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MINIMUM LEVELS OF LEARNING

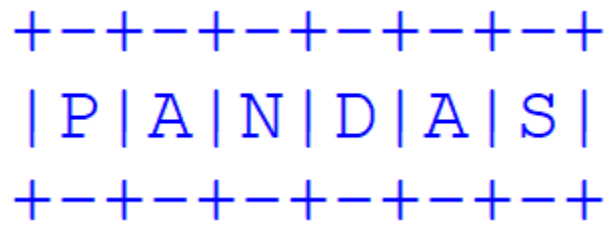
(2026-27)

CLASS XII

INFORMATICS PRACTICES (065)

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Introduction to Python Libraries Data Structure in Pandas: Series, attributes, functions, indexing and slicing.

Pandas is defined as an open-source library that provides high-performance data manipulation in Python.

The name of Pandas is derived from the word **Panel Data**.

Key Features of Pandas

- It has a fast and efficient DataFrame object with the default and customized indexing.
- Used for reshaping the data sets.
- Group by data for aggregations and transformations.
- Process a variety of data sets in different formats.
- Handle multiple operations of the data sets such as subsetting, slicing, filtering, groupBy, re-ordering, and re-shaping.
- It integrates with the other libraries such as SciPy.

Python Pandas Data Structure

The Pandas provides two data structures for processing the data, i.e., Series and DataFrame, which are discussed below:

Series — 1D

DataFrame — 2D

1) Series

Series is a one-dimensional labeled array capable of holding any data type (integers, strings, floating point numbers, Python objects, etc.). The axis labels are referred to as the index.

The basic method to create a Series is:

```
>>> s = pd.Series(data, index=index)
```

Key points:

Homogeneous

Size immutable

Values are mutable

A Series can be created using various inputs like

- NumPy Array

- Dictionary
- Tuple
- List
- Scalar Value

2) DataFrame

It is a widely used data structure of pandas and works with a two-dimensional array with labeled axes (rows and columns).

DataFrame is defined as a standard way to store data and has two different indexes, i.e., row index and column index.

It consists of the following properties:

- The columns can be heterogeneous types like int, bool, and so on.
- It can be seen as a dictionary of Series structure where both the rows and columns are indexed. It is denoted as "columns" in case of columns and "index" in case of rows.

A DataFrame can be created using various inputs like

- Numpy Array
- Dictionary
- Series
- List
- Another DataFrame

MCQ (MULTIPLE CHOICE QUESTIONS) – SOLVED

Fill in the blanks:

1. Numpy stand for _____
 a. Number python b. Num pandas c. Num python d. Numerical python

Ans: d. Numerical python

2. While trying to create series from dictionary, keys of dictionary become _____
 a. Index of Series b. Value of Series c. Columns of Series d. None of the above

Ans: a. Index of Series

3. Pandas stands for _____
 a. Packet data b. Panel data sort c. Panel data d. Panel data analysis

Ans: c. Panel data

4. Size of Series is _____ and values are _____
 a. immutable, mutable b. mutable, mutable c. mutable, immutable d. immutable, immutable

Ans: a. immutable, mutable

5. Size of DataFrame is_____ and values are_____

a. immutable, mutable b. mutable, mutable c. mutable, immutable d. immutable, immutable

Ans: b. mutable, mutable

6. Which of the following can be used to create a Pandas Series?

a. List b. Tuple c. Narray d. All of the above e. None of the above

Ans: d. All of the above

7. Command used to install pandas_____

a. pip install panda b. pip pandas c. pip install pandas d. pip panda

Ans: a. pip install pandas

8. A series by default have numeric data labels starting from_____

a. 1 b. 0 c. '1' d. 'a'

Ans: b. 0

9. To create a Series object, we have to import

a. pandas b. NumPy as np c. Series d. none of the above-mentioned options

Ans: a. pandas

10. Which data structure in Pandas represents a one-dimensional array-like object?

a. DataFrame b. Array c. Series d. List

Ans: c. Series

11. To skip not numeric or null values in series, we can use_____ attribute.

a. Skip b. skipna c. skipNaN d. Not possible

Ans: b. skipna

12. To get first element of series s1, we may use s1_____ function.

a. tail(1) b. tail() c. head(1) d. first[1]

Ans: c. head(1)

13. Identify false statement regarding series data structure of pandas library.

a. Series is homogenous data structure. b. Series is a two-dimensional data structure

c. Size of series is mutable d. Both (b) & (c)

Ans: d. Both(b) & (c)

14. How many elements will be there in the Series S?

```
>>>S=pd.Series(range(6))
```

```
>>>print(S)
```

a. 4 b. 5 c. 6 d. None of the above

Ans: c. 6

15. Which operator is used for slicing a Pandas Series?

- a. [] b. {} c. () d. <>

Ans: a. []

16. Which function is used to retrieve the last n elements of a Pandas Series?

- a. tail(n) b. last(n) c. bottom(n) d. end(n)

Ans: a. tail(n)

17. What is Pandas?

- a. A programming language b. A data manipulation library
c. A machine learning framework d. A web development framework

Ans: b. A data manipulation library

18. Choose correct option:

Statement 1: NumPy require homogeneous data

Statement 2: pandas can have heterogeneous data

- a. Only Statement 1 is true.
b. Only Statement 2 is true.
c. Both Statement 1 and 2 are true
d. Both Statement 1 and 2 are true

Ans: c. Both Statement 1 and 2 are true

19. Can a Series have duplicate index?

- a. True b. False

Ans: a. True

20. Choose correct option:

Rita created a series s1 having data elements as 2, 3, 4, 5 with index as I1, I2, I3, I4 respectively. She is using code either s1.loc ['I2':'I3'] or s1.iloc[1:3]

Statement 1: Both codes will give identical output.

Statement 2: Both codes can be used to access data elements as 3,4,5 respectively.

- a. Only Statement 1 is true.
b. Only Statement 2 is true.
c. Both Statement 1 and 2 are true, but Statement 2 is not correct reasoning of Statement1.
d. Both Statement 1 and 2 are true, but Statement 2 is correct reasoning of Statement 1.

Ans: c. Both Statement 1 and 2 are true, but Statement 2 is not correct reasoning of Statement1.

21. What will be correct syntax for pandas series?

- a. pandas_Series(data, index, dtype) b. panda.series(data, index, dtype)
c. pandas.Series(data, index, dtype) d. panda_Series(data, index, dtype)

Ans: c. pandas.Series(data, index, dtype)

22. If Series S1 has 5 values with index (1,2,3,4,5) and S2 has 5 values with index (2,4,6,8,10),

then what will be total number of values in S if $S=S1+S2$?

- a. 5 b. 6 c. 7 d. 8

Ans: d. 8

23. To get values >50 from Series S

- a. $S>50$ b. $S[S>50]$ c. Both of the above d. None of the above

Ans: b. $S[S>50]$

24. Which method used to subtract two Series?

- a. Substract() b. subtraction() c. sub() d. None of the above

Ans: c. sub()

25. How can you slice a Pandas Series to select multiple elements by index?

- a. $series[start:stop]$ b. $series[start:stop:step]$
c. $series[[index1, index2, index3]]$ d. All of the above

Ans: d. All of the above

26. To create an empty Series Object, you can use:

- a. $pandas.Series(empty)$ b. $pandas.Series(np.NaN)$ c. $pandas.Series()$ d. all of these

Ans: c. $pandas.Series()$

27. To get the number of dimensions of a Series object, attribute is displayed.

- a. Index b. Size c. Itemsize d. Ndim

Ans: d. Ndim

28. To display first three elements of a Series object S, you may write_____.

- a. $S[:3]$ b. $S[3]$ c. $S[3rd]$ d. All of these

Ans: a. $S[:3]$

29. Find output

```
import pandas as pd
S1=pd.Series([10,20,30])
S2=pd.Series([40,50])
S=S1+S2
print(S.size)
```

- a. 5 b. 3 c. 2 d. Error

Ans: b. 3

30. Find output

```
import pandas as pd
S1=pd.Series([10,20,30])
```

```
S2=pd.Series([40,50])  
print((S1+S2).count( ))
```

- a. 5 b. 3 c. 2 d. Error

Ans: c. 2

31. Find output

```
import pandas as pd  
S1=pd.Series([10,20,30])  
S2=pd.Series([40,50,60])  
S2.index=['a','b','c']  
print((S1+S2).count( ))
```

- a. 6 b. 3 c. 0 d. Error

Ans: c. 0

VERY SHORT ANSWER - SOLVED

Q1.What is a Series in Pandas?

Ans: Series is a one-dimensional labeled array in Pandas that can hold data of any type.

Q2.How can you create a Series in Pandas?

Ans. You can create a Series in Pandas using the pd.Series() function.

Q3.What are attributes in Pandas?

Ans. Attributes in Pandas are the properties or characteristics associated with a Pandas object, such as the size, shape, or data type.

Q4.How can you access the attributes of a Series object?

Ans. You can access the attributes of a Series object using the dot notation, e.g., series object.attribute_name.

Q5. What is indexing in Pandas?

Ans. Indexing in Pandas refers to accessing specific elements or subsets of data in a Series or DataFrame.

Q6. How can you perform indexing on a Series object?

Ans. We can perform indexing on a Series object using square brackets [] or the loc and iloc attributes.

Q7. What is slicing in Pandas?

Ans. Slicing in Pandas refers to extracting a portion of a Series or DataFrame based on a range of indices.

SHORT ANSWER - SOLVED

Q1. What will be the output of the following code?

```
import pandas as
A=pd.Series(data=[35,45,55,40])
print(A>45)
```

Ans:

```
0 False
1 False
2 True
3 False
dtype: bool
```

Q2. Write a program to create a series object using a dictionary that stores the number of students in each house of class 12D of your school.

Note: Assume four house names are Beas, Chenab, Ravi and Satluj having 18, 2, 20, 18 students respectively and pandas library has been imported as pd.

Ans:

```
import pandas as pd
d={'Beas':18, 'Chenab':20, 'Ravi':20, 'Satluj':18}
S1=pd.Series(d)
print(S1)
```

```
Beas    18
Chenab  20
Ravi    20
Satluj  18
dtype: int64
```

Q3. What is the difference between indexing and slicing in Pandas?

Ans. Indexing refers to accessing specific elements or subsets of data, whereas slicing refers to extracting a portion of data based on a range of indices.

Q4. How can you sort a Series object in Pandas?

Ans. You can sort a Series object using the `sort_values()` function in Pandas.

Q5. Fill the missing statements to get the given output:

```
import pandas as pd
Rollno[1,2,3,4,5,6,7]
.....=pd.Series(.....)#statement 1
print (p.head(.....))#statement 2
```

Output :

```
0    1
1    2
```

2 3

Ans:

```
p=pd.Series(rollno)
p.head(3)
```

LONG ANSWER

Q1. Write a program to create a Series object using ndarray.

```
import pandas as pd
import numpy as np
# ndarray data
data = np.array([10, 20, 30, 40])
# Create a Series object from ndarray
series_obj = pd.Series(data)
# Display the Series
print(series_obj)
```

```
0 10
1 20
2 30
3 40
dtype: int64
```

Q2. Give the output:

```
import pandas as pd
name = ['Pahul', 'Aman', 'Karan']
p=pd.Series(name, index=[0,1,2])
P1=p.reindex([2,1,0])
print(p)
print(P1)
```

Ans:

```
0    Pahul
1    Aman
2    Karan
```

```
2    Karan
1    Aman
0    Pahul
```

Q3. Write a program to create a Series object using a dictionary.

```
import pandas as pd
# Dictionary with data
data = {
    'A': 10,
    'B': 20,
    'C': 30,
    'D': 40
}
# Create a Series object from the dictionary
series_obj = pd.Series(data)
# Display the Series
print(series_obj)
```

Output:

```
A    10
B    20
C    30
D    40
dtype: int64
```

Q4. Write a program to create a Series object using a list

```
import pandas as pd
# List with data
data = [10, 20, 30, 40]
# Create a Series object from the list
series_obj = pd.Series(data)
# Display the Series
print(series_obj)
```

Output

```
0    10
1    20
2    30
3    40
dtype: int64
```

Q5. Write a program to create a Series object using scalar values

```
import pandas as pd
# Scalar values
value = 5
# Create a Series object with scalar values
series_obj = pd.Series(value, index=['A', 'B', 'C', 'D'])
```

```
# Display the Series
print(series_obj)
```

Output:

```
A    5
B    5
C    5
D    5
dtype: int64
```

UNSOLVED QUESTIONS

Q1. Write a program to create empty Series.

Q2. Write a program to change the index value from default to R, G, B.

Q3. Write a program to create series from given tuple

```
data = ("1", "Aman", 86.3, "A")
```

Q4. Write a program to create series from ndarray

Q5. Give the output

```
import pandas as pd
s=pd.Series([10,20,30,40,50], index = ["a", "b", "c",0,1])
print(s.loc['a'])
print(s.loc[0])
```

Q6. Give the output

```
import pandas as pd
s=pd.Series([10,20,30,40,50], index = ["a", "b", "c",0,1])
print(s.loc['a' : 'c'])
```

Q7. Give the output

```
import pandas as pd
s=pd.Series([10,20,30,40,50], index = ["a", "b", "c",0,1])
print(s.iloc[0])
```

Q8. Give the output

```
import pandas as pd
s=pd.Series([10,20,30,40,50,60,70,80], index = ["a", "b", "c", "d", "e", "f", "g", "h"])
print(s[2:5])
print (s[1:7:2])
```

Q9. Fill the missing values

```
import pandas as pd
name=['Harsh', 'Arun', 'Ankur', 'Divya']
Empno=[101,102,103,104]
```

```
s=pd.Series([.....],index = [.....])
print('name of empno 101 is',s[.....])
Output
name of empno 101 is Harsh
```

HOTS

Q10. Consider the following series S_amt having rent as shown

Table	350
Chair	200
Sofa	800
Stool	150

- (i)Write the command to display name of furniture having rent >250
- (ii)Write the command to change the name of the series as Furniture.

Q11.Consider the following Series Object,student

- (i)Write the command which will display the names of students having stream ="Arts"
- (ii)Write the command to name the series as subject.

Q12.Write a program to create a series from list marks and taking index values from list rollno.
Show all elements that are above 75 marks

Rollno=[1,2,3,4,5,6]

Marks=[23,86,74,11,98,75]

Q13. Write a code to create a series from empno list and show the last five rows
empno=[101,102,103,104,105,106,107]

Q14.Give the output

```
import pandas as pd
```

```
S=pd.Series("ABC",index=[0,1,2])
```

ANSWERS OF UNSOLVED QUESTIONS

Ans. 1

```
import pandas as pd
```

```
s=pd.Series (dtype=float)
```

```
print(s)
```

Ans. 2

```
import pandas as pd
```

```
d = ["Red", "Green", "Blue"]
```

```
s=pd.Series (d,index=[R,G,B])
```

```
print(s)
```

Ans. 3

```
import pandas as pd
data = ("1", "Aman", 86.3, "A")
s=pd.Series(data)
print(s)
```

Ans. 4

```
Import pandas as pd
Import numpy as np
Data=np.array(['a','b','c','d',])
s=pd.Series(data)
print(s)
```

Output

a
b
c
D

Ans. 5

10
40

Ans. 6

a 10
b 20
c 30

#both the start and stop are included, when index label is used.

Ans. 7

10

Ans. 8

c 30
d 40
e 50
b 20
d 40
f 60

Ans. 9 name

Empno
101

Ans. 10

(i) print {s_amt[S_amt>250]}

(ii) S_amt.name= 'Furniture'

Ans. 11

(i) print(student[student=="ARTS"])

(ii) student.name="Subject"

Ans. 12

```
import pandas as pd
```

```
Rollno=[1,2,3,4,5,6]
```

```
Marks=[23,86,74,11,98,75]
```

```
S=pd.Series(Marks,index=Rollno)
```

```
print(S[S>75])
```

Ans. 13

```
import pandas as pd
```

```
Rollno=[1,2,3,4,5,6]
```

```
Marks=[23,86,74,11,98,75]
```

```
S=pd.Series(empno)
```

```
print(S.tail())
```

Ans. 14

ABC

ABC

ABC

+--+--+--+--+--+--+--+--+--+ |D|a|t|a|F|r|a|m|e| +--+--+--+--+--+--+--+--+--+

Data Frame: It is a two-dimensional data structure that contains information in the form of rows and columns (just like an excel file). Each column can be of same or different type. We need to import pandas module to create and work with DataFrames.

