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COMPUTER SCIENCE

16. DATA VISUALIZATION USING PYLOT: 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

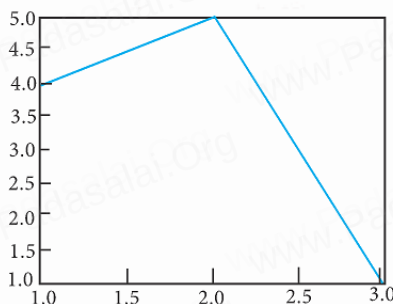
5. To install matplotlib, the following function will be typed in your command prompt.

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

b. import matplotlib.pyplot as plt
 plt.plot([1,2],[4,5])
 plt.show()

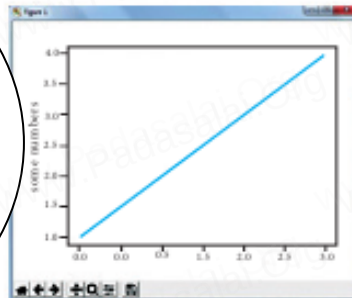
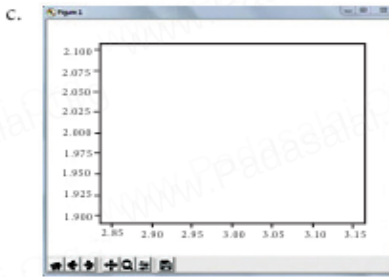
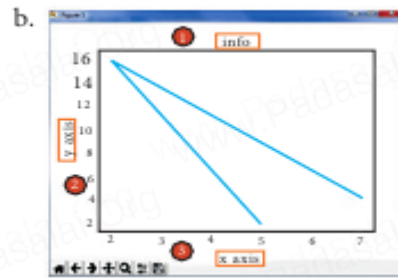
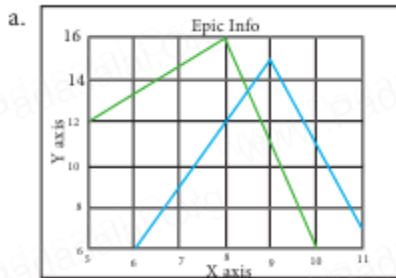
c. import matplotlib.pyplot as plt
 plt.plot([2,3],[5,1])
 plt.show()

d. import matplotlib.pyplot as plt
 plt.plot([1,3],[4,1])
 plt.show()

7. Read the code:

- import matplotlib.pyplot as plt
- plt.plot(3,2)
- plt.show()

Identify the output for the above coding.



8. Which key is used to run the module?

- F6
- F4
- F3
- 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.

- Line chart**
- Bar chart
- Pie chart
- 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
- c. Both the statements are correct
- d. Both the statements are wrong

Section-B

Answer the following questions

(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 software 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])`.

<code>plt.plot([1,2,3,4])</code>	<code>plt.plot([1,2,3,4], [1,4,9,16])</code>
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

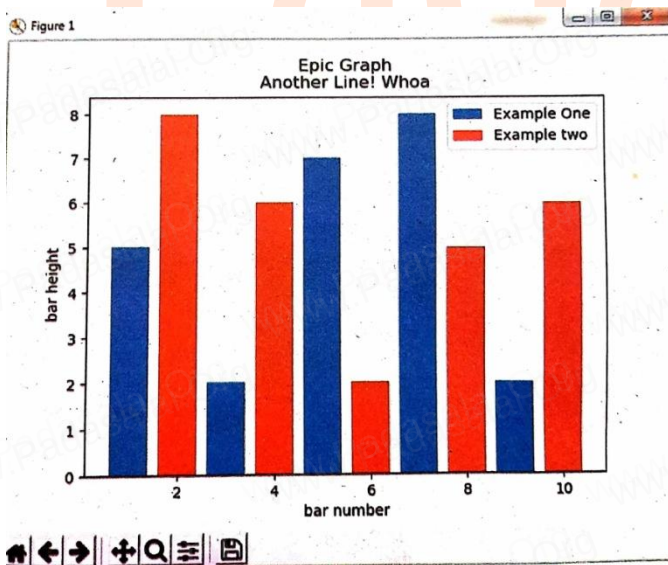
Answer the following questions

(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.

