data visualization.

- Data Visualization help users to analyze and interpret the data easily.
- It makes complex data understandable and usable.
- Various Charts in Data Visualization helps to show relationship in the data for one or more variables.

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3. Write the coding for the following:

 a. To check if PIP is Installed in your PC.
- In command prompt type pip – version.
- If it is installed already, you will get version.
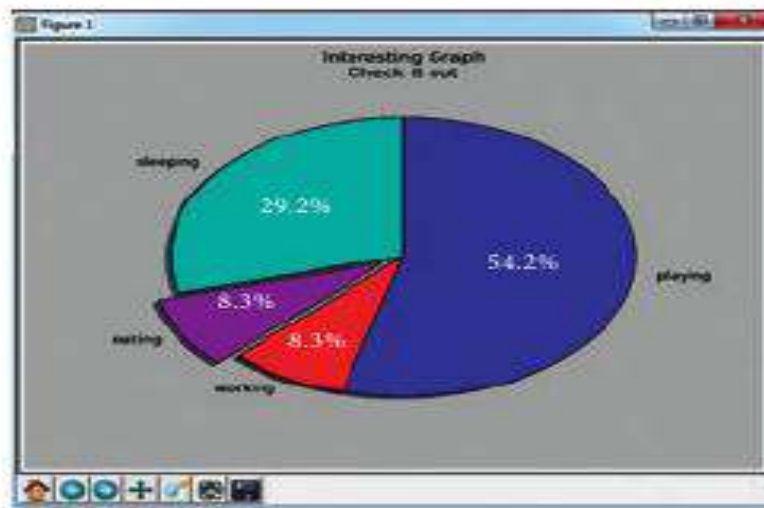- **Command:** Python - m pip install - U pip

 b. To Check the version of PIP installed in your PC.
- C:\Users\YourName\AppData\Local\Programs\Python\Python36-32\Scripts> pip-version

c. To list the packages in matplotlib.
- C:\Users\YourName\AppData\Local\Programs\Python\Python36-32\Scripts> pip list

4. Write the plot for the following pie chart output.


```
import matplotlib.pyplot as plt
slices = [7,2,2,13]
activities = ['sleeping', 'eating', 'working', 'playing']
plt.pie(slices, labels=activities, atopct = 'y.1.1 f%%')
plt.title('Interesting Graph Ceck It Out')
plt.show()
```

Section - D

Answer the following questions: **(5 Marks)**

1. Explain in detail the types of pyplots using Matplotlib.
Line Chart:
- A Line Chart or Line Graph is a type of chart which displays information as a series of data points called 'markers' connected by straight line segments.

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- A Line Chart is often used to visualize a trend in data over intervals of time – a time series – thus the line is often drawn chronologically.

Example:

```
import matplotlib.pyplot as plt
years = [2014, 2015, 2016, 2017, 2018]
total_populations = [8939007, 8954518, 8960387, 8956741, 8943721]
plt.plot (years, total_populations)
plt.title ("Year vs Population in India")
plt.xlabel ("Year")
plt.ylabel ("Total Population")
plt.show()
```
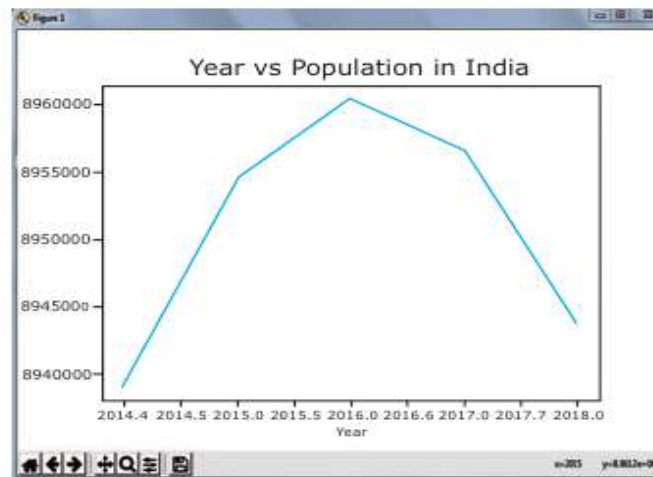
In this program,