The default row and column indexes in a DataFrame takes values from 0 to N-1.

Here N is the total number of rows or columns.

Creation of Data Frame: There are different ways to create a data frame I python pandas.

1. **From Lists:** We can create a dataframe using lists. For example.

output

```
import pandas as pd
Data = [3,4,5,6,7]
df = pd.DataFrame(Data)
print(df)
```

	0
0	3
1	4
2	5
3	6
4	7

2. **From Series:**We can create a dataframe using series as shown in the following example.

output

```
import pandas as pd
S = pd.Series([3,4,5,6,7])
df = pd.DataFrame(S)
print(df)
```

0	3
1	4
2	5
3	6
4	7

3. **From Dictionary of Series:**We can create a dataframe using a dictionary that contains different series as elements.

Suppose we have 3 series S1, S2 and S3 containing Roll number, Names and Marks of 5 students as shown below

```
import pandas as pd
S1 = pd.Series([11,12,13,14,15])
S2 = pd.Series(['Sakshi','Vivek','Shivam','Kashish','Jaya'])
S3 = pd.Series([40,50,45,70,75])
```

#Now we need to create a dictionary using these three series as its values.

```
Data = { 'RollNo': S1, 'Name':S2,'Marks':S3}
df = pd.DataFrame(Data)
```

```
print(df)
```

Output

	RollNo	Name	Marks
0	11	Sakshi	40
1	12	Vivek	50
2	13	Shivam	45
3	14	Kashish	70
4	15	Jaya	75

4. **From List of Dictionaries:** We can also create a dataframe from a list that contains dictionaries as its elements. For example, consider a list that contains

```
import pandas as pd
data = [ {1:20,2:30,3:15}, {1:40,5:40,5:25,6:15} ]
df = pd.DataFrame(data)
print(df)
```

The output will be as under:

```
      1   2   3   5   6
0    20  30.0 15.0  NaN  NaN
1    40   NaN  NaN 25.0 15.0
```

5. **From a text / csv file:** A dataframe can be created from a csv file in python.

There are two important methods used to work with csv files

- a) **read_csv():** To read the contents of a CSV file and convert it into a dataframe

For example, consider a csv file student.csv containing some records, the following code should read its contents using read_csv() method and create a dataframe df

```
import pandas as pd
df = pd.read_csv("C:\\Users\\DELL\\Desktop\\csv_files\\student.csv")
print(df)
```

```
RollNo  Name      Age  Stream  Percentage
0    0  Ankit      21    Math      88
1    1  Amit      19  Commerce  92
2    2  Aishwarya  20   Science  95
3    3  Priyanka   18    Math      70
4    4  Priya     17    Math      65
      5    5  Shaurya   21  Science  78
```

The dataframe df so created can be processed as any other dataframe.

- b) **to_csv():** This function is used to store a dataframe in a csv file.

```
import pandas as pd
```

```
df = pd.DataFrame({'first':[10,20,30,40],
'second':[4,5,7,9], 'third':[30,40,50,70]}, columns = ['first','second','third'])
print(df)
# store the dataframe to CSV file
df.to_csv("C:/Users/DELL/Desktop/student1.csv")
```

Some important attributes used with dataframes in python pandas :

We will consider the following dataframe to understand various attributes

import pandas as pd

Data = {'Rno':[1,2,3,4,5], 'Name':['Sapna','Vijay','Devansh','Geeta','Divya']}

df = pd.DataFrame(Data)

print(df)

	RollNo	Name	Marks
0	11	Sakshi	40
1	12	Vivek	50
2	13	Shivam	45
3	14	Kashish	70
4	15	Jaya	75

1. **ndim:** It displays the dimensions of the dataframe. Since dataframe has rows and columns, so ndim will always return the value 2 as output.

print(df.ndim) will print 2 << Since there are only 2 dimensions rows and columns>>

2. **index:** This attribute returns the index information of a rows of a dataframe

print(df.index) will display

RangeIndex(start=0, stop=5, step=1)

Because we have not redefined the row labels

If we specify the index while creating dataframe then a list of that labels will be returned by the index attribute.

df = pd.DataFrame(Data, index=['A','B','C','D','E'])

print(df.index) will return

Index(['A', 'B', 'C', 'D', 'E'], dtype='object')

3. **columns:** Returns column labels of a dataframe

print(df.columns) will returns Index(['Rno', 'Name'], dtype='object')

4. **Axes:** This attribute returns a list of both row labels sand column labels of a dataframe

print(df.axes) will return

[Index(['A', 'B', 'C', 'D', 'E'], dtype='object'), Index(['Rno', 'Name'], dtype='object')]

5. **dtypes:** Returns a series containing datatypes of each column of a dataframe

print(df.dtypes) will return

```
Rno    int64
Name   object
```

dtype: object

6. **size:** Returns number of elements in a dataframe.
(df.size) should return 10 as there are 10 elements in dataframe df
7. **shape:** Returns a tuple containing shape of dataframe in the form of number of rows and columns
print(df.shape) will displays (5,2) as output, since there are 5 rows and 2 columns in dataframe df
8. **Transpose (T):** This attribute of dataframe is used to convert rows into columns and columns into rows
print(df.T) will display

	A	B	C	D	E
Rno	1	2	3	4	5
Name	Sapna	Vijay	Devansh	Geeta	Divya

head() and tail() functions

By default, if no argument is passed, head() function return top 5 rows of a dataframe and tail() function returns last 5 rows of a dataframe, otherwise it displays rows and specified.

head(2) -> returns top two records of the dataframe

tail(3) -> returns last three records of the dataframe

Setting and resetting indexes

We can set index of a dataframe by using index property, for example for the dictionary Data as created previously,

```
df = pd.DataFrame(Data, index=['A','B','C','D','E'])
```

will replace the default row indexes 0,1,2,3 and 4 with labeled indexes 'A','B','C','D','E'

We can set and column as the index of a dataframe

To reset the column index, set_index() method is used.

df.set_index('Rno',inplace=True) --🕒 It will set Rno as the index of the dataframe df

print(df) will return

	Name
Rno	
1	Sapna
2	Vijay
3	Devansh
4	Geeta
5	Divya

To reset the index in original condition, **reset_index()** method is used.

df.reset_index(inplace=True) -> It will reset the index to original state

print(df) should display

Rno	Name
-----	------

0	1	Sapna
1	2	Vijay
2	3	Devansh
3	4	Geeta
4	5	Divya

Various operations that can be performed on DataFrames

A) Adding a new row

1. **By using loc() method we can insert a new row in a dataframe,** For example

```
df.loc[4] = ['Neha',35, 'Jalandhar','MCA','Punjab']
print(df)will insert a new row at row index 4. The output will be
```

	Name	Age	Address	Qualification	State
0	Gopal Lal	56	Jaipur	MA	Rajasthan
1	Varun Kumar	47	Amritsar	MSC	Punjab
2	Ved	36	Haridwar	MA	Uttarakhand
3	Ashutosh	32	Patna	BA	Bihar
4	Neha	35	Jalandhar	MCA	Punjab

It should be kept in mind that, if we try to add a new record at an index position which already exists in the dataframe, then the record at that position will be updated with the new values.

2. **Using append() method**

In this a new record is passed to append() method as a dictionary. For example

```
df=df.append({'Name':'Sachin','Age':54,'Address':'Delhi',
            'Qualification':'MCOM','State':'Delhi'},
            ignore_index = True)
```

```
print(df)
```

Output will be

	Name	Age	Address	Qualification	State
0	Gopal Lal	56	Jaipur	MA	Rajasthan
1	Varun Kumar	47	Amritsar	MSC	Punjab
2	Ved	36	Haridwar	MA	Uttarakhand
3	Ashutosh	32	Patna	BA	Bihar
4	Neha	35	Jalandhar	MCA	Punjab
5	Sachin	54	Delhi	MCOM	Delhi

B) Inserting a new column in a dataframe

There are three ways to insert a new column in a dataframe

1. **By declaring a new list as a column**

To insert a new column city in the above dataframe, the command is

```
df['City'] = ['Amritsar','Jalandhar','Chandigarh','Amritsar','Pathankot']
```

A new column City will be inserted as shown

	Rno	Name	City
0	1	Sapna	Amritsar
1	2	Vijay	Jalandhar
2	3	Devansh	Chandigarh
3	4	Geeta	Pathankot
4	5	Divya	Amritsar

2. Using insert() method

This method is used to insert a new column at a specified location / position. For example

```
df.insert(3,'State',['Punjab','Punjab','Punjab','Punjab','Punjab'])
```

will insert a new column 'State' at column index position 3

	Rno	Name	City	State
0	1	Sapna	Amritsar	Punjab
1	2	Vijay	Jalandhar	Punjab
2	3	Devansh	Chandigarh	Punjab
3	4	Geeta	Amritsar	Punjab
4	5	Divya	Pathankot	Punjab

3. Using assign() method

It is used to add a new column in the old dataframe and returns a new dataframe with added column

```
import pandas as pd
```

```
data = {'Name':['Gopal Lal', 'Varun Kumar', 'Ved', 'Ashutosh'],
```

```
       'Age': [56, 47, 36, 32],
```

```
       'Address': ['Jaipur', 'Amritsar', 'Haridwar', 'Patna'],
```

```
       'Qualification': ['MA', 'MSC', 'MA', 'BA']}
```

```
df = pd.DataFrame(data)
```

```
df = df.assign(State=['Rajasthan','Punjab','Uttarakhand','Bihar'])
```

```
print(df)
```

	Name	Age	Address	Qualification	State
0	Gopal Lal	56	Jaipur	MA	Rajasthan
1	Varun Kumar	47	Amritsar	MSC	Punjab
2	Ved	36	Haridwar	MA	Uttarakhand
3	Ashutosh	32	Patna	BA	Bihar

C) Deleting rows and columns from a dataframe

Drop() method is used to delete rows and columns from a dataframe

- Axis parameter specify whether to select particular row or column from a dataframe
- **Axis = 0**, means the operations is to be performed on rows and **axis = 1** means the operation is to be performed on columns

- **Inplace = True** parameter means after deleted row / column the same dataframe is updated

Let us take some examples:

- `df.drop([0])` -> delete the row having row index as 0 and return a new dataframe
- `df.drop([0,3], axis = 0)` ->
delete the rows having indexes from 0 and 3 and return a new dataframe
- `df.drop(['Name'],axis = 1)` ->
delete the column Name from dataframe df return a new dataframe
- `df.drop(['Name','Address'],axis = 1)`->
delete columns Name and Address from dataframe df and returns a new Dataframe
- `df.drop(['Name','Address'],axis = 1, inplace = True)` ->
delete the columns Name and Address from dataframe df and make the changes permanent in df

D)Indexing / Selecting / Extracting records from a dataframe

1. Using loc() method: It is label based indexing

This function selects data by the label of the rows and columns. If a single label is provided then it returns the row as a Series. For example:

- `print(df.loc[0])` ->

Name	Gopal Lal
Age	56
Address	Jaipur
Qualification	MA
State	Rajasthan

 Name: 0, dtype: object
- `print(df.loc[0:'Name'])` ->Returns the value present at intersection of 0th row index and Name column,Output will be 'Gopal Lal'
- `print(df.loc[:, 'Name'])` -> It returns all records but only Name column, Output will be

```

0  Gopal Lal
1  Varun Kumar
2  Ved
3  Ashutosh
4  Neha
5  Sachin
Name: Name, dtype: object

```

- `print(df.loc[:, ['Name', 'Age']])` -> Returns All rows of Name and Age columns as output

	Name	Age
0	Gopal Lal	56
1	Varun Kumar	47
2	Ved	36

3	Ashutosh	32
4	Neha	35
5	Sachin	54

- `print(df.loc[0:2,:])` -> Returns all the columns of rows indexes 0 to 2

	Name	Age	Address	Qualification	State
0	Gopal Lal	56	Jaipur	MA	Rajasthan
1	Varun Kumar	47	Amritsar	MSC	Punjab
2	Ved	36	Haridwar	MA	Uttarakhand

- `print(df.loc[2:3,'Age'])` -> returns the value under Age column for row indexes 2 and 3
2 36
3 32
Name: Age, dtype: int64

2. Using iloc() method : It is Integer index based -indexing and can be used to retrieve rows from a dataframe. Let us take some examples.

- `print(df.iloc[0:2])` -> Returns all rows of dataframe df having index from 0 to 1

	Name	Age	Address	Qualification	State
0	Gopal Lal	56	Jaipur	MA	Rajasthan
1	Varun Kumar	47	Amritsar	MSC	Punjab

- `print(df.iloc[0,1])` -> returns value at the intersection of row index 0 and column index 1
Output will be 56

- `print(df.iloc[0:2,0:3])` -> returns records with integer row index 0 to 1 and column index 0 to 3-1 i.e. 2.
Output will be

	Name	Age	Address
0	Gopal Lal	56	Jaipur
1	Varun Kumar	47	Amritsar

What is Boolean indexing?

Python pandas allows us to use Boolean values (True or False) as its index.
Let us consider the following example.

```
import pandas as pd
df = pd.DataFrame({'Rno':[1,2,3], 'Name':['Amit','Sachin','Kumar']}, index = [True,False,True])
print(df.loc[True])
```

This program will print the rows having index value True. i.e. It should print records of Amit and Kumar only.

Rno	Name
-----	------

```
True 1      Amit
True 3      Kumar
```

We can also apply relational and logical operators with dataframes. These operators return True / False as output

For example

`print(df['Marks'] > 50)` -> returns True if value of marks column of dataframe df is > 50 otherwise it displays False

Iterate over rows of dataframe

We can also iterate through the contents of a dataframe as per requirement. For this purpose following methods can be used

1. `iteritems()` -> used to iterate over (key, value) pairs
2. `iterrows()` -> used to iterate over each row of dataframe as (index, series) pairs

Example of `iteritems()`

```
import pandas as pd
import numpy as np
data = np.arange(1,26).reshape(5,5)
df = pd.DataFrame(data,
columns= ['Col1','Col2','Col3','Col4','Col5'])
print(df)
for key,value in df.iteritems():
    print(key,value)
```

	Col1	Col2	Col3	Col4	Col5
0	1	2	3	4	5
1	6	7	8	9	10
2	11	12	13	14	15
3	16	17	18	19	20
4	21	22	23	24	25

```
      Col1
0      1
1      6
2     11
3     16
4     21
Name: Col1, dtype: int32
      Col2
0      2
1      7
2     12
3     17
4     22
Name: Col2, dtype: int32
      Col3
0      3
1      8
2     13
3     18
```

```

4    23
Name: Col3, dtype: int32
Col4
0     4
1     9
2    14
3    19
4    24
Name: Col4, dtype: int32
Col5
0     5
1    10
2    15
3    20
4    25
Name: Col5, dtype: int32

```

Here each column is treated separately as key-value pair in the form of a Series

Example of iterrows()

```

import pandas as pd
import numpy as np
data = np.arange(1,26).reshape(5,5)
df = pd.DataFrame(data,
columns = ['Col1','Col2','Col3','Col4','Col5'])
print(df)
for key,value in df.iterrows():
    print(key,value)

```

	Col1	Col2	Col3	Col4	Col5
0	1	2	3	4	5
1	6	7	8	9	10
2	11	12	13	14	15
3	16	17	18	19	20
4	21	22	23	24	25

```

0 Col1  1
  Col2  2
  Col3  3
  Col4  4
  Col5  5
Name: 0, dtype: int32
1 Col1  6
  Col2  7
  Col3  8
  Col4  9
  Col5 10
Name: 1, dtype: int32
2 Col1 11
  Col2 12
  Col3 13
  Col4 14

```

```

Col5  15
Name: 2, dtype: int32
3 Col1  16
Col2  17
Col3  18
Col4  19
Col5  20
Name: 3, dtype: int32
4 Col1  21
Col2  22
Col3  23
Col4  24
Col5  25
Name: 4, dtype: int32

```

It displays the index and the content as a Series object

MCQS BASED ON DATAFRAMES

- Q1. Which of the following commands is required to be used to download pandas library?
- a) pip download pandas
 - b) install pandas library
 - c) pip install pandas
 - d) import pandas as pd

Ans. c) pip install pandas

- Q2. _____ is a 2D data structure.
- a) Series
 - b) Dictionary
 - c) DataFrame
 - d) All of these

Ans. c) DataFrame

- Q3. Which library should be imported for creating and working with dataframes in python?
- a) Numpy
 - b) pandas
 - c) matplotlib
 - d) math

Ans. b) pandas

- Q4. When we create DataFrame from list of dictionaries, then keys of the dictionary will become _____

Ans. b) column labels

- Q5. The following code will create a dataframe df with _____ number of rows and _____ number of columns

```

import pandas as pd
import numpy as np
df = pd.DataFrame(np.arange(21).reshape(3,7)).T
print(df)

```

Ans. c) 7,3

Q6. To delete a column from a dataframe _____ method can be used
a) delete() b) remove() c) erase() d) drop()

Ans. d) drop

Q7. df.loc[] method can be used to _____
a) Insert a new row in a dataframe b) Update the values of a row
c) Both a & b d) Only b

Ans. c) Both a & b

Q8. Consider the following dataframe df

	0	1	2	3	4
0	1	2	3	4	5
1	6	7	8	9	10
2	11	12	13	14	15
3	16	17	18	19	20
4	21	22	23	24	25

What will the following command do?

