QB365 Question Bank Software Study Materials

Data Visualization Using Pyplot: Line Chart, Pie Chart and Bar Chart Important 2, 3 & 5 Marks Questions With Answers (Book Back and Creative)

12th Standard

Computer Science

Total Marks : 75

2 Marks

10 x 2 = 20

1) What is Data Visualization?

Answer : Data Visualization is the graphical representation of information and data. The objective of Data Visualization is to communicate information visually to users.

2) List the general types of data visualization.

Answer : (i) Charts
(ii) Tables
(iii) Graphs
(iv) Maps
(v) Infographics
(vi) Dashboards

3) List the types of Visualizations in Matplotlib.

Answer : (i) Line plot
(ii) Scatter plot
(iii) Histogram
(iv) Box plot
(v) Bar chart and
(vi) Pie chart

4) How will you install Matplotlib?

Answer : We can install Matplotlib using Pip. Pip is a management software for installing Python packages.

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

Answer :

PLT.PLOT ([I,2,3,4])	**PLT.PIOT ([I,2,3,4], [1,4,9,16])**
1. It refers y values as [1,2, 3,4]	1. It refers x and y values as ([1, 2, 3, 4], [1,4,9, 16])
2. Indirectly it refers x values as [0, 1, 2, 3] (0,1), (1,2), 2,3), (3,4)	2. Directly given in the function (1,1), (2,4), (3,9), (4,16)

6) What is Infographics data visualization?

Answer : Infographics → An infographic (information graphic) is the representation of information in a graphic format.

7) What are the two ways to display data in the form of diagram?

Answer : Bar Graph and Histogram are the two ways to display data in the form of a diagram.

8) What is line chart?

Answer : 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.

9) What is Bar Chart?

Answer : A Bar Plot is one of the most common type of plot. It shows the relationship between a numerical variable and a categorical variable.

10) What is the use of autopct?

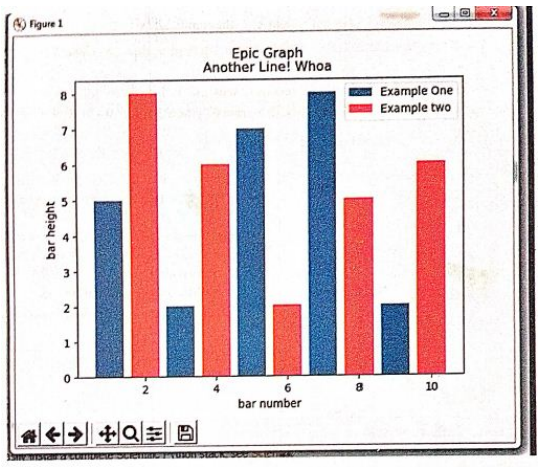
Answer : The autopct parameter allows us to display the percentage value using the python string formatting.

3 Marks 10 x 3 = 30

11) 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 in Another Line! Whoa')
plt.show()
```

Answer :



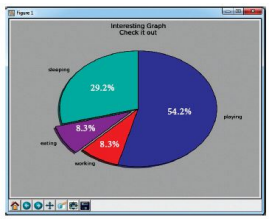
12) Write any three uses of data visualization.

Answer : (i) Data Visualization help users to analyze and interpret the data easily.

(ii) It makes complex data understandable and usable.

(iii) Various Charts in Data Visualization helps to show relationship in the data for one or more variables.

13) Write the plot for the following pie chart output.



Answer : Plot:

```
import matplotlib.pyplot as plt
sizes =  [105, 30, 30, 195]
label= ["sleeping", "eating", "working", "playing"]
plt.pie (sizes, labels = labels, autopct = "%.2f")
plt, axes ( ). set_aspect ("equal")
plt.show ( )
```

14) Write the coding for the following:

a. To check if PIP is Installed in your PC.

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

c. To list the packages in matplotlib.

Answer : **(a) Check if PIP is Installed:**

To check if PIP is already installed in our system, navigate our command line to the location of Python's script directory.

Command:

Python m pip install - U pip.

(b) To check PIP version:

To check the version of PIP in our system, type the command as:

C: \Users\Your Name\App Data\Local\Programs\Python\Python 36-32\Scripts > Pip--version.

(c) List packages:

To view the list of installed packages on our system, use the list command:

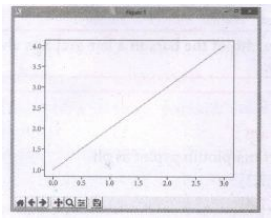
C:\Users\Your Name\App Data\Local\Programs\Python\Python 36-32\scripts > Pip list

15) Write a python code to display the following plot.

Answer : **Program:**