Plt.title() → specifies title to the graph

Plt.xlabel() → specifies label for X-axis

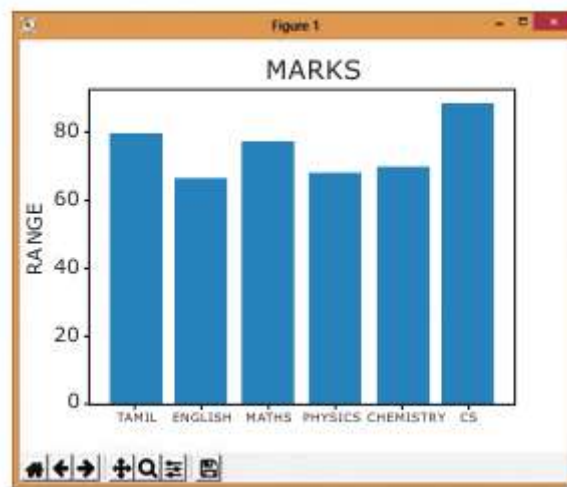Plt.ylabel() → specifies label for Y-axis

Output:

Bar Chart:

- A BarPlot (or BarChart) is one of the most common type of plot.
- It shows the relationship between a numerical variable and a categorical variable.
- Bar chart represents categorical data with rectangular bars.
- Each bar has a height corresponds to the value it represents.
- The bars can be plotted vertically or horizontally.
- It's useful when we want to compare a given numeric value on different categories.
- To make a bar chart with Matplotlib, we can use the plt.bar() function

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Example:

```
import matplotlib.pyplot as plt
labels = ["TAMIL", "ENGLISH", "MATHS", "PHYSICS", "CHEMISTRY", "CS"]
usage = [79.8, 67.3, 77.8, 68.4, 70.2, 88.5]
y_positions = range (len(labels))
plt.bar (y_positions, usage)
plt.xticks (y_positions, labels)
plt.ylabel ("RANGE")
plt.title ("MARKS")
plt.show()
```

Output:

Labels → Specifies labels for the bars.

Usgae → Assign values to the labels specified.

Xticks → Display the tick marks along the x-axis at the values represented.
Then specify the label for each tick mark.

Range → Create sequence of numbers.

Pie Chart:

- Pie Chart is probably one of the most common type of chart.
- It is a circular graphic which is divided into slices to illustrate numerical proportion.
- The point of a pie chart is to show the relationship of parts out of a whole.
- To make a Pie Chart with Matplotlib, we can use the plt.pie() function.
- The autopct parameter allows us to display the percentage value using the Python string formatting.

Example:
```
import matplotlib.pyplot as plt
sizes = [89, 80, 90, 100, 75]
labels = ["Tamil", "English", "Maths", "Science", "Social"]
plt.pie (sizes, labels = labels, autopct = "%.2f ")
plt.axes().set_aspect ("equal")
plt.show()
```
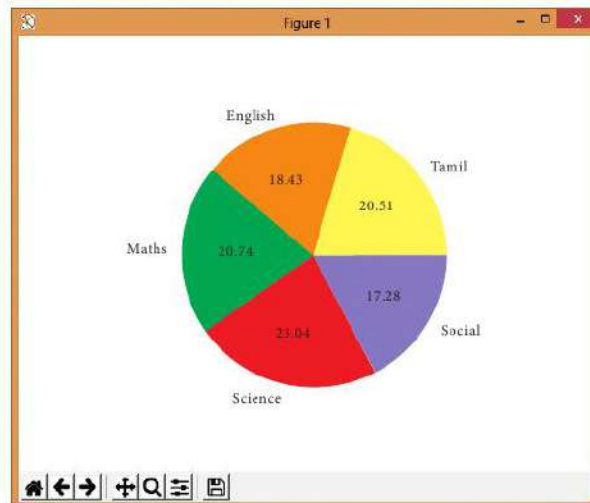

2. Explain the various buttons in a matplotlib window.

Home Button:

- The Home Button will help once you have begun navigating your chart.
- If you ever want to return back to the original view, you can click on this.

Forward/Back Buttons:

- These buttons can be used like the Forward and Back buttons in your browser.
- You can click these to move back to the previous point you were at, or forward again.

Pan Axis:

- This cross-looking button allows you to click it, and then click and drag your graph around.

Zoom:

- The Zoom button lets you click on it, then click and drag a square that you would like to zoom into specifically.
- Zooming in will require a left click and drag.
- You can alternatively zoom out with a right click and drag.

Configure Subplots:

- This button allows you to configure various spacing options with your figure and plot.

Save Figure:

- This button will allow you to save your figure in various forms.

3. Explain the purpose of the following functions:

  a. plt.xlabel

   plt.xlabel()→specifies label for X-axis

  b. plt.ylabel

plt.ylabel()→specifies label for Y-axis

  c. plt.title

   plt.title() →specifies title to the graph

  d. plt.legend()

  Calling legend() with no arguments automatically fetches the legend handles and their associated labels.

  e. plt.show()

Display a figure. When running in Python with its Pylab mode,display all figures and return to the Python prompt.

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****ALL THE BEST ****