`df = df.drop([0,1,2])`

- a. Delete the columns with labels 0, 1 and 2
- b. Delete the rows with labels 0, 1 and 2
- c. Delete any three rows
- d. None of these

Ans. a) Delete the columns with labels 0, 1 and 2

Q9. Which of the following command(s) will delete a row from a dataframe df having row label as 'A'?

- a. `df = df.drop([0], axis = 0)`
- b. `df = df.drop([0], axis = 1)`
- c. `df = df.drop(0)`
- d. both a & c

Ans. d) both a & c

Q10. Which of the following attribute returns the dimensions of the dataframe df?

- a) Dimension b) size c) shape d) None of these
- Ans. c) shape

IMPORTANT SHORT ANSWER QUESTIONS WITH ANSWERS

Q1. Which library should be imported to work with dataframes in python?

Ans. Pandas library is required to be imported for working with dataframes. The command is:
`import pandas as pd`

```
Df = pd.DataFrame()
```

Q2. Write command to install pandas library.

Ans. `pip install pandas`

The above command should be used at command prompt for installing pandas library.

Q3. Write code to create an empty dataframe in python pandas.

Ans. `import pandas as pd`

```
Df = pd.DataFrame()
```

Q4. Carefully observe the following code and answer the questions that follow:

```
import pandas as pd
```

```
dic = {'pid' : [101,102,103,104,105],
```

```
       'pname' : ['Shyam','Roshan','Archit','Medha','Lalit'],
```

```
       'sports' : ['Cricket','Tennis','Football','Cricket','Cricket'],
```

```
       'points' : [45000, 20000, 15000, 53000, 60000] }
```

```
player = pd.DataFrame(dic)
```

```
print(player)
```

For the dataframe created above, set the row label as 'Player1', 'Player2', 'Player3',

'Player4', 'Player5'

Ans. `player = pd.DataFrame(dic, index = ['Player1','Player2','Player3','Player4','Player5'])`

Q5. Rename the column 'points' to 'netpoints' in the dataframe player (Q 4)

Ans. `player = player.rename({'points':'netpoints'}, axis = 'columns')`

OR

```
player.rename({'points':'netpoints'}, axis = 'columns', inplace = True)
```

OR

```
player=player.rename({'points':'netpoints'},axis=1)
```

OR

```
player=player.rename (columns={'points': 'netpoints'})
```

OR

```
player.rename ({'points':'netpoints'},axis=1, inplace=True)
```

Q6. Deepak want to add a new row with values ('Chandan','Amritsar',400) at the end of the dataframe df, but he does not know the total number of rows of dataframe df. Help him to write command to add a row at the end of the dataframe df

Ans. `df.loc[len(df.index)] = ('Chandan','Amritsar',400)`

Q7. Write statement to change the row labels 0, 1 and 2 to 'One', 'Two', and 'Three' of dataframe df

Ans. `df.rename({0:'One',1:'Two',3:'Three'})`

Q8. Write command to display the first record of a dataframe df

Ans. `df.head(1)`

Q9. Write the difference between del statement and drop() functions of pandas dataframe.
Ans.

Del	Drop
1. del command is used to delete only column of a dataframe	1. Drop function can be used to delete both rows and columns of a dataframe
2. del can delete only one column at a time	2. Drop function can delete multiple columns at a time

Q10. Write code to delete columns 'COL1' and 'COL2' from a dataframe df and create a new dataframe. The original dataframe df should not be updated.

Ans. `df1 = df.drop(['COL1','COL2'],axis = 1)`

Data visualization is the technique to present the data in a pictorial or graphical format.

- It simplifies the complex quantitative information
- It helps analyze and explore big data easily
- It identifies the relationship between data points and variables

matplotlib is a python two-dimensional plotting library for data visualization and creating interactive graphics or plots. It can be installed using the following pip command from the command prompt:

For plotting using Matplotlib, we need to import its pyplot module using the following command:

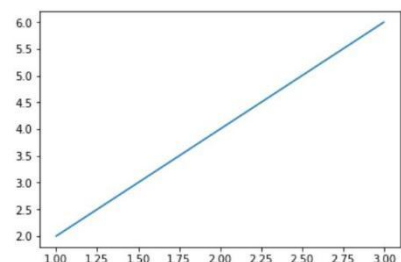
The pyplot module of matplotlib contains a collection of functions that can be used to work on a plot.

1. Line Chart
2. Bar Chart
3. Histogram

To create a line graph, we need x and y coordinates. For example-

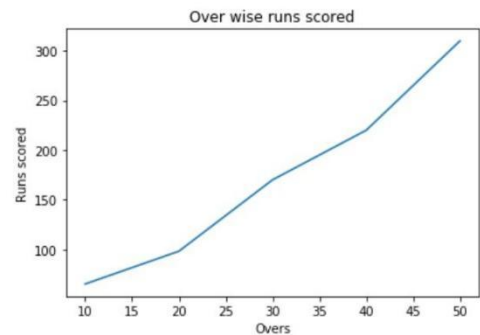
```
plt.plot(x,y,'colorname')
```

```
import matplotlib.pyplot as plt
x=[1,2,3]
y=[2,4,6]
plt.plot(x,y)
plt.show()
```



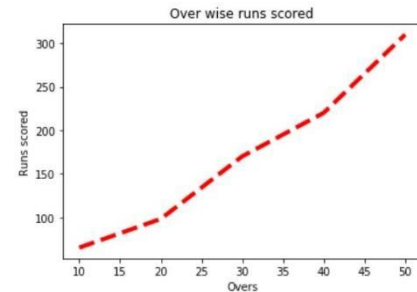
We can also set labels and give title to the line chart as shown in the example below:

```
import matplotlib.pyplot as plt
x=[10,20,30,40,50]
y=[65,98,170,220,310]
plt.plot(x,y)
plt.xlabel('Overs')
plt.ylabel('Runs scored')
plt.title('Over wise runs scored')
plt.show()
```



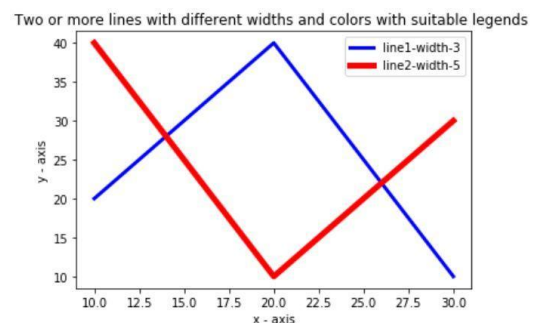
Changing line color, line width and line style:

```
import matplotlib.pyplot as plt
x=[10,20,30,40,50]
y=[65,98,170,220,310]
plt.plot(x,y,'r',linewidth=4,linestyle='dashed')
plt.xlabel('Overs')
plt.ylabel('Runs scored')
plt.title('Over wise runs scored')
plt.show()
```



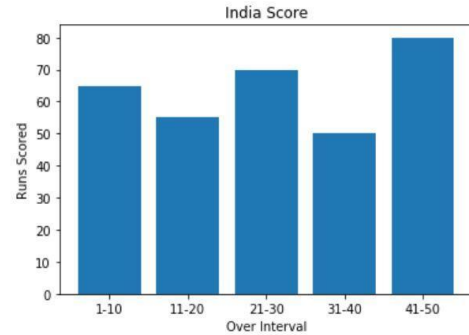
Plot two or more lines with legends, different widths and colors:

```
import matplotlib.pyplot as plt
# line 1 points
x1 = [10,20,30]
y1 = [20,40,10]
# line 2 points
x2 = [10,20,30]
y2 = [40,10,30]
plt.xlabel('x - axis')
plt.ylabel('y - axis')
plt.title('Two or more lines with different widths and colors with suitable legends ')
plt.plot(x1,y1, color='blue', linewidth = 3, label = 'line1-width-3')
plt.plot(x2,y2, color='red', linewidth = 5, label = 'line2-width-5')
# show a legend on the plot
plt.legend()
plt.show()
```



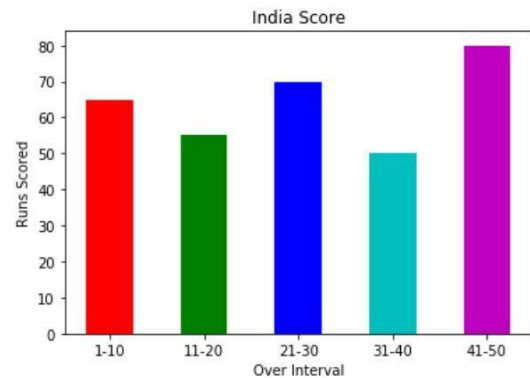
Bar Graph: It presents category wise data in rectangular bars with length proportional to the values. It can be horizontal or vertical.

```
import matplotlib.pyplot as plt
OverRange=['1-10','11-20','21-30','31-40','41-50']
RunsScored=[65,55,70,50,80]
plt.bar(OverRange,RunsScored)
plt.xlabel('Over Interval')
plt.ylabel('Runs Scored')
plt.title('India Score')
plt.savefig('bar1.jpg') # to save the graph in a file
plt.show()
```



Changing width, color in bar chart

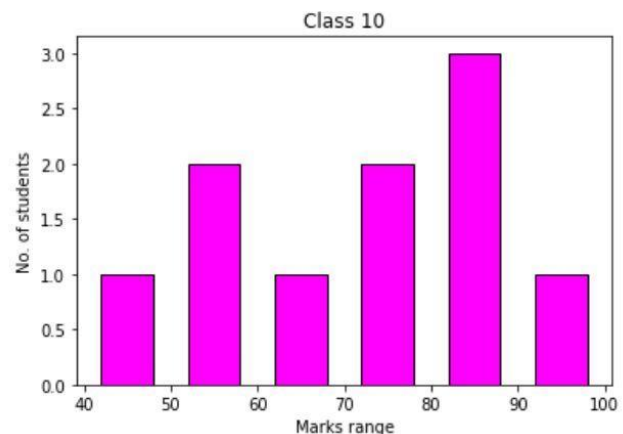
```
import matplotlib.pyplot as plt
OverRange=['1-10','11-20','21-30','31-40','41-50']
RunsScored=[65,55,70,50,80]
plt.bar(OverRange,RunsScored,
        width=0.5,color=['r','g','b','c','m'])
plt.xlabel('Over Interval')
plt.ylabel('Runs Scored')
plt.title('India Score')
plt.show()
```



Histogram: It is a column chart, where each column represents a range of values and the height of the column corresponds to how many values are in that range.

For example: we can collect the marks of students in a class and show it in the form of a histogram to know how many students are in the range of 40-50, 50-60 and so on. For this we can create histogram like this:

```
import matplotlib.pyplot as plt
marks=[45,55,62,74,78,82,85,87,92,52]
range=[40,50,60,70,80,90,100]
plt.hist(marks,bins=range,color='magenta',
        edgecolor='black',rwidth=.6)
plt.xlabel('Marks range')
plt.ylabel('No. of students')
plt.title('Class 10')
plt.show()
```



MULTIPLE CHOICE QUESTIONS

1. _____ is the function to save the graph.
a. savefig() b. savefigure() c. savegraph() d. savechart()
2. Which graph should be used where each column represents a range of values, and the height of a column corresponds to how many values are in that range?
a. plot b. line c. bar d. histogram
3. _____ function is used to display the graph.
a. display() b. show() c. showing() d. screen()
4. _____ function is used to plot a line chart.
a. plot() b. line() c. display() d. plotline()
5. Which of the following function of pyplot is used to give title to a chart?
a. head() b. heading() c. title() d. Title()
6. A _____ graph shows the frequency of data.
a. bar b. line c. pie d. histogram
7. Which attribute of plot function is used to set the line width in a line chart?
a. widthline b. linewidth c. width of line d. None of these
8. Which parameter is used to set number of bins in the histogram?
a. bin b. bins c. binvalue d. None of these
9. Which of the following command is valid for installing matplotlib library?
a. pip matplotlib b. pip install matplotlib
c. install pip matplotlib d. None of these
10. The data points plotted on a graph are called _____.
a. points b. marks c. pins d. markers

Answers: 1. a 2. d 3. b 4. a 5. c
6. d 7. b 8. b 9. b 10. d

VERY SHORT ANSWERS

1. What is the use of pyplot in matplotlib?

Ans. pyplot is a collection of methods in matplotlib that allows us to construct 2D plots graphs easily and interactively.

2. Name the command to install matplotlib.

Ans. pip install matplotlib

3. Explain the purpose of the following functions:

a. plt.xlabel()

b. plt.ylabel()

c. plt.title()

d. plt.legend()

e. plt.show()

Ans.

a. plt.xlabel() – To assign label to x-axis

b. plt.ylabel() - To assign label to y-axis

c. plt.title() – To assign the plot's title

d. plt.legend() – to describe elements for a particular area of a graph

e. plt.show() – to display the graph

4. Name the function which is used to save the plot.

Ans. savefig()

5. Name the function which you will use to create a:

(i) line chart (ii) bar chart (iii) histogram

Ans: line chart – plot() bar chart – bar() histogram – hist()

SHORT ANSWER QUESTIONS

1. What is the purpose of the Matplotlib library?

Ans. 1. The purpose of Matplotlib Library is to present data on graphs.