```
import matplotlib.pyplot as plt
pIt.plot([1, 2, 3, 4]) ,
plt.show ( )
```

Output:



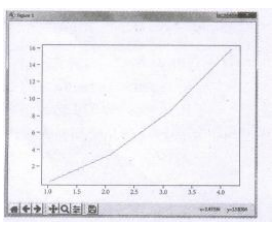
16) Write a python code to display the following plot.

Answer : **Program:**

For example, to plot x versus y, you can issue the command:

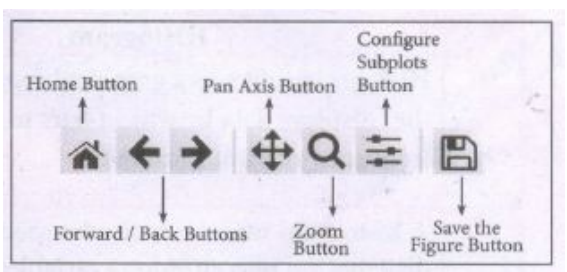
```
import matplotlib. pyplot as plt
pIt.plot([1,2,3,4], [1,4,9,16])
plt.show ( )
```

Output:



17) List the buttons in matlibplot window.

Answer :



18) Read the following code. What does the following represents.

(i) Labels

(ii) Usage

(iii) X ticks

(iv) Range

(v) Show

Answer : (i) Labels → Specifies labels for the bars.

(ii) Usgae → Assign values to the labels specified.

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

(iv) Range → Create sequence of numbers.

(v) Show → Displays the plot

19) What is the output for the following coding:

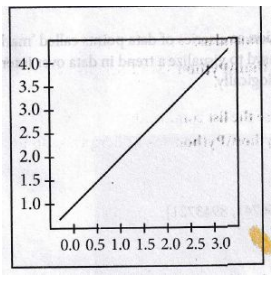
Answer : import matplotlib.pyplot as plt

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

plt.show ( )

Output:

This window is a matplotlib window, which allows us to see our graph. We can hover the graph and see the coordinates in the bottom right.



20) What is the output for the following coding?

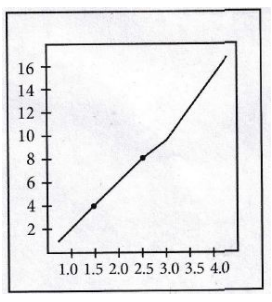
Answer : import matplotlib.pyplot as plt

plt.plot([1,2,3,4],[1,4,9,16])

plt.show ( )

Output:

This plot takes many parameters, but the first two here and 'X' and 'Y' coordinates. This means, we have 4 coordinates according to these lists: (1,1), (2,4), (3,9), (4,16)



5 Marks 5 x 5 = 25

21) Explain in detail the types of pyplots using Matplotlib.

Answer : Line Chart:

(i) 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.

(ii) 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)
pit. title ("Year vs Population in India")
plt.xlabel ("Year")
pIt.ylabel ("Total Population")
plt.showt (1)
```

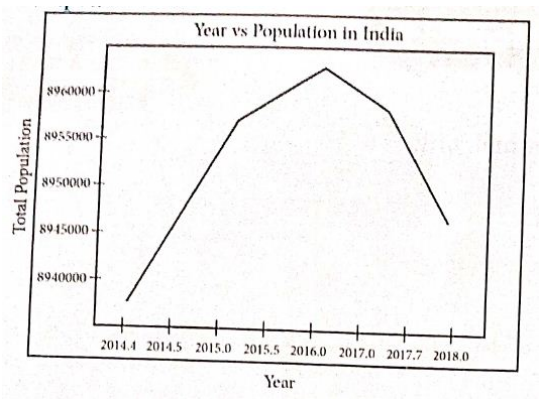
In this program,

Plt.titlet( ) → specifies title to the graph

Plt.xlabelt) → specifies label for X-axis

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

Output:



Bar Chart:

(i) A Bar Plot (or BarChart) is one of the most common type of plot. It shows the relationship between a numerical variable and a categorical variable

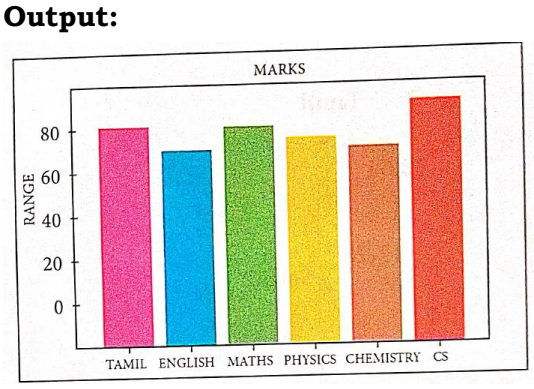
(ii) Bar chart represents categorical data with rectangular bars. Each bar has a height corresponds to the value it represents. The bars can be plotted vertically or horizontally.

(iii) 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
# Our data
labels = ["TAMIL", "ENGLISH", "MATHS", "PHYSICS", "CHEMISTRY", "CS"]
usage = [79.8,67.3,77.8,68.4,70.2,88.5]
# Generating the y positions.
y_positions = range (len(labels))
# Creating our bar plot
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.

Usage → Assign values to the labels specified.

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

Range → Create sequence of numbers.

Pie Chart:

(i) 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.

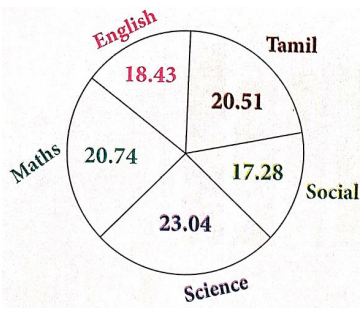
(ii) The point of a pie chart is to show the relationship of parts out of a whole. To make a Pie Chart with Matplotlib, we can use the plt.pief) function.

(iii) 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( )
```

Output:



22) Explain the various buttons in a matplotlib window.

Answer : **(i) Home Button** → The Home Button will help one to begun navigating the chart. If you ever want to return back to the original view, you can click on this.

(ii) Forward/Back buttons → These buttons can be used like the Forward and Back buttons in browser. Click these to move back to the previous point you were at, or forward again.

(iii) Pan Axis → This cross-looking button allows you to click it, and then click and drag graph around.

(iv) Zoom → The Zoom button lets you click on it, then click and drag a square would like to zoom into specifically. Zooming in will require a left click and drag. Zoom out with a right click and drag.

(v) Configure Subplots→ This button allows you to configure various spacing options with figure and plot.

(vi) Save Figure →This button will allow you to save figure in various forms

23) Explain the purpose of the following functions:

a. plt.xlabel

b. plt.ylabel

c. plt.title

d. plt.legend()

e. plt.show()

Answer : **(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.show():

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

(e) plt.legend():

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

24) Write the key differences between Histogram and bar graph.

Answer :

S.No	Histogram	Bar graph
i)	Histogram refers to a graphical representation; that displays data by way of bars to show the frequency of numerical data.	A bar graph is a pictorial representation of data that uses bars to compare different categories of data.
ii)	A histogram represents the frequency distribution of continuous variables.	Conversely, a bar graph is a diagrammatic comparison of discrete variables.
iii)	Histogram presents numerical data	Bar graph shows categorical data
iv)	Items of the histogram are numbers, which are categorised together, to represent ranges of data.	As opposed to the bar graph, items are considered as individual entities.
v)	A histogram, this cannot be done, as they are shown in the sequence of classes.	In the case of a bar graph, it is quite common to rearrange the blocks, from highest to lowest.
vi)	The width of rectangular blocks in a histogram mayor may not be same	The width of the bars in a bar graph is always same.

25) Write s python code to display to following plot.

Program

Answer : Program:

```
import matplotlib.pyplot as plt
x = [1,2,3]
Y = [5,7,4]
x2 = [1,2,3]
y2 = [10,14,12]
plt.plot(x, y, Iabel='Line 1')
plt.plot(x2, y2, Iabel='Line 2')
pIt.xlabel('X -Axis')
pIt.yIabel('Y- Axis')
pIt.title('LINE GRAPH')
plt.legend ( )
plt.show ( )
```