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

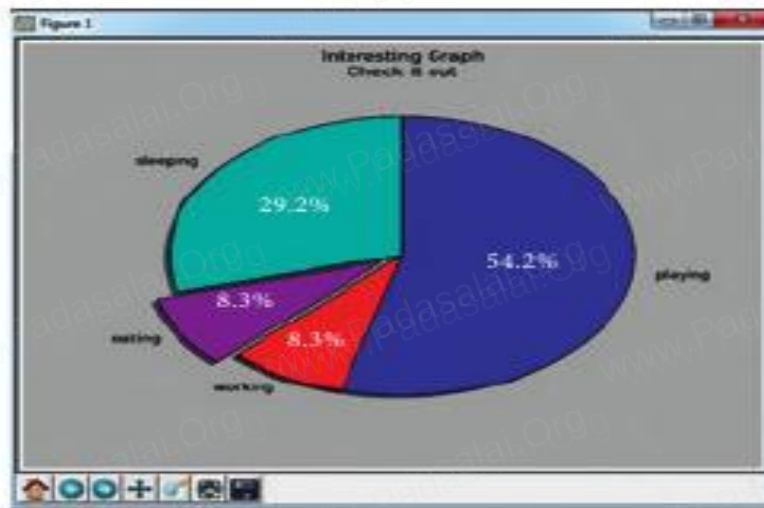
b. To Check the version of PIP installed in your PC.

- 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, autopct = '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.
- 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:

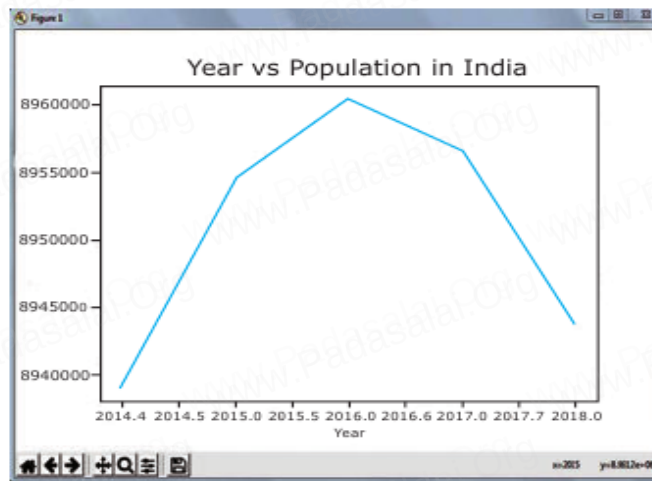
```
import matplotlib.pyplot as plt
years = [2014, 2015, 2016, 2017, 2018]
total_populations = [8939007, 8954518, 8960387, 8956741, 8943721]
plt.plot (years, total_populations)
plt.title ("Year vs Population in India")
plt.xlabel ("Year")
plt.ylabel ("Total Population")
plt.show()
```

In this program,

Plt.title() → specifies title to the graph

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

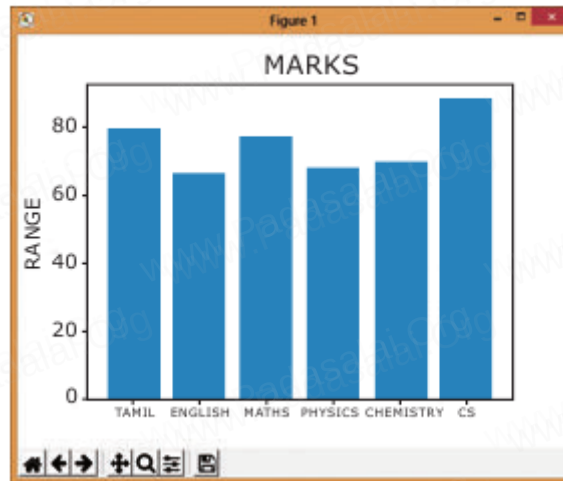
Plt.ylabel() → specifies label for Y-axis

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

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.

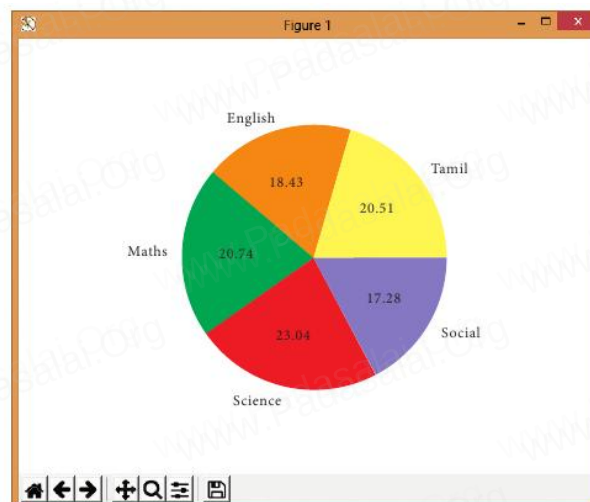
Range → Create sequence of numbers.

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 ****