2. You can create, animate interactive 2D plots or figures by using Matplotlib library.

3. By plotting data you can visualize variation or show the relationships between various data elements.

2. Mr. Sanjay wants to create a bar graph for the given set of values of the subject on x-axis and number of students who opted for that subject on y-axis. Complete the code to perform the following:

(i) To plot the bar graph in statement 1

(ii) To display the graph in statement 2

import matplotlib.pyplot as plt

x=['Hindi','English','Science','SST']

y=[10,20,30,40]

_____ **Statement 1**

_____ **Statement 2**

Ans. (i) plt.bar(x,y)

(ii) plt.show()

3. Mr. Harry wants to draw a line chart using a list of elements named LIST. Complete the code to perform the following operations:

(i) To plot a line chart using the given list

(ii) To give a y-axis label to the line chart named "Sample Numbers"

import matplotlib.pyplot as PLINE

LIST=[10,20,30,40,50,60]

_____ Statement 1

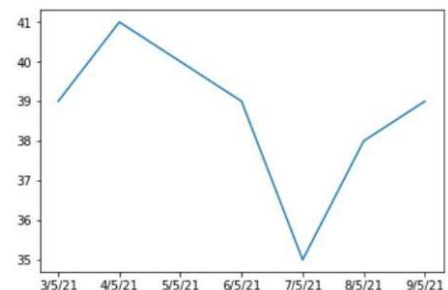
_____ Statement 2

Ans: (i) PLINE.plot(LIST)

(ii) PLINE.ylabel('Sample Numbers')

4. The following table lists last week Delhi's maximum Temperature. Plot a line graph showing temperature against date.

Date	Temperature
3/5/21	39
4/5/21	41
5/5/21	40
6/5/21	39
7/5/21	35
8/5/21	38
9/5/21	39



import matplotlib.pyplot as plt

date=['3/5/21','4/5/21','5/5/21','6/5/21','7/5/21','8/5/21','9/5/21']

temp=[39,41,40,39,35,38,39]

plt.plot(date,temp)

plt.show()

LONG ANSWER QUESTIONS

1. Plot the following data using a line plot:

Day	1	2	3	4	5	6	7
Tickets Sold	2000	2800	3000	2500	2300	2500	1000

- Before displaying the plot display "Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday" in place of Day 1, 2, 3, 4, 5, 6, 7
- Change the color of the line to 'Magenta'.
- Give suitable labels and title to the graph.
- Give legend to the graph.
- Save the graph in a file named Tickets.jpg

Ans.

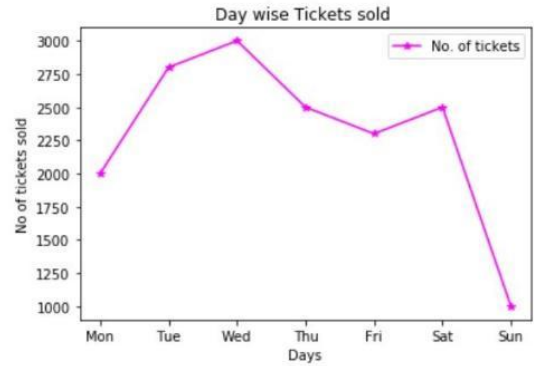
import pandas as pd

import matplotlib.pyplot as plt

```

x=["Mon","Tue","Wed","Thu","Fri","Sat","Sun"]
y=[2000,2800,3000,2500,2300,2500,1000]
plt.plot(x,y,color="magenta",marker="*",
        label="No. of tickets")
plt.title("Day wise Tickets sold ")
plt.xlabel("Days")
plt.ylabel("No of tickets sold")
plt.legend()
plt.savefig("d:\ Tickets.jpg")
plt.show()

```



2. Write short notes on different customization options available with any plot.

Ans. Chart customization refers to the process of changing the chart components' styles, design and adds more attractive features to the graph.

The most common options used to customize the plot are as following:

- **title()** – Applies titles for graphs with font size and color
- **grid()** – Show/Hide the gridlines on plot
- **legend()**: Represents the data displayed in the graph's Y-axis
- **loc**– Specify the location of the legend as "upper left" or "upper right" or "lower left" or "lower right"
- **plot()**: Allows changing the linestyle, linewidth, color, marker, marker size etc.
- **xlabel(), ylabel()**: Specify the x and the y titles respectively you can change the fontsize and color
- **show()**: displays the plot
- **savefig()**: saves the plot at the specified location

3. Create a histogram of the following data to show number of people in the age groups:

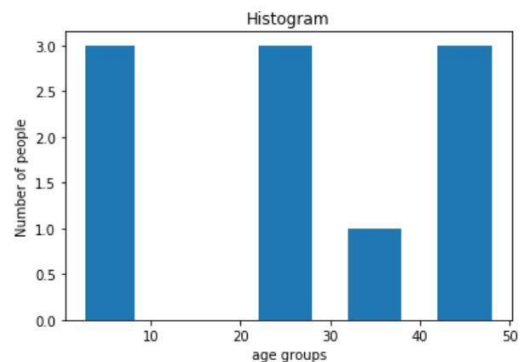
people = [22,55,62,45,21,22,34,42,42,4,2,8]

Ans.

```

import matplotlib.pyplot as plt
people = [22,55,62,45,21,22,34,42,42,4,2,8]
bins = [1,10,20,30,40,50]
plt.hist(people, bins, rwidth=0.6)
plt.xlabel('age groups')
plt.ylabel('Number of people')
plt.title('Histogram')
plt.show()

```



UNSOLVED QUESTIONS

1. The heights of 10 students of eighth grade are given below:

```
Height_cms=[145,141,142,142,143,144,141,140,143,144]
```

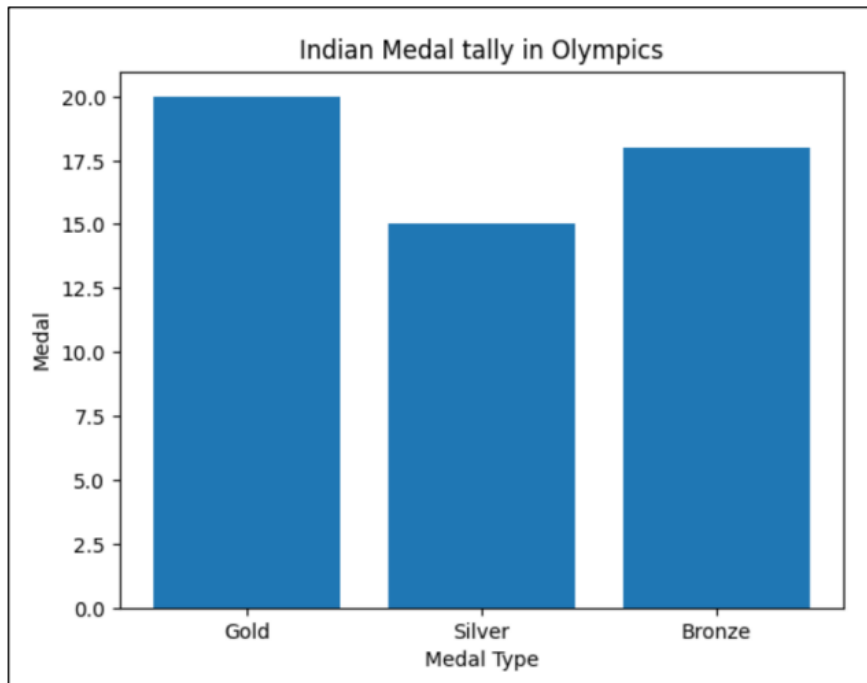
Write suitable Python code to generate a histogram based on the given data, along with an appropriate chart title and both axis labels. Also give suitable python statement to save this chart

2. Write a python program to plot a line chart based on the given data to depict the changing weekly average temperature in Delhi for four weeks.

```
Week=[1,2,3,4]
```

```
Avg_week_temp=[40,42,38,44]
```

3. Write Python code to plot a bar chart for India's medal tally as shown below:



4. Collect the minimum temperature of your city for a month and present it using a histogram. Let us assume the following data:

```
min_temp=[6,5,6,5,5,5,4,9,11,12,14,15,12,13,11,11,8,7,10,10,9,9,7,8,9,5,6,6,7,10]
```

5. Draw two-line graph where the x axis shows the individual classes and the y axis shows the number of students participating in ART/COMPUTER interhouse event. Use different colours for the plots. Let us assume the following data:

```
x=[4,5,6,7]
```

```
y=[6,10,14,13]
```

```
z=[10,12,18,20]
```

Where x represents classes. y represents students participating in Art Competition and z represents students participating in Computer Competition.

SOLUTION OF UNSOLVED QUESTIONS

Ans. 1

```
import matplotlib.pyplot as plt
Height_cms=[145,141,142,142,143,143,141,140,143,144]
plt.hist(Height_cms)
plt.title("Height Chart")
plt.xlabel("Height in cms")
plt.ylabel("Number of people")
plt.show()
plt.savefig("heights.jpg")
```

Ans. 2

```
import matplotlib.pyplot as plt
Week=[1,2,3,4]
Avg_week_temp=[40,42,38,44]
plt.plot(Week, Avg_week_temp)
plt.show()
```

Ans. 3

```
import matplotlib.pyplot as plt
Category=['Gold','Silver','Bronze']
Medal=[20,15,18]
plt.bar(Category,Medal)
plt.ylabel('Medal')
plt.xlabel('Medal Type')
plt.title('Indian Medal tally in Olympics')
plt.show()
```

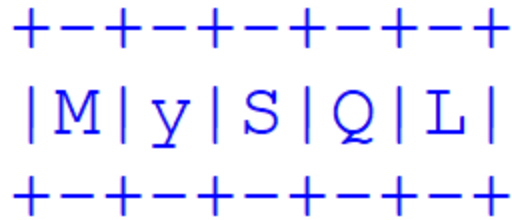
Ans. 4

```
import pandas as pd
import matplotlib.pyplot as plt
min_temp=[6,5,6,5,5,5,4,9,11,12,14,15,12,13,11,11,8,7,10,10,9,9,7,8,9,5,6,6,7,10]
plt.hist(min_temp,bins=5,color="brown",edgecolor="black")
plt.title("Minimum Temperatures in city During February 2021")
plt.ylabel("Frequency")
plt.xlabel("Temperature")
plt.show()
```

Ans. 5

```
import matplotlib.pyplot as plt
x=[4,5,6,7]
```

```
y=[6,10,14,13]
z=[10,12,18,20]
plt.plot(x,y,'g',label="Students participating in Art Competition")
plt.plot(x,z,'m',label="Students participating in Computer Competition")
plt.legend()
plt.title("Competition Participation")
plt.xlabel("Class")
plt.ylabel("No. of students participating")
plt.grid(True)
plt.show()
```



Basics of MySQL:

1. To create a new database in the system.
CREATE DATABASE <DATABASENAME>e.g. Create Database office;
2. To view the names of all the databases in the database system
SHOW DATABASES;e.g. Show Databases;
3. To open a database to work in it.
USE <DATABASENAME>; e.g. use office;
4. To remove or delete a database.
Drop database <databasename>;e.g. drop database school;
5. **CREATE TABLE:** CREATE TABLE EMP (EID INT PRIMARY KEY, ENAME CHAR(20) NOT NULL, SALARY INT CHECK(SALARY>0), ECITY VARCHAR(15));
6. **ALTER COMMAND:** To modify the structure of the table. i.e. add a new attribute, delete an existing attribute, change to size and data type of a new attribute, renaming an attribute.
ALTER TABLE EMP ADD DEPTID INT(5) //To add new column
ALTER TABLE EMP DROP DEPTID; // To delete column
ALTER TABLE EMP MODIFY ENAME VARCHAR(15); //to change data type
ALTER TABLE EMP CHANGE ECITY CITY VARCHAR(25); //to rename column
7. To Delete/remove a table from the database. **DROP TABLE EMP;**
8. To view the structure of the table. **DESC EMP;**
9. To view the names of the tables in the current database. **SHOW TABLES;**
10. To add new record or records into a table
e.g. **INSERT INTO EMP VALUES(101,"KARAN", 10000,"DELHI");**
11. To delete rows/tuples: e.g. **DELETE FROM EMP WHERE ENAME = 'Vishal'**
12. Update command:**Update EMP set SALARY = SALARY+ 5000 where ID =102;**
13. **SELECT COMMAND:**
SELECT * FROM EMP;
SELECT * FROM EMP WHERE SALARY>1000;
SELECT * FROM EMP WHERE SALARY BETWEEN 5000 AND 10000;
SELECT * FROM EMP WHERE ENAME LIKE "%A";

Primary Key: A column or Group of Column, which uniquely identify a Tuple in a Table is called Primary Key. A Primary key cannot have null or duplicate values. A table can have only **ONE** primary key but a Combination of columns can also act as primary key. example Roll No., PNR Number, Aadhaar etc.

Candidate Key: All Columns or group of Column, that **can act as a primary key** are called Candidate key.

Alternate Key: All candidate key **other than Primary key**.

Foreign Key: is a non-key attribute, which helps to establish a **relation with another table**. It is generally the Primary Key of another table.

Degree: Total No. of Columns in a table is called its Degree.

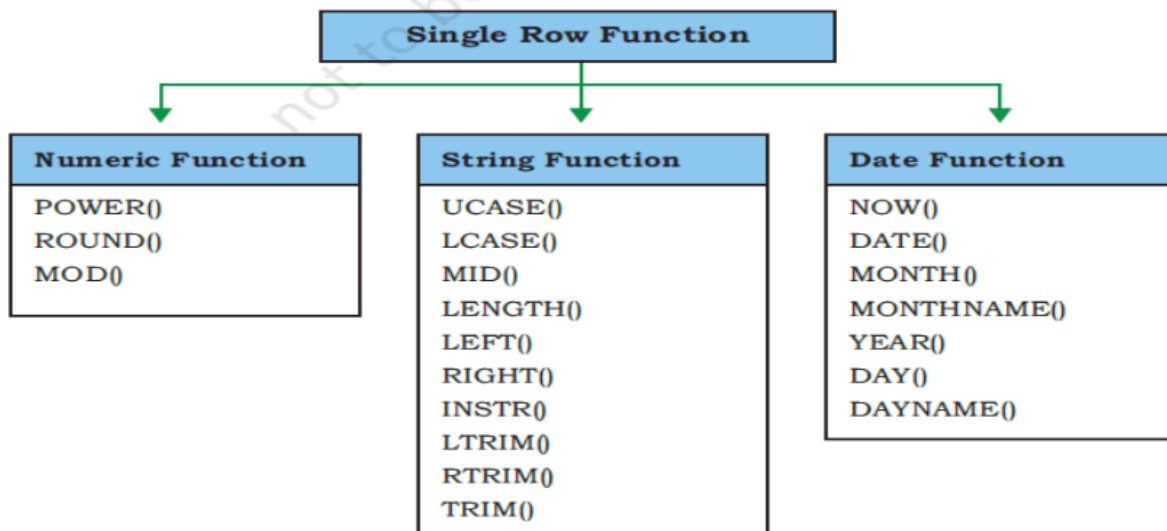
Cardinality: Total No. of Rows in a table is Called its Cardinality.

STRING FUNCTIONS		
CHAR()	SELECT CHAR (70);	Will return "E"
CONCAT()	SELECT CONCAT("Hello","World");	Will Return "HelloWorld"
LOWER()/LCASE()	SELECT LCASE ("HELLO WORLD");	Will return "hello world"
UPPER()/UCASE()	SELECT UPPER ("hello world") ;	Will return "HELLO WORLD"
SUBSTRING() /SUBSTR()	SELECT SUBSTRING ("HELLO WORLD",1,5);	HELLO
LTRIM()	SELECT LTRIM (' HELLO ');	"HELLO " will remove space from left side
RTRIM()	SELECT RTRIM (' HELLO ');	" HELLO" will remove space from right side
TRIM()	SELECT TRIM (' HELLO ');	"HELLO" will remove space from both sides
INSTR()	SELECT INSTR ('CORPORATE FLOOR','OR');	Will return 2. It returns the position of sub string in main string.
LENGTH	SELECT LENGTH ("HELLOWORLD");	Will return 11 (Length of string). Includes blank space also
LEFT	SELECT LEFT ("HELLO WORLD",5);	Will return "HELLO" i.e. 5 characters from left side
RIGHT	SELECT RIGHT ("HELLO WORLD",5);	Will return "HELLO" i.e. 5 characters from right side
MID ()	SELECT MID("HELLOWORLD",6,5);	Will return "WORLD" i.e. 6 th character onward 5 characters.
NUMERIC FUNCTIONS		
Mod()	Select mod(10,3);	Will return 1 i.e. remainder after dividing 10 by 3
Power()/pow()	Select power(3,2);	Will return 9 i.e. 3 exponent 2
Round()	Select round(134.29,1);	Will return 134.3 i.e. round up to 1 decimal place

Truncate()	Select truncate(134.29,1);	Will return 134.2 i.e. truncate up to 1 decimal place
Sign()	Select sign(-12);	Will return -1 if number is negative, 1 if number is positive and 0 if number is zero.
Sqrt()	Select sqrt(100);	Will return 10 i.e. square root

DATE/TIME FUNCTIONS

Curdate()/current_date()/current_date	Select curdate();	Will return current date
Sysdate()	Select sysdate();	Will return system date and time
Now()	Select now();	Will return the current date and time
Date()	Select date('2013-11-04');	Will return 2013-11-04
Day()	Select day('2023-07-04')	Will return 04
Month()	Select month('2013-11-04');	Will return 11
Year()	Select year('2013-11-04');	Will return 2013
Dayname()	Select dayname(sysdate());	Will return Tuesday
Monthname()	Select Monthname(sysdate());	Will return July
Dayofmonth()	Select dayofmonth(sysdate());	Will return 4
Dayofweek()	Select dayofweek(sysdate());	Will return 3
Dayofyear()	Select dayofyear(sysdate());	Will return 185



GROUP BY in SQL: At times we need to fetch a group of rows on the basis of common values in a column. This can be done using a GROUP BY clause. It groups the rows together that contain the same values in a specified column. We can use the aggregate functions (COUNT, MAX, MIN, AVG and SUM) to work on the grouped values. HAVING Clause in SQL is used to specify conditions on the rows with GROUP BY clause.

Consider the Following Table SALE:

InvoiceNo	CarId	CustId	SaleDate	PaymentMode	EmpID	SalePrice	Commission
I00001	D001	C0001	2019-01-24	Credit Card	E004	613247.00	73589.64
I00002	S001	C0002	2018-12-12	Online	E001	590321.00	70838.52
I00003	S002	C0004	2019-01-25	Cheque	E010	604000.00	72480.00
I00004	D002	C0001	2018-10-15	Bank Finance	E007	659982.00	79197.84
I00005	E001	C0003	2018-12-20	Credit Card	E002	369310.00	44317.20
I00006	S002	C0002	2019-01-30	Bank Finance	E007	620214.00	74425.68

Select count(*) from sale ; - this will give 6 as output i.e. total cars purchased.

But if we write SELECT CustID, COUNT(*) "Number of Cars" FROM SALE GROUP BY CustID;

CustID	Number of Cars
C0001	2
C0002	2
C0003	1
C0004	1

If we want to display customer Id and number of cars purchased if the customer purchased more than 1 car from SALE table then we have to write:

SELECT CustID, COUNT(*) FROM SALE GROUP BY CustID HAVING Count(*)>1;

CustID	COUNT(*)
C0001	2
C0002	2

Join - JOIN operation combines tuples from two tables on specified conditions. This is unlike Cartesian product, which make all possible combinations of tuples. While using the JOIN clause of SQL, we specify conditions on the related attributes of two tables within the FROM clause.

Natural Join – Same as Join but common column appears once.

Consider the two tables:

Customers

customer_id	first_name	last_name	age	country
1	John	Doe	31	USA
2	Robert	Luna	22	USA
3	David	Robinson	22	UK
4	John	Reinhardt	25	UK
5	Betty	Doe	28	UAE

Orders

order_id	item	amount	customer_id
1	Keyboard	400	4
2	Mouse	300	4
3	Monitor	12000	3
4	Keyboard	400	1
5	Mousepad	250	2

Select * from customers natural join orders;

Output

customer_id	first_name	last_name	age	country	order_id	item	amount
4	John	Reinhardt	25	UK	1	Keyboard	400
4	John	Reinhardt	25	UK	2	Mouse	300
3	David	Robinson	22	UK	3	Monitor	12000
1	John	Doe	31	USA	4	Keyboard	400
2	Robert	Luna	22	USA	5	Mousepad	250

Equi join – when two tables are joined on the basis of equality.

select * from customers,orders where customers.customer_id = orders.customer_id and country = "USA";

Output

customer_id	first_name	last_name	age	country	order_id	item	amount	customer_k
1	John	Doe	31	USA	4	Keyboard	400	1
2	Robert	Luna	22	USA	5	Mousepad	250	2

Non – Equi join – When two tables are joined on the basis of inequality.

select * from customers, orders where customers.customer_id=orders.customer_id and age >= 25;

customer_id	first_name	last_name	age	country	order_id	item	amount	customer_id
4	John	Reinhardt	25	UK	1	Keyboard	400	4
4	John	Reinhardt	25	UK	2	Mouse	300	4
1	John	Doe	31	USA	4	Keyboard	400	1

AGGREGATE FUNCTIONS

SUM()	The total sum of a column
COUNT()	The number of rows that matches a specified condition. Null values not included.
AVG()	The Average value of a column
MAX()	The Maximum value of a column
MIN()	The Minimum value of a column

```
mysql> SELECT ID,ENAME,SALARY,ECITY FROM EMP;
+-----+-----+-----+-----+
| ID    | ENAME  | SALARY | ECITY    |
+-----+-----+-----+-----+
| 101   | KARAN  | 10000  | DELHI    |
| 102   | SUMAN  | 15000  | CHANDIGARH |
| 103   | AKSHAT | 17000  | MUMBAI   |
+-----+-----+-----+-----+
```

```
mysql> SELECT SUM(SALARY) FROM EMP;
```

```
+-----+  
| SUM(SALARY) |  
+-----+  
|          42000 |  
+-----+
```

```
1 row in set (0.00 sec)
```

```
mysql> SELECT AVG(SALARY) FROM EMP;
```

```
+-----+  
| AVG(SALARY) |  
+-----+  
| 14000.0000 |  
+-----+
```

```
1 row in set (0.00 sec)
```

```
mysql> SELECT MAX(SALARY) FROM EMP;
```

```
+-----+  
| MAX(SALARY) |  
+-----+  
|          17000 |  
+-----+
```

```
1 row in set (0.00 sec)
```

```
mysql> SELECT MIN(SALARY) FROM EMP;
```

```
+-----+  
| MIN(SALARY) |  
+-----+  
|          10000 |  
+-----+
```

```
1 row in set (0.01 sec)
```

```
mysql> SELECT COUNT(SALARY) FROM EMP WHERE ID>=102;
```

```
+-----+  
| COUNT(SALARY) |  
+-----+  
|          2 |  
+-----+
```

```
1 row in set (0.00 sec)
```

COUNT() VS COUNT(*)

Count(<column>) – counts non-null values of the specified column

Count(*) – counts no. of records

```
mysql> SELECT * FROM EMP;
```

ID	SALARY	ENAME	ECITY
101	10000	KARAN	DELHI
102	15000	SUMAN	CHANDIGARH
103	17000	AKSHAT	MUMBAI
104	NULL	SUHANI	DELHI

4 rows in set (0.00 sec)

```
mysql> SELECT COUNT(SALARY) FROM EMP;
```

COUNT(SALARY)
3

1 row in set (0.00 sec)

```
mysql> SELECT COUNT(*) FROM EMP;
```

COUNT(*)
4

1 row in set (0.00 sec)

VERY SHORT ANSWER QUESTIONS (1 MARKS)

Q1. In SQL, which function is used to display current date and time?

- i. Date () ii. Time () iii. Current () iv. Now ()

Ans. iv. Now()

Q2. In SQL, the equivalent of UCASE() is:

- i. UPPERCASE () ii. CAPITALCASE() iii. UPPER() iv. TITLE ()

Ans. UPPER()

Q3. Which type of values will not be considered by SQL while executing the following statement?

SELECT COUNT(column name) FROM inventory;

- i. Numeric value ii. text value iii. Null value iv. Date value

Ans. iii. Null value

Q4. Raj, a Database Administrator, needs to display the average pay of workers from those departments which have more than five employees. He is experiencing a problem while running the following query: `SELECT DEPT, AVG(SAL) FROM EMP WHERE COUNT(*) > 5 GROUP BY DEPT;`

Which of the following is a correct query to perform the given task?

- i. `SELECT DEPT, AVG(SAL) FROM EMP WHERE COUNT(*) > 5 GROUP BY DEPT;`
- ii. `SELECT DEPT, AVG(SAL) FROM EMP HAVING COUNT(*) > 5 GROUP BY DEPT;`
- iii. `SELECT DEPT, AVG(SAL) FROM EMP GROUP BY DEPT WHERE COUNT(*) > 5;`
- iv. `SELECT DEPT, AVG(SAL) FROM EMP GROUP BY DEPT HAVING COUNT(*) > 5;`

Ans. iv. `SELECT DEPT, AVG(SAL) FROM EMP GROUP BY DEPT HAVING COUNT(*) > 5;`

Q5. If column "Fees" contains the data set (5000,8000,7500,5000,8000), what will be the output after the execution of the given query?

`SELECT SUM (DISTINCT Fees) FROM student;`

- i. 20500 ii. 10000 iii. 20000 iv. 33500

Ans. 20500

Q6. Which SQL statement do we use to find out the total number of records present in the table ORDERS?

- i. `SELECT * FROM ORDERS;`
- ii. `SELECT COUNT (*) FROM ORDERS;`
- iii. `SELECT FIND (*) FROM ORDERS;`
- iv. `SELECT SUM () FROM ORDERS`

Ans. `SELECT COUNT (*) FROM ORDERS;`

Q7. Predict the output of the following query: `SELECT MOD (9,0);`

- i. 0 ii. NULL iii. NaN iv. 9

Ans. NULL

Q8. Which one of the following is not an aggregate function?

- i. `ROUND()` ii. `SUM()` iii. `COUNT()` iv. `AVG()`

Ans. `ROUND( )`

Q9. Which one of the following functions is used to find the largest value from the given data in MySQL?

i. MAX()

ii. MAXIMUM()

iii. BIG()

iv. LARGE()

Ans. MAX ()

Q10. Which of the following SQL functions does not belong to the Math functions category?

i. POWER()

ii. ROUND()

iii. LENGTH()

iv. MOD()

Ans. LENGTH ()

Q11. Predict the output of the following query: SELECT LCASE (MONTHNAME ('2023-03-05'));

i. May

ii. March

iii. may

iv. March

Ans. march

SHORT ANSWER QUESTIONS (2-3 MARKS)

Q1. Shreya, a database administrator has designed a database for a clothing shop. Help her by writing answers of the following questions based on the given table: TABLE: CLOTH

CCODE	CNAME	SIZE	COLOR	PRICE	DOP
C001	JEANS	XL	BLUE	990	2022-01-21
C002	T SHIRT	M	RED	599	2021-12-12
C003	TROUSER	M	GREY	399	2021-11-10
C004	SAREE	FREE	GREEN	1299	2019-11-12
C005	KURTI	L	WHITE	399	2021-12-07

i. Write a query to display cloth names in lower case.

ii. Write a query to display the lowest price of the cloths.

iii. Write a query to count total number of cloths purchased of medium size.

Ans.

i. SELECT LOWER(CNAME) FROM CLOTH;

ii. SELECT MIN(PRICE) FROM CLOTH;

iii. SELECT COUNT(*) FROM CLOTH GROUP BY SIZE HAVING SIZE='M';

Q2. Write MySQL statements for the following:

i. To create a database named FOOD.

ii. To create a table named Nutrients based on the following specification:

Column Name	Data Type	Constraints
Food_Item	Varchar(20)	Primary Key
Calorie	Integer	

Ans.

- i. CREATE DATABASE FOOD;
- ii. CREATE TABLE NUTRIENTS(NAME VARCHAR(20) PRIMARY KEY,CALORIES INTEGER);

Q3.Predict the output of the following queries:

- i. select instr('exams@cbse.nic.in','');;
- ii. select substr('exams@cbse.nic.in',7,4);
- iii. select left('exams@cbse.nic.in',5);

Ans.

- i. 11
- ii. Cbse
- iii. exams

Q4.Reena is working with functions of MySQL. Explain her following:

- i. What is the purpose of now () function?
- ii. How many parameters does it accept?
- iii. What is the general format of its return type?

Ans.

- i. It returns the current date and time.
- ii. None
- iii. The return type for NOW() function is either in 'YYYYMM-DD HH:MM:SS' format or YYYYMMDDHHMMSS.uuuuuu format, depending on whether the function is used in a string or numeric context.

VERY LONG ANSWER QUESTIONS (4-5 MARKS)

Q1. Explain the following SQL functions using suitable examples.

- i. UCASE() ii. TRIM() iii. MID() iv. DAYNAME() v. POWER()

Ans.

- i. UCASE(): It converts the string into upper case. Example: SELECT UCASE('welcome world'); Output: WELCOME WORLD
- ii. TRIM(): It removes the leading and trailing spaces from the given string. Example: SELECT TRIM(' Welcome world '); Output: Welcome world
- iii. MID(): It extracts the specified number of characters from given string. Example: SELECT MID(' Welcome world,4,,4); Output: Come
- iv. DAYNAME(): It returns the weekday name for a given date Example: SELECT DAYNAME('2022-07-22'); Output: Friday
- v. POWER(): It returns the value of a number raised to the power of another number. Example: SELECT POW(6,2); Output: 36

Q2. Write suitable SQL query for the following:

- i. Display 7 characters extracted from the 7th left character onwards from the string 'INDIA SHINING'.
- ii. Display the position of the occurrence of string 'COME' in the string 'WELCOME WORLD'.
- iii. Round off the value 23.78 to one decimal place.
- iv. Display the remainder of 100 divided by 9.
- v. Remove all the expected leading and trailing spaces from a column userid of the table 'USERS'.

Ans.

- i. `select mid('INDIA SHINING',7,7);`
- ii. `select INSTR('WELCOME WORLD','COME');`
- iii. `select round(23.78,1);`
- iv. `select mod(100,9);`
- v. `select trim(userid) from users`

Q3. Preeti manages database in a blockchain start-up. For business purposes, she created a table named BLOCKCHAIN. Assist her by writing the following queries

TABLE: BLOCKCHAIN

id	user	value	hash	transaction_date
1	Steve	900	ERTYU	2020-09-19
2	Meesha	145	@345r	2021-03-23
3	Nimisha	567	#wert5	2020-05-06
4	Pihu	678	%rtYu	2022-07-13
5	Kopal	768	rrt4%	2021-05-15
7	Palakshi	534	wer@3	2022-11-29

- i. Write a query to display the year of oldest transaction.
- ii. Write a query to display the month of most recent transaction.
- iii. Write a query to display all the transactions done in the month of May.
- iv. Write a query to count total number of transactions in the year 2022.

Ans.

- i. `SELECT YEAR(MIN(TRANSACTION_DATE)) FROM BLOCKCHAIN;`
- ii. `SELECT MONTH(MAX(TRANSACTION_DATE)) FROM BLOCKCHAIN;`
- iii. `SELECT * FROM BLOCKCHAIN WHERE MONTHNAME (TRANSACTION_DATE)='MAY';`
- iv. `SELECT COUNT(ID) FROM BLOCKCHAIN WHERE YEAR(TRANSACTION_DATE)=2022;`

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|C|o|m|p|u|t|e|r| |N|e|t|w|o|r|k|s|
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INTRODUCTION TO NETWORK

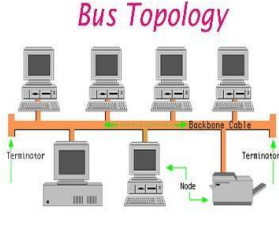
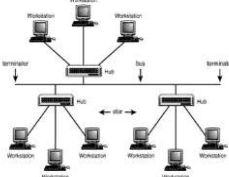
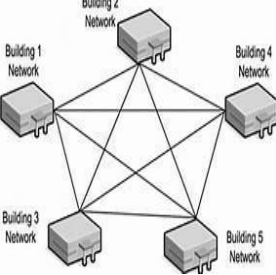
TYPES OF NETWORK

| NETWORK | FULL FORM | AREA COVERED | EXAMPLES | TECHNOLOGY |
|---------|---------------------------|-------------------------|----------------------------------|--------------------------------------|
| PAN | PERSONAL AREA NETWORK | UPTO 10 METER | USED WITHIN A ROOM, PERSONAL USE | INFRARED, BLUETOOTH |
| LAN | LOCAL AREA NETWORK | UPTO 10 KM | USE WITHIN A BUILDING OR CAMPUS | ETHERNET, WI-FI |
| MAN | METROPOLITAN AREA NETWORK | UPTO 100KM RADIUS | USED WITHIN A CITY | OPTICAL FIBER, RADIO WAVE, MICROWAVE |
| WAN | WIDE AREA NETWORK | ENTIRE COUNTRY OR GLOBE | USED GLOBALLY | ROUTER, GATEWAY |

NETWORKING DEVICES

| DEVICE NAME | DESCRIPTION |
|-------------------------------------|--|
| MODEM
(Modulator
Demodulator) | Converts analog signal to digital (known as modulation) and digital signal to analog (known as demodulation) |
| HUB | Connects several devices in network and Broadcasting device, send message to all nodes |
| SWITCH | Connects several devices in network and unicast device, send message to destination nodes only |
| REPEATER | Regenerates signal after distance of 100 meter |
| ROUTER | Forwards data packets from one machine to another |
| GATEWAY | Connects two dissimilar networks |

NETWORKING TOPOLOGY

| <p>BUS</p>  | <p>STAR</p>  | <p>TREE</p>  | <p>MESH</p>  |
|---|---|---|--|
| <p>Easy to setup; Less cable length; Fault diagnosis difficult; Not suitable for large network</p> | <p>Centrally controlled; Fault diagnosis easy; Expensive to setup; If central hub fails, network disrupts</p> | <p>Combination of star and bus, fault diagnosis easy, maintenance is difficult and costly</p> | <p>Network can be expanded without affecting existing LAN; Robust topology; Complex setup</p> |

IMPORTANT NETWORKING TERMS

| Terms | Description |
|-------------|---|
| Email | Electronic Mail," is the transmission of messages electronically over computer network |
| Chat | Online textual talk is called chatting. |
| WWW | A set of programs, standards and protocols that allows the multimedia files to be created, displayed and linked on the internet |
| Website | Collection of related web pages on a web server and are linked together and share a common interface and design. |
| Web page | A document that uses HTTP is called a webpage. |
| Web browser | A software on a client computer, that retrieves information from the web. examples: Internet explorer, GoogleChrome, MozillaFirefox, opera, safari, lynx etc. |
| Web server | A web server is a computer or a group of computers that hosts or stores content of a website. Examples – Apache Tomcat, IIS |
| Web | The process of uploading/saving the web content on a web server to make it |

| | |
|---------|---|
| hosting | available on WWW (World Wide Web) |
| URL | Each web page has a unique address called URL (uniform resource locator) |
| COOKIES | A cookie is a small text file sent by web server to a web browser when a user browses a website |
| VOIP | Voice over Internet Protocol.it is used for audio and video calls |

Difference between static and dynamic web page

| STATIC WEB PAGE | DYNAMIC WEB PAGE |
|---|--|
| 1) Display the same content each time when someone visits it
2) No database required
3) Less time to load | 1) WEB page content changes according to the user
2) Database is used in at the server end
3) Loading time is more |

Multiple Choice Questions (MCQ)

- 1) A _____ is a set of computers that can be interconnected by one or more transmission paths.
 a) Network b) Topology c) ftp d) IP Address
- 2) A computer that facilitates the sharing of data, software and hardware resources on the network is called _____.
 a) Client b) Dump Terminal c) Printer d) Server
- 3) Which are the devices that send the data directly to the computer rather than everywhere within the network?
 a) Repeaters b) Switch c) Hub d) Routers
- 4) Sahil of Class X is sending some media files on Sajal's mobile over Bluetooth, which type of networks he formed by them:
 a) LAN b) WAN c) MAN d) PAN
- 5) The network devices that amplifies and restores the signal for long distance transmission?
 a) Repeaters b) Switch c) Hub d) Routers
- 6) What is the collection of the hyperlinked document on the internet known as?
 a) HTML b) Email c) WWW d) Internet
- 7) What is the location of a resource on the internet given by?
 a) Email b) IP c) Protocol d) URL

8) Identify among the following the network device used to connect two dissimilar types of networks.

- a) Switch b) Hub c) Bridge d) Gateway

9) Which of the following topology contains a backbone cable running through the whole length of the network?

- a) star b) bus c) mesh d) Tree

10) Internet is an example of _____ topology

- a) star b) Bus c) mesh d) Tree

11) Data is converted in a form which has to travel over telephone lines using the device

- a) modem b) Hub c) switch d) router

12) A website is a collection of

- a) HTML document b) Graphics files c) audio and video files d) all of the above

13) When you visit a website, it will open the page set as _____ of the website.

- a) web site b) home page c) email d) ISP

14) Which amongst the following is not an example of browser?

- b) Chrome b) Firefox c) Avast d) edge

15) Electronic mail cannot be used for

- a) sending documents b) sending attachments
c) sending bulk data (say over 2GB) d) sending messages

16) A _____ is a device that connects the organization's network with the outside world of the Internet. [CBSE Sample paper]

- a) Hub b) Modem c) Gateway d) Repeater

17) Television cable network is an example of: [[CBSE Sample paper]

- a) LAN b) WAN c) MAN d) Internet

18) Which protocol allows us to have voice calls over the internet?

- a) HTTP b) VoIP c) Video Chat d) SMTP

19) An online activity that enables us to publish website or web application on the internet

- a) Web server b) Web Browser c) Web Hosting d) None

20) Website stores the browsing activity through:

- a) web page b) Cookies c) passwords d) server

ASSERTION AND REASONING based questions

Mark the correct choice as

- (A) Both A and R are true and R is the correct explanation for A
- (B) Both A and R are true and R is not the correct explanation for A
- (C) A is True but R is False
- (D) A is false but R is True

Q1 Assertion (A): Each website has a unique address called URL.

Reasoning (R): It is Unified Resource Locator and a correct example is <http://mypage.htm/google.com>

Q2 Assertion (A): - VoIP makes audio and video calls possible from any internet connected device having a microphone and speakers.

Reasoning (R): - VoIP is possible if both caller and receiver have the right software and hardware to speak to one another

Q3 Assertion(A): Incognito browsing opens up a version of the browser that will track your activity

Reasoning(R): Incognito browsing is useful when entering sensitive data

Q4 Assertion (A): -The Internet is a collection of interconnected computer networks linked by transmission medium such as copper wires, fiber-optic cables, wireless connections etc.

Reasoning (R): - World wide web is a collection of interconnected documents.

Q5 Assertion (A): - MODEM stands for modulator-demodulator.

Reasoning (R): - It is a computer hardware device that converts data from a digital format to analog and vice versa. [CBSE Sample paper]

Q6 Assertion (A): - Repeater is device to regenerate a digital signal.

Reasoning (R): - Freeware source code is usually hidden from user.

Q7 Assertion (A): - Cookies are plain text files.

Reasoning (R): - Cookies store the Profile picture on Social Media.

Q8 Assertion (A): - Internet cookies are text files that contain small pieces of data, like a username, password and user's preferences while surfing the internet.

Reasoning (R): - To make browsing the Internet faster & easier, its required to store certain information on the server's computer.

Q9 Assertion (A): - Internet is a collection of networks

Reasoning (R): - WWW is collection of Interconnected hypertext documents

Q10 Assertion (A): - There is a centralized control in case of Star topology.

Reasoning (R): - A hub can transfer data packets only to the intended node in a network.

MCQ ANSWERS

| | | | | | | | |
|----|---|-----|---|-----|---|-----|---|
| Q1 | a | Q6 | c | Q11 | a | Q16 | c |
| Q2 | d | Q7 | d | Q12 | d | Q17 | c |
| Q3 | b | Q8 | d | Q13 | b | Q18 | b |
| Q4 | d | Q9 | b | Q14 | c | Q19 | c |
| Q5 | a | Q10 | C | Q15 | c | Q20 | b |

ASSERTION REASONING ANSWER

| | | | |
|----|---|-----|---|
| Q1 | b | Q6 | c |
| Q2 | a | Q7 | b |
| Q3 | b | Q8 | a |
| Q4 | b | Q9 | b |
| Q5 | b | Q10 | c |

2 MARKS QUESTIONS (UNSOLVED)

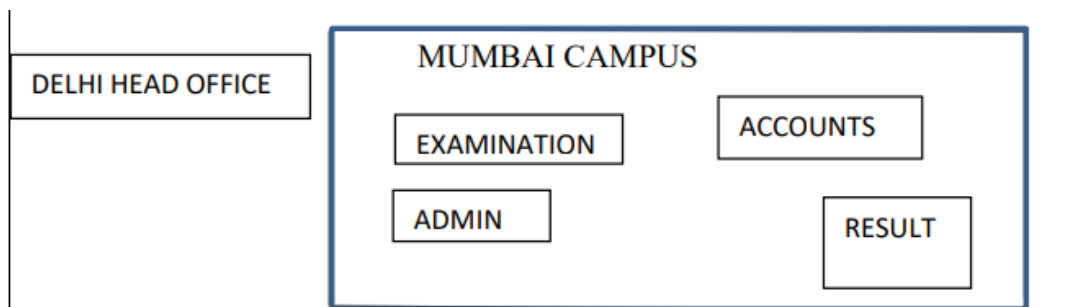
- Q1. Explain the terms Web page and Home Page.
- Q2. Mention any four networking goals.
- Q3. Kanwal is confused between the terms web server and webhosting explain the basic concepts of a web server and web hosting to Kanwal
- Q4. Rudra is doing a course in networking. She is unable to understand the concept of URL. Help her by explaining it with the help of suitable example.
- Q5. Compare and contrast – STAR and BUS topologies
- Q6. Expand the following terms related to Computer Networks:
a. SMTP (b) POP (c) FTP (d) TCP
- Q7. Explain the terms Static and dynamic Web pages.
- Q8. What is difference between hub and switch
- Q9. write any four benefits of networking.
- Q10. Differentiate between website and webpage
- Q11. Define the term web browser. Give some examples of it
- Q12. What do you understand by term [WWW](#). Name some applications of WWW.
- Q13. What happens to the Network with Star topology if the following happens
(i) One of the computers on the network fails?

- (ii) The central hub or switch to which all computers are connected, fails?
- Q14. How do Computer networks reduce hardware costs of an organization? Explain with the help of example.
- Q15. Why switch is known as intelligent Hub.

CASE STUDY QUESTIONS(SOLVED)

Q1. Prime Computer services Ltd. is an international educational organization. It is planning to set up its India campus at Mumbai with its head office in Delhi. The Mumbai office campus has four main buildings-ADMIN, ACCOUNTS, EXAMINATION and RESULT. You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (v), keeping in mind the distances between the buildings and other given parameters.

[CBSE Sample paper]



Shortest distances between various buildings:

| | |
|------------------------------------|--------|
| ADMIN TO ACCOUNTS | 55 m |
| ADMIN TO EXAMINATION | 90 m |
| ADMIN TO RESULT | 50 m |
| ACCOUNTS TO EXAMINATION | 55 m |
| ACCOUNTS TO RESULT | 50 m |
| EXAMINATION TO RESULT | 45 m |
| DELHI Head Office to MUMBAI campus | 2150 m |

Number of computers installed at various buildings are as follows:

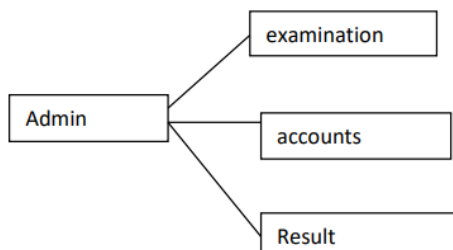
| | |
|-------------------|-----|
| ADMIN | 110 |
| ACCOUNTS | 75 |
| EXAMINATION | 40 |
| RESULT | 12 |
| DELHI HEAD OFFICE | 20 |

- (i) Suggest the most appropriate location of the server inside the MUMBAI campus (out of the four buildings) to get the best connectivity for maximum number of computers. Justify your answer.
- (ii) Suggest and draw cable layout to efficiently connect various buildings within the MUMBAI campus for a wired connectivity.

- (iii) Which networking device will you suggest to be procured by the company to interconnect all the computers of various buildings of MUMBAI campus?
- (iv) Company is planning to get its website designed which will allow students to see their results after registering themselves on its server. Out of the static or dynamic, which type of website will you suggest?
- (v) Which of the following will you suggest to establish the online face to face communication between the people in the ADMIN office of Mumbai campus and Delhi head office?
- (a) Cable TV (b) Email (c) Video conferencing (d) Text chat

Solution:

- i) Server should be installed in Admin department as it has maximum number of computers.
ii) Star topology



- (iii) Hub/Switch
(iv) Dynamic
(v) Video conferencing

Q2. XYZ Media house campus is in Delhi and has 4 blocks named Z1, Z2, Z3 and Z4. The tables given below show the distance between different blocks and the number of computers in each block.

[CBSE Sample paper]

| | |
|-----------------------------|-------------------|
| Block Z1 to Block Z2 | 80 metres |
| Block Z1 to Block Z3 | 65 metres |
| Block Z1 to Block Z4 | 90 metres |
| Block Z2 to Block Z3 | 45 metres |
| Block Z2 to Block Z4 | 120 metres |
| Block Z3 to Block Z4 | 60 metres |

| Block | Number of computers |
|--------------|----------------------------|
| Z1 | 135 |
| Z2 | 290 |
| Z3 | 180 |
| Z4 | 195 |

The company is planning to form a network by joining these blocks.

(i) Out of the four blocks on campus, suggest the location of the server that will provide the best connectivity. Explain your response.

(ii) For very fast and efficient connections between various blocks within the campus, suggest a suitable topology and draw the same.

(iii) Suggest the placement of the following devices with justification

(a) Repeater (b) Hub/Switch

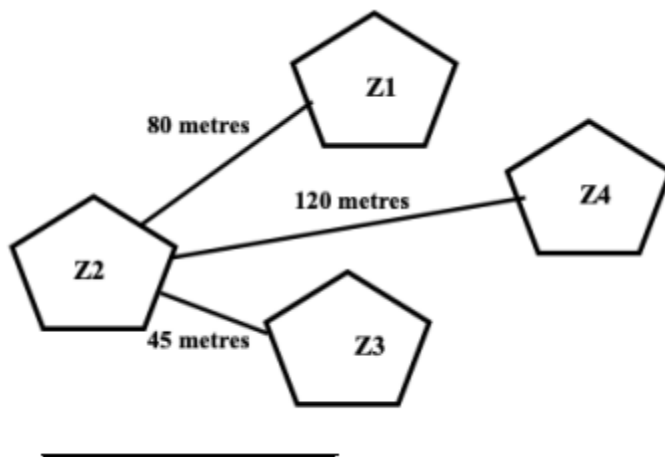
(iv) VoIP technology is to be used which allows one to make voice calls using a broadband internet connection. Expand the term VoIP.

(v) The XYZ Media House intends to link its Mumbai and Delhi centers. Out of LAN, MAN, or WAN, what kind of network will be created? Justify your answer.

Solution

i) Z2 as it has maximum number of computers.

ii) For very fast and efficient connections between various blocks within the campus suitable topology: Star Topology



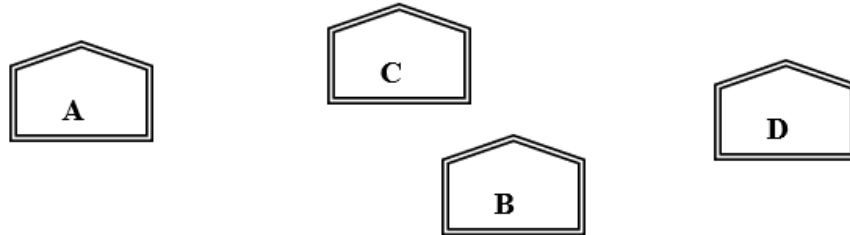
iii) Repeater: To be placed between Block Z2 to Z4 as distance between them is more than 100 meters. Hub/Switch: To be placed in each block as each block has many computers that needs to be included to form a network.

iv) Voice Over Internet Protocol

v) WAN as distance between Delhi and Mumbai is more than 40kms

CASE STUDY QUESTION (UNSOLVED)

Q1. Knowledge Supplement Organization has set up its new centre at Mangalore for its office and web-based activities. It has 4 blocks of buildings as shown in the diagram below:



Centre to centre distances between various blocks

| | |
|--------------------|-------|
| Block A to Block B | 50 m |
| Block B to Block C | 150 m |
| Block C to Block D | 25 m |
| Block A to Block D | 170 m |
| Block B to Block D | 125 m |
| Block A to Block C | 90 m |

Number of Computers

| | |
|---------|-----|
| Block A | 25 |
| Block B | 50 |
| Block C | 125 |
| Block D | 10 |

- Suggest a cable layout of connections between the blocks.
- Suggest the most suitable place (i.e. block) to house the server of this organization with a suitable reason.
- Suggest the placement of the following devices with justification
 - Repeater
 - Hub/Switch

Q2 Ravya Industries has set up its new center at Kaka Nagar for its office and web based activities. The company compound has 4 buildings as shown in the diagram below:



Centre to centre distances between various buildings

| | |
|---------------------------------|-------|
| Harsh Building to Raj Building | 50 m |
| Raj Building to Fazz Building | 60 m |
| Fazz Building to Jazz Building | 25 m |
| Jazz Building to Harsh Building | 170 m |
| Harsh Building to Fazz Building | 125 m |
| Raj Building to Jazz Building | 90 m |

Number of Computers

| | |
|----------------|-----|
| Harsh Building | 15 |
| Raj Building | 150 |
| Fazz Building | 15 |
| Jazz Building | 25 |

- Suggest a cable layout of connections between the buildings.
- Suggest the most suitable place (i.e. building) to house the server of this organisation with a suitable reason.
- Suggest the placement of the following devices with justification:
 - Internet Connecting Device/Modem

(ii) Switch

(d) The organization is planning to link its sale counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer.

Q3. Nootan Vidya Mandir in OOTY is setting up the network between its different wings. There are 4 wings named as SENIOR(S), MIDDLE(M), JUNIOR(J) and OFFICE(O).

Distance between the various wings are given below:

| | |
|------------------|------|
| Wing O to Wing S | 100m |
| Wing O to Wing M | 200m |
| Wing O to Wing J | 400m |
| Wing S to Wing M | 300m |
| Wing S to Wing J | 100m |
| Wing J to Wing M | 450m |

Number of Computers

| | |
|--------|-----|
| Wing O | 10 |
| Wing S | 200 |
| Wing M | 100 |
| Wing J | 50 |

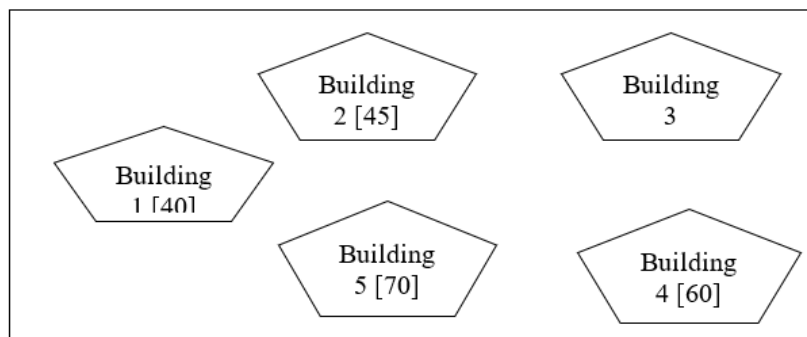
(i) Suggest a suitable Topology for networking the computer of all wings.

(ii) Name the wing where the server to be installed. Justify your answer.

(iii) Suggest the placement of Hub/Switch in the network.

(iv) Mention an economic technology to provide internet accessibility to all wings.

Q4. East and West Public Ltd. has decided to network all its offices spread in five buildings.



[] indicates the total no. of computers.

The distances between buildings are given below:

| | | | |
|---------------|---------|---------------|--------|
| Between 1 & 2 | 20 Mts | Between 3 & 5 | 70 Mts |
| Between 2 & 3 | 50 Mts | Between 1 & 5 | 65 Mts |
| Between 3 & 4 | 120 Mts | Between 2 & 5 | 50 Mts |
| Between 4 & 5 | 30 Mts | Between 1 & 3 | 60 Mts |

The distances between buildings are given below:

(i) Suggest cable layout(s) for connecting the buildings.

(ii) Suggest the most suitable building to install the server of this organization with a suitable reason, with justification.

(iii) Suggest the placement of the following devices with justification?

(a) Hub/Switch (b) Repeater

(iv) The company also has another office in the same city but at a distant location about 25-30 kms away. How can link be established with this building? (i.e. suggest the transmission medium).

Patent: A patent is usually granted for inventions. Unlike copyright, the inventor needs to apply (file) for patenting the invention. When a patent is granted, the owner gets an exclusive right to prevent others from using, selling, or distributing the protected invention.

Trademark™: Trademark includes any visual symbol, word, name, design, slogan, label, etc., that distinguishes the brand or commercial enterprise from other brands or commercial enterprises. For example, no company other than Nike can use the Nike brand to sell shoes or clothes

Violation of IPR: Violation of intellectual property right may happen in one of the following ways:

- a. **Plagiarism:** Presenting someone else's idea or work as one's own idea or work is called plagiarism. E.g. Presenting someone else's idea or work as one's own idea or work is called plagiarism
- b. **Copyright infringement:** Copyright infringement is when we use another person's work without obtaining their permission to use or we have not paid for it, if it is being sold
- c. **Trademark infringement:** Trademark Infringement means unauthorized use of another's trademark on products and services

Free and Open source software (FOSS): FOSS refers to the software available free of cost and their source code is also open for anyone to access, modify, correct and improve. For example, Linux kernel-based operating systems like Ubuntu and Fedora come under FOSS.

Creative Common (CC) Licenses: CC is used for all kinds of creative works like websites, music, film, literature, etc. CC enables the free distribution of an otherwise copyrighted work. It is used when an author wants to give people the right to share, use and build upon a work that they have created.

Licensing: It is the legal term used to describe the terms under which people are allowed to use the copyrighted material.

GPL (General Public License) is primarily designed for providing a public license to a software. GNU GPL is another free software license, which provides end users the freedom to run, study, share and modify the software, besides getting regular updates.

Cyber Crime is defined as a crime in which a computer is the medium of crime (hacking, phishing, spamming), or the computer is used as a tool to commit crimes (extortion, data breaches, theft).

Hacking: Hacking is the act of unauthorized access to a computer, computer network or any digital system. Hacking, when done with a positive intent, is called **ethical hacking**. Such ethical hackers are known as **white hat hackers**.

Black hat hackers: A non-ethical hacker is the one who tries to gain unauthorized access to computers or networks in order to steal sensitive data with the intent to damage or bring down systems. They are called black hat hackers or crackers.

Phishing: Phishing is an unlawful activity where fake websites or emails that look original or authentic are presented to the user to fraudulently collect sensitive and personal details, particularly usernames, passwords, banking and credit card details. E.g. Identity theft

Identity Theft: A user's identifiable personal data like demographic details, email ID, banking credentials, passport, PAN, Aadhaar number and various such personal data are stolen and misused by the hacker on behalf of the victim. This is one type of phishing attack where the intention is largely for monetary gain.

Ransomware: The attacker threatens to publish personal and sensitive information or photographs unless a ransom is paid. Reach through email attachments, ads. etc.

Preventing Cyber Crime: Following points can be considered as safety measures to reduce the risk of cyber-crime:

- Take regular backup of important data.
- Use an antivirus software and keep it updated always.
- Avoid installing pirated software. Always download software from known and secure (HTTPS) sites.
- Always update the system software which include the Internet browser and other application software
- Do not visit or download anything from untrusted websites.
- Use a strong password for web login, and change it periodically.
- Always secure a wireless network at home with a strong password and regularly change it.

Cyber bullying: It is the attack on an individual or group through the use of electronic means such as instant messaging, social media, email etc. with the intent to abuse, intimidate or overpower.

IT Act: The Government of India's The Information Technology Act, 2000 (also known as IT Act), amended in 2008, provides guidelines to the user on the processing, storage and transmission of sensitive information. In many Indian states, there are cyber cells in police stations where one can report any cybercrime.

E-waste: Hazards and Management: E-waste or Electronic waste includes electric or electronic gadgets and devices that are no longer in use. Hence, discarded computers, laptops, mobile phones, televisions, tablets, music systems, speakers, printers, scanners etc. constitute e-waste when they are near or end of their useful life.

Impact of E-waste on Environment:

When e-waste is carelessly thrown or dumped in landfills or dumping grounds, certain elements or metals used in production of electronic products cause air, water and soil pollution.

Impact of e-waste on humans

If e-waste is not disposed of in proper manner, it can be extremely harmful to humans, plants, animals and the environment as discussed below:

- One of the most widely used metals in electronic devices (such as monitors and batteries) is lead. When lead enters the human body through contaminated food, water, air or soil, it causes lead poisoning which affects the kidneys, brain and central nervous system. Children are particularly vulnerable to lead poisoning.
- When e-waste such as electronic circuit boards are burnt for disposal, the elements contained in them create a harmful chemical called beryllium which causes skin diseases, allergies and an increased risk of lung cancer. Burning of insulated wires to extract copper can cause neurological disorders.
- Some of the electronic devices contain mercury which causes respiratory disorders and brain damage.
- The cadmium found in semiconductors and resistors can damage kidneys, liver and bones.
- None of the electronic devices are manufactured without using plastics. When this plastic reacts with air and moisture, it passes harmful chemicals into the soil and water resources. When consumed, it damages the immune system of the body and also causes various psychological problems like stress and anxiety.

Management of e-waste: E-waste management is the efficient disposal of e-waste. Some of the feasible methods of e-waste management are reduce, reuse and recycle.

- **Reduce:** We should try to reduce the generation of e-waste by purchasing the electronic or electrical devices only according to our need.
- **Reuse:** It is the process of re-using the electronic or electric waste after slight modification.
- **Recycle:** Recycling is the process of conversion of electronic devices into something that can be used again and again in some or the other manner.

Impact on Health: Excessive usage of digital devices has a negative impact on our physical as well as psychological well-being. Ergonomic positioning of devices as well as our posture are important.

MCQ (MULTIPLE CHOICE QUESTIONS) – SOLVED

Q1. When e-waste such as electronic circuit boards are burnt for disposal, the elements contained in them create a harmful chemical called _____ which causes skin diseases, allergies and an increased risk of lung cancer.

- a. Hydrogen b. Beryllium c. Chlorine d. Oxygen

Q2. Copyright, Patent and Trademark comes under:

- a. Intellectual Property Right b. Individual Property Right
c. Industrial Property Right d. None of the above

Q3. _____ is not a FOSS tool.

- a. Libre Office b. Mozilla Firefox c. Google Chrome d. Python

Q4. By restricting the server and encrypting the data, a software company's server is unethically accessed in order to obtain sensitive information. The attacker blackmails the company to pay money for getting access to the data, and threatens to publish sensitive information unless price is paid. This kind of attack is known as:

- a. Phishing b. Identity Theft c. Plagiarism d. Ransomware

Q5. _____ is a non-profit organization that aims to build a publicly accessible global platform where a range of creative and academic work is shared freely.

- a. Creative Cost b. Critical Commons c. Creative Commons d. Creative Common

Q6. Which of the following is not a type of cybercrime?

- a. Data theft b. Installing antivirus for protection c. Forgery d. Cyber bullying

Q7. What is an example of e-waste?

- a. A ripened mango b. Unused old shoes c. Unused old computers d. Empty cola cans

Q8. 'O' in FOSS stands for:

- a. Outsource b. Open c. Original d. Outstanding

Q9. Legal term to describe the rights of a creator of original creative or artistic work is:

- a. Copyright b. Copyleft c. GPL d. FOSS

Q10. _____ is the trail of data we leave behind when we visit any website (or use any online application or portal) to fill-in data or perform any transaction.

- a. Offline phishing b. Offline footprint c. Digital footprint d. Digital phishing

Q11. ASSERTION AND REASONING based questions. Mark the correct choice as

- a. Both A and R are true and R is the correct explanation for A
b. Both A and R are true and R is not the correct explanation for A
c. A is True but R is False
d. A is false but R is True

Assertion (A): - Internet cookies are text files that contain small pieces of data, like a username, password and user's preferences while surfing the internet.

Reasoning (R): - To make browsing the Internet faster & easier, its required to store certain information on the server's computer.

Q12. IPR stands for:

- a. Intelligent Property Rights b. Intellectual Property Reserve
c. Intellectual Property Rights d. Intellectual Product Rights

Q13. Which of the following is not a violation of IPR?

a. Plagiarism b. Copyright Infringement c. Patent d. Trademark Infringement

Q14. _____ is the practice of taking someone else's work or ideas and passing them off as one's own:

a. Plagiarism b. Copyright c. Patent d. All of the above

Q15. Following are the impact of e-waste on the environment. Choose the odd one out.

a. Soil Pollution b. Water Pollution c. Air Pollution d. Sound Pollution

Q16. Abdul deleted all his chats from all his social media accounts, and he thinks that all his traces are deleted completely. Is he right in thinking so?

a. Yes b. No c. May be d. Not sure

Q17. The legal and regulatory aspects of the internet refer to.....

a. Cyber Space b. Cybercrime c. Criminal law d. IT act

Q18. Rashid received an email warning him of closure of his bank accounts. If he did not update his banking information as soon as possible. He clicked the link in the email and entered his banking information. Next, he got to know that he was duped. This is an example of _____.

a. Online Fraud b. Identity Theft c. Plagiarism d. Phishing

Q19. I can keep you signed in. I can remember your site preferences. I can give you locally relevant content. Who am I?

a. Browser b. Cookies c. Virus d. Spam

Q20. Gaining unauthorized access to a network or computer or digital files with malicious intentions is called _____.

a. Cracking b. Hacking c. Banging d. Phishing

Q21. The digital data trail we leave online unintentionally is called _____

a. Active digital footprints b. Passive digital footprints
c. Current digital footprints d. None of the above

Q22. Our digital footprints are stored in local web browser in the form of _____

a. browsing history b. cookies c. passwords d. All of the above

Q23. Our digital foot prints are stored in _____

a. Local web browser b. Servers where the applications are hosted
c. Both of the above d. None of the above

Q24. The name and logo of the software will be protected by _____

a. copyright b. patent c. registered trademark d. None of the above

Q25. The _____ include right to copy (reproduce) a work, right to distribute copies of the work to the public, and right to publicly display or perform the work.

- a. Copyright b. Patent c. Copyleft d. None of the above

Q26. A patent protects an invention for _____ years, after which it can be freely used.

- a. 10 b. 20 c. 30 d. 40

Q27. GPL stands for _____

- a. General Public License b. GNU General Private License
c. GNU General Public License d. GNU Public License

Q28. FOSS stands for _____

- a. For open source software b. Free and open set software
c. Free and open source software d. None of the above

Q29. _____ operating system comes under FOSS.

- a. Ubuntu b. Unix c. Mac d. Windows

Q30. _____ is defined as a crime in which the computer is the medium of crime.

- a. Computer crime b. Cybercrime c. Internet crime d. Digital crime

Q31. Which of the following is cybercrime?

- a. Hacking b. Phishing c. Spamming d. All of the above

Q32. Which of the following is called black hat hacker?

- a. Ethical hacker b. Non-Ethical hacker c. Both of the above d. None of the above

Q33. Hackers try to break security system _____

- a. for Identity theft b. for monetary gain c. to leak sensitive information d. All of the above

Q34. _____ is an activity where fake websites or emails that look original or authentic are presented to the user.

- a. Phishing b. Hacking c. Spamming d. Identity theft

Q35. Which of the following can be considered as safety measures to reduce the risk of cybercrime?

- a. Use an antivirus software and keep it updated always.
b. Avoid installing pirated software.
c. Use a strong password for web login, and change it periodically.
d. All of the above

Q36. _____ is a branch of science that deals with designing or arranging workplaces including the furniture, equipment and systems so that it becomes safe and comfortable for the user.

- a. Ergonomics b. Ergomics c. Agonomics d. All of the above

Q37. Bad posture of using computer may cause _____

- a. Backache b. Neck Pain c. Shoulder pain d. All of the above

Q38. Proprietary software is a software which is available _____

- a. free of charge b. on paying license fee
c. free for first year only d. none of the above

Q39. _____ browser comes under FOSS.

- a. Internet explorer b. Chrome c. Mozilla Firefox d. None of the above

Q40. Which of the following is a popular category of public licenses?

- a. GPL b. CC c. Both of the above d. None of the above

MCQ ANSWERS:

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| a | a | c | d | c | b | c | b | a | c |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| c | c | c | a | d | b | d | d | b | b |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| b | d | c | c | a | b | a | c | a | b |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| d | b | d | a | d | a | d | b | c | c |

Very Short Answer (VSA)/Short Answer Questions (SA) – 2 Marks each

Q1. Differentiate between the active digital footprint and passive digital footprints.

Ans. **Active Digital Footprints:** Active digital footprints include data that we intentionally submit online. This would include emails we write, or responses or posts we make on different websites or mobile Apps, etc.

Passive Digital Footprints: The digital data trail we leave online unintentionally is called passive digital footprints. This includes the data generated when we visit a website, use a mobile App, browse the Internet, etc.

Q2. List any four benefits of e-waste management.

Ans. Benefits of e-waste management are given below:

- i. Saves the environment and natural resources
- ii. Allows for recovery of precious metals
- iii. Protects public health and water quality
- iv. Saves landfill space

Q3. Mention any four net etiquette.

- Ans. i. No copyright violation
ii. Share the expertise with others on the internet
iii. Avoid cyber bullying
iv. Respect others privacy and diversity

Q4. List any two health hazards related to excessive use of Technology.

Ans. The continuous use of devices like smartphones, computer desktop, laptops, headphones etc. cause a lot of health hazards if not addressed. These are:

- i. Impact on bones and joints: wrong posture or long hours of sitting in an uncomfortable position can cause muscle or bone injury.
- ii. Impact on hearing: using headphones or earphones for a prolonged time and on high volume can cause hearing problems and in severe cases hearing impairments.

Q5. Priyanka is using her internet connection to book a flight ticket. This is a classic example of leaving a trail of web activities carried by her. What do we call this type of activity? What is the risk involved by such kind of activity?

Ans. We call this type of activity as Digital Footprints.

Risk involved: It includes websites we visit, emails we send, and any information we submit online, etc., along with the computer's IP address, location, and other device specific details. Such data could be used for targeted advertisement or could also be misused or exploited.

Q6. Sutapa received an email from her bank stating that there is a problem with her account. The email provides instructions and a link, by clicking on which she can logon to her account and fix the problem. Help Sutapa by telling her the precautions she should take when she receives these types of emails.

Ans. She should check whether it is a valid bank site or not by checking in the URL https. It is always better to type the URL and then login to the site. She should not click on the link provided in the email.

Q7. Anshika received a phone call from a company claiming that she has won the Rs. 1 crore lottery. She is asked some security questions for verification like name, date of birth, account number, IFSC code, phone number, OTP etc. In relation to this, answer the following questions:

a) Should Anshika give the details being asked?

b) Give reasons for your answer to part (a)

Ans. (a) No

(b) Never share your personal information with anyone as the person on the phone call is trying to extract the personal information from her.

Q8. Mention any four safety measures for prevention from cybercrime.

Ans. Safety measures for prevention from Cybercrime are:

- i. Take regular backup of important data.
- ii. Use an antivirus software and keep it updated always.
- iii. Avoid installing pirated software. Always download software from known and secure (HTTPS) sites.
- iv. Do not visit or download anything from untrusted websites.
- v. Use a strong password for web login, and change it periodically

Q9. Mention any two social media etiquette.

Ans. **Social Media etiquette:**

Be secure: Choose password wisely, know who you befriend, Beware of fake information

Be reliable: Think before uploading anything on the internet.

Q10. What do you mean by phishing? Give an example.

Ans. **Phishing:** Phishing is an unlawful activity where fake websites or emails that look original or authentic are presented to the user to fraudulently collect sensitive and personal details, particularly usernames, passwords, banking and credit card details. E.g. Identity theft.

Q11. Describe measures to recycle your e-waste safely.

Ans. Following measures can be adopted to recycle the e-waste safely:

- i. Give old electronics to certified e-waste recyclers.
- ii. Sell your electronics instead of throwing them away.
- iii. Donate to NGOs.

Q12. What do you mean by Cyber security?

Ans. Cyber security is the combination of best processes and practices to ensure the security of networks, computers, programs, data and information from attack, damage or unauthorized access.

Q13. Write down the names of any three social networking sites.

Ans. Facebook, Twitter, LinkedIn, Google+ etc.

Q14. What are the demerits of social networking?

- Ans. i) Lack of control
ii) Can be addictive
iii) Unreliable information

Q15. What is cyberstalking?

Ans. Cyberstalking is defined as an unlawful act of harassing a person or collecting an individual's private information using an electronic network.

LONG ANSWER QUESTIONS (LA) – 3 MARKS

Q1. Kritika, recently started using her social media account. Within a few days, she befriends many people she knows and some that she does not know. After some time, she starts getting negative comments on her posts. She also finds that her pictures are being shared online without her permission. Based on the given information, answer the questions given below.

Ans. i. Identify the type of cybercrime she is a victim of.

ii. Under which act, she can lodge a complaint to the relevant authorities?

iii. Suggest her any two precautionary measures which she should take in future while being online to avoid any such situations.

- a) She is a victim of Cyber Bullying
 - b) Information Technology Act, 2000 (also known as IT Act)
 - c) Need to be careful while befriending unknown people on the internet
 - d) Never share personal credentials like username and password with others
- (1 mark for each correct answer)

Q2. Mention any three health hazards associated with inappropriate and excessive use of gadgets.

Ans. Simran needs to be made aware of the following consequences: i) Eye strain ii) Painful muscles and joints iii) Poor memory iv) Lack of sleep v) Back pain and neck pain

Q3. Kanika has recently shifted to a new city and school. She does not know many people in her new city and school. But all of a sudden, someone is posting negative, demeaning comments on her social networking profile etc. She is also getting repeated mails from unknown people. Every time she goes online, she finds someone chasing her online.

i. What is this happening to Kanika?

ii. What immediate action should she take to handle it?

iii. Is there any law in India to handle such issues? Discuss briefly.

Ans. i. Kanika has become a victim of cyber bullying and cyber stalking.

ii. She must immediately bring it into the notice of her parents and school authorities. And she must report this cybercrime to local police with the help of her parents.

iii. Yes. The Information Technology Act, 2000 (also known as ITA-2000, or the IT Act) is the primary law in India dealing with cybercrime and electronic commerce.

Q4. What do you understand about plagiarism? Why is it a punishable offence? Mention any two ways to avoid plagiarism.

Ans. Plagiarism is the act of using or stealing someone else's intellectual work, ideas etc. and passing it as your own work. In other words, plagiarism is a failure in giving credit to its source. Plagiarism is a fraud and violation of Intellectual Property Rights. Since IPR holds a legal entity status, violating its owners right is a legally punishable offence.

Any two ways to avoid plagiarism:

- Be original
- Cite/acknowledge the source

Q5. What do you mean by Identity theft? Explain with the help of an example.

Ans. Identity theft is the crime of obtaining the personal or financial information of another person for the sole purpose of assuming that person's name or identity to make transactions or use it to post inappropriate remarks, comments etc.

Example: Alex likes to do his homework late at night. He uses the Internet a lot and also sends useful data through email to many of his friends. One Day he forgot to sign out from his email account. In the morning, his twin brother, Flex started using the computer. He used Flex's email account to send inappropriate messages to his contacts.

Q6. What do you understand by Net Etiquette? Explain any two such etiquette. 3

Ans. Net Etiquette refers to the proper manners and behavior we need to exhibit while being online. These include:

No copyright violation: we should not use copyrighted materials without the permission of the creator or owner. We should give proper credit to owners/creators of open source content when using them.

Avoid cyber bullying: Avoid any insulting, degrading or intimidating online behavior like repeated posting of rumors, giving threats online, posting the victim's personal information, or comments aimed to publicly ridicule a victim.

Q7. Ms Natasha has many electronics gadgets which are not usable due to outdated hardware and software. Help her to find the three best ways to dispose of the used electronic gadgets.

- Ans. 1. Give Your Electronic Waste to a Certified E-Waste Recycler
2. Donating Your Outdated Technology
3. Give Back to Your Electronic Companies and Drop Off Points

Q8. Anubhav has recently changed his school so he is not aware of the people, but someone is posting negative, demeaning comments on his social media profile. He is also getting repeated mails from unknown people. Every time he goes online, he finds someone chasing him online.

i. Anubhav is a victim of

- a. Eavesdropping b. Stolen identity c. Phishing d. Cyber stalking

Ans. (d)

ii. The action that Anubhav should take:

- a. He should ONLY share with his friends
b. He should NOT share with anyone as it can cause serious problem
c. He should immediately report to the police
d. He should bring to the notice of his parents and school authorities.

Answer: (d)

iii. is a set of moral principles that governs the behavior of a group or individual and regulates the use of computers?

Copyright b. Computer ethics c. Property rights d. Privacy law

Answer: (b)

iv. Anubhav needs to protect his personal information or data from unintentional and intentional attacks and disclosure which is termed as

a. Digital right b. Copyright c. Privacy d. Intellectual property

Ans. (c)

v. The act of fraudulently acquiring someone's personal and private information, such as online account names, login information and passwords is called as

a. Phishing b. Fraud c. Scam d. Plagiarism

Answer: (a)

Q9. Describe some (at least three) common forms of student plagiarism.

Ans. 1) Rewriting someone else's work without properly citing sources.

2) Submitting someone else's work as their own.

3) Using quotations without citing the source.

4) Citing the source inaccurately.

Q10. What do you understand by Digital Footprint? What are its different types?

Ans. **Digital Footprint** is the Trail of data we leave behind when we visit any website (or any online application or portal).

Types of Digital Footprint:

Active Digital Footprint is created when a user intentionally shares personal information while using the internet. E.g. sharing personal information on Facebook, Instagram etc.

Passive Digital Footprint is created when information is collected from a user without their knowledge. E.g. website that installs cookies without user's permission.

CASE STUDY BASED QUESTIONS

1. After practicals, Harish left the computer laboratory but forgot to sign off from his email account. Later, his classmate Ankit started using the same computer. He is now logged in as Harish. He sends inflammatory email messages to a few of his classmates using Harish's email account. Ankit's activity is an example of which of the following cybercrime?

- a) Hacking b) Identity theft c) Cyber bullying d) Plagiarism

2. Ankita found a crumpled paper under her desk. She picked it up and opened it. It contained some text which was struck off thrice. But she could still figure out easily that the struck off text was the email ID and password of Manoj, her classmate. What is ethically correct for Ankita to do?

- a) Inform Manoj so that he may change his password.
b) Give the password of Manoj's email ID to all other classmates.
c) Use Manoj's password to access his account.

3. Deepika is down with fever. So, she decided not to go to school tomorrow. Next day, in the evening she called up her classmate, Tanuja and enquired about the computer class. She also requested her to explain the concept. Tanuja said, "Mam taught us how to use lists in python". Further, he generously said, "Give me some time, I will email you the material which will help you to understand tuples in python". Tanuja quickly downloaded a 2-minute clip from the Internet explaining the concept of lists in python. Using video editor, she added the text "Prepared by Tanuja" in the downloaded video clip. Then, she emailed the modified video clip to Deepika. This act of Tanuja is an example of —

- a) Fair use b) Hacking c) Copyright infringement d) Cyber crime

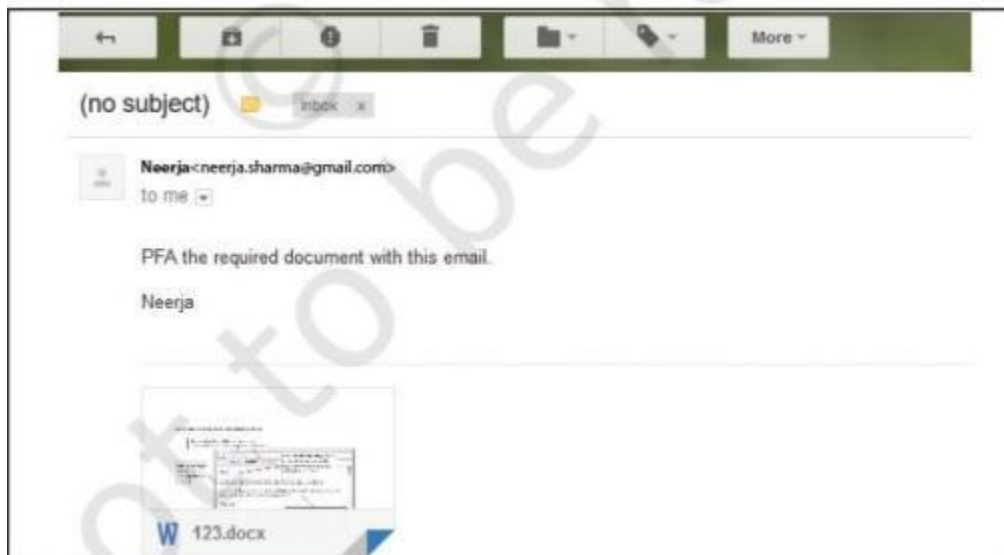
4. After a fight with your friend, you did the following activities. Which of these activities is not an example of cyber bullying?

- a) You sent an email to your friend with a message saying that "I am sorry".
b) You sent a threatening message to your friend saying "Do not try to call or talk to me".
c) You created an embarrassing picture of your friend and uploaded on your account on a social networking site.

5. Hritik has to prepare a project on "Digital India Initiatives". He decides to get information from the Internet. He downloads three web pages (webpage 1, webpage 2, webpage 3) containing information on Digital India Initiatives. Which of the following steps taken by Hritik is an example of plagiarism or copyright infringement?

- a) He read a paragraph on "Digital India Initiatives" from webpage 1 and rephrased it in his own words. He finally pasted the rephrased paragraph in his project.
b) He downloaded three images of "Digital India Initiatives" from webpage 2. He made a collage for his project using these images.
c) He downloaded "Digital India Initiative" icon from web page 3 and pasted it on the front page of his project report.

6. Neerja is a student of Class XI. She has opted for Computer Science. Neerja prepared the project assigned to her. She mailed it to her teacher. The snapshot of that email is shown below.



Find out which of the following email etiquette are missing in it.

- a) Subject of the mail
- b) Formal greeting
- c) Self-explanatory terms
- d) Identity of the sender
- e) Regards

ANSWERS

| | |
|---|---|
| 1 | b |
| 2 | a |
| 3 | c |
| 4 | a |
| 5 | b |
| 6 | a |

LINK OF CBSE QUESTION BANK AND SAMPLE PAPERS

| | | |
|----|------------------|---|
| 1 | QUESTION BANK | https://cbseacademic.nic.in/web_material/QuestionBank/ClassXII/InformaticsPracticesXII.pdf |
| 2 | 2021-22 TERM2 QP | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2021_22/InformaticsPractices-SQP_Term2.pdf |
| 3 | 2021-22 TERM2 MS | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2021_22/InformaticsPractices-MS_Term2.pdf |
| 4 | 2022-23 QP | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2022_23/InformaticsPractices-SQP.pdf |
| 5 | 2022-23 MS | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2022_23/InformaticsPractices-MS.pdf |
| 6 | 2023-24 QP | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2023_24/InformaticsPractices-SQP.pdf |
| 7 | 2023-24 MS | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2023_24/InformaticsPractices-MS.pdf |
| 8 | 2024-25 QP | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2024_25/InformaticsPractices-SQP.pdf |
| 9 | 2024-25 MS | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2024_25/InformaticsPractices-MS.pdf |
| 10 | 2025-26 SQP | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2025_26/InformaticsPractices-SQP.pdf |
| 11 | 2025-26 MS | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2025_26/InformaticsPractices-MS.pdf |
| 12 | 2026-27 SQP | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2026_27/InformaticsPractices-SQP.pdf |
| 13 | 2026-27 MS | https://cbseacademic.nic.in/web_material/SQP/ClassXII_2026_27/InformaticsPractices-MS.pdf |

ALL THE BEST